



Baseline study for the implementation of lighthouses of the Mission ‘Restore our ocean and waters by 2030’: **Atlantic, Arctic, Danube and Mediterranean lighthouses**

Final Report

Independent
Expert
Report

Baseline study for the implementation of lighthouses of the Mission ‘Restore our ocean and waters by 2030’: Atlantic, Arctic, Danube and Mediterranean lighthouses

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Baseline study for the implementation of lighthouses of the Mission ‘Restore our ocean and waters by 2030’: **Atlantic, Arctic, Danube and Mediterranean lighthouses**

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STRATEGIES
MER ET LITTORAL



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ABSTRACT

This baseline study for the Mission Restore our Ocean and Waters aims to provide a comprehensive basis for the development and piloting, and the future deployment and upscaling of three Mission lighthouses: the lighthouse in the Atlantic and Arctic Sea basin, the lighthouse in the Danube River basin, and the lighthouse in the Mediterranean Sea basin. In line with the Mission Implementation Plan, the lighthouses in the Danube River basin and the Atlantic & Arctic Sea basin both focus on Mission objective 1 - protect and restore marine and freshwater ecosystems and biodiversity; and the lighthouse in the Mediterranean Sea basin focuses on the implementation of the Mission's objective 2 - prevent and eliminate pollution. The preparation of the baseline entailed mapping the situation in the lighthouse areas in 2021-22 with respect to the Mission objectives, targets and activities. In the Atlantic/Arctic and Danube lighthouse areas, case studies of recent projects supported by the EC were prepared and indicators for assessing the protection as well as the restoration level of marine and freshwater ecosystems were defined, with key indicators proposed for each of the three targets formulated under Mission Objective 1. For the Mediterranean lighthouse area, the work included an overview of the state of pollution, the identification of pollution hotspots, a review of port waste management, and an overview of country capacities to address pollution incidents. The study proposes a draft set of indicators for measuring Mission progress towards its targets in these specific lighthouses. Moreover, the study mapped major stakeholders and networks relevant for the implementation of the Mission objectives, including a comprehensive mapping of past, ongoing and future key EU and national projects in the lighthouse areas relevant to the Mission objectives and activities. Furthermore, the study produced an analysis of the Smart Specialisation Strategies (S3s) and other regional strategies in the lighthouse, analysing their synergies with the Mission objectives and activities and providing recommendations for their alignment with the new S4+ framework for sustainable and inclusive growth linking smart specialisation and mission-oriented policy for sustainable development. In addition the study mapped current governance structures and mechanisms (incl. regional, national and macro-regional strategies and plans, and also National Recovery and Resilience Plans (RRPs) aiming to mitigate the economic and social impact of the Covid-19 pandemic) and their alignment with Mission objectives. The study furthermore investigated and mapped activities to support citizen engagement and literacy in areas relevant to the Mission objectives. In addition, for each basin, an indicator-based and descriptive overview was provided in terms of geography, demographics and socio-economic situation, information on governance and administration. On this basis, an analysis of regional disparities identified the differences in the socio-economic performance of the regions in each lighthouse area, as well as the differences in the performance and connectedness of the research and innovation (R&I) ecosystems to European counterparts. The methodology comprised a variety of methods such as desk research, data analyses using various open databases, case studies, surveys and stakeholder interviews. The study offers recommendations for future implementation of the Mission in the areas covered by the study, presented in the form of a Strategic Note. The results will feed into activities to implement the Mission, such as the Mission Implementation Platform and the Coordination and Support Actions (CSAs) in the three lighthouses.

STRATEGIC NOTE

FRA/C.2/ENV/2020/OP/0032

1. INTRODUCTION

EU Missions are a new way to bring concrete solutions to some of our greatest challenges. They have ambitious goals and will deliver concrete results by 2030. They will deliver impact by putting research and innovation into a new role, combined with new forms of governance and collaboration, as well as by engaging citizens. EU Missions are a novelty of the Horizon Europe research and innovation programme for the years 2021-2027. EU Missions are a coordinated effort by the Commission to pool the necessary resources in terms of funding programmes, policies and regulations, as well as other activities. They also aim to mobilise and activate public and private actors, such as EU Member States, regional and local authorities, research institutes, entrepreneurs and investors to create real and lasting impact. Missions will engage with citizens to boost societal uptake of new solutions and approaches. EU Missions will support Europe's transformation into a greener, healthier, more inclusive and resilient continent. They aim to bring tangible benefits to people in Europe and engage Europeans in their design, implementation and monitoring.

The objectives of the Mission ‘Restore our ocean and waters by 2030’ is to provide a systemic approach for the restoration of our oceans, seas and waters by 2030. Within this overall objective, the Mission aims at three specific interlinked and mutually supporting objectives:

- 1) Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030;
- 2) Prevent and eliminate pollution of our oceans, seas and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil;
- 3) Make the sustainable blue economy carbon-neutral and circular, in line with the European Climate Law and the holistic vision supported by the Sustainable Blue Economy Strategy.

The Mission will be implemented in two phases, a ‘development and piloting phase’ (2021-2025) and a ‘deployment and upscaling phase’ (2026-2030). In the ‘development and piloting’ phase the Mission is rolling out ‘lighthouses’ in major European sea and river basins, as the Mission sites. Lighthouses act as hubs and platforms for the development, demonstration and deployment of solutions to support the implementation of the Mission specific objectives.

In December 2021, the European Commission launched baseline studies to support the implementation of the Mission during its first phase. The purpose of two of these studies is to ascertain the status of the implementation of the Mission objectives in the areas of the four Mission lighthouses, i.e. in the Danube river basin, Atlantic and Arctic sea basin, Mediterranean sea basin and in the Baltic and North sea basin, to propose a set of indicators to monitor the future progress of the implementation of the Mission objectives in the four Mission lighthouse areas and to collect information about existing governance structures, ongoing citizen engagement initiatives and to assess the state of alignment of Smart Specialisation Strategies with the Mission objectives.

The present study focuses on the Danube river basin, Atlantic and Arctic sea basin, and the Mediterranean sea basin. The Baltic and North sea basin is covered by a separate study.

The present Strategic Note highlights the key findings, strategic outcomes and recommendations of the baseline study carried out for the Danube river basin, Atlantic and Arctic sea basin and Mediterranean sea basin over the period January to September 2022.

2. LIGHTHOUSE AREA OVERVIEW

Task 1 of this baseline study comprised a general overview of the four basins (the Atlantic, Arctic, Danube and Mediterranean) in terms of geography, demographics and socio-economic situation, information on governance and administration, regional, national and macroregional strategies and plans as well as their implementation. In addition, for each lighthouse area, an analysis of regional disparities has been performed, related to the differences in the socio-economic performance of the regions in each lighthouse area, as well as the differences in the performance and connectedness of the research and innovation (R&I) ecosystems to European counterparts.

Atlantic Basin

The Atlantic Sea basin is situated at the western edge of the European continent. To the North, it is bordered by the Arctic Sea basin and to the South and West by the Wider Atlantic. The basin itself hosts the United Kingdom and four EU Member States: Ireland, Spain, Portugal, and France¹. These States are also members of OSPAR. The OSPAR Commission is the only formal basis for inter-governmental collaborative management of the marine environment which applies to all countries in the North Sea and Celtic Sea basins covering at the same time North Atlantic and Arctic.

The Atlantic Sea basin is covered by the **Atlantic Action Plan 2.0**, which aims to promote innovation, contribute to the protection and improvement of the Atlantic's marine and coastal environment, improve connectivity and create synergies for a socially inclusive and sustainable model of regional development. Operational coordination is ensured through the **Atlantic Strategy Committee** (ASC) that acts as a decision-making (executive) body and ensures the involvement of representatives from different coastal regions.

The Atlantic basin has a larger average population density in comparison to the rest of the EU and the majority of its regions consist of an urban environment or close to a city. Economically, the Atlantic basin is a key sea basin in the European Union, representing 36 % of the EU blue economy Gross Value Added². It provides vital transportation and trade links, not only among EU Member States, but also internationally to America and Africa. It has also the highest resource potential in the EU for wind and tidal energy along the Atlantic coast³. Nevertheless, there are high socio-economic disparities across the Atlantic basin regions. 68 % of the regions are below the mean for GDP per capita, and there is a large gap from the average GDP per capita to the top level. There is a **North-South divide**, with the majority of above-average performing regions (in terms of GDP per capita, but also generally lower unemployment) being located in the UK and Ireland, while less economically well-off regions, with higher unemployment are found in the southern-based states such as Spain and Portugal.

The Atlantic basin shows high disparities within countries between top and bottom performers in terms of Government expenditure on R&D (GERD) and Human Resources in Science & Technology (HRST). However, looking at the level of the Atlantic area as a whole, **the region is well distributed in terms of R&I inputs such as GERD (but not for HRST), and the general score on the Regional Innovation Scoreboard**. In terms of outputs of knowledge production, the majority are observed in France, Ireland and the UK, while Spain and Portugal are relatively behind. However, only a third of the regions can be considered well-connected to the EU R&I ecosystem through participation in H2020 projects and through hosting EU structures.

Arctic Basin

The Arctic basin covers the northernmost part of our planet and is within the Arctic Circle. It is a vast area that borders regions in the northern parts of five Arctic Ocean coastal states: Norway, Greenland and Faroe Islands as part of Denmark, northwest Russia, and Alaska as part of the United States of America, and Northern Canada, all including indigenous peoples. Together with Finland, Iceland, and Sweden which do not have direct access to the Arctic Ocean but Arctic and subarctic territories, the eight Arctic states cooperate and coordinate via an international governance forum for the region called the Arctic Council as created by the Ottawa Declaration. The main objective of the Arctic Council is to promote environmental protection and sustainable development in the Arctic region. It has suspended its work in 2022, following Russia's invasion of Ukraine and seven member states are exploring ways of continuing their cooperation under the forum.

The Arctic states are considerably different in terms of population size, growth rates, life expectancy, and population density – especially within their respective northern regions. Common challenges caused by demographic changes include young people moving to urbanised areas for education, ageing population, depopulation, all of them leading to a decline in the labour force. The Arctic Sea basin is increasingly influenced by sea transport, the development of energy systems and the exploration and extraction of fossil energy sources, all the more while climate change induces an increase in accessible space for longer time spans, amongst other impacts. The average GDP per capita of the states bordering the Arctic basin is above the EU average. In addition, there are relatively low socio-economic disparities among the Arctic area regions (based on data related to the EU and Norwegian regions considered part of the Arctic, and Iceland).

¹ Please note at the time of finalizing this report (July 2022), the UK's participation in Horizon Europe was still under negotiation. This is why, we have included the UK as a country in the Mission lighthouse, with participating regions selected based on the coverage of the previous Interreg Atlantic Programme 2014-2020.

² European Commission (2020). Blue Economy Report: Blue sectors contribute to the recovery and pave way for EU Green Deal.

³ *ibid*

The Arctic regions are generally above EU average in terms of R&I inputs (gross expenditure in R&D) and innovation performance on the Regional Innovation Scoreboard Index. Overall, the disparities in R&I performance show a varied picture among the Arctic regions. Top performing regions are Länsi-Suomi and Pohjois- ja Itä-Suomi (Finland), and Trøndelag (Norway), while R&I disadvantaged regions are Nord-Norge (Norway), Ísland (Iceland) and Mellersta Norrland (Sweden).

Danube basin

The Danube is the second largest river basin in Europe, running through or bordering various EU countries from Central to Eastern Europe and non-EU countries: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia and Ukraine.

The Danube Basin Area is covered by the Danube Region Strategy (EUSDR), agreed by the European Commission and partner states. Another transnational body active in the Danube region is the International Commission for the Protection of the Danube River (ICPDR). It was established to implement the Danube River Protection Convention. It has 14 countries as signatories and the European Union.

Demographically, the region is home to 115 million people, with varying degrees of population growth. Average population growth in the higher income⁴ countries of the Danube region reached 3 %, while the lower income countries had a 3 % average decrease in population⁵. A large majority of regions in the Danube area are at two extremes: 54 % of the regions are less developed, and 40 % more developed (according to the EU cohesion policy categorisation), which shows the important polarisation and regional disparities in development occurring in the Danube basin. Most of the regions have lower unemployment than the Danube basin average, which is a positive sign. However, income, and risk of poverty indices have significant spread not only between non-EU and EU regions, but also between EU regions in the same country. The distance between the top performers and the next group of regions (above average performers) in terms of GDP per capita is very high (GDP per capita in Oberbayern is roughly five times as high as the top region with above average performance in the basin, Yugozapaden in Bulgaria).

The Danube region has one of the major R&D and innovation hubs in Europe, which is Munich (and surrounding areas) in Germany. German and Austrian regions are among the top performing regions in terms of R&I in the area, while more Eastern European countries spend less on R&D and show lower R&I outputs such as patents. More than a third of the regions are also less connected than the average of the basin to H2020 projects and EU R&I networks and structures.

Mediterranean basin

The Mediterranean Sea basin is a semi-enclosed sea for 19 countries, situated at the south-east of the European continent⁶. The basin itself hosts eight EU Member States, namely, Croatia, Cyprus, France, Greece, Italy, Malta, Slovenia and Spain. Additionally, the Mediterranean Sea is also a geographical border for five African countries (Algeria, Egypt, Libya, Morocco and Tunisia), Balkan countries, Albania, Montenegro and Bosnia and Herzegovina, and some other southeast countries, namely, Israel, Jordan, Lebanon, Palestine, Syria, Turkey⁷.

The policy and governmental ecosystem within the Mediterranean Sea basin is covered by several initiatives that bring together the interest of the countries which border the sea. The relevance of these initiatives within the basin is particularly important, given the tremendous environmental pressures that the basin experiences as a result of being the number one tourism destination in the world. In particular, the European Commission is engaged in three different initiatives: Union for Mediterranean action on blue economy, Western Mediterranean (WestMED) initiative and the EU strategy for the Adriatic and Ionian region (EUSAIR).

The Mediterranean basin population residing in EU countries has decreased by 0.98 % over the period between 2015 and 2020, being the only basin with a negative population change over this period. The Mediterranean basin is quite **disadvantaged in terms of socio-economic indicators** (based on data available for the Mediterranean regions within the EU and its neighbourhood). Over half of the Mediterranean countries (54 %) are below average for GDP per capita, unemployment and at-risk-of-poverty. Moreover, the average unemployment rate at Mediterranean level (12.76 %) is double the size of the EU average (6.2 %), and the at-risk-of-poverty average rate (20.4 %) is higher than the EU average (17.1 %).

⁴ Considering countries with GDP per capita PPP above 20 000 EUR: Slovenia, Czechia, Austria, Germany.

⁵ Considering countries with GDP per capita PPP below EUR 20 000.

⁶ The proposed geographical delimitation is similar to the geographical delimitation of the Interreg CBC Mediterranean Sea Basin Programme, building on existing cooperation experience.

⁷ Due to lack of data, Morocco and Montenegro have not been reported on in this study.

The basin performance is moderate for most R&I indicators with a high majority of regions falling below the mean. The only indicators that are more evenly distributed are GERD and the Regional Innovation Scoreboard index. Similar to other lighthouse areas, the region shows a pattern of concentration of R&I activities in 'R&I Hubs', as **roughly 70 % of regions are performing below average in terms of R&I networks and outputs** (with below average participation in H2020 projects, number of patents and number of publications produced). Regions and countries are lagging behind, especially those outside the EU. However, countries such as Greece, Spain and Croatia also have many disadvantaged regions, while many French and Italian regions are considered advanced in terms of R&I.

3. LIGHTHOUSE-SPECIFIC BASELINES

Task 2 involved the preparation of baseline information on the three lighthouse areas, focusing on issues related to their Mission objectives. The work included the identification of key indicators related to these objectives and an overview of recent and ongoing projects related to the Mission objectives. For the Atlantic/Arctic and Danube lighthouse areas, case studies of recent projects were prepared. For the Mediterranean lighthouse area, the work included an overview of the state of pollution, the identification of pollution hotspots, a review of port waste management, and an overview of the country capacities to address pollution incidents. For all three lighthouse areas, gaps in data, monitoring and the implementation of EU legislation were identified. On the basis of the information gathered, recommendations were developed on the possible focus of future actions and projects.

Atlantic/Arctic Lighthouse Areas

For the Atlantic and Arctic Sea basin lighthouse areas, the following three targets have been set:

- 1) Protect a minimum of 30 % of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network;
- 2) Strictly protect at least 10 % of the EU's sea area;
- 3) Contribute to relevant upcoming marine nature restoration targets including degraded seabed habitats and coastal ecosystems.

Main findings

- Key relevant actors

In both the Atlantic and Arctic, **OSPAR** is a key actor, for example in its role supporting the implementation of the Marine Strategy Framework Directive in the Atlantic and ensuring cooperation with Arctic countries. In addition, **a range of other actors** at local, regional, national and international levels play key roles. (Please see sections below for further conclusions on key actors and stakeholders in all three lighthouse areas.)

- Baseline and data gaps

The data gathered show that **EU Member States are far from achieving the two targets for marine protected areas** - the protection of a minimum of 30 % of the EU's sea area (together with the integration of ecological corridors); and the strict protection of 10 % of the EU's sea area. For the second target, moreover, a common definition of "strict protection" is needed: IUCN's protected area management categories Ia and Ib are proposed (data are available from EEA for these IUCN categories).

While EEA and other EU sources provide several key datasets for the baseline, **data are often incomplete**. This is the case, for example, for data on habitat status in existing coastal and marine Natura 2000 sites as well as data on descriptors reported under the MSFD. Consequently, it is not yet possible to quantify the distance to attain the third target, which refers to the Commission's 2022 proposal for a European Regulation on nature restoration. Further data are also needed on monitoring and management of MPAs. Moreover, data are not collected for one key element of the first target, ecological corridors.

- Projects and financing

The study developed a database of 48 relevant, EU-funded research projects and prepared six case studies of good examples of recent and ongoing projects. The case studies provide valuable examples of projects that use **interdisciplinary approaches** to address marine environmental issues. These projects have, moreover, sought to build on past research efforts. The identification of possible case studies found few examples in the Arctic, potentially due to obstacles including its remoteness and harsh conditions.

These projects worked with local authorities and citizens on knowledge and solutions but show that **ecosystem protection and restoration can be politically and socially contentious**. Indeed, the projects worked with stakeholders in favour of ecosystem protection, not those that may be opposed (for example, stakeholder groups that fear economic losses), which may lead to biased results. Moreover, the case study projects in the EU focused on Natura 2000 areas rather than undesignated marine areas.

The database of 48 projects shows that research increasingly addresses key issues such as ecosystem restoration and nature-based solutions in coastal areas; the impacts of **climate change** on coastal and marine ecosystems; and the **cumulative impacts** of pressures on these ecosystems. One gap is that **few deep-sea research projects** have been identified; moreover, the data suggest that there is little research on the restoration of degraded seabed habitats. The database shows that **systemic action is needed** for ecosystem restoration and protection, combining initiatives ranging from the reduction of pressures such as fisheries and land-based pollution to restoration actions and protected area management.

- Strategic recommendations

The European Commission should work closely with OSPAR on background data for the Mission, on coordination with Arctic countries and on coordination with other relevant national and international initiatives. In the Arctic, which is beyond the EU's territories, it will also be important to work with organisations in Europe's overseas countries and territories and in the member countries of the European Economic Area.

The existing **EUNIS habitat database** (whose data are available from EEA and EMODnet) provides a good basis for indicators that can track habitat restoration. A key task will be to improve the data available and its tracking.

As noted, the Mission could use the IUCN's protected area management categories Ia and Ib as a starting point for the definition of **strictly protected MPAs**. Projects funded under the Mission's future Work Programmes could help to review and develop this definition, for example to develop guidelines and checklists for MPA management.

The links between protected areas and ecosystem health are not fully understood. Research under the Mission could investigate **how different levels of area protection support marine ecosystem health**, both within MPAs and more broadly. In addition, further research is needed on the restoration of degraded seabed habitats.

Work under the Mission should support the development of **a common definition of ecological corridors** as well as methods to determine and assess corridors in the open ocean as well as between marine, coastal and inland areas. **Further research on ecosystem connectivity is needed** – key areas include the roles of MPAs in supporting connectivity, the appropriate spatial and temporal scales to be used, and the importance of connectivity in ecosystem protection. This work should moreover build on and strengthen knowledge both within and across regional seas.

The Mission could also support further research on **deep-sea ecosystems**, including their links to other marine ecosystems and the best approaches for MPAs to manage such ecosystems.

Based on our findings, we propose the following specific recommendations based on what the Mission can do to deploy concrete solutions:

- The Mission could **act as a catalyst for national action**. For example, by promoting the creation of a hub for MPA managers across Member States (and third countries), allowing for communication exchange and experience sharing across the Arctic and Atlantic Sea basins.
- The Mission could **promote best practices** coming from national initiatives (see the recent Irish MPA strategy for instance) and provide a platform for their communication.
- The mission could **closely interact with civil society partners**, such as NGOs specialised in protected areas (IUCN, Protected Planet).
- The Mission could ensure that Member States do not create “paper MPAs”, where ecosystems remain under significant pressure, by **promoting the design and development of MPA management plans that are realistic and scientifically sound** in targeting existing relevant drivers and pressures. Mission projects could research key issues for MPA management plans and pilot innovative approaches.

Danube Lighthouse Area

For the Danube basin lighthouse area, the following two Mission targets have been set:

- 1) Restore at least 25 000 km of free-flowing rivers in Europe;
- 2) Contribute to nature restoration targets.

Main findings

- Key relevant actors

The International Commission for the Protection of the Danube River (ICPDR) plays a key role in the Danube basin, including its coordination of national actions for the Water Framework Directive. Consequently, **ICPDR will be an important partner for Mission work** in the Danube. A range of other international organisations (including UNESCO and the World Bank) and NGOs are active in Danube projects related to Mission targets.

- Baseline and data gaps

In its work, ICPDR gathers several datasets relevant for the Mission targets on free-flowing rivers and nature restoration (these go beyond data gathered at EU level for the WFD): these are key sources for the baseline. However, **an agreed definition of free-flowing rivers has not been established** at either EU level or for the Danube basin. Moreover, Member States use their own categorisations and standards for topics, such as river morphology. As a result, data and information available may not be fully comparable.

A full definition of free-flowing rivers – and monitoring of this target – should cover not only the morphology of the rivers but also issues related to **water flows**, including the volume of abstractions, ecological flows and hydropowering.

The baseline data show that, while the Danube and its tributaries are heavily affected by artificial barriers and other alterations, the basin still includes free-flowing sections and important natural areas. Nonetheless, **data are often poor** for key fields related to the Mission, including the status of freshwater, transitional water and coastal Natura 2000 sites. Therefore, it is difficult to assess key needs and gaps in particular for Target 2, the contribution to nature restoration targets. Further data relevant for this target will be available with the preparation of **National Restoration Plans**, when the Commission's proposed Regulation on nature restoration is in force.

- Projects and financing

The study prepared a database of 41 EU-funded projects as well as case studies on five of these projects. The database and case studies show that, in recent years, projects ranging from capacity building and awareness raising to research have sought to restore natural areas and free-flowing river sections in the Danube basin. More activities and projects have been carried out, are underway or are planned in the upper Danube (i.e., in Austria and Germany) than in the lower Danube basin, which includes the Danube Delta, an area particularly rich in biodiversity. Member States and third countries in the Lower Danube have greater **financial and capacity constraints**.

One lesson from the projects reviewed is that investments in river and habitat restoration often face **unexpected costs that require additional financing**. One reason is that river and nature restoration projects are a new field of activity where learning and development is still ongoing. Another is that their implementation often requires large areas of land, which can be difficult to obtain if it is privately held.

One key area where there can be synergies is that of **natural water retention measures** (also called nature-based solutions and green infrastructure): these can restore natural areas while supporting EU policy goals in areas including flood protection and drought management.

- Strategic recommendations

The Mission should seek to **work closely with ICPDR** as a partner. ICPDR can support the Mission on data gathering and on transboundary coordination. The ICPDR could, moreover, support MS work on National Restoration Plans in the areas of freshwater habitats and the Danube Delta.

The work of the Mission should concentrate on **projects and actions in the Lower Danube**, as there are significant natural or near-natural habitats left in that region, as well as pristine areas in parts of the Balkan

region (e.g. Sava Basin, Delta Area). Moreover, countries in the Lower Danube have fewer national and regional resources to provide for such projects and actions. In addition to ICPDR and national institutions, the Mission should cooperate closely with **other international organisations and NGOs** that are active in the Lower Danube, including for project co-financing. These organisations can promote third-party projects that support the Mission targets.

One early area of action for the Mission should be support the development of **common definitions and protocols relevant** for data related to the Mission targets – and then support for stronger monitoring of river morphologies and habitat conditions. The Mission should work with ICPDR and build on the existing work to develop **a more detailed overview of river flow and nature conditions** throughout the Danube basin, including its tributaries.

Restoration projects may face **unexpected additional costs**. Financing mechanisms should be prepared for these uncertainties. To meet the goal of a project, the Mission should enable projects that fulfil the Mission's targets even if they encounter difficulties, such as the need for additional time or resources. A reporting mechanism for the projects to the Mission could track issues they encounter, including external factors (e.g., inflation and administrative difficulties) as well as project-specific ones (e.g., a need to update an outdated baseline of the project area).

The Mission should explore the potential of pilot projects for **natural water retention measures** that support both the Mission targets as well as other EU policy goals. On the basis of these pilots, the Mission could explore the benefits of these nature-based solutions in terms of climate adaptation, as well as potential trade-offs between nature restoration, other freshwater goals and sectoral activities. The results of the pilots should be evaluated to develop guidance for prompt financing of further projects.

The Mission's targets call for the restoration both of free-flowing rivers and of natural areas. The second target requires action beyond the removal of barriers: as freshwater habitats are strongly dependent on the surrounding areas outside their river channels, the Mission should investigate how national and local regulations and incentives, along with innovative technical solutions, can be put in place to **promote complex, natural vegetation close to rivers**, on the bankface and the banktop, for this “horizontal connectivity”.

Mediterranean Lighthouse Areas

The Mission has the following three targets for the Mediterranean lighthouse area:

- 1) Reduce by at least 50 % plastic litter at sea
- 2) Reduce by at least 30 % microplastics released into the environment
- 3) Reduce by at least 50 % nutrient losses, the use and risk of chemical pesticides.

As noted above, the work for the Mediterranean under Task 2 covered the state of pollution, pollution hotspots, the state of port waste management, and the identification of solutions to pollution issues.

Main findings

- Key relevant actors

Several international actors have a strong role to play in addressing pollution in the Mediterranean, including UNEP's long-standing Mediterranean Action Plan (**UNEP/MAP**) and its regional action centres (RACs), as well as the Union for the Mediterranean (**UfM**), which among its activities finances environmental projects. The global International Maritime Organization (IMO), secretariat for the International Convention for the Prevention of Pollution from Ships (MARPOL), is relevant for ship-based waste and oil spills.

- Baseline and data gaps

The review of available data on pollution identified **68 pollution hotspots** in EU Mediterranean countries. Of these, 77 % were not in compliance with two or more MSFD descriptors. These hotspots include non-compliance for descriptors on plastic litter, nutrients and chemicals: these descriptors are closely related to the Mission targets for the Mediterranean lighthouse area.

In the Mediterranean as well, there are **important data gaps**. While the MSFD descriptors cover key elements of the Mission targets, including nutrients, pollution and plastic litter, the data available vary across Member States and were last updated in 2018. Data on oil pollution entering the Mediterranean are poor.

Under the MSFD, **threshold values for good environmental status** have not been designated at EU or Mediterranean level **for several pollutants** and related descriptors. As a result, some Member States have designated national threshold values; however, this has resulted in gaps and a lack of harmonisation. Marine litter is a key example where common threshold values are not currently available.

- Projects and financing

The review identified **83 recent and ongoing projects** related to the Mission targets in the Mediterranean, including research projects, pilot implementation actions and studies. More than half of the 83 projects address marine litter, including plastic pollution. EU sources – in particular from the Horizon 2020, Interreg and LIFE programmes – provided the lion's share of funding for these projects.

- National capacities to address pollution incidents

An overview was prepared of **current capacities to address pollution incidents**: specifically, of capacities to identify and monitor oil spill incidents and industrial accidents (the latter could, in coastal locations and also inland, lead to marine pollution). The results show that EU Member States have identified national reaction agencies and taken further actions to prepare for such accidents; however, the sources available cannot assess the effectiveness of this work. It was not possible to access data gathered at EU level on waste management in ports. Nonetheless, studies estimate that the gap between waste generated by ships and waste collected in ports ranges between 7 and 34 %, indicating that further action is needed to reduce the uncertainty in this parameter and minimise uncontrolled waste disposal.

- Strategic recommendations

The Mission should ensure cooperation and coordination with key players in the Mediterranean, including UNEP/MAP and UfM.

The Mission should consider focusing work in the Mediterranean on selected **pollution hotspots**. As a high share of the projects identified currently address **marine litter and plastics**, in this area the Mission could focus on gathering their results to identify the most promising approaches and solutions for the issue.

For the Mediterranean in particular, data reported under the MSFD will be valuable for monitoring the evolution of pollution in the Mediterranean basin, including plastic waste. The Mission could support the process of **developing common threshold values for key MSFD descriptors** and improving monitoring methods and actions.

While **ship waste management** is addressed by EU legislation, the Mission could support the achievement of its objectives, which in turn will support Mission targets on plastic waste. A key possible area for Mission work would be to improve data. In this work, selected **ports and shipping companies** could be involved in Mission activities to improve ways of measuring and tracking ship waste, as well as increasing their recycled waste.

While information was sought on capacities to react to pollution incidents, little information was found. The Mission could seek to gather further information and to identify key areas where **innovative solutions** are needed. Moreover, work under the Mission could seek to strengthen data for key types of marine pollution, including oil pollution.

- Cross-cutting analysis

For the **nature restoration** targets in the Atlantic and Danube lighthouse areas, the Mission should cooperate closely with the European Environment Agency (EEA) – which will have several roles under the Commission's proposed nature restoration regulation, including supporting Member States on their nature restoration plans – and the Joint Research Centre (JRC), which will support on methodologies for monitoring and indicators.

Across the three lighthouse areas, collaboration with regional organisations (OSPAR for Atlantic/Arctic, UNEP/MAP for the Mediterranean and ICPDR in the Danube basin) will be valuable. EMODNET is a suitable information platform for data sharing in sea basins.

In addition, a broad range of EU-funded projects and national and local initiatives have been working in the areas of the Mission targets. As the Mission will seek to catalyse the work of a broad range of actors, it will be valuable to develop **detailed project and actor databases** as well as **establish forums** to exchange information on key activities and results related to the Mission targets.

Across all three lighthouse areas, many projects will need a mix of financial sources. The Mission should support the development of “**one-stop shops**” – e-government portals also called Points of Single Contact that can provide project developments with information they need and allow them to complete administrative procedures online.

The Mission targets are by design closely linked to existing EU policies and to current and proposed environmental legislation. The success of individual actions will moreover depend on the involvement of key stakeholders, including those potentially wary or opposed to the targets. Consequently, projects and actions under the Mission will need to have a **strong policy and social interface**.

A key challenge for the Mission’s long-term success will be maintaining the work and results over the long term, beyond the durations of individual projects. The Mission should investigate **innovative social and financial solutions** that can maintain actions that support its objectives beyond its current lifetime.

4. GOVERNANCE STRUCTURES AND STAKEHOLDER INVOLVEMENT – ATLANTIC, ARCTIC, DANUBE AND MEDITERRANEAN LIGHTHOUSE AREAS

The objective of Task 3 is to map the most relevant governance structures and their flagship activities, as well as to identify institutions that are most relevant for the Mission’s objectives. It is not, however, the purpose to provide an exhaustive or comprehensive list of stakeholders present in the different lighthouse areas. An overview is provided for a geographical area totalling 42 countries (including 16 EU Member States) with very different governance structures, and varying degrees of political integration. Categories of governance bodies and stakeholder clusters operating in the lighthouse areas were mapped: **governmental organisations, R&D and innovation entities, industry and business grouping and networks, NGOs and civil society organisations, philanthropic organisations and financing institutions**. Governmental institutions are described in general terms, the other sections focus on organisations/institutions of importance for the Mission’s objectives in the four basins.

Atlantic

Main findings

In the EU Mission to Restore Our Oceans and Waters, the Atlantic and Arctic areas are conceptualised as one lighthouse area titled the “Atlantic and Arctic coast”. However, in this section, the two areas are treated separately though some of the organisations identified here for the Atlantic are also relevant for the Arctic lighthouse area, which overlaps with the Atlantic Sea basin. To achieve the Mission’s objectives, we have scoped the following potential priority partners, corresponding to some of the stakeholders present in the basin⁸:

⁸ Please note that the list of potential priority partners although including key players, is non-exhaustive and many other stakeholder organisation at the country, regional and local level could have been considered.

Actor	Description	Potential Role as partner to the Mission
Atlantic Action Plan 2.0 (AAP) rotating presidency and its steering committee	The role of the AAP Assistance Mechanism (AM) is to promote the lighthouse and to develop synergies with the AAP implementation. The AAP AM can support the stakeholders in the mission's call thanks to its national hubs which are located in the 4 countries. The AAP 2.0's aims are fully integrated in the European Commission's political priorities for 2019 – 2024, notably a European Green Deal. It receives EU support for its implementation.	Political partner
Atlantic Strategy Committee (ASC)	Established platform between EC and Member States, through the Atlantic Action Plan 2.0. If the target is to effectively promote the mission objectives among the involved Member States in the Northeast Atlantic, it is an appropriate platform for engagement.	Political partner
Ifremer	Involved in research of excellence based on various disciplines and themes, relying on partnerships with universities and research organisations. It is also a driving force at the international and European levels for concerted programming initiatives, whether for research or infrastructure (fleet, observatories, databases).	Partner or leaders in projects
Irish Marine Institute	It implements the Ireland's National Marine Research & Innovation Strategy 2017-2021 (MRIS) launched by the Minister for Agriculture, Food and the Marine.	Partner or leaders in projects
AZTI Technological Expert Center on marine and food innovation	Conducts strategic applied research to generate knowledge, focused on the Basque Country economic and social development.	Partner or leaders in projects
Portuguese Institute for Sea and Atmosphere	Promotes the revision of spatial plans for MPAs, developing instruments of management for the N2000 Network, assuring the connectivity referent to migration, geographical distribution and genetic exchange of species	Partner or leaders in projects
Office français pour la biodiversité (OFB)	In charge of the protection and restoration of biodiversity in Metropolitan France and its Overseas Territories. Its dedicated roles are fully in line with the Mission.	Partner or leaders in projects
Ocean & Climate Platform (OCP)	Fosters reflection and exchanges between the scientific community, civil society and policy-makers. Its ambition is to mobilise the largest number of actors for better consideration of the scientific message on the interactions between the ocean, climate and biodiversity by policy-makers and the general public.	Partner or leaders in projects
SEO Birdlife Spain	Aims to conserve nature and biodiversity, as well as acting on topics related to water contamination, exploitation of resources and nature conservation including marine birds.	Partner or leaders in projects
Pong Pesca (Portugal)	The main objective is to create a Forum of dialogue and work between the NGOs that develop the work on the coastal and marine environment in Portugal.	Partner or leaders in projects
Pôle Mer-Bretagne Atlantique (PMBA) - France Forum Oceano – Portugal Seastainable Ventures – Spain	The engagement of the private sector is to be considered via the national clusters which can be a good catalyst for innovative project ideas contributing the next EC related calls.	Partner or leaders in projects
TotalEnergies Foundation	Sponsor activities with a special focus on young people, and priority areas of action: road safety, climate, coastal areas and oceans, youth inclusion and education, and cultural dialogue and heritage.	Financing partner
The Fondation de France	Stimulate and foster the growth of private philanthropy and private foundations in France.	Financing partner

Recommendations

The key players mapped for the Atlantic sea basin should be considered for involvement in the Mission objectives, keeping in mind that most of the actions related to the protection and restoration, in particular of marine spaces, fall within national competences at central level.

The involvement of the **marine regions (i.e., Atlantic Arc commission of the CPMR and Atlantic Cities)** is also to be considered if the objective is to engage with local authorities about their engagement with mission objectives and promote project participation and development. For activities related to protection and restoration, the involvement of **national agencies** is critical for any potential success towards implementing projects to meet the mission objectives related with increasing MPA's coverage (targets 1 and 2) and specific actions to restore and protect marine ecosystems (target 3). Specifically, agencies managing protected areas

are pivotal as they have a legitimate role for the protection but also thanks to their experience in LIFE projects (refer to Task 2) since they have the ability to coordinate and increase the chances of success with project implementation.

Beyond the specific objectives of the Mission, there is already a strong ecosystem of research and innovation in the Atlantic area which is engaged in the development of a sustainable blue economy. Their involvement could be further strengthened through dedicated existing EU initiatives such as **JPI Oceans** that could be seen as an EU wide umbrella for research.

Collaboration in projects could be considered with the engagement of active **NGOs**. All of them have already demonstrated capacities to be partner or leaders in projects, and their participation in a consortium is to be considered by the national agencies. Moreover, the engagement of the **private sector** is to be considered via the **national clusters** which can be a good catalyst for innovative project ideas contributing the next EC related calls. In addition, some synergies could be considered with **private or philanthropic organisations** which can fund or launch calls for projects related to the mission objectives.

Arctic

Main findings

There are many actors and initiatives in the Arctic lighthouse area which are active on restoration and protection, providing ample opportunities for collaboration. Even though the lighthouse area lies outside of the EU's sea area and isn't directly considered by the minimum protection targets, protection and restoration of Arctic ecosystems are urgent. In addition, also the Mission objectives to reduce pollution and make the blue economy carbon-neutral and circular are relevant to the Arctic lighthouse area, and some of the actors listed are active in these domains. We suggest the following priority partners, corresponding to some of the stakeholders present in the basin⁹:

⁹ Please note that the list of potential priority partners although including key players, is non-exhaustive and many other stakeholder organisation at the country, regional and local level could have been considered.

Actor	Description	Potential Role as partner to the Mission
Arctic Council	Most important forum for intergovernmental cooperation in the Arctic, as they take a circumpolar approach, and also directly includes key stakeholders such as Indigenous Peoples Organisations and (some) NGOs.	Decision maker, science partner, potential project leader, financing/programming partner
Barents-Euro Arctic Council (BEAC)	Supports and promotes intergovernmental co-operation and development in the Barents Region. Especially its Working Group on the Environment (WGE) is relevant to achieving Mission objectives and there is potential for collaboration between the EU Mission and BAEC to align priorities and coordinate activities.	Political partner
University of the Arctic (UArctic)	Network of universities, colleges, research institutes, and other organisations. Cooperating with UArctic as a focal point could allow a distribution channel to the network of EU universities. In the wider context of EU PolarNet, the research priorities and educational activities of the EU could continue to grow via UArctic to fulfil the Mission objectives, as well as provide the opportunity to expand access to a wide-ranging and well-established network of stakeholders in the Arctic region, also beyond the EU Member States.	Science partner
Arctic Circle	Large network for international dialogue and cooperation with members from foundations, organisations, universities, corporations, research institutions, governmental bodies and public associations. Increased collaboration could raise awareness of the Mission objectives and connect with a diverse group of stakeholders active in the basin: potential participation in the annual Arctic Circle Assembly, and in additional regional fora which could allow for a more region-specific focus and exchange.	Science partner, potential project leader
Inuit Circumpolar Council (ICC) Saami Council	Represent Indigenous Peoples of the Arctic and are also among the six Permanent Participants of the Arctic Council. Sámi The ICC and Saami Council already have direct contacts and exchanges with the EU's Arctic units. Continuing and deepening this cooperation could support building further trust with additional Indigenous institutions and initiatives, which is integral to ensure participation in Arctic protection activities in the future.	Political partner, potential project leader

Recommendations

The focus of this overview lies on transnational actors and initiatives. These offer the most potential for collaboration to implement the Mission objectives, considering that the lighthouse area does not cover the marine waters of any EU Members States, and that the conditions in the region (remoteness, limited accessibility, high costs of operations) have required transnational cooperation in the past to create a more effective governance framework in several sectors. The transnational actors and initiatives can also serve as entry-points to establish contact with relevant actors and initiatives at the national and sub-national level.

Danube

Main findings

A multitude of actors from many sectors are active in the Danube RB, aiming at the conservation of these pristine areas: major **regional and global actors** (WB, GEF, ICPDR, BSC), major **NGOs** (WWF, Birdlife International, IUCN), and many high-profile scientific institutions. Due to WFD implementation and international initiatives and agreements, restoration measures and barrier removal initiatives are being planned and implemented. Such initiatives, however, face serious economic constraints, and are not yet being implemented on the scale necessary to achieve the Mission's objectives. To achieve the Mission's objectives, we suggest the following priority partners, corresponding to some of the stakeholders present in the basin¹⁰:

¹⁰ Please note that the list of potential priority partners although including key players, is non-exhaustive and many other stakeholder organisation at the country, regional and local level could have been considered.

Actor	Description	Potential Role as partner to the Mission
Competent Authorities for WFD implementation	Authorities in charge of WFD implementation in the EU Member States are the main contact points for the Mission with regard to any issues touching on the WFD's central objectives. Currently not all Danube countries are EU MS and therefore not legally obliged to fulfil the WFD requirements. However, when the WFD was adopted in 2000, all countries cooperating under the DRPC decided to make all efforts to implement the Directive throughout the whole basin.	Decision makers
EUSDR National Coordinators (NCs)	NCs are the focal point for EUSDR implementation on the national level. They are the core strategic decision-makers within the governance structure of the EUSDR, and hence of fundamental importance for implementing the biodiversity elements of the Strategy (PA 06) and the Mission's objectives. NCs encourage mutual exchange with relevant programmes/financial instruments, aiming at better alignment of policies, resources and funding a national and macro-regional level.	Political partners, often double function as decision makers
International Commission for the Protection of the Danube River (ICPDR) and the Black Sea Commission (BSC)	Involved in a high number of project-based and supporting activities. Regarding transboundary restoration and conservation schemes and projects, there is "no way around" these organisations, as they hold crucial knowledge and are vital networking hubs, connecting national state actors, NGOs and the scientific community.	Political partners
Lower Danube Green Corridor Agreement	It is the most ambitious wetland protection and restoration initiative in Europe, between Bulgaria, Moldova, Romania, and Ukraine. Each country prepared an action plan in which additional areas of floodplain were designated for protection and restoration.	Decision makers
International Association for Danube Research (IAD)	Goal of promoting and coordinating activities in the fields of limnology, water management, water protection and sustainable development in the Danube River basin. Based on the Danube river basin management plan provided by the ICPDR, IAD established to be a strong science-based partner in different critical issues at river basin scale.	Science partner
World Wildlife Fund for Nature (WWF)	Central and Eastern European branch (WWF CEE) is very present in many restoration and conservation projects in the Danube RB. It is considered by us to be the most effective and impactful environmental NGO in the area.	Funding partner, potential project leader
Rewilding Europe	Environmental NGO promoting "rewilding" as a progressive approach to conservation. One of the 9 rewilding areas of the organisation is the Danube Delta.	Potential project leader
European Investment Bank (EIB)	While the large majority of projects financed by the EIB are in the EU, the EIB has been active outside the EU for more than 50 years and is firmly committed to supporting EU development policies in non-EU countries.	Financing/programming partner
Global Environment Facility (GEF)	GEF can serve as a source of funding for the Mission, and as a "cornerstone" of cooperation which it has been in the GEF "Strategic Partnership on the Black Sea and Danube Basin", an initiative aimed to address the root causes of environmental degradation in this region and promote investments and capacity building to return the Black Sea/Danube Basin environment to its 1960s condition. As it was finalised in 2006, a similar partnership could be initiated by the Mission, covering restoration and conservation objectives instead of nutrient pollution.	Financing/programming partner
World Bank (WB)	For the Mission, the WB can act as an important source of funding – via individual Country Partnership Frameworks, coordinated with the EUSDR – in a partnership with other international donors. The WB should be involved in the Mission, to avoid contrasting policies to affect the region's rich biodiversity and the Mission's objectives, as it is an important sponsor of hydropower projects and advocate for agricultural intensification.	Financing/programming partner
Coca-Cola Foundation	The Coca-Cola Foundation funds nature protection projects in the Danube RB, as strategic partner to the ICPDR. For the Mission, the considerable funds of the Foundation could be harnessed to facilitate high profile restoration and conservation efforts.	Financing partner

Recommendations

The restoration of free-flowing rivers is important, but the conservation of existing pristine highly valuable areas needs to be treated as an equal priority. This includes the prevention of new hydropower developments, to not make the same mistakes as previously (e.g., in the Mura-Drava area, the “Amazon of Europe”).

The focus should be on the lower parts of the Danube (e.g., the Danube Delta region) for restoration and conservation projects, as well as including highly valuable areas in Danube tributaries, especially in the Balkans (e.g., Mura-Drava).

Mediterranean

Main findings

Although marked by major differences between the Southern, Eastern and Western shores, the Mediterranean Basin is rich in governance organisations and structures. The regional cooperation features strongly the European Union, the Union for the Mediterranean (UfM), an intergovernmental Euro-Mediterranean organisation, and the Barcelona Convention with the objective of protecting the Mediterranean marine and coastal environment while achieving sustainable development. Though several governance bodies have been operating over recent decades in the region, the Mediterranean governance appears to be the less integrated of the three lighthouse areas covered by this project. We then suggest the following priority partners, corresponding to some of the stakeholders present in the basin¹¹:

¹¹ Please note that the list of potential priority partners although including key players, is non-exhaustive and many other stakeholder organisation at the country, regional and local level could have been considered.

Actor	Description	Potential Role as partner to the Mission
UNEP/MAP	Promotes and facilitates the implementation of the Barcelona Convention and its protocols, as well as ensures that the MAP system operates correctly. The MAP also operates through seven regional specialised activity centres (RAC) located around the basin.	Political partner, and Decision makers
Union for the Mediterranean (UfM)	Promotes integration among Northern, Southern and Eastern Mediterranean actors. In particular through regional cooperation to protect the sea basin by contributing to depollution and pollution prevention actions, as well as supporting green and blue economy models.	Political partner, and Decision makers
WestMED Initiative	Sets a roadmap for the development of a sustainable blue economy in the Western Mediterranean, resulting from the “5+5 Dialogue”. The improvement of the maritime governance is among its main objectives.	Political partner
IUCN Centre for Mediterranean Cooperation (IUCN-MED)	Regional operational centre of the IUCN in the Mediterranean Sea basin. IUCN-MED has a topic and regional focus by mainstreaming biodiversity conservation into agricultural and fishing practices, and also tourism planning through the development of evidence-based content for decision-making in the region. It has a particular regional focus in North African countries.	Potential project leader
WWF Mediterranean Marine Initiative	Works towards the protection of the basin by bringing together WWF offices from across the region (North Africa, Adria, EPO, France, Greece, Italy, Spain, and Turkey) with a network of partners including NGOs (i.e., MedPan, Tethys, etc.), international organisations (i.e., UNEP/MAP, IUCN, GFCM, etc.) and corporate partners (i.e., ImpactHub, Unicredit, etc.).	Financing/programming partner, and Potential project leader
PRIMA Foundation	Ten-year initiative to improve water availability and sustainable agriculture production. PRIMA cooperates closely with the UfM's activities as well with its relevant Ministerial Conferences statements. It develops projects related to chemical and nutrient pollution in groundwater and surface water through the treatment of wastewater from agricultural in the basin.	Science partner
Prince Albert II of Monaco Foundation	Although the Foundation conducts its work at a global scale, there is a specific mission targeting the Mediterranean basin. It has participated in the development of several relevant initiatives related to the governance of the sea such as The MedFund, Beyond Plastics Med, and Because the Ocean.	Financing/programming partner, and Potential project leader
European Investment Bank (EIB)	Besides EU countries in the sea basin, the EIB also supports the development of non-EU countries. The advisory facility MED 5P was created to support Public-Private Partnership Project Preparation in the Southern and Eastern Mediterranean for infrastructure projects.	Financing/programming partner
Global Environment Facility (GEF)	Within the basin, the Mediterranean Sea Programme (MedProgramme) is of particular interest to enhance environmental security with a budget allocation of US\$43 million.	Financing/programming partner, and Potential project leader
World Bank	Even though the WB does not count as a regional facility in the Mediterranean, it actively supports the development of countries in the Middle East and North Africa (MENA) region.	Financing/programming partner

Recommendations

The integration of governance bodies would benefit from being strengthened to bring more consistency into regional activity and efficiently mobilise it in order to achieve sea and water quality targets. The implementation of legislation, regulations, and policies at various levels, involving all relevant stakeholders, is key to improving the governance in the region, which could be considered along several lines.

Integration of regional governance, establishing stronger links between all relevant regional frameworks, particularly the UNEP/MAP, UfM and EU by supporting common strategies and coordinated action plans including marine spatial plans at a macro-regional scale involving several territories. This should be in line with the trend observed at the overall level to shift from fragmented governance of maritime and marine affairs towards more integrated and coherent governance, fully considering protection of the marine environment as a primary policy objective.

Development of further international cooperation on marine issues in the region relying on major organisations already present in the basin, such as the European Union, UN agencies (i.e., UNEP, UNEP/MAP), UfM, the World Bank, among others.

An interface between science and policy could be established to reach effective governance, and bridge scientific gaps that prevent pollution programmes (monitoring, removal, etc.) at regional and national levels.

Increasing financing by including diversified funding tools (i.e., traditional, innovative, national, international) from both public and private sources (i.e., philanthropy, development banks, international funds, businesses, etc.) should be considered.

Challenges such as pollution could be tackled with a combination of political, regulatory, and economic instruments.

Establishment of dialogue between public and private actors to mainstream best practices and sustainability principles into their strategies to tackle challenges on marine and maritime issues.

Cross cutting analysis / recommendations

The Atlantic, Arctic and Mediterranean sea, and the Danube river basins are severely impacted by climate change and ecosystem degradation, underlining the importance of achieving the Mission objectives to i) protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030; and ii) prevent and eliminate pollution of our oceans, seas and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil. The governance and stakeholder involvement structures presented play a transversal role in achieving the Mission Objectives 1 and 2 in the corresponding sea and river basins.

It is important to highlight that the Mission should involve diverse types of stakeholders to achieve the targets since they play a specific role in achieving the objective. For instance, international governmental institutions will provide political partnerships and serve as entry points to the countries that make up the basin. Also, NGOs will provide a leading role when implementing the activities set up to achieve the targets. Moreover, financial institutions as well as philanthropic organisations will ensure the financing and programming of the activities that are needed to secure the long-term sustainability of the results.

A number of governance bodies have been operating over the last decades in the basins, in a number of areas including the environment, pollution control and the protection of sea ecosystems and habitats. However, the level of governance integration appears to differ from one lighthouse to another covered by this project.

5. ANALYSIS OF CITIZEN ENGAGEMENT AND OCEAN/WATER LITERACY ACTIVITIES – ATLANTIC/ARCTIC, MEDITERRANEAN AND DANUBE LIGHTHOUSE AREAS

Atlantic

Main findings

Backgrounds and traditions in public participation and citizen involvement differ in the EU countries of the Atlantic Sea basin lighthouse (IE, FR, PT, FR). Some citizens' assemblies have been in place, but the majority address social issues and policy fields other than the environment (e.g. gender equality, constitutional issues, health). Countries in the lighthouse have some experience with citizens' assemblies on environmental topics, in particular on climate action issues (France, Spain and Ireland). There is also a citizens' assembly on biodiversity in Ireland.

In addition to activities of international scope, the **majority** of citizen engagement and ocean literacy activities relevant to marine protection and restoration were identified in **Ireland, France and Portugal**. A smaller number of activities were identified in **Spain** with some Atlantic regions, in particular Galicia and the Canary Islands, being more active than others. Most of the activities are coordinated by academia, research organisations, NGOs and foundations, and in some cases by government institutions.

Citizen science on coastal and marine ecosystems is particularly well developed in Ireland and France, complemented with a number of citizen science projects of international scope. Ocean **literacy networks, education and training programmes** with a focus on the Atlantic Ocean include activities of international scope (mainly driven by the All-Atlantic Ocean Research Alliance and the European Ocean Coalition) and of national scope. Impactful ocean literacy and education programmes were identified in Ireland, France and Portugal.

The mapping also identified some more innovative forms of citizen engagement and literacy such as a prize for **artistic films on the ocean** for school groups in Portugal, as well as **ocean festivals** in Spain (Galicia) and Ireland with focus on raising citizen awareness of the importance of the Atlantic Ocean.

Recommendations

Recommendation 1. Future cooperation of the Mission on citizen engagement and ocean literacy should **focus on existing and well-functioning activities at national level**, as international citizen engagement and ocean literacy initiatives for the Atlantic are already linked/co-organised with/financed by the EU (e.g., through EU4Ocean). **It is important that the Mission cooperates with academia, research organisations, NGOs and foundations** that play a key role as coordinators of ocean literacy and citizen engagement activities in the Atlantic countries.

Recommendation 2. Collaborate with citizen science initiatives in Ireland which are well- developed and impactful. The Mission can make initial contact with the National Biodiversity Data Centre that runs Explore your Shore! and is very well networked with numerous marine biodiversity citizen science projects, Irish activities with volunteer citizens and educational institutions. These activities could then be replicated in other countries of the Atlantic basin, with the support of the Mission and its lighthouse. There is concrete potential for further upscaling linked to Ireland's **Draft Marine Biodiversity Citizen Science Strategy 2023–2028**, the success of which depends on securing adequate funding and support. This Strategy could be an inspiration for other countries of the Atlantic basin to launch similar initiatives.

Recommendation 3. Collaborate with well-established education programmes and citizen science in France, in particular the teacher training programme of the Tara Ocean Foundation, which aims to strengthen ocean literacy in both sea basins of France (Atlantic and Mediterranean), the educational programme *Merci la Mer* (organised by *Fondation de la Mer*, National Ministry of Education and Youth, and the *Centre d'Etudes Stratégiques de la Mer*), and the citizen science BioLit Coastline Monitors (*Muséum National d'Histoire Naturelle* and *Université de Rennes*).

Recommendation 4. In Portugal, the Mission should cooperate with the successful and impactful **national programme on ocean literacy Escola Azul**. Collaboration can also be explored with the ocean literacy pillar of the Ocean Azul Foundation, which works with the Ministry of Education to improve school curricula on ocean protection.

Other types of citizen engagement activities, such as citizen science specifically targeting the ocean and coastal areas, seem to be less well-developed. A possible focus of the Mission could be to encourage research organisations in Portugal that already run activities on invasive alien species and broad biodiversity to develop citizen science for ocean and coastal issues, and possibly learn from exchanges with similar initiatives in Ireland and France.

Recommendation 5. The Mission could place particular emphasis on **strengthening citizen engagement and Atlantic Ocean literacy activities in Spain**. The Mission could begin cooperation with existing and well-developed activities in the regions that have been most active so far, in particular **Galicia and the Canary Islands**. The successful Mar de Mares ocean festival in Galicia could be an innovative entry point for the Mission lighthouse to have an inspiring presence and engage the broader public. There is also scale-up potential, as the festival's future plans include organising other activities throughout the year, including in other cities, rural areas and especially inland areas. Spain could benefit from bilateral collaboration with neighbouring Atlantic regions in Portugal and France on educational programmes in ocean literacy.

Arctic

Main findings

At regional level, the Arctic Council acts as the principal body for formalised citizen engagement and public participation in decision-making. An important focus of the Arctic Council is fostering the active participation of the Indigenous peoples living in the Arctic region. In the context of marine activities, engagement of Indigenous peoples is led by the Protection of the Arctic Marine Environment (PAME) Working Group, the focal point of the Arctic Council's activities on the protection and sustainable use of the Arctic marine environment.

Citizen engagement and public participation is further fostered at national and local level for each of the countries in the Arctic lighthouse. Activities, means and processes vary between countries, depending on their history and political system and is relatively restricted given the sparse population unevenly distributed along the coastline of the Arctic basin. Recent studies assessing local participation in Marine Protected Area (MPA) governance in Norway appear to be lacking. In Iceland, despite positive trends in citizen engagement

and participation since the 2008 financial crisis and the subsequent 2010-2013 constitutional reform period, organised civic participation remains relatively new, being seen largely in neighbourhood councils, school boards and youth councils, and mostly organised top-down.

The most prevalent category among the mapped activities is **citizen science as well as other forms of citizen involvement, while educational activities above local level were noticeably lacking**. Concerning the geographical scope of activities, **the regional level (focusing on the broadly defined Arctic region) remains underrepresented**, although it is at times implicitly nested within activities with an international scope. This comparative lack of regional-level initiatives may be driven by a preference - among governments in particular - for initiatives of national scope associated with national policy objectives and of international scope (e.g., conferences).

Norway is most advanced in the implementation of citizen engagement and ocean literacy activities, with activities ranging from the national – and even local – to the international level. This may be due to the **significant financial resources allocated to ocean-related activities**, as the Norwegian government has a focused on the ocean – for both conservation and exploitation purposes – under the mandate of Prime Minister Erna Solberg.

Recommendations

Recommendation 1. A number of relevant citizen engagement and/or ocean/water literacy activities are already implemented across the Arctic lighthouse by different institutions/organisations. The Mission Secretariat could **build on these activities and foster synergies** with possible future initiatives in relevant topics. In addition, the Mission Secretariat could consider **funding and supporting the development of educational/training activities**, which were found to be comparatively less represented in the Arctic area.

Recommendation 2. In comparison to national funding streams, the overall share of EU funding for citizen engagement and/or ocean and water literacy activities was limited. The Mission Secretariat could consider **increasing the share of EU funding supporting the development of these activities**.

Recommendation 3. International regional bodies are important institutions for fostering citizen engagement and/or ocean/water literacy above national level. The Mission Secretariat could **explore possible collaboration avenues with the Arctic Council**, as the main intergovernmental body in the Arctic region, **and other relevant regional bodies** (of pan-Arctic scope).

Recommendation 4. Most of the mapped citizen engagement and ocean literacy activities with a national scope are implemented in Norway. Norway is thus an important partner in developing and expanding citizen engagement and ocean literacy activities in the Arctic lighthouse, not least given its EEA membership and full involvement in Horizon Europa. The Mission Secretariat could **prioritise collaborations with activities already implemented in Norway**, engaging with the relevant institutions/organisations/networks implementing and/or funding these activities, including universities, other research actors, NGOs.

Recommendation 5. Support the development and implementation of activities that duly recognise and include Indigenous peoples and their knowledge: Indigenous peoples are integral to Arctic social-ecological systems. Their culture, histories, and practices should be duly recognised, and their knowledge included in future citizen engagement activities through the Mission in the Arctic area. With the aim of fostering the active participation of Indigenous peoples and their representatives, the Mission Secretariat could consider engaging with the relevant NGOs (e.g. Saami Council) and Working Groups under the Arctic Council (e.g. the Sustainable Development Working Group).

Mediterranean

Main findings

The Mediterranean Sea is a **very diverse basin and thus entails several challenges** for the promotion of ocean literacy on pollution. A **widespread increase in ocean literacy** in the Mediterranean basin **is required**, from education and school curricula to decision-makers and the public at large. The diversity of the Mediterranean Sea and the resulting ocean literacy challenges was partly addressed in recent decades through setting up different organisations and structures from the supra-national to regional levels.

The mapping exercise in the Baseline Study revealed several **training and education activities**, as well as **citizen science initiatives**. The vast majority focus on the issue of plastic pollution at sea and on the coastline. However, inland pollution from other sources (e.g. chemical, nutrients) was not a topic for ocean literacy activities or citizen engagement. **Most of the activities have an international scope**, even though they do not cover the entire basin. Some include solely EU countries, while others are working on collaboration between southern and northern Mediterranean countries.

European Blue Schools are already established in some countries of the Mediterranean basin (Spain, France, Italy, Slovenia, Greece, Croatia, Cyprus and Turkey). There is an opportunity to continue increasing ocean literacy at school level in the sea basin by strengthening and expanding this network in other regions of the Mediterranean.

The European Marine Science Educators Association (EMSEA) formed the Med-Working Group and launched the **Mediterranean Sea Literacy (MSL) guide**, comprising seven principles and 43 concepts. This region-specific framework **takes into account the social and cultural specificities** of the 21 Mediterranean countries. It aims to boost ocean literacy and citizen engagement through a network of educators (formal and non-formal) and scientists, targeting a wider audience including policymakers and the general public.

Finally, citizen assemblies related to climate change were found at the national level in France and Spain. Further, in the Mediterranean basin, the **Mediterranean Citizens' Assembly Foundation (MCAF)** was created in 2008 and has been promoting and sponsoring beach clean-ups since 2017 and involving young participants from nine countries.

Recommendations

Recommendation 1. **EMSEA** targets literacy in the Mediterranean and produced the MSL guide to the protection of the basin. It could therefore be an interesting entry point for development and participation in ocean literacy activities already being conducted.

Recommendation 2. **Build on existing activities conducted by larger organisations** already rooted in the Mediterranean basin. The Mission could benefit from synergies with organisations that worked on ocean literacy and citizen engagement for decades. Noteworthy entry points are the **MEDIES initiative (from MIO-ECSDE)** or the Ocean Initiatives, which have been active in the region for more than 20 years, promoting awareness and sustainability.

Recommendation 3. **Capitalise on the work developed by ongoing or completed projects that included awareness-raising** work packages, even if the main objective of the project is not within the scope of expanding ocean literacy in the Mediterranean. Several Interreg projects involving Member States and third countries are developing actions relevant to plastic pollution. For example, Plastic Busters CAP and MENAWARA both show the importance of linking the Mission to training activities that are included within funding instruments such as Interreg. Moreover, the Interreg Euro-Med Academy is an example of collaboration between thematic communities of different Interreg projects that bring together the experiences in capacity building.

Recommendation 4. Academia could play an important role in mainstreaming ocean literacy. Hence, it could be of interest for the Mission to **increase cooperation and support the work conducted by academic institutions** to reach a wider audience and develop programmes tailored to tackle the plastic pollution issue in the Mediterranean. For instance, the Interdisciplinary graduate school for the blue planet (ISblue) is the result of joining forces of universities and research institutions with the objective of training ocean innovators and science leaders in blue economy topics.

Recommendation 5. Language differences remain one of the main barriers within the basin for ensuring ocean literacy becomes widespread and mainstream. **Producing information in different languages** is essential to reach wider audiences, especially when targeting the general public and citizens in general.

Danube

Main findings

Citizen engagement and water literacy activities are widespread in the Danube basin, but do not cover all regions and topics equally. Generally, there has been an increase in activities and numbers of projects over the past 10 years and the scope of projects has broadened. The presence of the International Commission for the Protection of the Danube River (ICPDR), with its initiatives and coordinated efforts with partner organisations, has raised awareness and contributed to water literacy among different target groups. There is also a range of projects that are transboundary in nature to better coordinate knowledge and actions across the basin. This is especially important in light of the wide cultural diversity in language, political history and perceptions/management of the Danube.

The past decade has seen **progress** in citizen engagement for the protection of the Danube (across ministries, sectors and countries), aided by research and projects. This success can also be linked to the **various initiatives on the ground that increase awareness** among citizens, train utility staff, and educate the public about the value of the Danube River basin. **Different networks were formed** to collaborate on a

professional level, as well as to celebrate the natural and recreational functions of the Danube. Activities on citizen engagement and water and ocean literacy have established **many different formats and content**. However, the Danube lighthouse area shows **a gap in the use of citizen science**. The citizen science projects identified are very local and do not have sufficient scale to support the Mission lighthouse targets.

To accommodate **different traditions and backgrounds** within the Danube lighthouse, the **initiatives, projects and programmes in place address the challenges** (e.g., selecting neutral spaces for workshops when participants with different political views must participate), but also **seize the opportunity this presents** (e.g. enabling stakeholders to transfer their knowledge and experience in transboundary projects).

Citizen activities in the Danube lighthouse **rely primarily on public funds**. However, in the implementation phase and for smaller, local projects, the budgets of beneficiaries are also used to finance the activities. It is difficult to distinguish funding specifically for water literacy in projects where literacy is a side component of other, more technical activities. **Some of the projects struggle with different frameworks in the countries in which they operate** (e.g., Ukraine as a non-EU country until February 2022 was not eligible for EU funds, but also had more freedom for restoration because CAP framework does not apply in the area), while others struggle with governments' reluctance to co-finance non-priority activities.

Recommendations

Recommendation 1. The Mission Secretariat should **build on and expand existing activities** in place for different target groups. For example, technical knowledge and training for water suppliers and wastewater treatment has been facilitated by the Danube Water Programme, which formed a network of companies and government actors over the past nine years, with the aim of continuing after project funding ends. Similarly, the Water Innovation Danube + project enables young people to create their own innovative projects on Danube topics, while various projects initiated by the ICPDR (e.g., the Danube Art Master, organised by GWP EEC) encourage young people to get active in Danube protection projects. While some projects plan to continue at their current scope (e.g., Danube Water Partnership), others have ambitions to increase their scope (e.g. Danube Innovation Lab+).

Recommendation 2. Ways of delivering **water and ocean literacy and knowledge to rural settings should be developed**. Currently, water literacy and its delivery are very much focused on the urban sphere and the projects struggle to find mechanisms (outside of schools) to reach the rural population. An increase of online formats since the COVID-19 pandemic presents an opportunity (where suitable) to deliver **more online courses and training**. The e-learning component facilitates reaching the rural population and can save costs (according to some project leaders). **Social media could be extended** across existing and future projects. It could play a bigger role in sharing information and engaging citizens in water literacy in rural and urban settings and across countries.

Recommendation 3. Integration of source-to-sea approaches and across countries: Future literacy projects should emphasise the linkage between the Danube, its tributaries and the Black Sea to a broader extent. Upper Danube citizens, in particular, and all target groups generally, need to understand this link better. Engagement can take place through source-to-sea approaches and by facilitating a more holistic understanding of the Danube-Black Sea relationship, including literacy projects on its tributaries.

Transboundary projects should be encouraged, given the transboundary nature of the river and the increased chance for cooperation. Initiatives by the ICPCR, as well as individual actions by Rivers of Europe (RIVE) or Rewilding Danube Delta, are good examples of existing transboundary initiatives that could be replicated.

Recommendation 4. Exploring funding schemes together: Secure funding through grants properly enables innovation and enables people to build projects for the longer term, improving maintenance, sustainability and networking. Interviewees repeatedly noted that this also holds when project participants receive a small grant to continue or implement their project (e.g., Water Innovation Danube+). The need for funding, paired with a need for good overview and monitoring for successful project implementation (GWP CEE), makes funding schemes such as the one-stop-shop principle¹² a good mechanism for all partners involved.

Recommendation 5. Being aware of countries' frameworks: Not all countries in the Danube basin are EU Member States. There is a need to address country differences in terms of culture and politics (e.g., finding neutral spaces to deliver training for people with different political perspectives). Other differences arise where a project has both non-EU and EU countries, particularly access to funding and CAP scheme

¹² https://vat-one-stop-shop.ec.europa.eu/index_en

presence/absence. If the differences between countries are limiting the objectives of a project, ways need to be found to overcome those differences.

6. ANALYSIS OF SMART SPECIALISATION STRATEGIES (RIS3)

The purpose of Task 4 was to provide information on the extent to which several types of strategies existing at regional level (including regional innovation strategies for smart specialisation – RIS3), national (National Recovery and Resilience Plans - RRP), and inter-regional level in the EU are in line with the objectives of the Mission ‘Restore our Ocean and Waters by 2030’ for the four lighthouses in focus of this study. In this note, we present the summary results of the task, performed from March to June 2022, based on extensive desk research, mapping of strategies, a survey with regional officials and interviews with regional stakeholders. In addition, the task mapped national and regional public sector stakeholders, who are mandated to implement the measures proposed in the strategies mapped and could be engaged by the Mission.

Potential synergies of Mission ‘Ocean and Waters’ objectives with RIS3s

The results of this mapping are not representative of the entire lighthouse areas, due to the lack of availability of updated RIS3s for the 2021-2027 period. Nevertheless, the results show that, for the 13 strategies mapped more in-depth, the Mission Objectives are relatively well covered for the Mediterranean (Mission Objective 2 – MO2), and Atlantic and Arctic Areas (Mission Objective 1 – MO1). The Danube area has the least alignment with the Mission Objectives among all lighthouse areas, especially for the field of biodiversity protection in freshwater ecosystems.

The RIS3s can be considered as a starting point for understanding the specialisation and the development trajectory envisioned by each region, and whether the region would be relevant for a) sources of innovations in support of the Mission goals, or b) becoming specific demonstration sites for achieving goals relevant to the Mission. The RIS3s can also support the Mission through channelling and legitimising investments in developing the required technologies or innovations needed for the systems transformation intended by the Mission, and leveraging other relevant sources of funds (such as regional, European Structural and Investment Funds, other national or inter-regional funds).

Another important finding was that the regional actors in charge of the RIS3 (regional development agencies, regional innovation agencies or EU funding managing authorities) generally do not have the competences to work on the same goals as the Mission. While their role is to promote research and innovation in the field, it is rather other types of public authorities at national, regional or local level, such as ministries of environment, environmental protection agencies, water or ports authorities who are mandated to work on promoting the blue economy goals (i.e., the reduction of pollution in the ocean, sea or river basins, promoting biodiversity, etc.). For this reason, the level of stakeholder engagement that the Mission needs to take may need to be more granular.

Potential synergies of RRPs with Mission ‘Ocean and Waters’ objectives

The RRPs have a rather general and sectoral focus, and generally do not focus on targeted support for deploying innovative digital or technological solutions in the sectors targeted by the Mission. The RRPs are documents that cover activities such as: improvement of framework conditions (through reforms); infrastructure investments; sectoral environmental policy measures promoting biodiversity on land (and at sea in many cases); and horizontal measures promoting digitalisation, research, and innovation. In terms of current alignment with the Mission objectives, there are discrepancies between the different lighthouse areas:

MO1 is better covered in the Atlantic and Arctic areas, with rather more partial coverage in the Danube area, where compliance measures and reforms with the EU Water Framework Directive, Floods Directive, or Biodiversity Strategy are more the focus.

MO2 (only focusing on the Mediterranean area) shows significant gaps in coverage in terms of RRP priorities. In general, there are no specific holistic measures targeting the reduction of pollution in the Mediterranean Sea through research and innovation or scaling up of innovative solutions. Italy, Malta and Cyprus have more measures focusing on greening ports, improving the energy efficiency of ports, and promoting the use of alternative fuels for ports and ships. In Greece, the RRP does not cover pollution reduction in the way that the MO2 does.

Potential support of inter-regional strategies towards Mission ‘Ocean and Waters’ objectives

The majority of the inter-regional strategies (generally covering macro-regional areas designated by the EU, or self-organised conventions or international bodies that work across similar regions as the lighthouse areas)¹³ cover measures that are very relevant to the Mission objectives. All the strategies cover objectives and/or actions that touch on issues relevant to the MSFD, and almost all cover objectives relevant to the Blue Economy, the EU2030 Biodiversity Strategy, and the EU Adaptation Strategy. At the same time, the strategies have a different intervention reasoning from the EU Mission, working more towards improving and harmonising regulations, policy, markets, and education, for the fields of environment, marine and freshwater ecosystems and habitats, biodiversity protection, maritime spatial planning etc. They also aim to create or manage relevant thematic networks of policy makers or researchers, and foster knowledge exchanges on the topics relevant to healthy oceans, seas and rivers. All of the strategies (except for the OSPAR¹⁴ 2030 strategy) also target support for developing Blue Economy sectors, such as ports and shipping, blue skills, marine renewable energy, sustainable tourism, etc.

The All-Atlantic Ocean Alliance and BlueMed initiative are particularly focused on supporting collaborative research and innovation projects, offering technology development and innovation platforms at the Atlantic area level, and are also working towards nurturing niches relevant to the Mission objectives.

Strategic recommendations and suggestions for action

Systemic change happens when the innovations that are currently considered as “niche” replace dominant practices (“regimes”), once they start opening up to new alternatives under specific pressures, trends or externalities (e.g., the pandemic or climate change) that conditions how the transformations occur¹⁵. Mission-oriented policies are meant to support system-wide transformations and require the collaboration of diverse sectors and value chains, in order to promote both the acceleration of the implementation of tested solutions to urgent problems in the short term, as well as the deployment of ambitious innovations that can disrupt and upgrade the system¹⁶. At the same time, the transformative character of the Mission means that the mission activities have to connect different worlds, in order to achieve the mission goals: i.e. connect the promoters and developers of relevant innovations, to the players who would be able to use the innovations, and have similar societal goals as the Mission.

The Mission could thus act more on expanding and mainstreaming the innovation niches, and on connecting the innovations to the actors that are the incumbents in the “regime”. For this, the Mission secretariat could act at the interface between the different parts of the system.

Below we offer suggestions on how the Mission could further intervene:

- **On building and nurturing niches:** understand how the development of disruptive technologies could be further accelerated, or how already developed initiatives could be scaled up at regional level. Based on the regional mapping performed, regions need support for the orchestration of their water-related innovation ecosystems, building on their RIS3s as starting points and legitimising tools for focusing on the waters, seas, ocean and blue economy sectors. Based on the outcomes of the interviews performed in the study, the Mission should provide more support to the regions in mobilising stakeholders towards the Mission objectives. This includes:

- creating a clearer type of partnership with the regions or the national level in relation to the Mission, through developing governance mechanisms and clearer operational guidelines.
- further promoting the Mission at the Member State and regional level, as well as providing opportunities for peer learning on how to implement Mission-relevant activities.
- ensuring direct funding for regional ecosystem orchestration and/or demonstration of Mission-relevant solutions in the regions that can support the achievement of Mission-relevant objectives.

¹³ See the Task 4 report to understand which strategies were covered by the analysis

¹⁴ Convention for the Protection of the Marine Environment of the North-East Atlantic

¹⁵ Palavicino, Matti, & Witte, 2022: MOTION Handbook. Developing a transformative theory of change, <https://www.tipconsortium.net/wp-content/uploads/2022/02/MOTION-Handbook-180222.pdf>

¹⁶ Miedzinski, Mazzucato et al., 2019: A framework for mission-oriented innovation policy roadmapping for the SDGs: The case of plastic-free oceans, Working Paper WP 2019-03, https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/a_framework_for_mission-oriented_policy_roadmapping_for_the_sdgs_final.pdf.

- **On expanding and mainstreaming niches:** the Mission could engage with the mapped actors that are part of RIS3s or coordinate the macro-regional strategies, in order to help connect the developed innovative practices and technologies to potential users (within or outside the region), many of them being public bodies in charge of water, sea, river or ocean beds. The RRPs are important sources of funding that the Mission could tap into for the mid-term term (until 2026). The institutions managing the RRP funds (who have similar goals to the Mission in different lighthouse areas) could be encouraged to investigate how to take up relevant innovations or technologies in order to tilt the system towards the desired Mission goals.
- **On opening up and unlocking regimes:** the Mission could engage with the actors coordinating the macro-regional or national sectoral policies related to environmental, water management, ports management, industrial policies, etc. – and support their learning process towards new alternative practices and technologies relevant to support progress in reaching the objectives of the Mission.

Connected strategies	Suggestions for action
RIS3s	<p>Support regions (e.g., through direct funding) for the orchestration of their water-related innovation ecosystems, building on their RIS3s</p> <p>partnerships with the regions or the national level in relation to the Mission, through developing governance mechanisms and clearer operational guidelines.</p> <p>further promote the Mission at the Member State and regional level</p> <p>provide opportunities for peer learning on how to implement Mission-relevant activities.</p> <p>support (e.g., through funding) regions in demonstration of Mission-relevant solutions in the region.</p>
RRPs and inter-regional strategies	<p>Expand and mainstream mission-relevant innovations and technologies to potential users, who are also eligible for RRPs funding, or are managing RRP funding (e.g., public bodies in charge of water, sea, river or ocean beds)</p> <p>support the actors in active inter-regional initiatives in their learning process towards new alternative practices and technologies relevant to support progress in reaching the objectives of the Mission</p>

Table 1 Potential actions suggested based on the strategies mapping

TASK 1 – DESCRIPTION OF THE LIGHTHOUSE AREAS

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1. INTRODUCTION

The objective of Baseline study for the implementation of the lighthouse in the Atlantic, Arctic, Danube and Mediterranean areas for the Mission ‘Restore our ocean and waters by 2030’, under Framework Contract N° FRA/C.2/ENV/2020/OP/0032 is to comprehensively map the situation in the lighthouse areas with regard to the Mission objectives :

- A general overview of lighthouse areas (Task 1 Mission Objective 1 (MO1): Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030 (for the Atlantic, Arctic, and Danube areas)
- Mission Objective 2 (MO2): Prevent and eliminate pollution of our ocean, seas, and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil (for the Mediterranean area).

The mapping is performed to include all relevant stakeholders, networks, governance structures and citizen engagement activities, as well as past, planned and ongoing projects, and strategies at lighthouse areas, national or regional levels. This should serve to provide a basis for the implementation of the lighthouses and to support the creation of the Implementation Charter for the lighthouse, and to establish the status in 2021 for the relevant Mission objectives, against which the success of Mission implementation will be measured (in 2025 and 2030).

This report for Task 1 comprises a general overview on the four lighthouse areas in focus of this study (the Atlantic, Arctic, Danube and Mediterranean) in terms of geography, demographics and socio-economic situation, information on governance and administration, regional, national and macroregional strategies and plans as well as their implementation. There is a dedicated chapter of this report for each of the lighthouse areas, as follows:

- Chapter 2: Arctic area
- Chapter 3: Atlantic area
- Chapter 4: Danube area
- Chapter 5: Mediterranean area

In addition, for each lighthouse area, an analysis of regional disparities has been performed, related to the differences in the socio-economic performance of the regions in each lighthouse area, as well as the differences in the performance and connectedness of the research and innovation (R&I) ecosystems to European counterparts. The methodology description is found in Appendix B.

2. ARCTIC BASIN

2.1. Geographical and natural characteristics

The Arctic covers the areas at the northernmost part of our planet. It is a vast area that includes the northern parts of **eight Arctic states**¹⁷: Finland, Sweden, Iceland, Norway including Svalbard and Jan Mayen, Greenland and Faroe Islands as part of Denmark, northwest Russia, and Alaska as part of the United States of America, and Northern Canada. Only Canada, the United States, Russia, Iceland, Norway, and Denmark via Greenland, border the Arctic Ocean. While only three of the Arctic countries are EU countries, the Arctic is still an important area for the EU, especially because of the areas' vast resource potential and the climate impact that severely affects the area as a result of global as well as European emissions¹⁸. The Arctic is especially vulnerable due to the demand of the area's resources, which includes energy resources such as gas and oil as well as mineral resources excavated through mining, such as coal, iron ore, zinc, lead, nickel, precious metals, diamonds, and gemstones¹⁹. The EU is a key market for these resources and the economic demand for oil, gas, the expansion of renewable energy, and the demand for sub-Arctic fisheries and shipping, is prominent.

¹⁷ EU Arctic policy, EEAS, https://eeas.europa.eu/headquarters/headquarters-homepage/20956/arctic-short-introduction_en_en, 20.05.2021.

¹⁸ European Commission, 2021: Overview of EU actions in the Arctic and their impact: Summary,

https://ec.europa.eu/environment/international_issues/pdf/EU-policy-Arctic-Impact-Report-Summary.pdf, June 2021.

¹⁹ Nordregio, resources in the Arctic 2019, <https://nordregio.org/maps/resources-in-the-arctic-2019/>.



Figure 1 OSPAR regions (I, II, III, IV and V)

Source : OSPAR, The North-East Atlantic, <https://www.ospar.org/convention/the-north-east-atlantic>

For the sake of this baseline study, we apply the definition of OSPAR area I, the Arctic Waters minus the Russian part, as the geographical definition of the Arctic Basin part of the Lighthouse Area Atlantic – Arctic. (Figure 1).

The **coastal area** of the Arctic is on average 331 432 km. While most of the Arctic countries are coastal, a few regions (mostly in Finland) are non-coastal. The Arctic basin has an average surface area of 612 312 km². Finland's and Sweden's average surface area is significantly higher than the other Arctic states with 230 045 km² and 240 786 km². Norway's surface area is the lowest with 38 481 km². At the national level in Iceland, Sweden, and Norway, several coastal regions have more than 50 % of the population and the surface area in mountain areas. These areas are distinguished by harsh climate conditions, albeit populated with indigenous peoples that are used to scarcity of human resources, lack of infrastructure, and an array of species.

As depicted in Figure 2, Norway has the longest **national coastline** among the depicted Nordic countries with 265 523 km. Iceland has the shortest with 8 506 km. Finland and Sweden²⁰ have similar length of their national coastlines, respectively 31 119 km and 26 384 km.

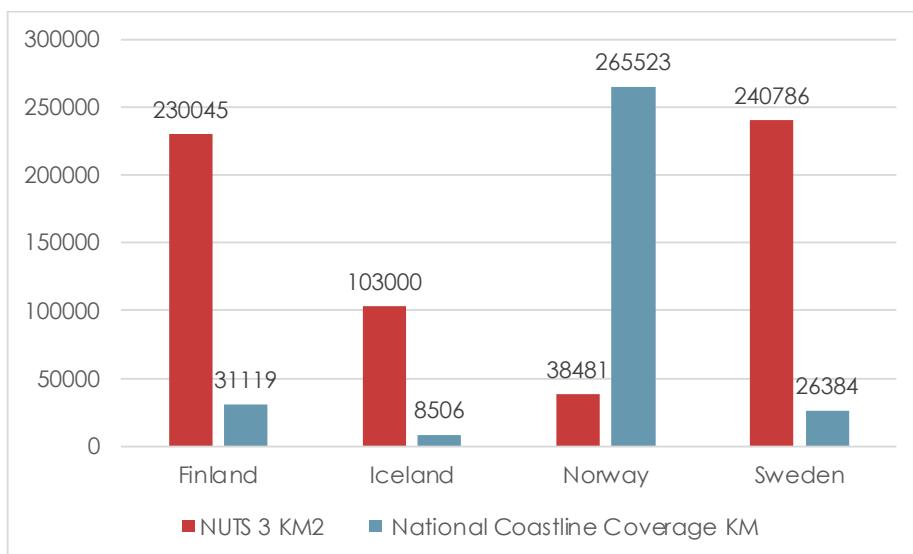


Figure 2 Total lighthouse area per country and total national coastline in Finland, Iceland, Norway, and Sweden

Source : Eurostat

²⁰ In Figure 2, due to missing data the following countries are not included: Greenland and Faroe Islands as part of Denmark, Russia and Alaska.

2.2. Policy context and governance analysis

The eight Arctic countries cooperate and coordinate via an **international governing body** for the region called the **Arctic Council**²¹ as defined by the Ottawa Declaration. The main objective of the Arctic Council is to promote environmental protection and sustainable development in the Arctic region. While the Arctic Council aims to protect the area, national jurisdiction and international law govern the Arctic basin and surrounding waters. Moreover, the Arctic Council also represents six permanent participants representing Arctic indigenous peoples and their rights :

- Aleut International Association (AIA)
- Arctic Athabaskan Council (AAC)
- Gwich'in Council International GCI)
- Inuit Circumpolar Council (ICC)
- Russian Association of Indigenous Peoples of the North (RAIPON)
- Saami Council

These participants have full consultation rights in terms of negotiations and decisions made by the Arctic council. Moreover, their contribution to activities in the areas are facilitated by the Indigenous Peoples' Secretariat. Furthermore, thirteen non-Arctic states have been approved as Observers to the Arctic Council including France, Germany, Italy, Japan, the Netherlands, China, Poland, India, Korea, Singapore, Spain, Switzerland, and the United Kingdom²².

According to the Arctic Council Strategic Plan 2021-2030²³, and the vision and goal of the countries for the next decade, the Council will be focusing on ensuring increased environmental protection through monitoring and assessing the impacts of climate change in the Arctic and continuing the awareness of the area's ecosystems and marine environment. Moreover, social and cultural inclusion of Arctic inhabitants and indigenous people is emphasised, as well as to advance the sustainable diverse economic development in the Arctic, such as information sharing on innovative and low-emission technologies.

Other main institutions and organisations that are active and have influence in the area are²⁴:

- Barents Euro-Arctic Council (BEAC)
- Nordic Council (NC)
- Northern Forum (NF)
- Northern Dimensions (ND)
- Standing Committee of Parliamentarians of the Arctic region (SCPAR)

To provide increased **administrative capacity and institutionalisation**, the Permanent Secretariat of the Arctic Council maintains continuity and effectiveness when implementing Arctic policies and initiatives. The Permanent Secretariat provides administrative and organisation support through the management of meetings, preparation of reports and archiving, as well as in terms of communication and outreach including operating the Arctic Council website, facilitating, and improving the information about the Arctic Council, facilitating the exchange of information between the Arctic states, permanent participants, and observers²⁵.

²¹ Arctic Council: <https://arctic-council.org>.

²² Non-Arctic states Observers, <https://arctic-council.org/about/observers/non-arctic-states/>, Arctic Council.

²³ Arctic Council Strategic Plan 2021-2030., <https://oaarchive.arctic-council.org/handle/11374/2601>, Arctic Council, 20 May 2021

²⁴ German Arctic Office Factsheet – Current knowledge on the theme Arctic Governance, https://www.arctic-office.de/fileadmin/user_upload/www.arctic-office.de/PDF_uploads/Fact_Sheet_Governance_Englisch.pdf

²⁵ Arctic Council Secretariat, [https://arctic-council.org/about/secretariat/#~:text=The%20Arctic%20Council%20Secretariat%20\(ACS,became%20operational%20in%20June%202013](https://arctic-council.org/about/secretariat/#~:text=The%20Arctic%20Council%20Secretariat%20(ACS,became%20operational%20in%20June%202013), Arctic Council website

In terms of **institutional capacity**, the available data from the Regional Competitiveness Index²⁶ for the regions of Länsi-Suomi (Western Finland) and Pohjois-ja Itä-Suomi (Northern and Eastern Finland) show that the regions have high regional competitiveness, scoring respectively at 88.7 and 89.14. Similarly, the regional area of Mellersta Norrland and Övre Norrland scores high with a score of 77.69 for both areas.

A cohesive approach has become an integrated focus of the strategies of the Arctic states to ensure a unified direction to address the environmental, economic, sociocultural, and geopolitical challenges in the area. The main **challenge** of the Arctic – namely to prevent that the individual interests of European and foreign states in exploring the Arctic dominate - is addressed by this common approach. While states attempt to address the melting of the Arctic sea ice and the rights of the area's inhabitants including indigenous populations, the Arctic environment also offers oil and gas reserves and natural resources which causes concerns in terms of additional human activity and the risk of competitive behaviour of states towards the existing resources.

Arctic policy and objectives, as well as national priorities, have been outlined by the Arctic states, indigenous peoples' organisations and non-Arctic states in Europe and Asia. The increased interest in Arctic issues in recent years is a result of the area's wealth in resources as well as the knock-on effects of global warming in the Arctic area. At the national level, the Arctic states have strategies that outline their objectives in the region with similar thematic areas of international collaboration, security and stability, climate and the environment, polar research, sustainable economic development, respect for the rights of indigenous peoples, and further innovation including a focus on oil and gas activities and development projects²⁷.

Besides the presence of intergovernmental institutions, a few of the regions of the Arctic basin have developed regional **Smart Specialisation Strategies** to encourage increased research and innovation in their areas. Strategies can be found in most of the Finnish regions²⁸, in Sweden²⁹ and Norway³⁰. However, it is notable that only a few of the strategies cover the upcoming period, including the following:

- Kainuu region, Finland: Kainuu RIS3 strategy revision (Kainuu RIS3, 2021-2027)
- Northern Ostrobothnia region, Finland: Pohjois – Pohjanmaa Älykkään Erikoistumisen strategia 2021 - 2024
- Jämtland Härjedalen in Jämtlands län, Sweden: Innovative - Jämtland Härjedalen 2025
- Norrbotten län and Västerbottens län, Sweden, Innovativ och hållbar utveckling av mineralsektorn i Norrbottens och Västerbottens län – 2025

2.3. Demographic background

The Arctic states are considerably different in terms of population size, growth rates, life expectancy, and population density. A few of the challenges that are caused by the demographic changes include young people moving to urbanised areas for education, ageing population, depopulation, all of them leading to a decline in the labour force. Russia, Canada, and Norway are leading a new project called the [Arctic Demography Index](#) until 2023, attempting to map and identify case examples regarding this change as well as the migration patterns of the Arctic inhabitants³¹.

The average **population** of the Arctic is 231 331 people, with the highest number of people in the region of Pirkanmaa and the lowest number of people in the region of Keski-Pohjanmaa, both in Finland (see Figure 3). As there were too many regions to be represented in Figure 3, the top six and bottom six in terms of population are depicted.

In terms of **population change**, the average population of the Arctic shows a low 0,45% increase in growth from 2015-2020, as illustrated in Figure 3. The Icelandic regions are attracting significant numbers of new citizens with an increase in population of up to 11 %. This is followed by Västerbottens län with 4 % growth in population, Jämtland län in Sweden and Pirkanmaa region in Finland with a 3 % increase each. Based on the Swedish, Icelandic and a few of the Finnish regions, all regions have experienced population growth, except the Finnish regions of Etelä-Savo (6 % decrease), Pohjois-Karjala (2 % decrease), and Keski-Pohjanmaa (1 % decrease).

²⁶ Regional Competitiveness Index, https://cohesiondata.ec.europa.eu/Other-RCI/European-Regional-Competitiveness-Index-2019-index/if3f-ywei_European_Commission - DG REGIO

²⁷ The Arctic Institute – Center for Circumpolar Security Studies, 2021, Environmental Policy Integration with the Existing Arctic Strategies (2021), <https://www.thearcticinstitute.org/environmental-policy-integration-existing-arctic-strategies/>.

²⁸ Including the regions of Central, Southern and Northern Ostrobothnia, Ostrobothnia, Central Finland, Kainuu, Keski-Pohjanmaa, Lapland, North Karelia, Pirkanmaa, Pohjois Pohjanmaa, Satakunta, Southern Savonia, Northern Savonia.

²⁹ Including the regions Västernorrlands län, Jämtlands län, and Västerbottens län.

³⁰ Only Nordland.

³¹ Arctic Demography Index – Case studies on demographic change and migration in the Arctic, <https://arctic-council.org/projects/arctic-demography-index/>, Arctic Council.

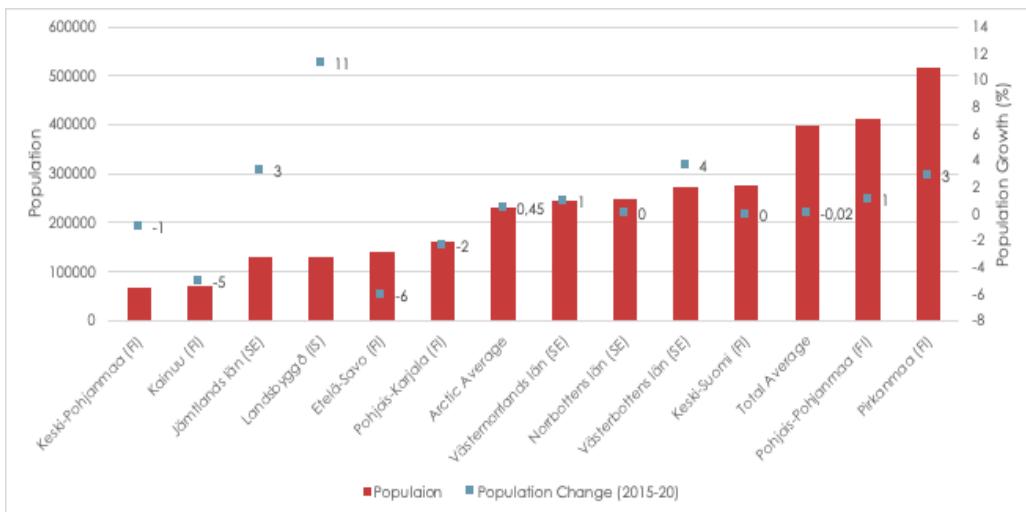


Figure 3 Top and bottom Arctic regions in terms of population size (2020) and population change (2015-2020) (NUTS3)

Source : Eurostat ; the graph only takes into account EU, Norwegian and Icelandic regions

As illustrated in Figure 4 below, the overall **population density** at the national level is estimated at an average 14 per km² and significantly lower in comparison with the EU average of 117 people per km². At country level, Sweden has the highest population density, slightly above average with 25 people per km², followed by Finland with 18 people per km², and Norway with 15 people per km². Below average, Russia has 9 people per km², and lastly, Iceland with the lowest population density of 4 people per km². Most of the population lives in permafrost settlements, although regional differences occur.

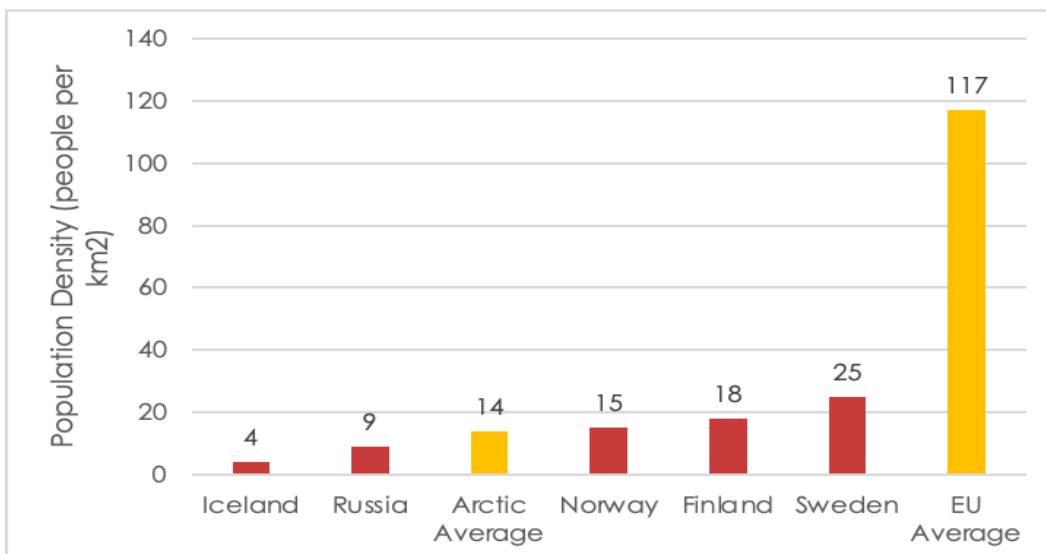


Figure 4 Population density in Arctic countries (national)

Source : Technopolis Group based on Eurostat

Compared to the other lighthouse areas, the Arctic has the highest average **life expectancy** peaking at an age of slightly above 83 years. This is higher than the EU average, which is estimated at 81.3 years. At the national level of the Arctic countries, the numbers remain high but vary little. The highest life expectancy is in Norway and Iceland with 83 years, followed by Finland and Sweden with slightly above 82 years. This is illustrated in Figure 5 below. According to the Arctic Human Development Report (2015)³², long life expectancy in the Arctic is due to increased knowledge about infectious deceases and improved sanitation, food safety, and public health. In more detail, there are also gender differences and differences between indigenous and non-indigenous populations.

³² Arctic Human Development report – Regional Processes and Global Linkages (2015), <https://www.norden.org/en/publication/arctic-human-development-report>, Norden.

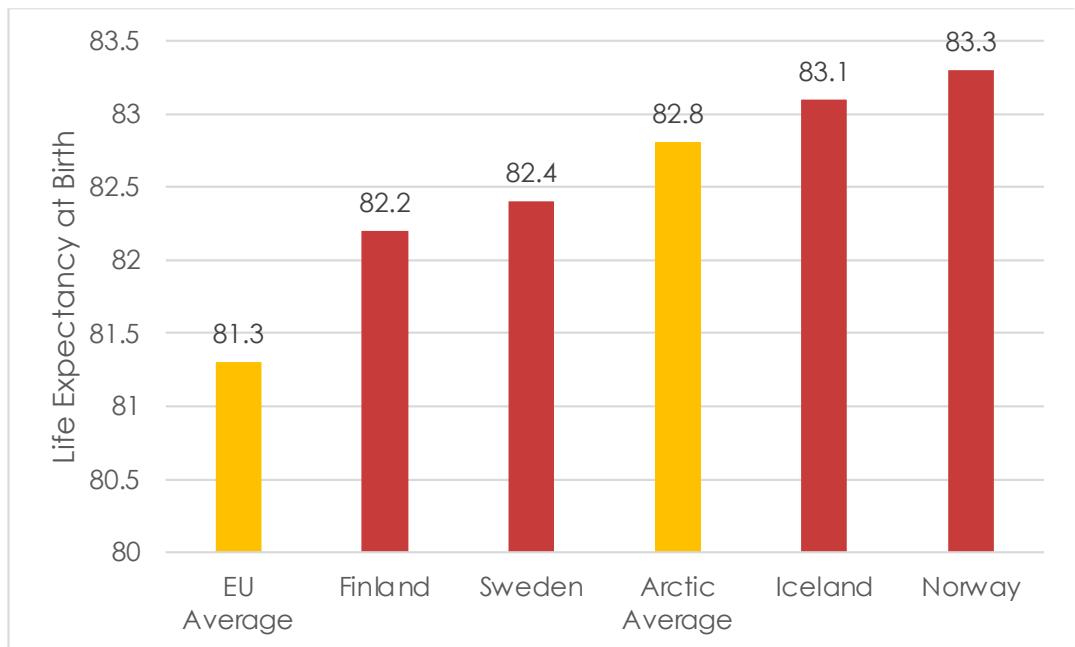


Figure 5 Life expectancy in Arctic countries (national level)

Source : Technopolis Group based on Eurostat

In terms of level of **urbanisation**, the Arctic regions are predominantly rural and remote, followed by regions that are rural but close to a city (about 80 % and 18 of 24 regions). Other areas are intermediate and close to the city (4 of 24 regions, about 15 %) and the rest are intermediate/remote or predominantly urban (4 of 24 regions, about 5 %). This is illustrated in Figure 6.

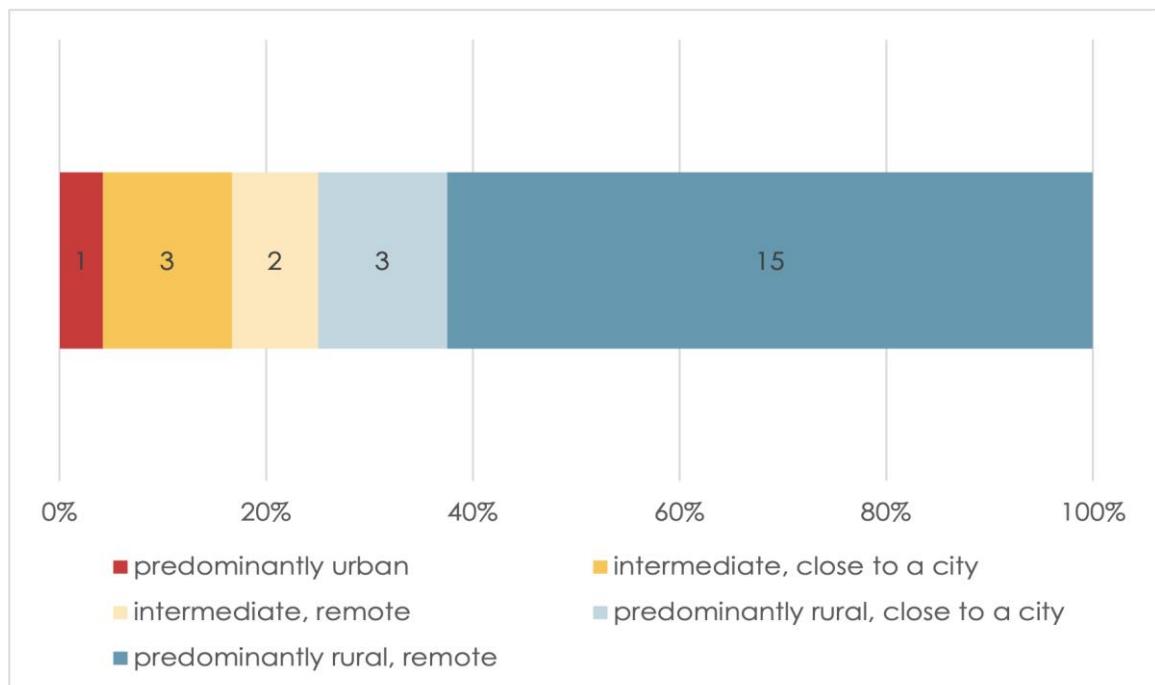


Figure 6 Distribution of Arctic regions in terms of urbanisation (NUTS3)

Source : Technopolis Group based on Eurostat

2.4. Socio-economic background

The Arctic sea basin is greatly influenced by both the development of energy systems and the exploration of resources with direct impacts of the area causing climate change. This also affects greatly the population of permanent inhabitants. Economic activities of petroleum supply and gas resources, as well as the shipping industry in the Arctic, are greatly influenced by global economic development and energy demand. The societal development is largely affected by migration and emigration in the area affecting the employment and unemployment rates. Unemployment is primarily a result of an ageing population and emigration of the

youth to urbanised areas due to the lack of educational opportunities³³. The at-risk-poverty rate is overall very high and more than 15 % in some regions (see Figure 14).

In Figure 7, the distribution of Arctic regions in terms of cohesion policy categorisation shows the data of four areas in Finland and Sweden (Pohjois-ja Itä-Suomi, Länsi-Suomi, Mellersta Norrland, and Övre Norrland) with a half-and-half division of more developed regions (with a GDP above 75 % of EU average), and those that are currently in transition (with a GDP between 50-75 % of EU average).

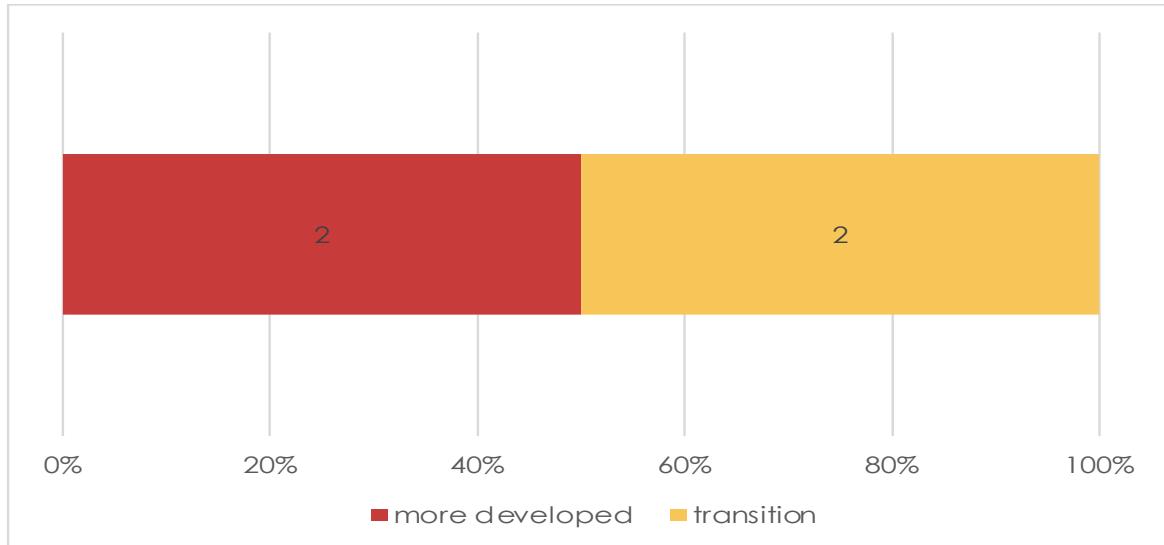


Figure 7 Distribution of Arctic regions in terms of cohesion policy categorisation (NUTS2)

Source : Technopolis Group based on DG REGIO

The average performance in terms of **GDP** (current market prices) considering the states of Finland, Iceland, Norway, Sweden, Russia and Canada, is an average EUR 648.3 billion. Within the EU, Sweden peaks at EUR 475.4 billion. Russia (EUR 1 348 billion) and Canada (EUR 1 494.9 billion) have the largest economies of the basin, while Iceland has the lowest GDP at EUR 19 billion.

In terms of **GDP per capita** of the areas and regions in the Arctic lighthouse, for which data exists, Figure 8 illustrates that Finnish and Swedish areas have a GDP per capita of close to EUR 40 000, while the Norwegian area of Nord Norge and the region of Trøndelag is slightly above 50 000.

The Arctic states implemented relief and recovery measures at the national, regional, and local levels to meet the economic challenges of the **COVID19 pandemic**. While economic responses have been fruitful, the regions have reported that they have had difficulties understanding the practical implementation of the financial support and reported about inequity. To better meet the challenges of COVID19, the Arctic Council has recently urged a focus on data collection and community engaged economic analysis to better understand the COVID19 impacts in the Arctic. Furthermore, economic impacts on key industries are needed along with addressing food supply and security in the short- and long-term to be able to assess availability, affordability, and quality of food³⁴.

³³ Socio-Economic Scenarios for the Eurasian Arctic by 2040 (2016),

<https://helda.helsinki.fi/bitstream/handle/10138/160254/2016nro1.pdf?isAllowed=y&sequence=1>, Finnish Meteorological Institute.

³⁴ Covid-19 in the Arctic - Briefing Document for Senior Arctic Officials (2020), https://oaarchive.arctic-council.org/bitstream/handle/11374/2473/COVID-19-in-the-Arctic-Briefing-to-SAOs_For-Public-Release.pdf?sequence=3&isAllowed=y, Arctic Council.

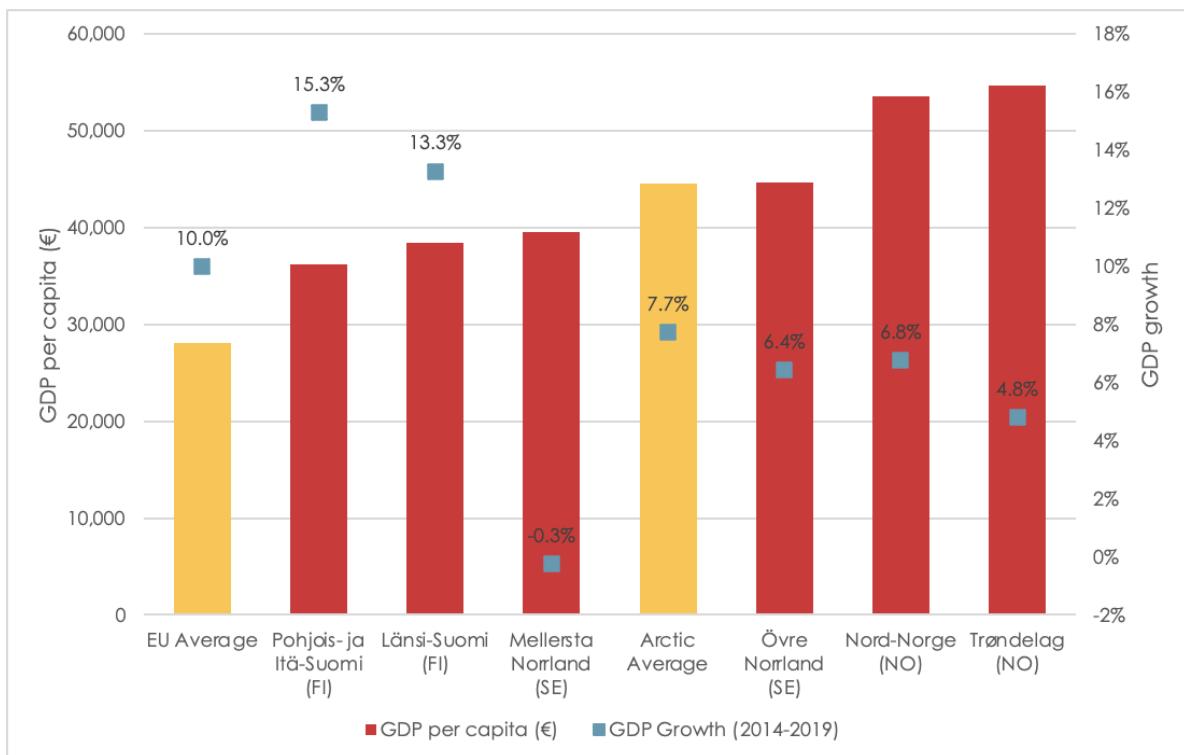


Figure 8 GDP per capita and GDP growth (2014-19) in selected Arctic regions (NUTS2)

Source : Technopolis Group, based on available data in Eurostat

When it comes to the **aggregated GDP and GDP growth** of the Arctic basin level in the period of 2016-2020, Figure 9 shows a varied level of GDP growth, peaking at 4.39 % in 2017. However, in 2020 the growth progressed to -4.74 % also with a lower result of GDP than previous years.

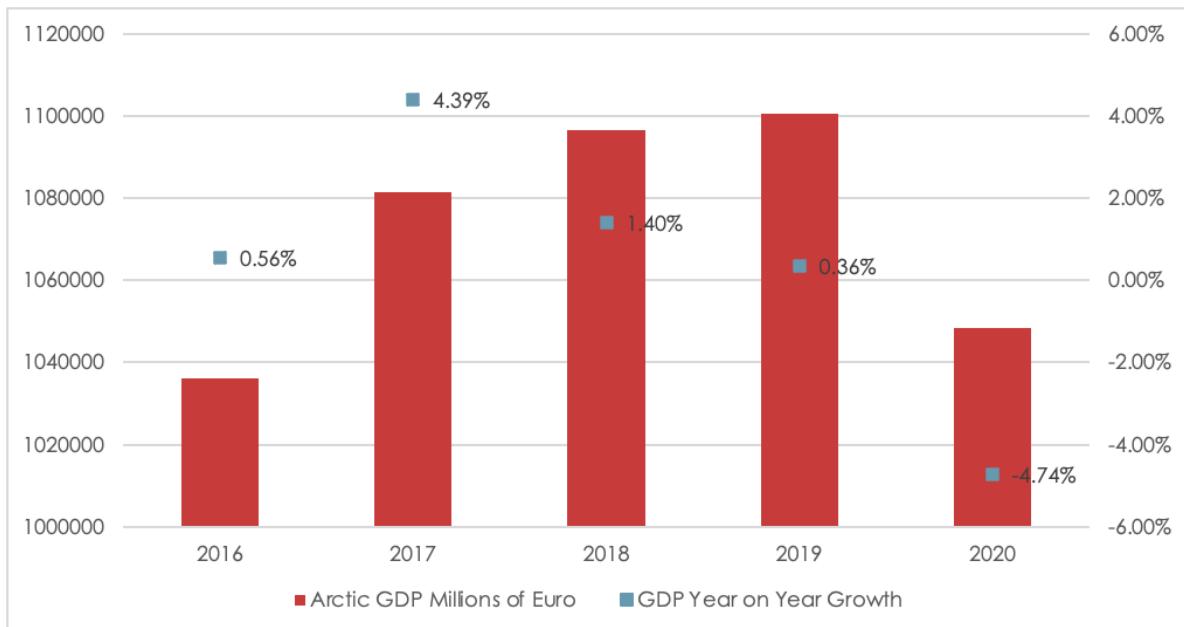


Figure 9 Aggregated GDP and GDP growth at the Arctic basin level (excluding Russia and Canada) (2016-2020)

Source : Technopolis Group based on Eurostat

Figure 10 illustrates that at national level, the **enterprise birth rate** in the Arctic countries of Sweden, Norway, Finland, and Iceland is 8.42 %, which is below the EU average of 10.24 % and also slightly below the other lighthouses. Nationally, the economic activity is somewhat varied across the Arctic.

The **growth rate of enterprises** in Iceland is higher than the other countries, peaking at 11.13 %. In Sweden, it is the lowest at 6.22 %. Finland has an enterprise birth rate at 8.72 % and Norway at 7.62 %. Compared to the other lighthouses, the Arctic has the lowest numbers of enterprise birth rates with about 2 percentage points.

While economic activity related to entrepreneurship and innovation is difficult to obtain from the Arctic regions, the Nordic states of Sweden, Finland, Iceland, and Norway are known to be the high performers. Moreover, more than half of the enterprises that focus on innovation as their core activity are situated in these Nordic states³⁵.

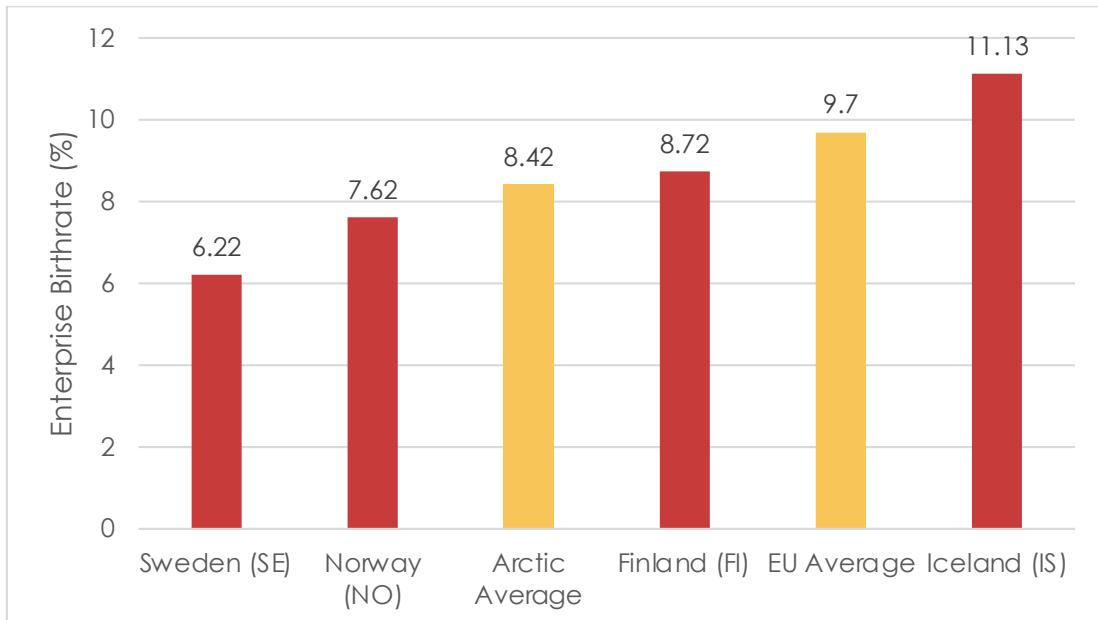


Figure 10 Enterprise birth rate in Arctic countries (national)

Source : Technopolis based on Eurostat

In Figure 11, the selected group of cities in the Arctic states of Finland, Sweden, Norway, Iceland, and Russia show a high number of **start-up activities**. Moscow tops the Arctic cities since 2015, with as many as 814. This is vastly beyond the Arctic average of 198 start-ups in the same year. The cities of Reykjavik in Iceland and Trondheim in Norway have similar numbers of 84 and 73 starts-ups in 2015, while lower numbers can be seen in the city of Umeå (19) in Sweden and very low numbers in Pori (2) in Finland.

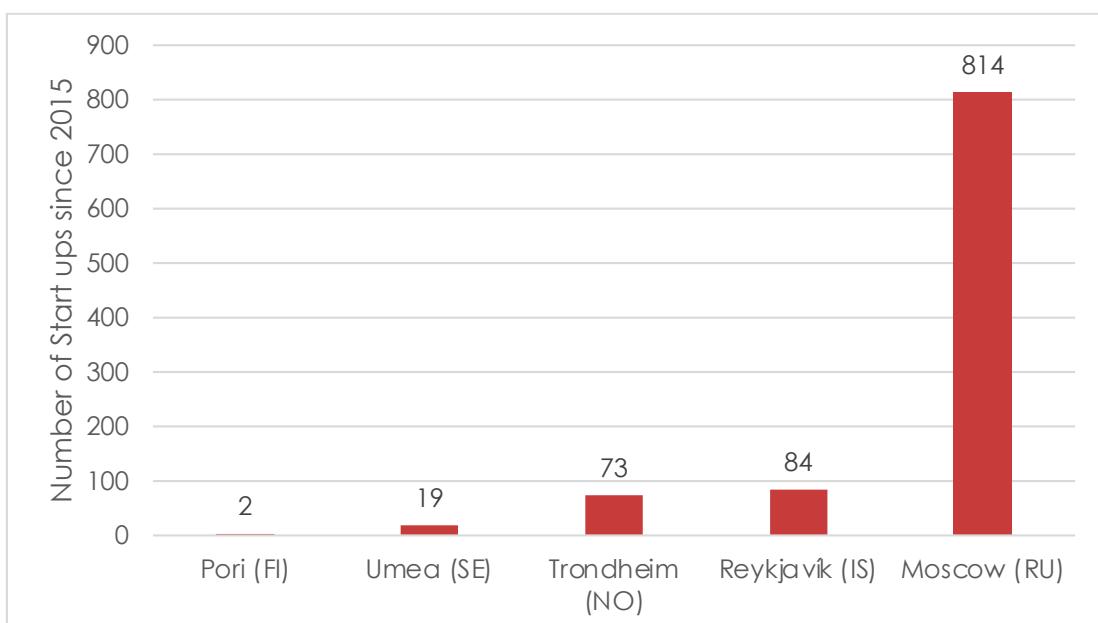


Figure 11 Start-up activity in Arctic cities

Source : Technopolis Group, based on Crunchbase

³⁵ Arctic Business Analysis – Entrepreneurship and innovation (2018), <https://arcticeconomiccouncil.com/wp-content/uploads/2018/05/Arctic-Business-Analysis-Entrepreneurship-and-innovation.pdf>, Nordic Council of Ministers.

The **labour market in the Arctic** is primarily challenged by increased skill shortages due to demographic changes, the emigration of young people and segregated labour markets. This causes imbalance³⁶.

In terms of **employment**, the Arctic regions have 60.4 % employed people over the total labour force, which is significantly higher than the EU average of 49.8 % and significantly above the employment rate of the other lighthouses (Atlantic: 53.6 %, Danube: 50.4 %, and Mediterranean: 45.4 %).

As illustrated in Figure 12, high **unemployment rates** can be seen in the Finnish areas of Pohjois-ja Itä-Suomi (Northern and Eastern Finland) and Länsi-Suomi (Western Finland), respectively at 8.8 % and 7.7 %. In Sweden, the unemployment rates are similarly high at 7.6 % in Mellersta Norrland and 6.2 % in Övre Norrland in Sweden. These rates are above the Arctic average of 6.1 %. Below the average are Iceland with an employment rate of 5.5 %, followed by 3.5 % and 3.2 % in the Norwegian area of Nord-Norge and the region of Trøndelag respectively.

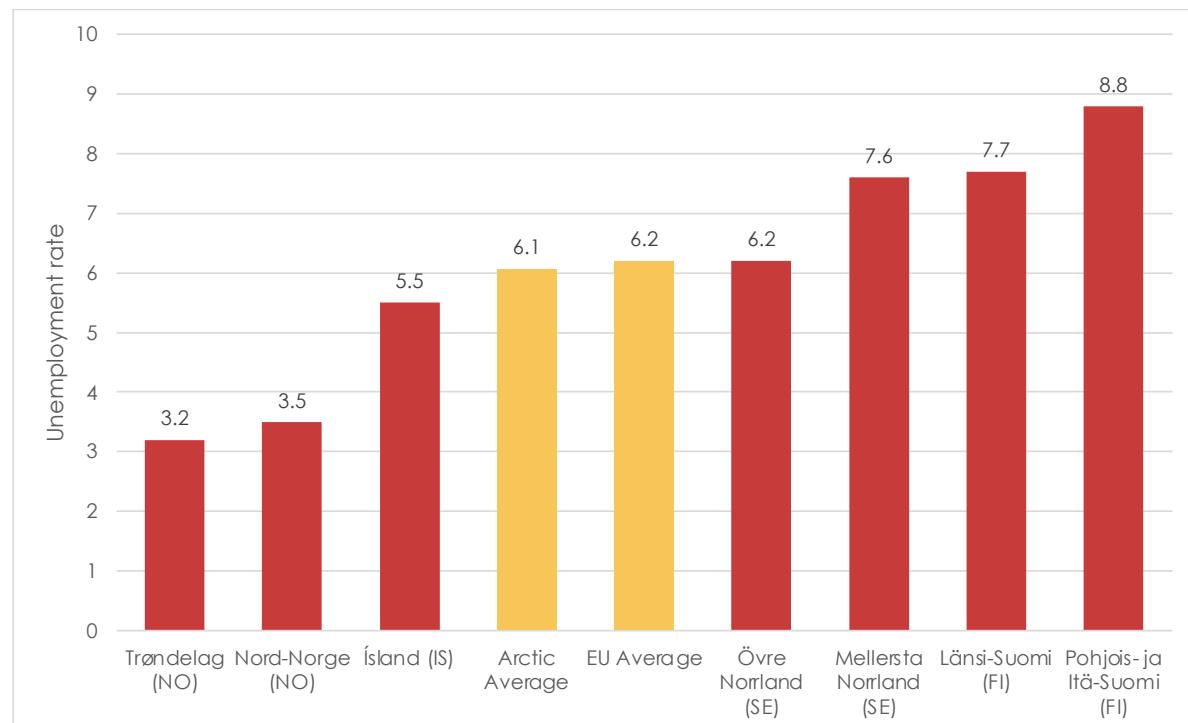


Figure 12 Unemployment rate (%) in Arctic regions (NUTS2)

Source : Technopolis Group, based on Eurostat

The **average youth unemployment** rate in the Arctic is at 8.2 %, much higher than the 6.3 % unemployment rate of the EU average in Figure 13. In the various areas and regions, Finland and Sweden peak at more than 10 % unemployment in the area of Pohjois-ja Itä-Suomi (Northern and Eastern Finland) and Mellersta Norrland. This is followed by 9.9 % in Länsi-Suomi (Western Finland), and 8.7 % in Övre Norrland in Sweden. Below the average, Iceland has 7.2 % youth unemployment while Norway has the lowest youth unemployment rating at 4.9 % in Nord-Norge and 5.4 % in Trøndelag.

In 2021, the Arctic Council developed an Arctic Youth Engagement Strategy for 2021-2026 in cooperation with the Conservation of Arctic Flora and Fauna (CAFF) to encourage more participation. The strategy focuses on increasing the opportunities for young people to engage in activities such as education and training, cultural exchanges, professional growth development, involvement in projects (e.g. decision-making, policy, and diplomacy), youth roles in events such as the Arctic Biodiversity Congress, and mentoring opportunities³⁷.

³⁶ Pippola, Saily (2020): Mobility in the Arctic North: Labour market perspectives in the Northern most north, <http://ltu.diva-portal.org/smash/record.jsf?pid=diva2%3A1504463&dswid=-344>, Luleå University of Technology

³⁷ Arctic Youth Engagement Strategy: 2021-2026 (2021), https://oarchive.arctic-council.org/bitstream/handle/11374/2635/MMIS12_2021 REYKJAVIK CAFF Youth-Strategy 2021-2026.pdf?sequence=1&isAllowed=y, Arctic Council.

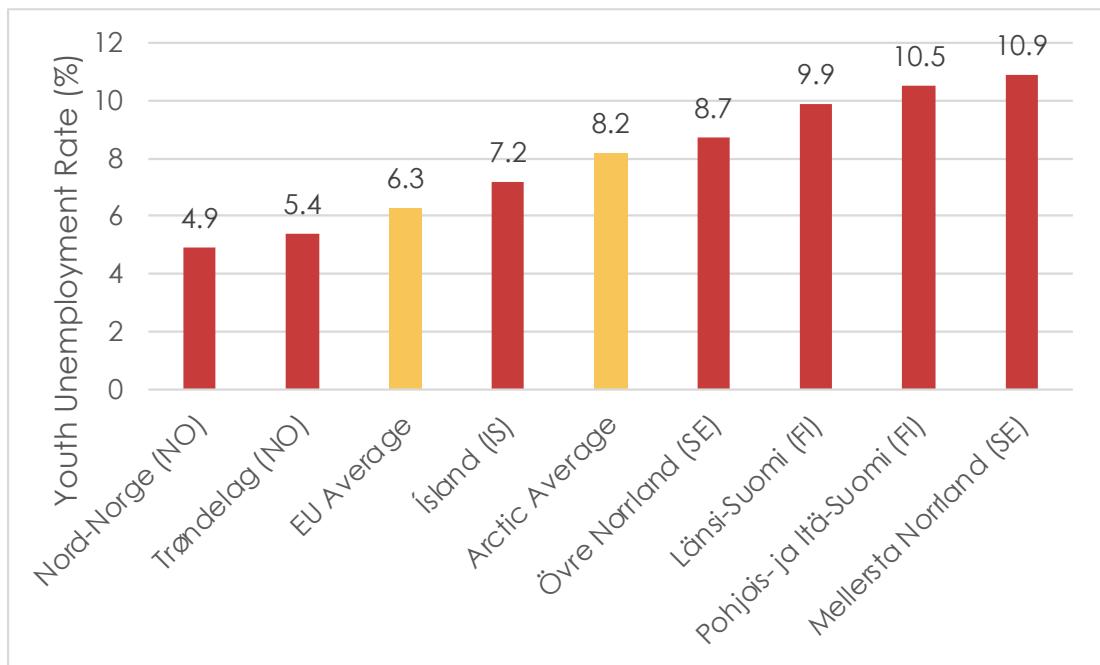


Figure 13 Youth unemployment rate in Arctic regions (NUTS3)

Source : Technopolis Group, based on Eurostat

Regarding the percentage of the population aged 25-64 who have successfully completed **tertiary studies** (e.g. university, higher technical institution, etc.), the Arctic is well above the average and slightly higher than the other lighthouses, peaking at 49.54 %. Nationally, Russia has the highest percentage of people (62.02 %), followed by Norway (50.9 %), then Sweden (49.2 %), Finland (43.8 %), and finally, Iceland (41.7 %).

In Figure 14, the data shows that in the Arctic, most of the countries struggle with the risk of poverty. The Arctic average of the at-risk-of-poverty rate in the Arctic region is 15.2 %, slightly below the EU average of 17.1 %. The numbers show significant disparities among the regions and areas in Norway, Finland and Sweden. Mellersta Norrland in Sweden is especially high above these averages with one fifth of the population, or 21.3 %, at risk of poverty. Nord-Norge is at the lowest end, with 12 % at risk of poverty which is similar to the region of Trøndelag at 12.8 %, Övre Norrland in Sweden has a risk of 14.2 %, and Pohjois-ja Itä-Suomi (Northern and Eastern Finland) is slightly above with 15.9 %.

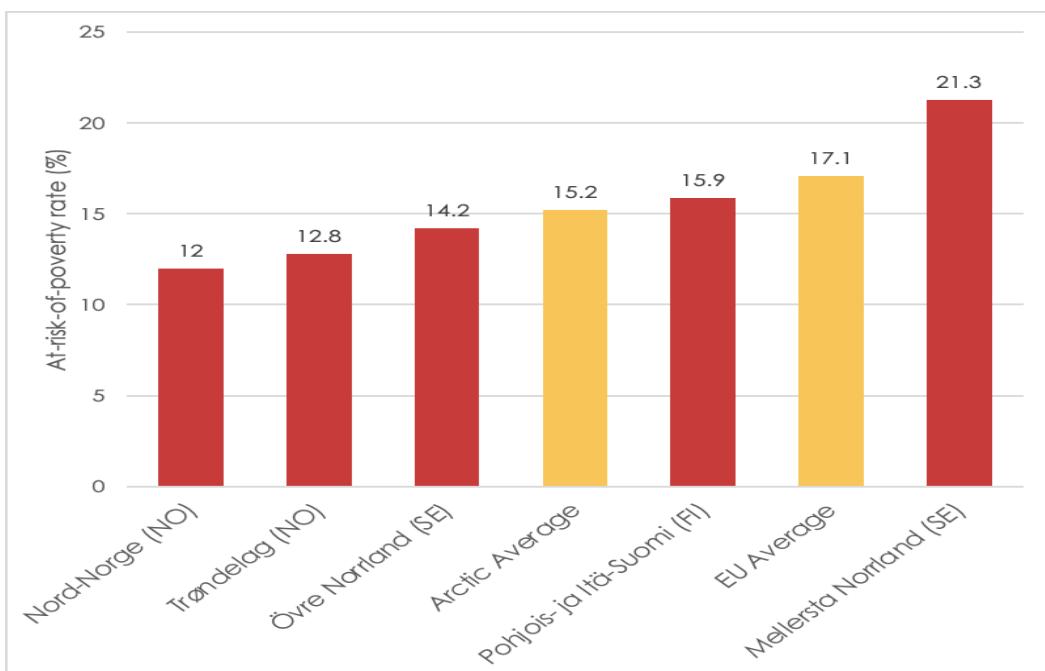


Figure 14 At-risk-of-poverty rate in Arctic regions (NUTS2)

Source : Technopolis Group, based on Eurostat

In terms of **material and social deprivation rate**, Finland, Norway, and Sweden show a very low rate compared to the other lighthouses. Finland's rate is 4.6 %, Norway's is 4.3 %, and Sweden's is 3.9 %. On average, the rate of the Arctic is 4.27 % which is significantly lower than the highest performing sea basin (Mediterranean: 19.79 %) and still significantly lower than the second lowest performing lighthouse (Atlantic: 13.85 %).

Table 2 below shows **low disparities among regions within the Arctic basin area**. Given the low availability of data, it is difficult to make a comparison across the entire Arctic lighthouse area, as data has only been found for six regions (see Table 3). Half of the regions are below the average of GDP per capita. Notably, there are relatively large differences between the top performers (the two Norwegian regions of Trøndelag and the area of Nord-Norge) and the worst performers (the Finnish regions of Länsi-Suomi and Pohjois- ja Itä-Suomi in terms of GDP per capita and unemployment rate. The top performing regions' annual GDP per capita are EUR 54 700 and EUR 53 600, including a low unemployment rate (3.2 % and 3.5 %) and a somewhat low at-risk-of-poverty rate compared to the other regions (12 % for Nord Norge). The same can be said about the differences of the unemployment rate where the top performer has a low 3.2 % unemployment rate, while for the bottom performers (the two Finnish regions) are at 8.8 %, though only slightly above average. At-risk-poverty remains mostly below the EU average for all regions, although the high percentage of 21.3 % in the Swedish region of Mellersta Norrland causes reasons for concern. Overall, the Arctic basin maintains generally positive results in terms of socio-economic factors with potentially lessons learned from the higher outcomes of the Norwegian regions.

Arctic lighthouse	GDP Per Capita (average at regional level)	Unemployment Rate	At-Risk-of Poverty
Average	44516,6	6.07%	15.24%
% of regions above Arctic average	50%	57%	40%
% of regions below Arctic average	50%	43%	60%
Top Performers	51375 to 54700	3.2 to 4.5	12 to 12.8
Above Average Performers	42100 to 51375	4.5 to 6.2	12.8 to 14.2
Disadvantaged performers	38675 to 42100	6.2 to 7.65	14.2 to 15.9
Worst Performers	36200 to 38675	7.65 to 8.8	15.9 to 21.3

Table 2 Aggregated status of the cohesion/socio-economic disparities for regions in the Arctic basin

Source : Technopolis Group based on Eurostat

PERFORMANCE GROUP	NUTS CODE	REGION NAME	COUNTRY
Top socio-economic performers	NO06	Trøndelag	Norway
	NO07	Nord-Norge	Norway
Above average socio-economic performers	SE33	Övre Norrland	Sweden
	IS00	Ísland	Iceland
Disadvantaged socio-economic performers	SE32	Mellersta Norrland	Sweden
Bottom socio-economic performers	FI19	Länsi-Suomi	Finland
	FI1D	Pohjois- ja Itä-Suomi	Finland

Table 3 List of regions ranked by socio-economic performance in the Arctic area

Source : Technopolis Group ; no data found for the Norwegian regions of Vestandet and Svalbard og Jan Mayen

2.5. R&I performance

There are variations among the regions when it comes to their R&I performance. Norwegian regions score highly on gross expenditures in R&D, human resources in science & technology, the performance on the Regional Innovation Scoreboard, and participation in H2020 projects. Länsi-Suomi (Western Finland) follows closely on most of these indicators as well. However, quite a few of the other Finnish regions score low on participation in the H2020, publications and patents. Several Swedish regions follow closely on almost all indicators as a third best performer. As a clear exception, Pohjois-Pohjanmaa scores the highest in terms of connectedness to various EU R&I networks and structures with 10 partnerships, while other Finnish, Norwegian and Swedish regions have a limited participation of 1-2 partnerships.

Based on the **gross expenditure in R&D (GERD)** as illustrated in Figure 15, the data shows that the region of Trøndelag in Norway is the highest GERD performer with 4.59 %. The area of Nord-Norge scores significantly lower at 1.94 %, followed by Iceland at 2.32 %. The lowest performer is Mellersta Norrland in Sweden at 0.74 %. The other areas show similar results, slightly above the Arctic average.

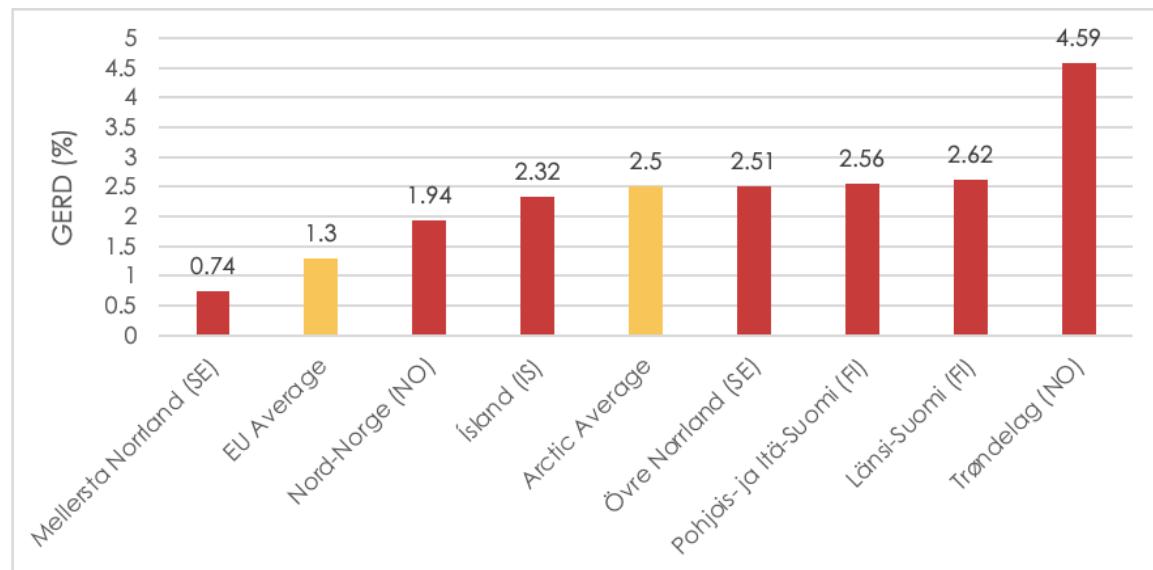


Figure 15 Gross Expenditure in R&D (GERD) in Arctic regions (NUTS2)

Source: Technopolis Group, based on Eurostat

Further, in terms of **business R&D expenditure as percentage of GDP (BERD)**, Sweden is the highest performer with a share of 2.44 %, while Finland, Iceland, Norway follow closely behind with respectively 1.83 %, 1.61 %, and 1.14 % of GDP.

In terms of **human resources in science & technology (HRST)** illustrated by Figure 16, in the Arctic regions in Norway, Finland, Sweden and Finland, the numbers range closely to the Arctic average of 51.2 %. The highest performer with the most skilled labour force can yet again be seen in the region of Trøndelag in Norway, maintaining the resources at 54.7 %. Following closely is Mellersta Norrland in Sweden with 52.2 % and Länsi-Suomi (Western Finland) with 52.9 %. Above the EU average of 46.3 % but below the Arctic average, various regions range from 48 % to 51.1 %. Thus, in their human resources, the regions score very similarly.

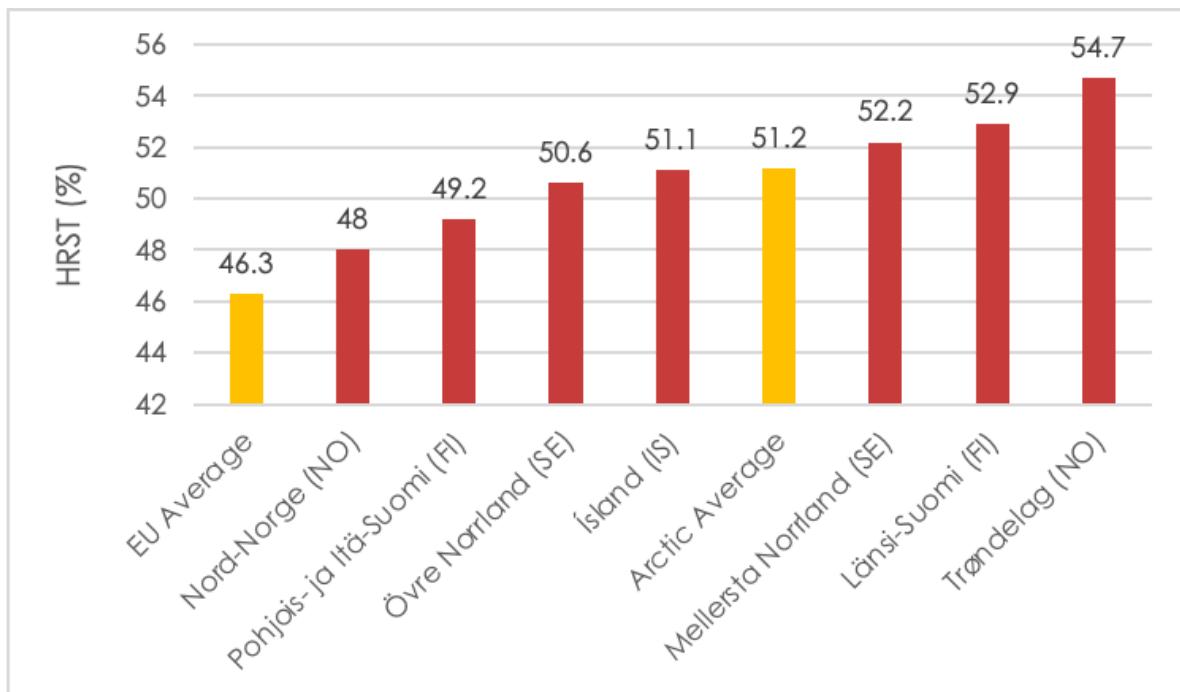


Figure 16 Human Resources in Science & Technology in Arctic regions (NUTS2)

Source: Technopolis Group, based on Eurostat

In terms of **regional innovation based on the Regional Innovation Scoreboard Index**, the data shows very little difference between the regions, although all regions and areas depicted in Figure 17 score on or above the EU average. Four areas and regions stand out as the most innovative, namely Länsi-Suomi (Western Finland), the region of Trøndelag in Norway, Övre Norrland in Sweden and Pohjois- ja Itä-Suomi (Northern and Eastern Finland) scoring at 120, above the EU average. Least innovative are the areas of Nord-Norge and Mellersta Norrland in Sweden which score 100, on the EU average and below the Arctic average.

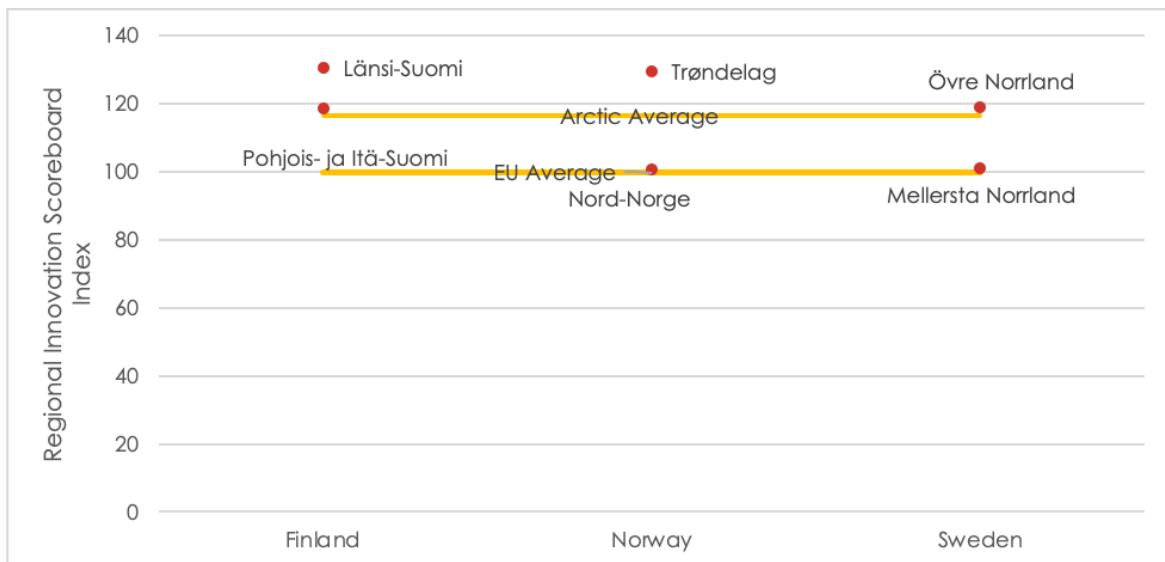


Figure 17 Distribution of Regional Innovation Scoreboard performance in Arctic regions (NUTS2)

Source: Technopolis Group, based on European Commission, 2021, Regional Innovation Scoreboard

In terms of the **Global Innovation Index**, the score is similar between Sweden (63.1), Finland (58.4), Iceland (51.8), and Norway (50.4) apart from Russia which scores significantly lower (36.6).

The most active region in terms of **participation in H2020 projects** is the region of Trøndelag in Norway with an impressive 446 projects, which is more than double of the second-best performing region, Pirkanmaa in Finland with 214. Furthermore, four other regions have implemented projects above both the Arctic average and EU average, Höfuðborgarsvæði (198), Pohjois-OPohjanmaa (108), Norrbottens län (102), and Pohjois-Savo (73). Significantly below the two averages, are mostly Finnish regions and Norwegian regions (indicated regions with zero projects) which are the least connected to EU projects and initiatives. This is illustrated in Figure 18 below.

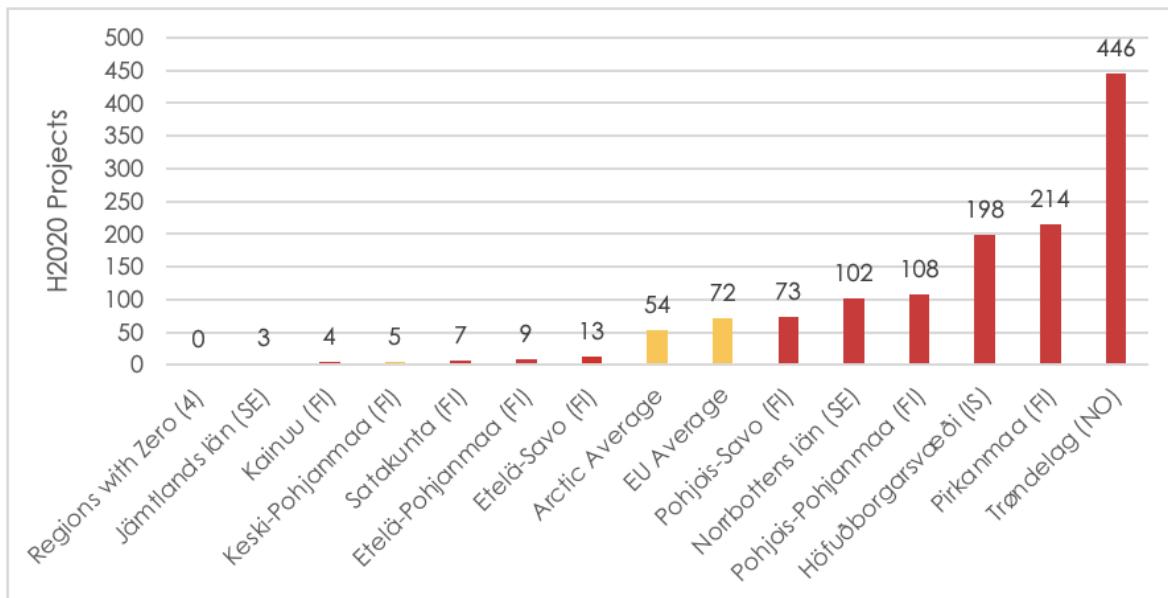


Figure 18 Number of participation in H2020 projects per Arctic region (NUTS3)

Source : based on data provided by AIT for DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2020)

In terms of number of scientific publications illustrated in Figure 19, the most active and best performing region is yet again the region of Trøndelag in Norway with an impressive 16 672 publications, followed by the Swedish region of Västerbottens län with 11 336 publications and the Finnish region of Pirkanmaa with 9 369 publications. The lowest performers are the four regions with zero publications, namely two Icelandic regions and four Norwegian regions. Several Finnish regions score below the Arctic and EU average.

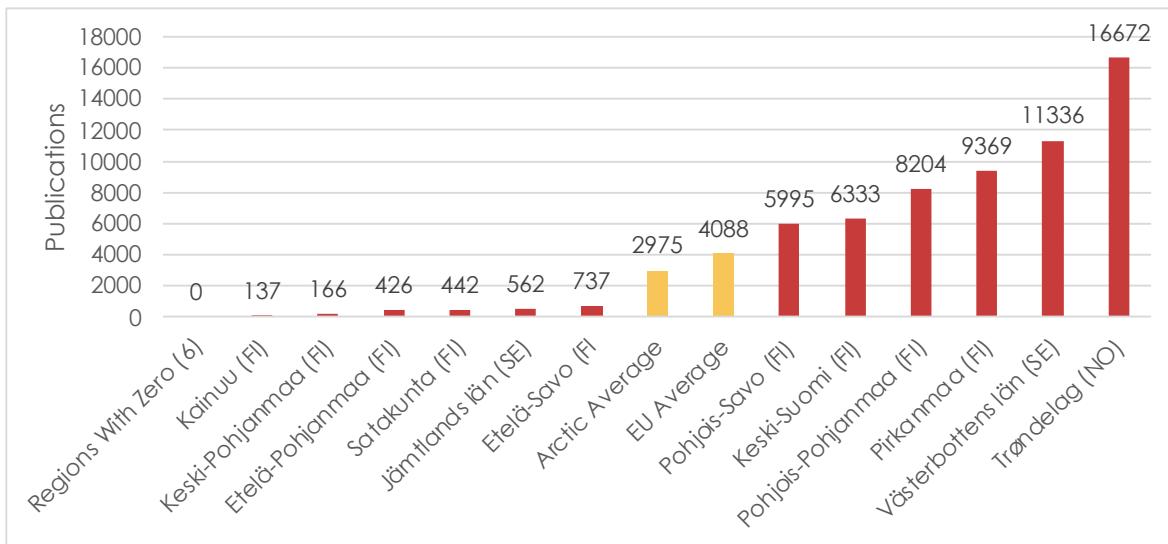


Figure 19 Number of scientific publications per Arctic region, 2015-2019 (NUTS3)

Source : based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2020)

In terms of **patents**, the Finnish region of Pirkanmaa scores the highest with 1 425 patents, followed by Pohjois-Pohjanmaa (748) and Norrbottens län (667). Yet again, the data shows that several Finnish regions score below the Arctic average of 184 and EU average of 458, as illustrated by Figure 20, and that six regions do not have any patents at all.

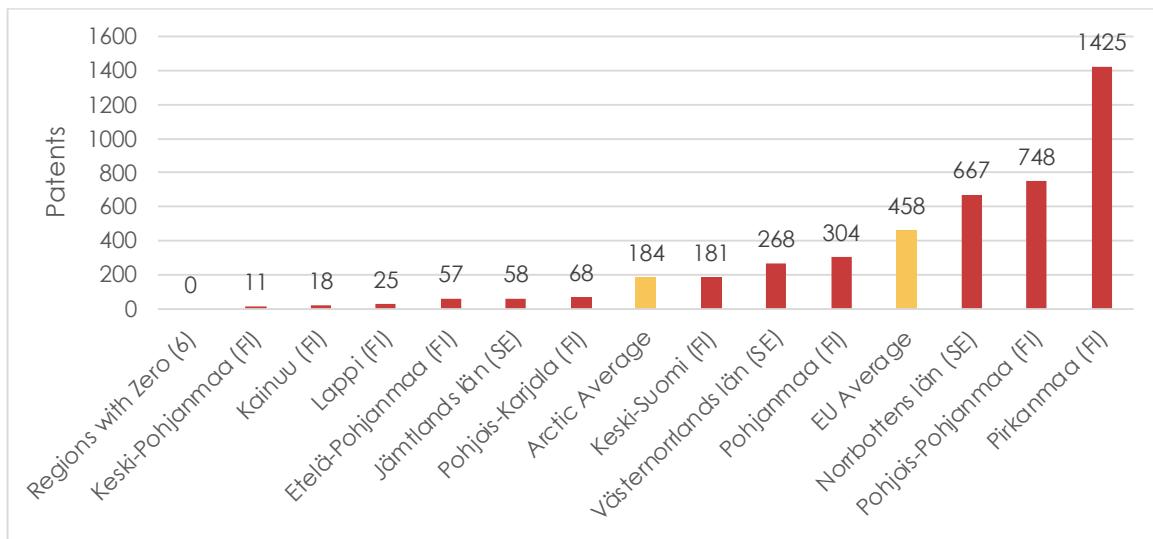


Figure 20 Number of patents per Arctic region, 2014-2019 (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2020)

When it comes to the **number of participations in DIH and collaboration clusters**, the data shows that the Finnish region of Pohjois-Pohjanmaa is the most active with 10 clusters, followed by the Finnish region of Lappi with five. Both are above the total average of three. Below the total average with two clusters, we find the two Norwegian regions of Trøndelag and Nordland, and the two Swedish regions of Västernorrlands län and Västerbottens län. This is in line with the Arctic average of two clusters. Below both these averages are five Finnish regions and one Swedish region, as illustrated in Figure 21.

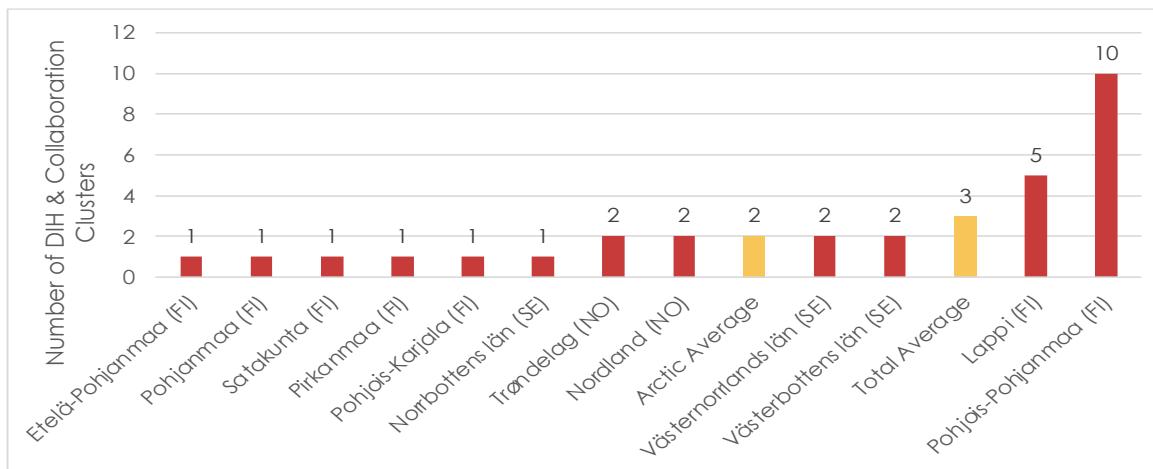


Figure 21 Number of participations in DIH and collaborations clusters per Arctic region (NUTS3)

Source : based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2020)

Overall, the **disparities of the R&I performance show a varied picture of top performance** among the Arctic regions. **Länsi-Suomi (Western Finland)** is a top performer across the various indicators, especially when it comes to their score on the Regional Innovation Scoreboard (130) number of patents (2 137) and number of publications (17 616). However, the region of **Trøndelag In Norway** scores better on gross R&D expenditure per inhabitant (4.59 %), on human resources in science and technology (54.7 %) and on participation in H2020 projects (446). The lowest performers are more spread across the indicators, although most notable is the **very low gross R&D expenditure of Mellersta Norrland** with a score of 0.74 %, significantly lower than the other regions where most maintain a score above 2 %. Several regions have below the median results on the number of patents and participation in the EU R&I networks and structures, often resulting in zero contributions. A relatively low number of 23 H2020 projects is also visible in Mellersta Norrland and 25 H2020 projects in Nord-Norge, significantly lower than the top performer in this area, as mentioned above.

While there are outliers that peak at certain indicators to show that regions excel in certain fields, the R&I performance for the regions is still low and has opportunities for enhancement and further investment. As most of the indicators show results below average (with the exception of the HRST), there is potential for supporting the regions to catch up. The aggregated status of these results are indicated in Table 4 below.

Arctic	Gross R&D expenditure per inhabitant (% of GDP)	Human resources in science and technology	Regional Innovation Scoreboard index	H2020 Projects	Number of patents	Number of publications	Participation in EU R&I networks and structures
Average	2.47	51.24	116.59	158.56	491.22	7 933.33	3.22
% Above	57 %	43%	57 %	56 %	33 %	44 %	22 %
% Below	43 %	57 %	43 %	44 %	67 %	56 %	78 %
Worst Performers	0.74 to 2.13	48 to 49.9	101 to 108	0 to 23	0	0	0
Below average performers	2.13 to 2.51	49.9 to 51.1	109 to 119	23 to 165	0	0 to 1492	0 to 2
Above average performers	2.51 to 2.59	51.1 to 52.55	119 to 124	165 to 255	0 to 844	1492 to 16672	2 to 3
Top performers	2.59 to 4	52.55 to 54.7	124 to 131	255 to 446	844 to 2137	16672 to 19026	3 to 16

Table 4 Aggregate status of the R&I disparities for the Arctic regions

Source : Technopolis Group

Performance Group	Country	NUTS Code	Region name
R&I disadvantaged regions	Norway	NO07	Nord-Norge
	Iceland	IS00	Ísland
	Sweden	SE32	Mellersta Norrland
R&I above average regions	Sweden	SE33	Övre Norrland
R&I top performing regions	Finland	FI1D	Pohjois- ja Itä-Suomi
	Norway	NO06	Trøndelag
	Finland	FI19	Länsi-Suomi

Table 5 List of region areas in the Arctic area grouped by their R&I performance

Source : Technopolis Group

3. ATLANTIC BASIN

3.1. Geographical and natural characteristics

The Atlantic Sea basin is within the Atlantic Ocean. The Atlantic Ocean is the second largest ocean covering approximately one-fifth of Earth's surface and separating the continents of Europe and Africa to the east from those of North and South America to the west.

The Atlantic Sea basin is situated at the western edge of the European continent. To the North, it is bordered by the Arctic Sea basin and to the South and West by the Wider Atlantic. The basin itself hosts four EU Member States : Ireland, Spain, Portugal, and France. The UK is also on its shores which includes Wales, West-England, West- Scotland and Northern Ireland. It contains the Celtic Seas, the Bay of Biscay, and the Iberian Coast. The Atlantic basin lighthouse area consists of 293 999 km² of land and 44 028 km of coastline.³⁸

³⁸ Please note: at the time of finalising this report (July 2022), the UK's participation in Horizon Europe was still under negotiation. This is why, we have included the UK as a country in the Mission lighthouse, with participating regions selected based on the coverage of the previous Interreg Atlantic Programme 2014-2020.



Figure 22 Regions covered by the Atlantic Ocean lighthouse

Source : Interreg Programme Atlantic Area, <https://www.atlanticarea.eu/page/3>.

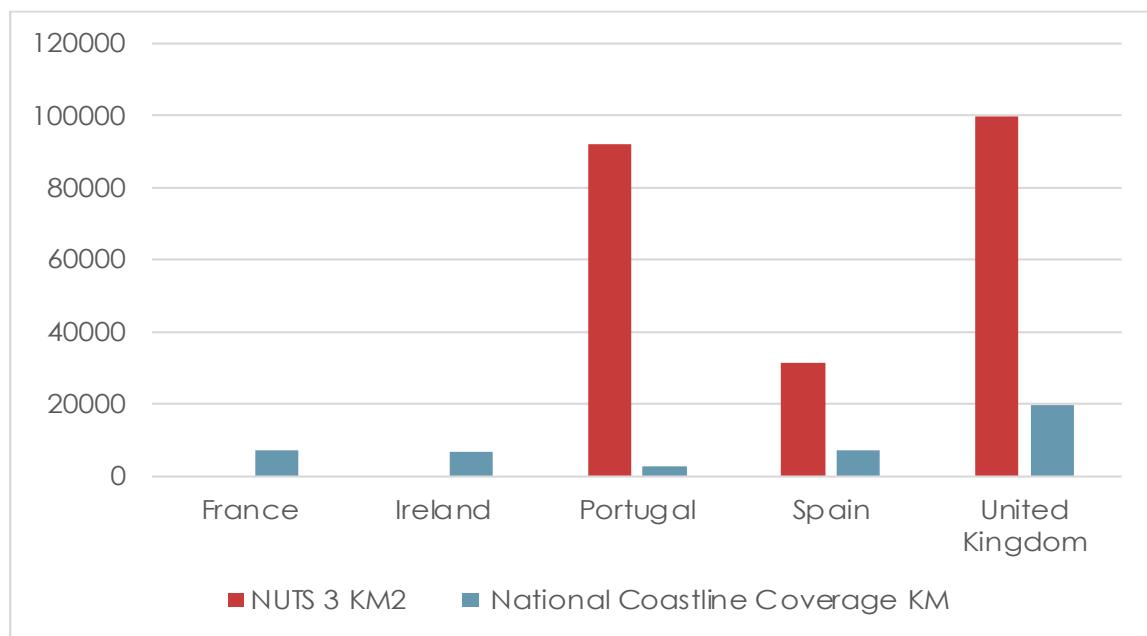


Figure 23 Total lighthouse area per country and total national coastline in selected countries

Source : Eurostat

Economically, the Atlantic basin is a key sea basin in the European Union. It provides vital transportation and trade links, not only among EU Member States, but also internationally to America and Africa.

According to the 2020 Blue Economy Report³⁹, the Atlantic basin is the most important sea basin in the EU in terms of GVA (Gross Value Added), representing 36 % of the EU blue economy GVA. In 2017, the Blue Economy in the Atlantic Ocean generated EUR 73.4 billion of GVA and employed 1.29 million people. The GVA is generated mainly by Coastal tourism (EUR 27 billion), followed by Non-living resources (EUR 16 billion), Port activities (EUR 12 billion) and Living resources (EUR 7 billion). In terms of employment, coastal tourism employs more than all the other sectors combined (0.76 million people). Port activities (0.18 million people) and Living resources (0.17 million people) are also sectors offering significant employment opportunities (Blue Economy Report, 2020).

3.2. Policy context and governance analysis

The Atlantic Sea basin is covered by the **Atlantic Action Plan 2.0**, which is a revised version of its predecessor the Atlantic Action Plan. The Political coordination is primarily conducted by the Ministers responsible for maritime affairs of the participating countries (Ireland, France, Portugal, Spain). Member States define the broad political guidelines and guide the implementation of AAP 2.0, as well as also decide, in consultation with the European Commission, whether to expand membership of the Atlantic strategy to other interested States.

According to the action plan⁴⁰, its objectives are to promote innovation, contribute to the protection and improvement of the Atlantic's marine and coastal environment, improve connectivity and create synergies for a socially inclusive and sustainable model of regional development. While contributing to offset the adverse socio-economic impact of the COVID-19 crisis, the updated Atlantic action plan addresses some of the 'great challenges' structured around blue economy in four thematic pillars :

- Atlantic ports as gateways and hubs for the blue economy
- Marine renewable energy
- Blue skills of the future and ocean literacy
- Healthy ocean and resilient coasts

There is also a strong international dimension as the action plan focuses on research and innovation under the Atlantic Ocean Research Alliance which includes USA, Canada, Brazil and South Africa.

Operational coordination is ensured through the **Atlantic Strategy Committee** (ASC) that acts as a decision-making (executive) body and ensures the involvement of representatives from different coastal regions. The ASC is comprised of representatives from the four EU Member States (France, Ireland, Portugal and Spain) bordering the Atlantic Ocean as well as representatives from the European Commission, the Committee of the Regions, the Economic and Social Committee and representatives from coastal regions, cities and other relevant economy and social stakeholders.

The Atlantic Strategy Committee is also the governing body of the AAP 2.0 and aims to ensure the political and operational coordination of the plan and to provide the framework for its implementation. To that effect, each year the ASC Chair undertakes the organisation of the main Atlantic event, the Atlantic Stakeholder Platform Conference, on one of its coastal regions, seeking to bring together stakeholders to discuss the AAP 2.0 implementation and share new ideas and new innovations to promote the blue economy in the Atlantic sea-basin.

Representatives of relevant funding and financing institutions, as well as other relevant parties, can be invited as observers on a case-by-case basis. Additionally, the **Atlantic Assistance Mechanism**, an EU funded project, aims to provide stakeholders with updated information on the revised AAP 2.0, its research and investment priorities, news, events and networking opportunities. The Assistance Mechanism team consists of a National Hubs network, operating in France, Ireland, Portugal and Spain, coordinated by a central team.

Other bodies in the Atlantic basin include :

- The Atlantic Arc Commission which is a sea-Bed Strategy addressing common opportunities and challenges of the regions mainly those related to maritime physical and socio-economic context.

³⁹ European Commission (2020). Blue Economy Report : Blue sectors contribute to the recovery and pave way for EU Green Deal.

⁴⁰ Atlantic action plan 2.0: A revamped maritime strategy to foster a sustainable blue economy and the EU Green Deal.

- The Atlantic Transnational Network which is a platform for cooperation of civil society in the Atlantic area.
- The Atlantic Cities which goal is to create a network with and for the cities placed at the edge of the Atlantic Ocean.

Governance performance at the regional level can be assessed through **institutional capacity**, is the capability of a region to set and achieve social and economic goals, through knowledge, skills, systems, and institutions⁴¹. The average institutional capacity scores 58 in the basin ; however, the scores vary significantly. Andalucia scores the lowest (35.32) while South-West England displays the best performance (73.43). At the country level, the UK also has the best average institutional capacity (70.7) and Spain the lowest (44.31)⁴².

3.3. Demographic background

There are over 59.5 million people inhabiting the Atlantic basin and the basin has seen its population grow by on average 1.04 % between 2015-2020, much higher than the EU average of 0.01 %. It also has a higher average population per NUTS3 region (457 161) than the EU average (383 368). As expected, cities such as Dublin (1.4 million), Porto (1.7 million), Sevilla (1.9 million) and Lisbon (2.8 million) are the most populated, while islands and rural coastal regions have the lowest populations. Portugal is the only nation with a declining population, with a mean of -2.26 % across all its regions from 2015-2020. In comparison, Ireland's population is the fastest growing (average of 6.64 %) in the same period and is the only country to see growth in all of its regions. Fuerteventura in Spain has seen the largest population growth with 14.76 %, nearly doubling the second largest population growth which occurred in Mid-East Ireland (8.07 %), a commuter region for Dublin, Ireland.

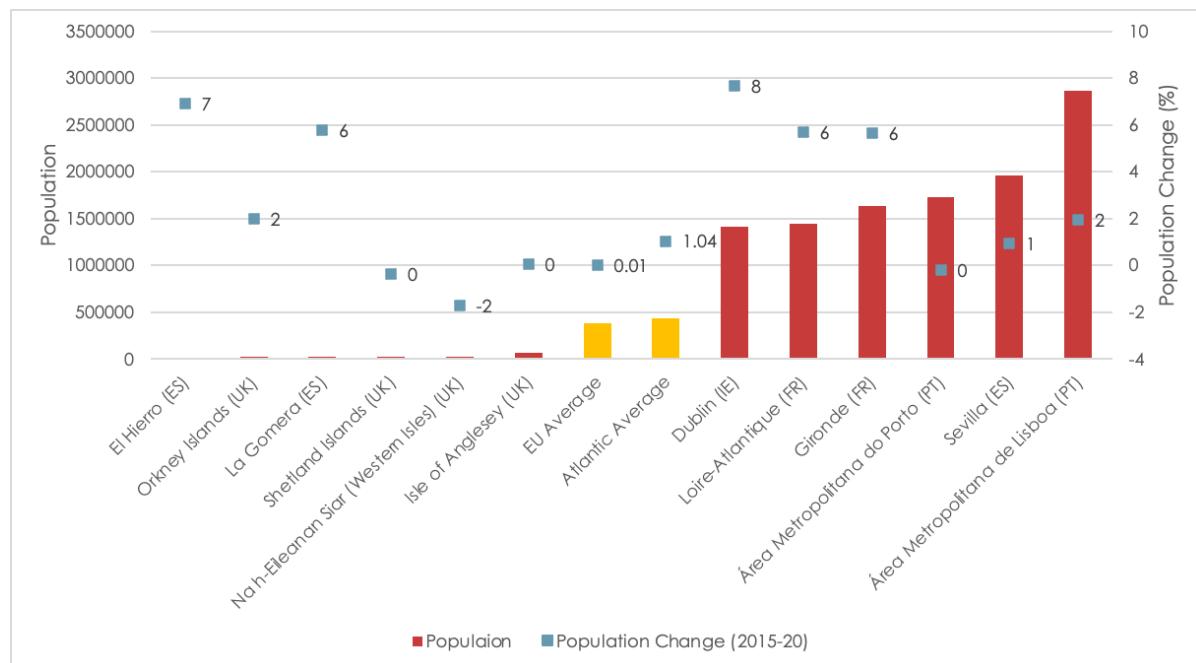


Figure 24 Top and bottom population and population growth in Atlantic regions (NUTS3)

Source : Eurostat

The Atlantic basin has a larger average population density in comparison to the rest of the EU and the majority of its regions consist of an urban environment or close to a city. The United Kingdom has the highest population density (278 people/km²), which contributes to pull the average density of the Atlantic basin further up to 136. There is a large range in population density compared to Ireland (73), and even in comparison to the other countries of the basin : Spain (95), Portugal (112) and France (123). The Atlantic basin is among the most urban basins, with most of the NUTS3 regions (79 out of 137, i.e. 58 %) categorised as urban or close to a city. Only 30 regions are considered rural and remote.

⁴¹ DG REGIO, 2019: Regional Competitiveness Index, <https://cohesiondata.ec.europa.eu/Other-RCI/European-Regional-Competitiveness-Index-2019-index/if3f-yweu>.

⁴² ibid.

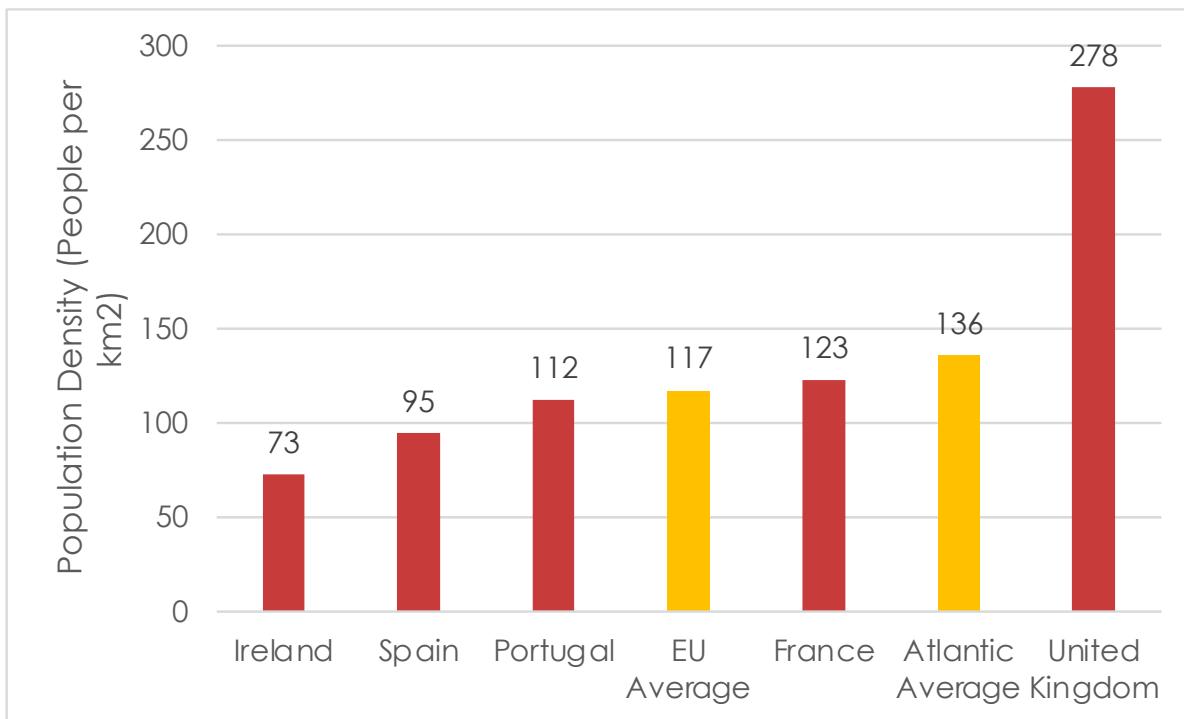


Figure 25 Population density in Atlantic countries (national)

Source : Eurostat

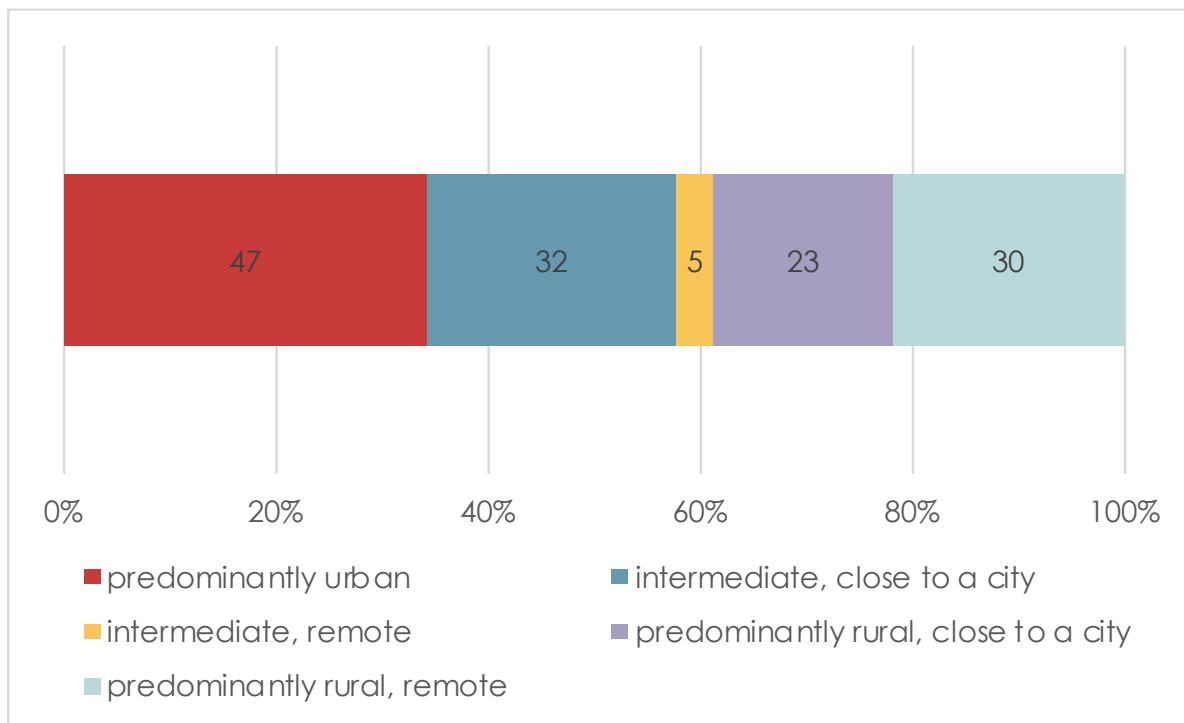


Figure 26 Distribution of Atlantic regions in terms of urbanisation (NUTS3)

Source : Eurostat

In terms of life expectancy, one can observe that citizens within the Atlantic basin live a bit longer in comparison to the EU population. All the Atlantic countries have a life expectancy close to the regional mean of 82. Ireland (82.8) has the longest life expectancy while the United Kingdom and Portugal display the lowest (81), but the difference remains small (1.8 years), indicating equally healthy lifestyles and good healthcare across the basin.

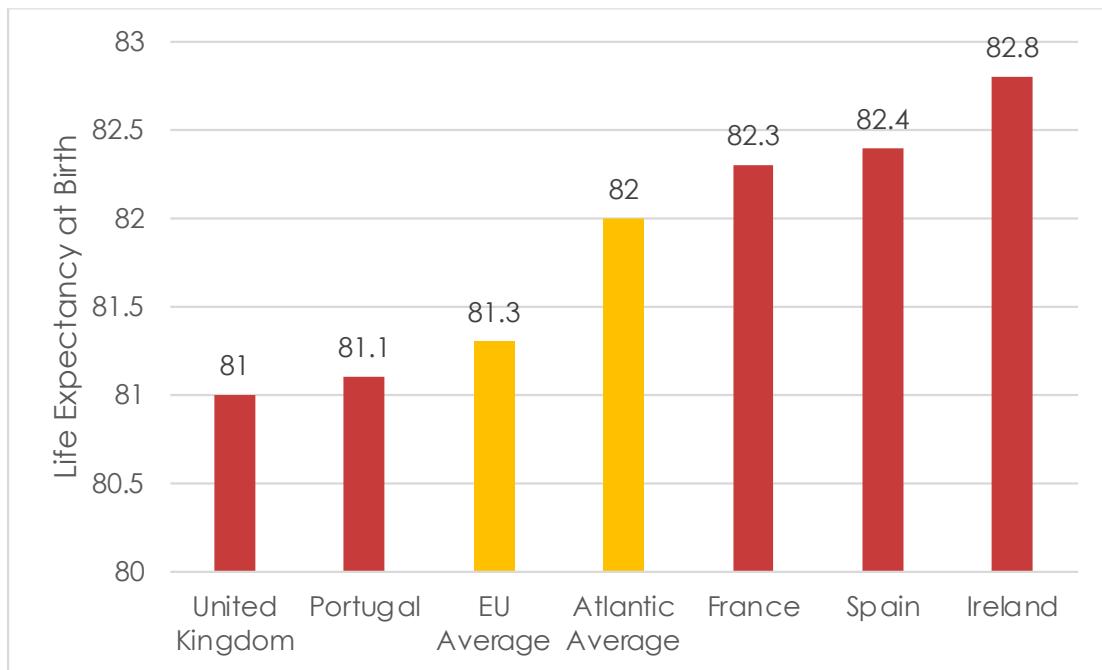


Figure 27 Life expectancy in Atlantic countries (national level)

Source : Eurostat

3.4. Socio-economic background

The countries in the Atlantic basin are some of the wealthiest and best developed countries in the EU. While the basin performs well from an economic and entrepreneurial point of view, this does not translate when analysing the regions individually. The basin has a poor social standing in comparison to the rest of the EU and is heterogeneous.

Understanding at what stage of development the regions within the basin are, is enabled by the categorisation of the regions in terms of cohesion policy status. One can observe that half of NUTS2 regions within the basin (for which data is available) are at a transition stage (11 out of 22), and these include all five French regions of the basin. Six regions are less developed and a large majority of them (five) are located in Portugal. The five regions that are considered as more developed are in Spain (Navarra, Basque Country), Ireland (Southern, Eastern and Midland) and Portugal (Lisbon).

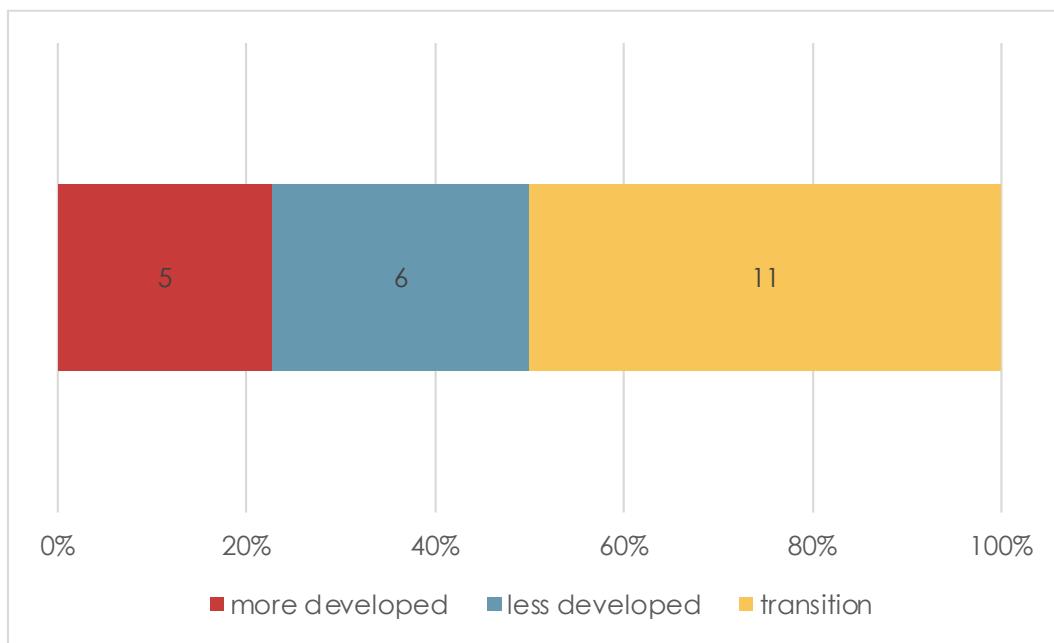


Figure 28 Distribution of Arctic regions in terms of cohesion policy categorisation (NUTS2)

Source : Eurostat

The Atlantic basin contains some of the wealthiest regions in the EU in terms of GDP. The Atlantic region grew considerably year-on-year from 2016 to a peak in 2019. However, understandably the impact of the COVID-19 pandemic greatly affected its growth and pushed the region back to 2017 levels (Figure 29), due to a negative yearly growth of -7.13 %. At the national level, the United Kingdom (EUR 2 526.62 billion) is the largest economy followed by France (EUR 2 302.86 billion). Ireland (EUR 372.87 billion) and Portugal (EUR 200.09 billion) are at the bottom.

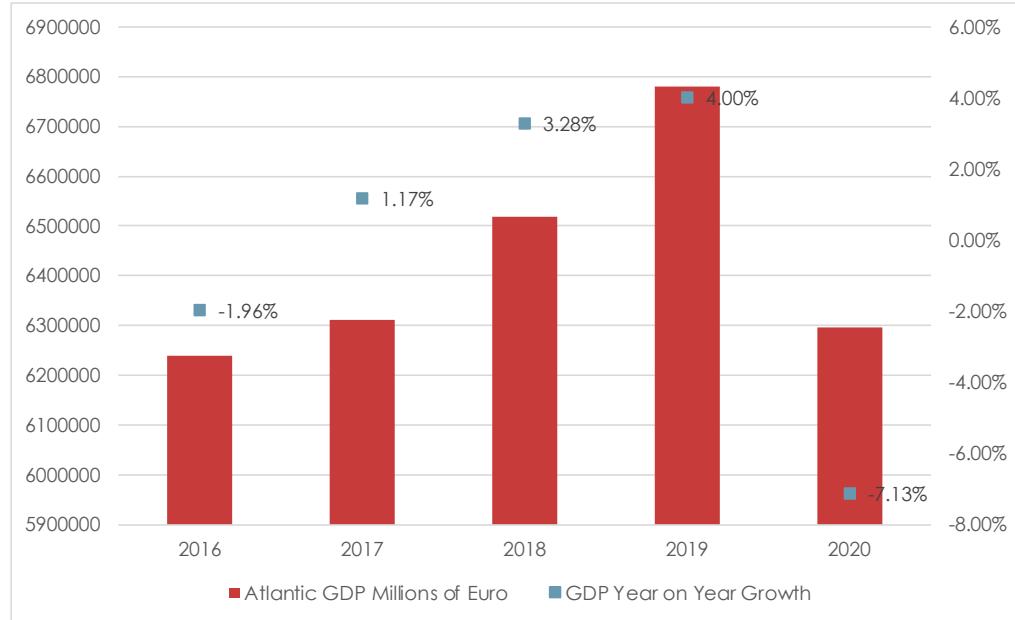


Figure 29 Aggregated GDP and GDP growth in Atlantic regions (NUTS2)

Source : Eurostat

GDP per capita is an important indicator of economic performance and a useful metric to make cross-country comparisons of average living standards and economic wellbeing despite differences in country size, while GDP growth rate per capita shows us how much the given area's economy is growing. There is a gap of EUR 72 300 between the top and the bottom GDP per capita in the Atlantic basin, indicating there are outlier regions. In particular, the NUTS 2 regions Southern Ireland (EUR 90 000) and Eastern and Midland Ireland (EUR 75 000) perform particularly well in terms of GDP per capita. Both have also experienced the top GDP growth over the five last years with 133.16 % for Southern Ireland and 50.4 % for Eastern and Midland Ireland. Five of the seven Portuguese regions are in the bottom six in terms of GDP per capita, with Norte (EUR 17 700) being the lowest. In fact, none of the Portuguese regions' GDP per capita exceeds the basin average, the highest being EUR 26 900 in the Metropolitan area of Lisbon. The Portuguese regions are not experiencing a faster growth than the other areas - they have an average 25.87 % growth while the Atlantic basin's average is 22 %, showing that the GDP gaps in the basin are not narrowing.

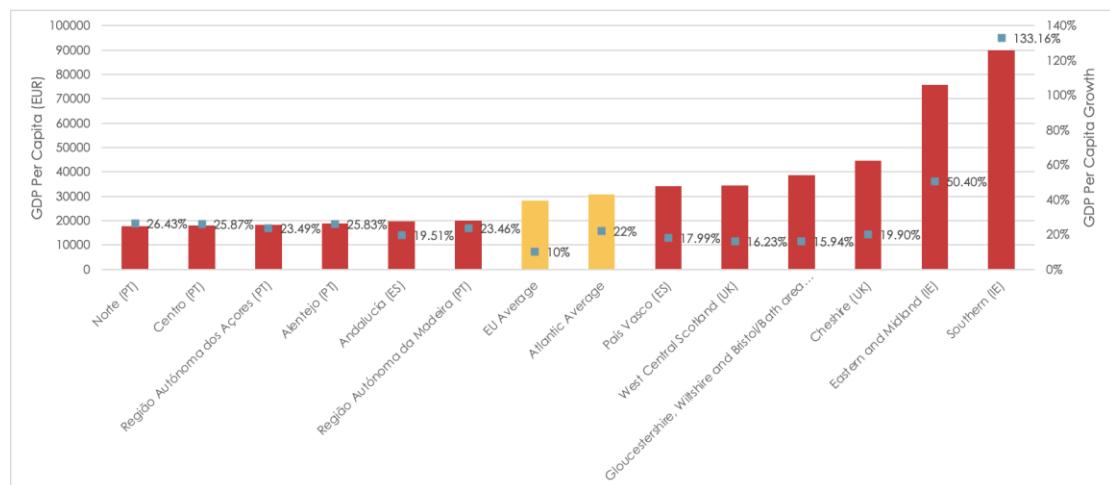


Figure 30 Top and bottom GDP per capita (2019) and GDP growth (2015-2019) in Atlantic regions (NUTS2)

Source : Eurostat

The entrepreneurial activity in the Atlantic basin is dynamic (more than the EU average) but shows heterogenous trends across the basin. Ireland, despite displaying the highest GDP per capita, has the lowest enterprise birth rate (5.35) - roughly half of the basin average rate. On the contrary, Portugal has an enterprise birth rate of 15.78 %, which confirms that the enterprise birth rate is not a determinant of the GDP per capita and GDP growth. The remaining countries are clustered in and around the basin average, with rates between 9.36 % (Spain) and 13.46 % (UK).

However, when comparing cities for start-up activity since 2015 Dublin, dwarves the cities for which data was collected in the Atlantic area with 917 start-ups.

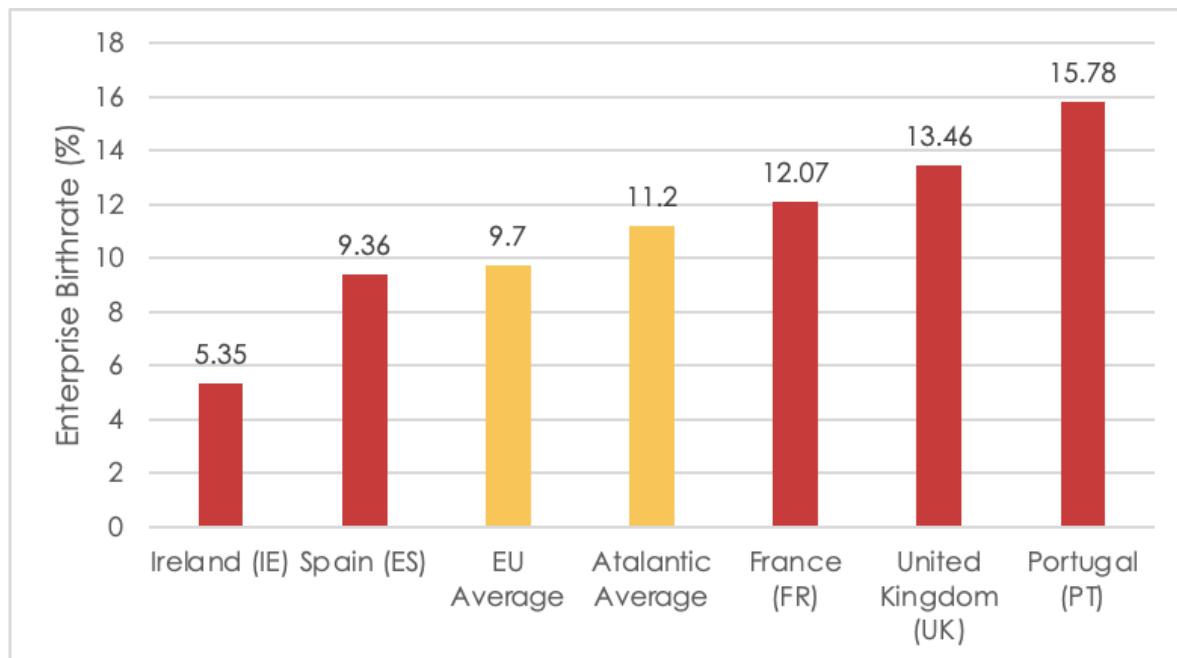


Figure 31 Top and bottom enterprise birth rate in Atlantic countries (national)

Source : Eurostat

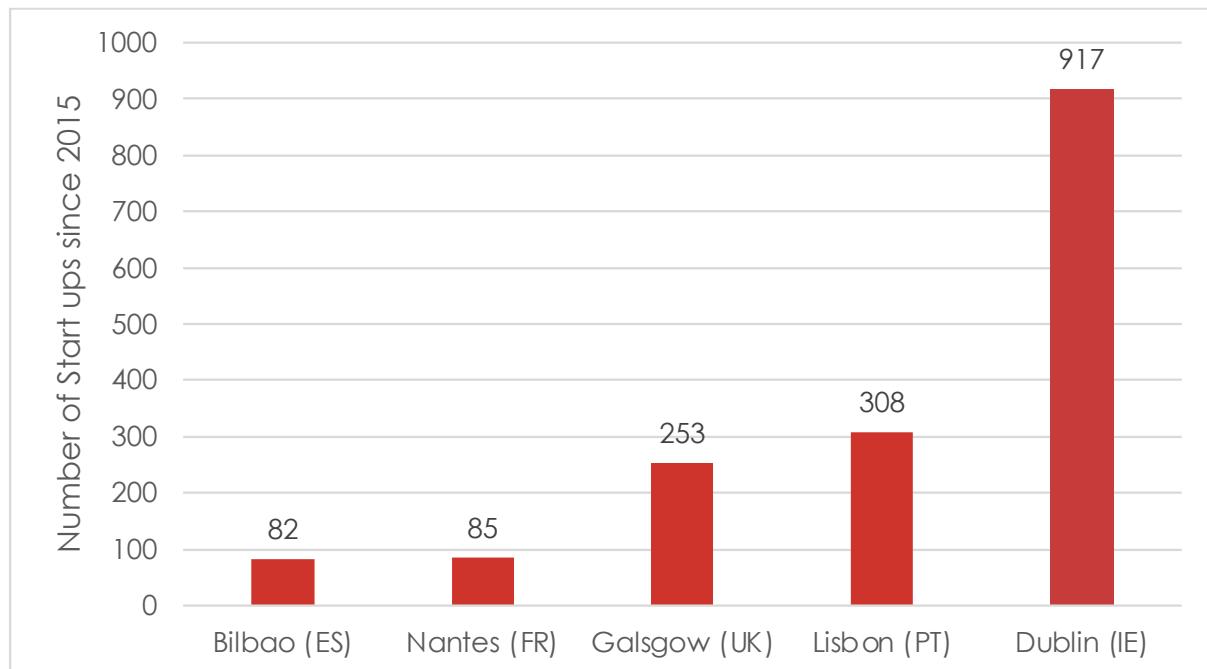


Figure 32 Top and bottom start-up activity in Atlantic regions (City level)

Source : Technopolis Group based on Crunchbase

The labour market of the Atlantic basin is heterogenous, showing some disparities with respect to tertiary education attainment, employment rate and dependency ratio.

The age dependency ratio refers to the imbalance between the number of older citizens (assumed inactive) and active citizens – it notably spots issues related to population ageing. Portugal (34.5 %) has the highest dependency ratio, followed by France (33.1 %), while Ireland (22.1 %) has the lowest dependency ratio of the basin.

Ireland is also an outlier for tertiary education attainment – it is the only country of the Atlantic basin with more than half of its population having graduated from tertiary education (58.4 %). The UK and France are the next highest with 49.4 % and Portugal has the lowest tertiary attainment (41.9 %). Hence, the UK and Ireland have a highly educated labour force with little age dependency, while in comparison, Portugal is a country with a less educated labour force and a higher age dependency. At the basin level, the tertiary education attainment is higher than at the EU level (49.3 % versus 40.5 %)

In terms of employment, the basin has an average employment rate of 53.6 % with the UK (60 %), Ireland (58 %) and Portugal (54 %) the only nations with an employment rate of 50 % or higher. France (49 %) and Spain (47 %) lie just below 50 %.

At the regional level, unemployment and youth unemployment indicators follow similar trends. The Spanish regions display the highest unemployment and youth unemployment rates with all Spanish regions falling above the Atlantic average. Moreover, five regions out of the six worst unemployment rates are Spanish, and Andalucia and Canarias showcase the highest unemployment rates among the whole basin, with respectively 22.3 % and 22.6 % for the population, 17.7 % and 16.8 % for the youth. The UK has the lowest percentage for both youth and overall unemployment, with all regions displaying lower-than-average unemployment rates and five regions among the top performers for youth unemployment.

At the basin level, the unemployment issue does not seem to be more severe among the youth than for the overall population, with rates that appear to be similar: 7.2 % for the population versus 7.7 % among the youth.

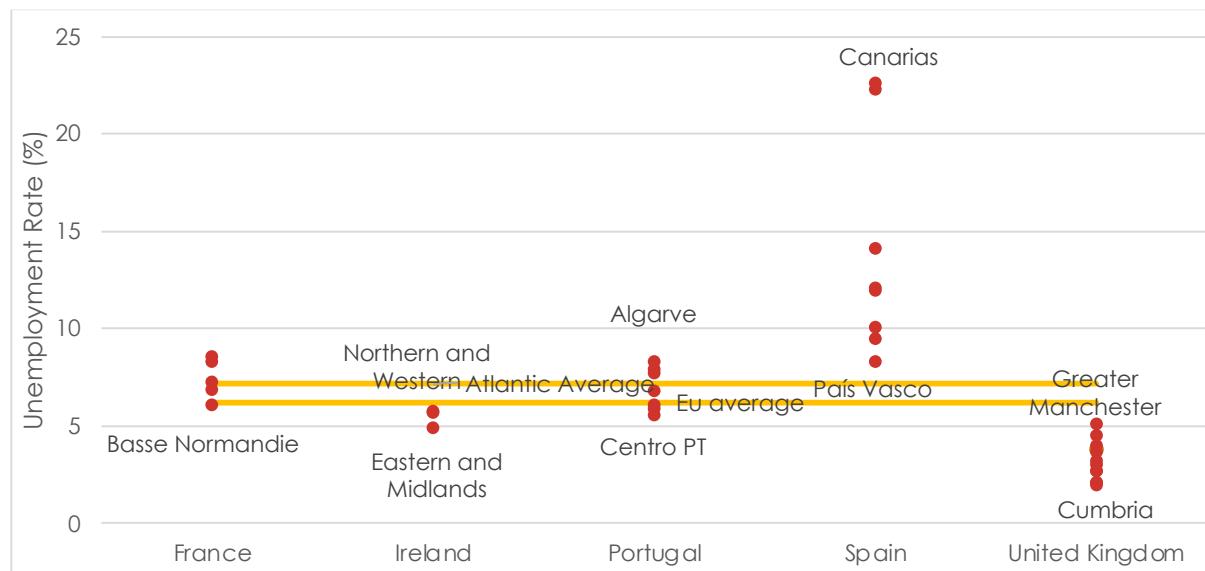


Figure 33 Distribution of unemployment rate in Atlantic regions (NUTS2) per country

Source : Eurostat

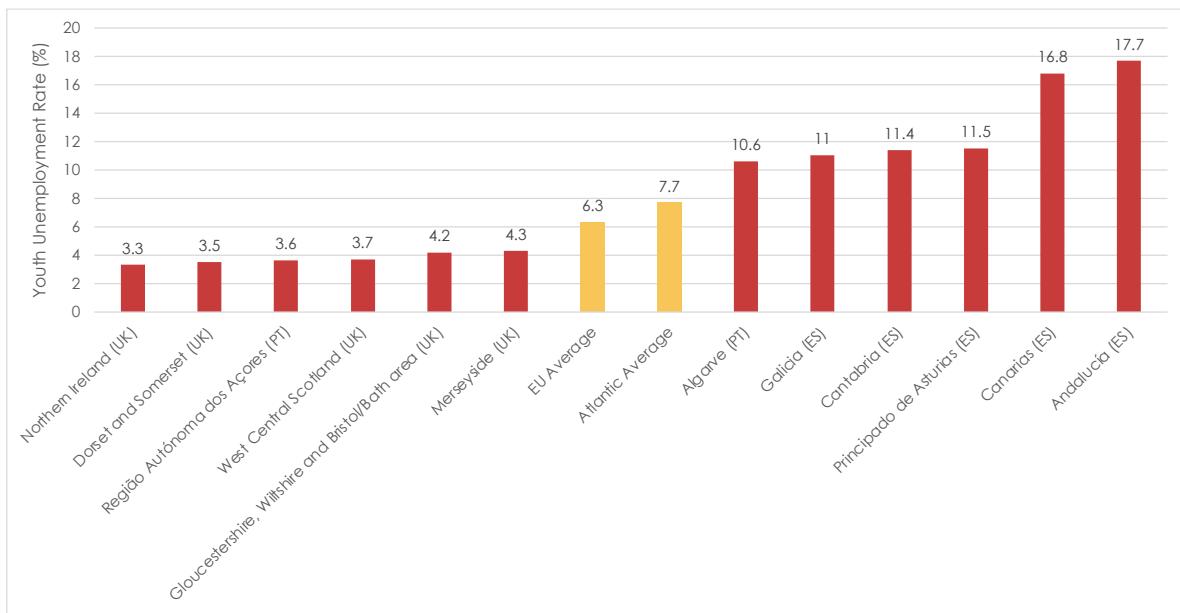


Figure 34 Top and bottom youth unemployment rate in Atlantic regions (NUTS3)

Source : Eurostat

The Atlantic basin has high levels of material and social deprivation with 13.85 % of the population of the basin not having their basic needs met. This is almost twice the EU average level of 7.8 %. There is homogeneity in the material and social deprivation rate in the Atlantic basin, with all countries clustering around the average. Portugal (12.7 %) has the lowest value while Spain has the highest (15.4 %).

In terms of at-risk-of-poverty rate, the disparities between the regions are more significant – with a 20 % gap between the top and the bottom region: 29.9 % of Canarias' population is at-risk of poverty, versus only 9.9 % in the Community of Navarra. Interestingly, both regions are located in Spain, showing that the disparities are specific to the country rather than to the Atlantic basin. At the basin level, the population at-risk of poverty is slightly higher than the EU. It is important to note that there is missing data for France and the UK, as at-risk-of-poverty rates are not published on Eurostat at regional level for these countries.

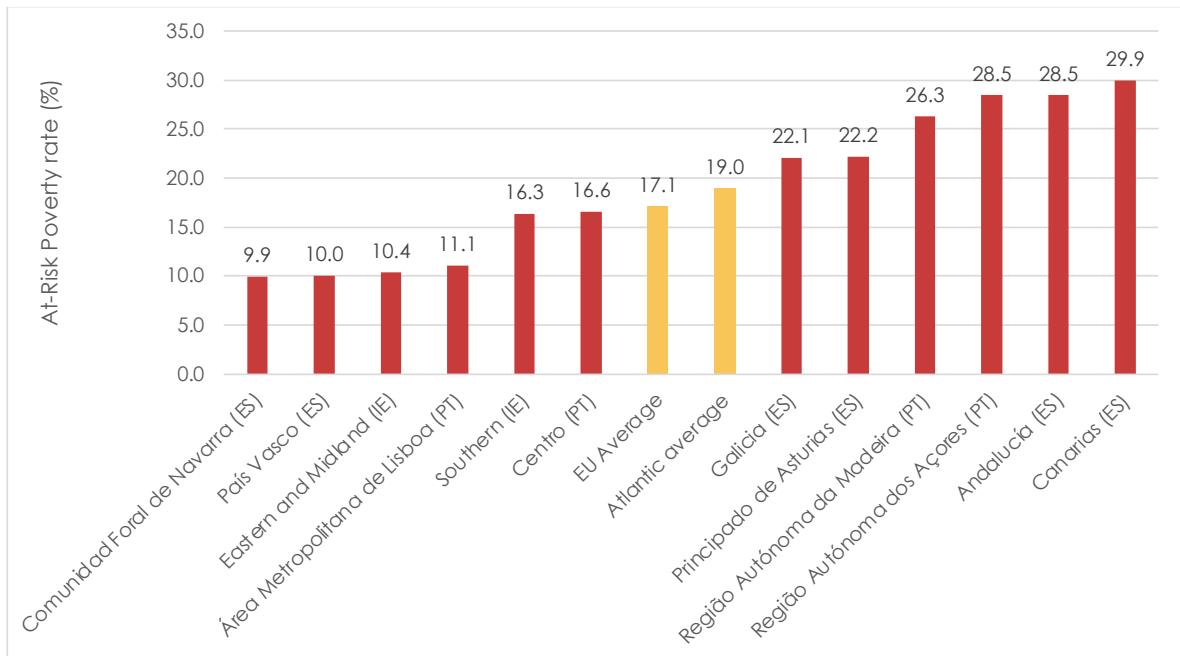


Figure 35 Top and bottom at-risk-of-poverty rate in Atlantic regions (NUTS2)

Source : Eurostat ; Data for France and UK are not available at regional level

In summary, the table below provides an aggregated overview of the Atlantic regions' socio-economic status. As illustrated in the table below, 68 % of the regions are below the mean for GDP per capita, and the distance from the average GDP per capita to the top performance is very high. The top performer regions are Southern Ireland, and Eastern and Midland Ireland, which have a GDP per capita that is triple (Southern

Ireland) and more than double (Eastern and Midland) the size of the average. However, if we disregard the two top performing regions, the rest of the Atlantic area regions are relatively close in terms of GDP per capita levels, which rather signals relatively moderate disparities in terms of economic welfare in the Atlantic area overall. Nevertheless, roughly 60 % of the regions in the Atlantic area are falling below the mean for unemployment rate and at-risk poverty rate. It is important to note, as discussed above, both rates are already above EU average, which shows structural weaknesses in the Atlantic regions' economies. There is clearly a **North-South divide**, with the majority of above-average performing regions (in terms of GDP per capita, but also generally lower unemployment) being located in the UK and Ireland.

Atlantic	GDP Per Capita	Unemployment Rate	At-Risk-of Poverty
Average (mean)	30 826.74	7.16	18.96
% Above	32 %	38 %	41 %
% Below	68 %	62 %	59 %
Top Performers	90 000 to 32 100	2 to 3.8	9.9 to 11.1
Above Average Performers	29 000 to 31 848		
	4 to 5.7	16.3 to 18.1	
Disadvantaged performers	23 900 to 28 769	6.1 to 7.9	18.1 to 22.1

Table 6 Aggregated status of the cohesion/socio-economic disparities for regions in the Atlantic basin

Source : Technopolis Group based on Eurostat

Looking at the individual performance groups, it appears that the majority of bottom performers are regions in Spain and Portugal, including five regions from Spain : Galicia, Asturias, Cantabria, Andalucia and the Canarias. The other four regions come from Portugal: Norte, Algarve, Madeira and Acores. Many of these regions had a low GDP per capita and high unemployment rate.

Those who are considered disadvantaged are the regions which consistently score in the 50th to 74th percentile for unemployment rate and at-risk poverty, while for GDP per capita it is 25th to 49th. It consists of three French regions, one Irish, three Portuguese and one from the UK.

Basse-Normandie in France is disadvantaged in both GDP per capita and unemployment rate. Haute-Normandie is in the worst performers for unemployment rate but above median for GDP; the same occurs for Poitou-Charentes.

Three Portuguese regions of Centro, Alentejo and Lisbon are part of the advantaged regions. Centro and Alentejo both are in the bottom performers for GDP per capita among the Portuguese regions, while above the median for at-risk poverty rate. Lisbon, on the other hand, is a top performer for at-risk poverty but is disadvantaged for GDP and unemployment.

Northern and Western Ireland is above the median for GDP per capita and unemployment rate but disadvantaged in terms of at-risk poverty rate. West Wales and The Valleys is disadvantaged for GDP per capita and above the median for unemployment rate.

Those who are considered above average score in the 50th to 74th percentile for GDP per capita and 25th to 49th percentile for unemployment rate and at-risk poverty. It consists of two Spanish regions, two French regions, one Irish and three from the UK.

Top performing regions are those who lie in the 75th to 100th percentile for GDP and 1st to 24th percentile for unemployment and at-risk poverty. It consists of one Irish region: Eastern and Midland. The remaining regions are from the UK : Cumbria, Greater Manchester, Lancashire, Cheshire, Dorset and Somerset, West and Central Scotland, Northern Ireland and Gloucestershire, Wiltshire and Bristol/Bath area. The only below average performance these regions had is for unemployment rate.

PERFORMANCE GROUP	NUTS CODE	REGION NAME	COUNTRY
Socio-economic bottom performers	ES12	Principado de Asturias	Spain
	ES61	Andalucía	Spain
	ES70	Canarias	Spain
	PT20	Região Autónoma dos Açores	Portugal
	PT30	Região Autónoma da Madeira	Portugal
	ES11	Galicia	Spain
	ES13	Cantabria	Spain
	PT11	Norte	Portugal
	PT15	Algarve	Portugal
Socio-economic disadvantaged regions	FRD1	Basse-Normandie	France
	FRD2	Haute-Normandie	France
	FRI3	Poitou-Charentes	France
	PT16	Centro (PT)	Portugal
	PT18	Alentejo	Portugal
	UKL1	West Wales and The Valleys	United Kingdom
	IE04	Northern and Western	Ireland
	PT17	Área Metropolitana de Lisboa	Portugal
Socio-economic above average performers	ES21	País Vasco	Spain
	ES22	Comunidad Foral de Navarra	Spain
	FRG0	Pays de la Loire	France
	FRI1	Aquitaine	France
	UKD7	Merseyside	United Kingdom
	UKK3	Cornwall and Isles of Scilly	United Kingdom
	UKK4	Devon	United Kingdom
	IE05	Southern	Ireland
Socio-economic top performers	UKD1	Cumbria	United Kingdom
	UKD3	Greater Manchester	United Kingdom
	UKD4	Lancashire	United Kingdom
	UKK2	Dorset and Somerset	United Kingdom
	UKM8	West Central Scotland	United Kingdom
	UKN0	Northern Ireland	United Kingdom
	IE06	Eastern and Midland	Ireland
	UKD6	Cheshire	United Kingdom
	UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	United Kingdom

Table 7 List of regions by grouped by socio-economic performance in the Atlantic area

Source : Technopolis Group

3.5. R&I performance in the Atlantic Area

Research and innovation (R&I) plays an essential role as a catalyst for smart and sustainable growth and job creation. By creating new knowledge, research is essential to developing new and innovative products, processes and services, which enable higher productivity, industrial competitiveness, and ultimately prosperity. The Atlantic basin shows **high levels of disparity in terms of R&I activity** with some nations and regions clearly lagging, while others are consistently among the top performers.

When evaluating regional indicators that show the inputs into R&I, the results vary widely. Portuguese regions are consistently lagging in performance showing a less developed innovation ecosystem.

At the national level, the United Kingdom and France are the leaders in terms of Business Expenditure in R&D (BERD) with respectively 1.19 % and 1.44 % of GDP. They score well above the basin's average (0.99 %), and France has roughly double the BERD in comparison to Spain (0.7 %) and Portugal (0.74 %).

Regional Government Expenditure on R&D (GERD) also shows a wide variance within the basin and even within countries. The UK, Spain and Portugal all have regions in the top and bottom six regions in terms of GERD. There is a wide range between the highest-ranking Cheshire (2.37 %) and Açores (0.3 %). In fact, none of the bottom six regions' performance is half of the basin average, indicating large differences in public funding for research between regions.

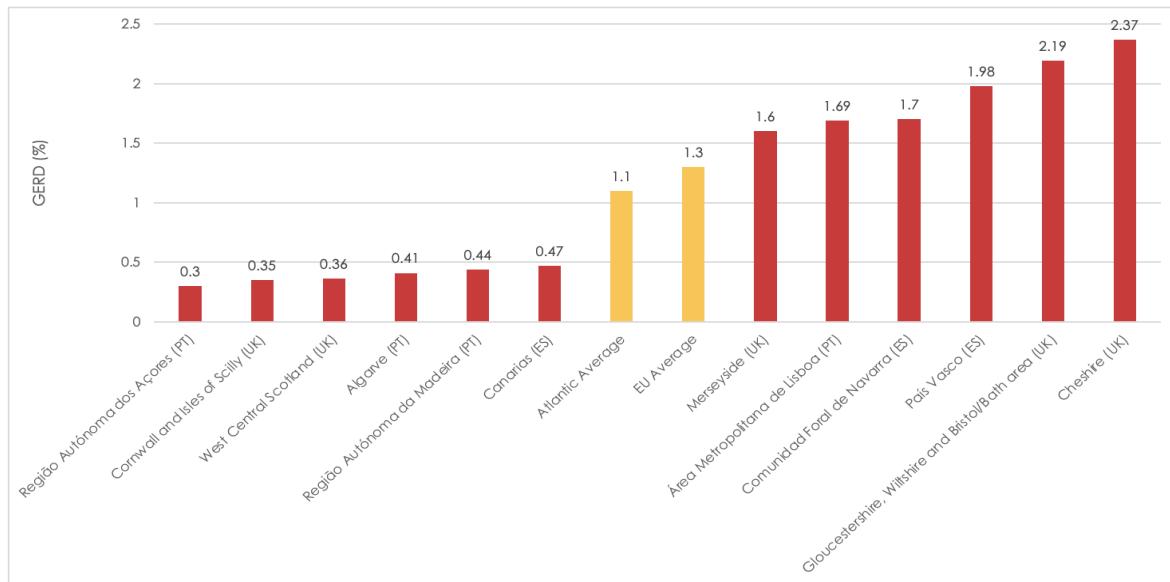


Figure 36 Top and bottom Government Expenditure in R&D (as % of GDP) in Atlantic regions (NUTS2)

Source : Technopolis Group based on Eurostat

Similarly, the Human Resources in Science and Technology (HRST) display wide disparities in the basin, although the Atlantic basin average (47.8 %) is just above the EU average (46.3 %). Portugal is particularly lagging behind with six out of the seven Portuguese regions within the bottom six. The lowest regions, Açores (26.9 %), is 34 % away from the top performing region, Eastern and Midlands (61.4 %). It is interesting to note that **the basin average is closer to the top 6 regions than to the bottom 6 regions' rates, showing that the outliers in this case are rather the low-scoring regions**. Interestingly, many of the regions which have a high GERD rate also have a high HRST rate.

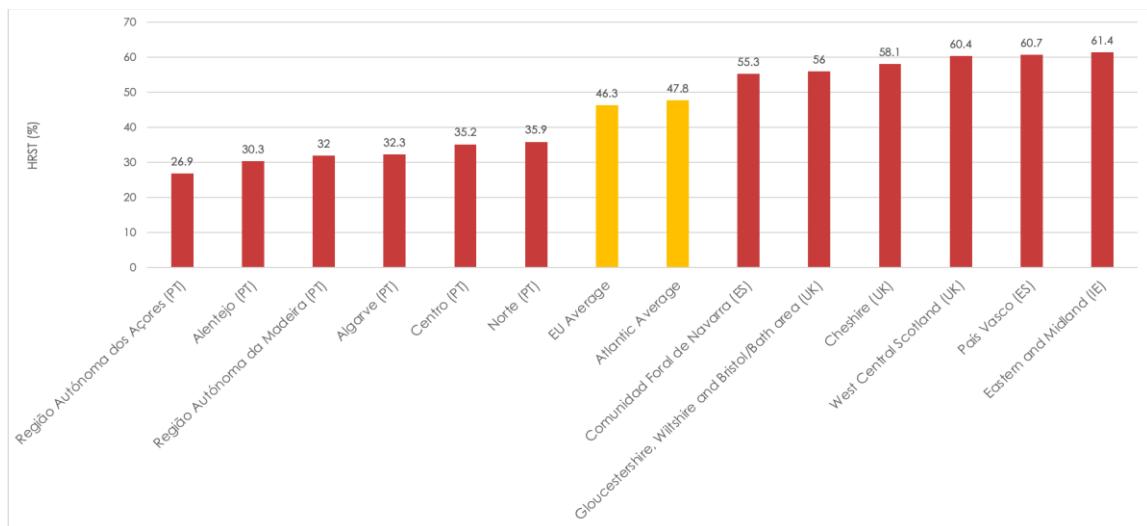


Figure 37 Top and bottom Human Resources in Science & Technology in Atlantic regions (NUTS2)

Source : Technopolis Group based on Eurostat

The Atlantic basin scores are quite similar in terms of the Global Innovation Index and Regional Innovation Scoreboard. However, Portugal does fall behind. For the Global Innovation Index the range between Portugal (44.2) and the United Kingdom (59.8) is 15.6, while the average for the basin is 51.02.

When comparing NUTS2 regions' performance through the Regional Innovation Scoreboard, a similar pattern emerges. The Atlantic region itself has a smaller mean (93.4) than the EU performance that has been normalised to 100. Ireland and the UK have the majority of their regions above the EU average with Southwest UK (124.7) having the highest score for the UK and East and Midland (114.87) having the highest score for Ireland. Spanish and French regions are below the EU performance. Madera and Açores (Portugal) have the joint lowest score of the basin (46). Notably, Portugal is also the only country with all its regions below the Atlantic average.

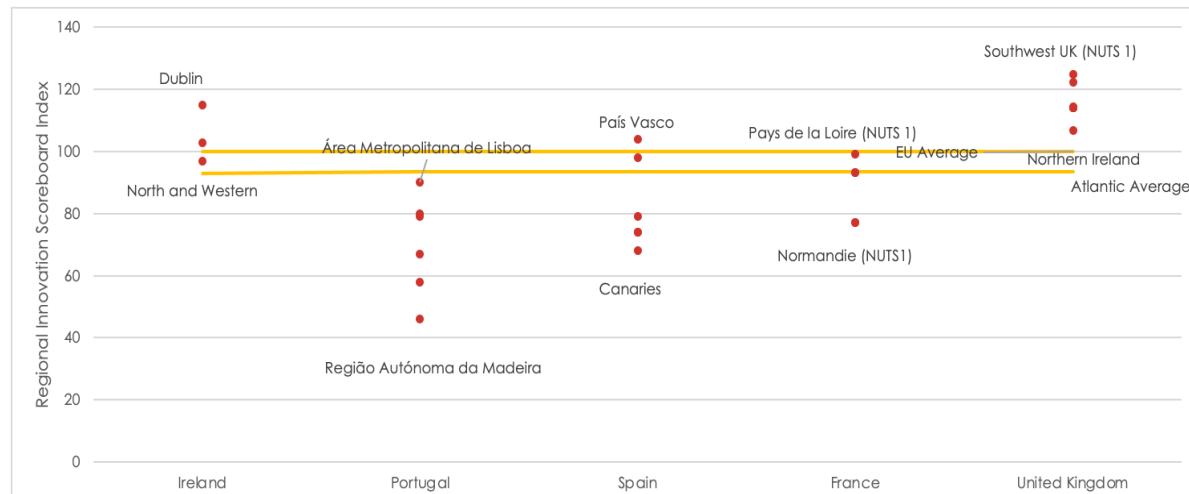


Figure 38 Distribution of Regional Innovation Scoreboard performance in Atlantic regions (NUTS2)

Source : Technopolis Group based on European Commission, Regional Innovation Scoreboard 2021

Knowledge production in the basin is highly dispersed among the NUTS 3 regions. Much of it occurs in France, Ireland and the UK, while Spain and Portugal lag behind. Knowledge production within the basin takes place, although to a very limited extent, in most NUTS 3 regions with only four Spanish regions not having produced any patents, and only one region, El Hierro, not having produced any publications nor patents. However, on average the Atlantic basin does fall below the EU average for patents produced. Spanish, Portuguese and UK regions are the only nations that have regions that appear as worst performers in both patents and publications. This shows the disparities occurring within UK regions in terms of knowledge creation, as despite being a top performer in most R&I indicators, UK has regions with almost no R&I activity.

Dublin (2 141) is the outlier with regard to patents, with almost 900 more patents than any other region in the basin. The next top-performing regions in terms of patents' production are Bath, Somerset and South Gloucestershire in UK (1 215) and Gironde in France. Dublin is also the only region that is one of the best performers for both publications and patents.

In terms of specialisation, one can observe that the **UK regions produce the most publications while the French regions produce patents**, indicating that UK regions are rather more specialised on basic research, stemming from the academic environment, while French regions are more specialised on technological or industrial research, which result in patents. In comparison to patents, publications are much more evenly spread among the top performing regions, in the sense that there is not one region which outperforms all the others. Lisbon (35 958 patents) is the only region from Spain or Portugal to appear as a top performer in either of the knowledge production indicators.

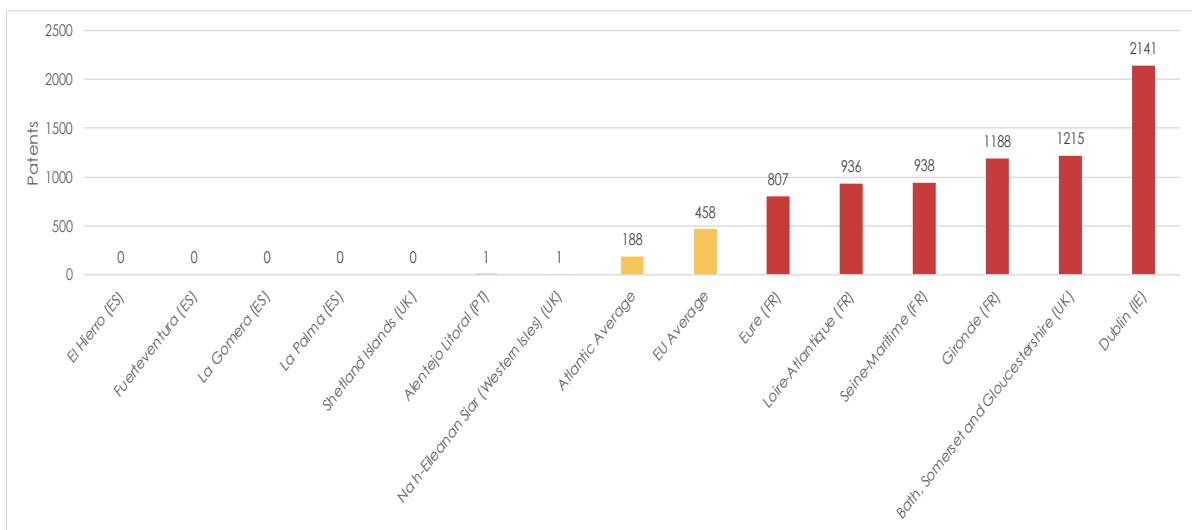


Figure 39 Top and bottom number of patents per Atlantic region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2021)

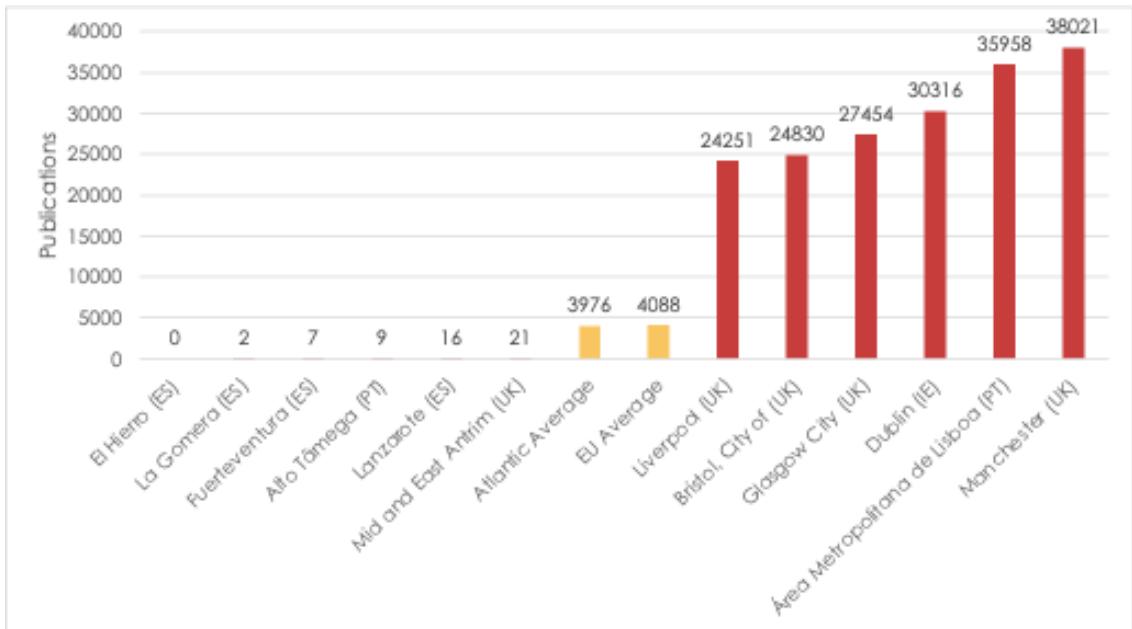


Figure 40 Top and bottom number of scientific publications per Atlantic region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2021)

The participation in European R&I initiatives shows large disparities between the top regions and the rest of the regions, although the majority of the regions are less connected in general. Dublin again is a front runner for being involved in EU H2020 projects (802) and R&I networks (7). The Spanish region of Bizkaia also appears in both H2020 (619) top regions and R&I networks (9) top participants. However, Portuguese regions appear to be the best for participation in European projects and initiatives in the basin, with both Porto and Lisbon appearing in the top regions for the two indicators, with the latter having the highest number of H2020 projects at 932. French and UK regions on the contrary underperform and appear to be the least connected in both indicators. For the UK, this can be explained by the fact it is not part of the European Union.

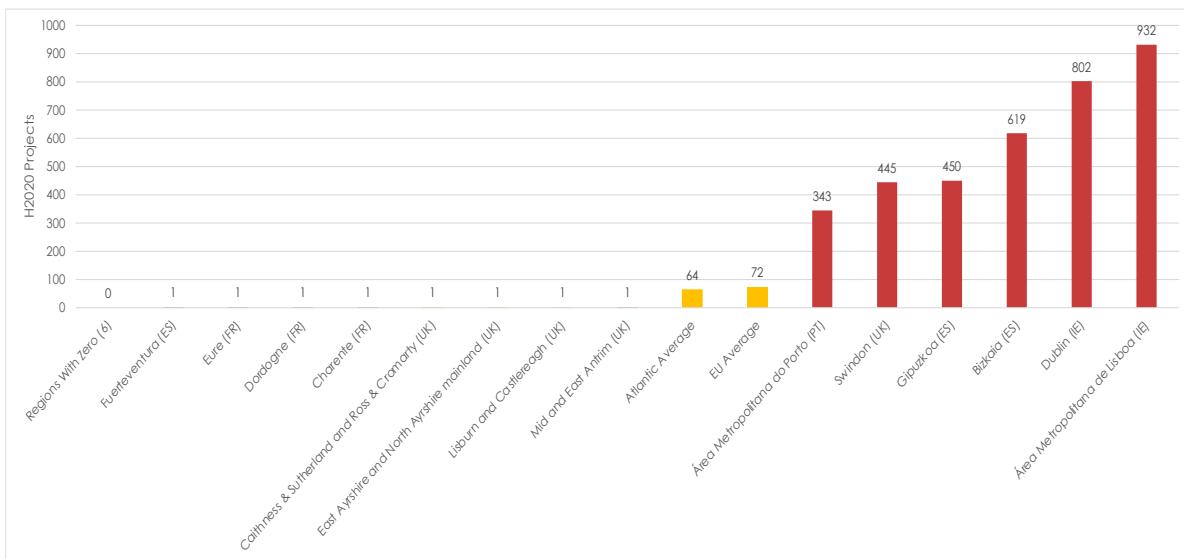


Figure 41 Top and bottom number of participations in H2020 projects per Atlantic region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2021)

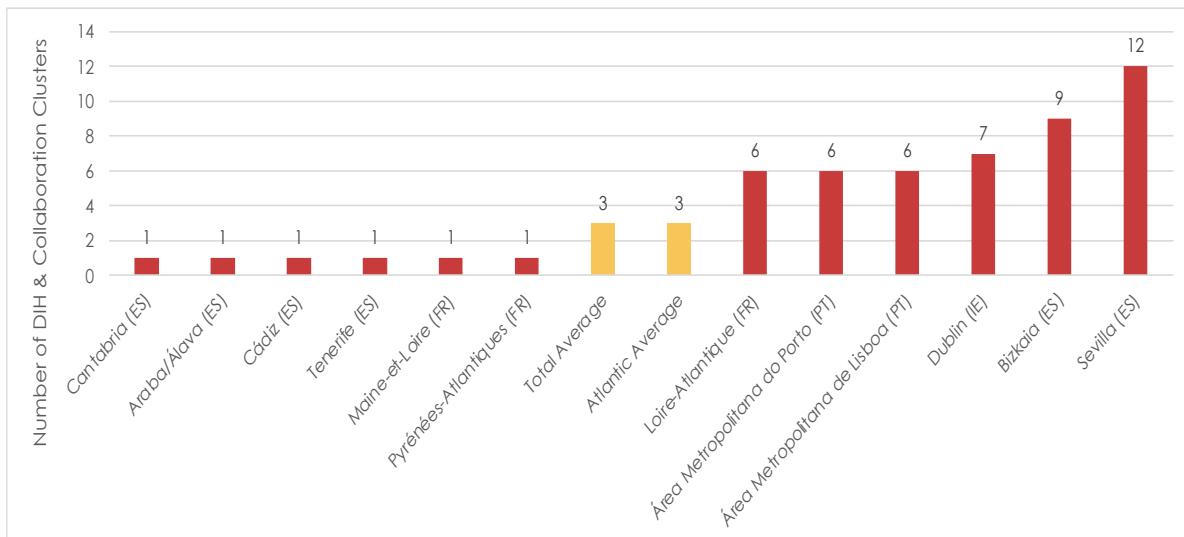


Figure 42 Top and bottom number of participations in DIH and collaboration clusters per Atlantic region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2021)

The table below provides an overview of the regions' connectedness to EU R&I networks, and performance in terms of R&I inputs and R&I outputs. As mentioned in this section, there are high disparities within countries between top and bottom performers in terms of GERD and HRST but looking at the level of the Atlantic area as a whole, **the region is well distributed in terms of R&I inputs such as GERD (but not for HRST), and the general score on the Regional Innovation Scoreboard**. In terms of outputs of knowledge production, the majority are observed in France, Ireland and the UK, while Spain and Portugal lag behind. However, it is striking that **only 29 % of the regions have acquired a number of H2020 projects higher than the Atlantic average, and only 32 % of the regions have more than four EU structures represented in their region** (mainly EU Digital Innovation Hubs and clusters participating in the European Clusters Collaboration Platform). Thus, as for the majority of the lighthouse areas, **we can speak more of 'R&I Hubs' instead of regions that are disadvantaged in terms of R&I networks, as the latter seem to make up most of the regions in the Atlantic Basin.**

Atlantic	Gross R&D expenditure per inhabitant and as % of GDP (GERD)	Human resources in science and technology (HRST)	Regional Innovation Scoreboard index	H2020 Projects	Number of patents	Number of publications	Participation in EU R&I networks and structures
Average	1.12	47.83	93.41	260	738	16505	4
Share Above Average	46 %	65 %	53 %	29 %	35 %	38 %	32 %
Share Below Average	54 %	35 %	47 %	71 %	65 %	62 %	68 %
Worst Performing Regions	0.3 to 0.78	26.9 to 46.81	46 to 77	10 to 63	2 to 151	526 to 6 095	0
Disadvantaged Regions	0.79 to 0.97	46.82 to 49.94	78 to 97	64 149	152 to 507	6 096 to 13 023	0 to 2
Above average Regions	0.98 to 1.52	49.95 to 51.97	98 to 114	150 to 133	5 078 to 868	13 024 to 24 486	2 to 4
Top regions	1.53 to 2.37	51.98 to 61.4	115 to 125	134 to 1145	869 to 2 947	24 487 to 65 186	5 to 31

Table 8 Aggregate status of the R&I disparities for the Atlantic regions

Source: Technopolis Group based on Eurostat

At the individual level, however, there are very diverse patterns of performance in fact, with a diversity of combinations in terms of results for R&I inputs, outputs and connectedness, especially when talking about the R&I disadvantaged areas (see table below):

Among the regions, Galicia in Spain is considered a top performer in EU R&I networks and structures and is above the average for H2020 projects and publications. However, it is less performant for GERD, HRST and the regional innovation scoreboard. A similar Spanish region is Asturias. Showing an opposite pattern, West Wales and The Valleys, UK, are two other NUTS 2 regions which perform well in some aspects such as regional innovation scoreboard, GERD and publications; however, they are considered a disadvantaged region for HRST, H2020 projects, patents and participation in EU R&I networks and structures. The other regions from the UK that are disadvantaged were Dorset, Somerset and Devon.

Northern and Western Ireland region is above average for HRST, H2020 projects and number of patents; however, for the other selected R&I indicators they are considered disadvantaged. Centro, Portugal, performs well for participation in EU R&I networks and structures and is above average for publications and H2020 projects; however, is one of the worst regions for HRST.

In France, the regions Basse-Normandie and Haute-Normandie can be considered more disadvantaged areas in terms of R&I connectedness. Both scored well in patents with the number of patents, with Haute-Normandie being one of the top performers. However, they were both some of the worst performers for H2020 projects and are disadvantaged for the remainder.

We considered regions who consistently scored in the 50th to the 74th percentile as performing well. It consisted of two Spanish regions, two Portuguese regions and four regions from the UK.

The top performing regions consistently scored in the 75th to 100th percentile. It consisted of: one Spanish region, The Basque country; two French: Aquitaine and Pays de la Loire; two Irish: Southern, and Eastern and Midland; the remaining three from the UK: Greater Manchester, Merseyside and Gloucestershire, Wiltshire and Bristol/Bath area. Portugal had none of its regions in the top performers.

PERFORMANCE GROUP	NUTS CODE	REGION NAME	COUNTRY
R&I bottom regions	PT20	Região Autónoma dos Açores	Portugal
	PT30	Região Autónoma da Madeira	Portugal
	PT15	Algarve	Portugal
	PT18	Alentejo	Portugal
	ES13	Cantabria	Spain
	ES70	Canarias	Spain
	UKD1	Cumbria	United Kingdom
	UKK3	Cornwall and Isles of Scilly	United Kingdom
	FRI3	Poitou-Charentes	France
R&I disadvantaged regions	ES12	Principado de Asturias	Spain
	FRD1	Basse-Normandie	France
	UKK2	Dorset and Somerset	United Kingdom
	FRD2	Haute-Normandie	France
	UKK4	Devon	United Kingdom
	IE04	Northern and Western	Ireland
	ES11	Galicia	Spain
	PT16	Centro (PT)	Portugal
	UKL1	West Wales and The Valleys	United Kingdom
R&I above average regions	ES61	Andalucía	Spain
	UKD4	Lancashire	United Kingdom
	UKN0	Northern Ireland	United Kingdom
	ES22	Comunidad Foral de Navarra	Spain
	UKD6	Cheshire	United Kingdom
	PT11	Norte	Portugal
	UKM8	West Central Scotland	United Kingdom
Top performing R&I regions	FRI1	Aquitaine	France
	PT17	Área Metropolitana de Lisboa	Portugal
	UKD7	Merseyside	United Kingdom
	FRG0	Pays de la Loire	France
	IE05	Southern	Ireland
	UKD3	Greater Manchester	United Kingdom
	ES21	País Vasco	Spain
	UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	United Kingdom
	IE06	Eastern and Midland	Ireland

Table 9 List of Atlantic area regions grouped by R&I performance

Source: Technopolis Group

4. DANUBE BASIN

4.1. Geographical and natural characteristics

The Danube is the second largest river basin in Europe, with a total area of 801 463 km². It contains various countries from Central to Eastern Europe EU and non-EU countries : Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, Ukraine. Its major river is the Danube which flows through nine countries from the Black Forest to the Black Sea, making the river the most international river of the world. With a length of 2 857km, the river flows through varied landscapes, from high mountainous areas to lowlands and before entering the Black Sea, forming one of the greatest marshlands of Europe with a size of 6 500km², the Danube Delta.

The river provides a great number of resources, like freshwater (both for human consumption and irrigation), fish, hydropower and resources also for tourism with its picturesque landscapes in mountainous, hilly and flat areas with forests, national parks, urban and rural regions. The Danube and some of its major tributaries (such as Inn, Morava, Drava, Sava, Tisza) also serve as major infrastructure for cargo and civilian transportation⁴³. In terms of “coastlines”, this region is more complex than others as the waters of interest are not that concrete as in the case of seashores. Rivers and waters/wells that feed them are interconnected on surface and underground which makes these ecosystems more complex to measure in length and in territory.

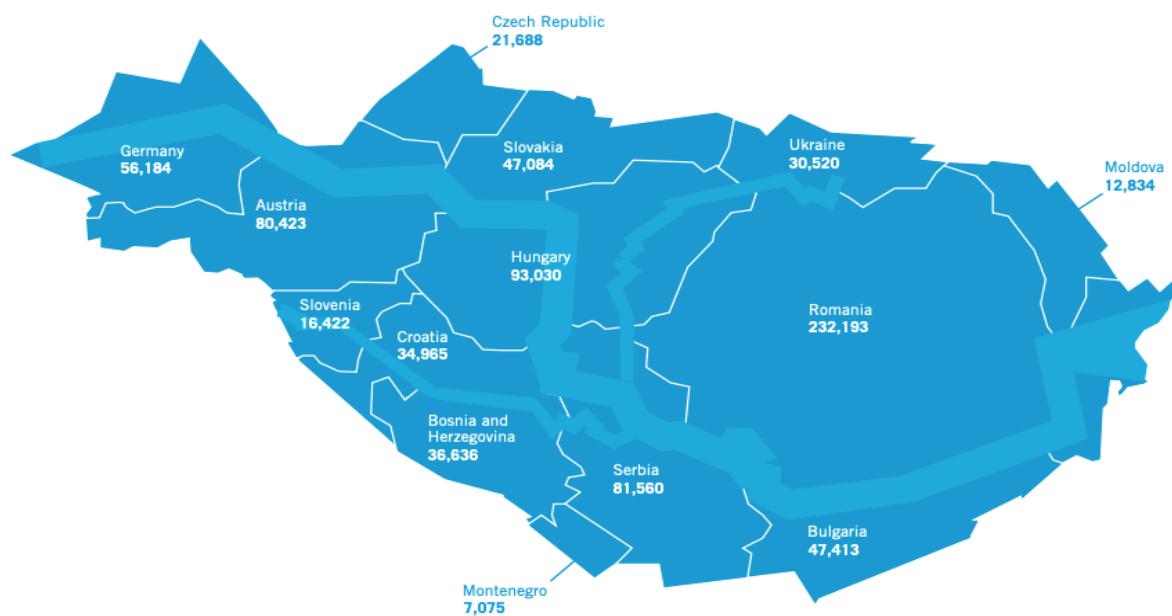


Figure 43 Countries covered by the Danube Basin

Source: ICPDR, The Danube River Basin Facts and Figures,
https://www.icpdr.org/main/sites/default/files/nodes/documents/icpdr_facts_figures.pdf ; Note: the figures in the above map relate to the surface covered (km²).

4.2. Policy context and governance analysis

The Danube Basin Area is covered by the Danube Region Strategy (EUSDR), which was the result of a consultation process with stakeholders from different backgrounds and levels: the EU (European Commission), partner countries' representatives and experts. Since 2018, the Danube Strategy Point provides the secretariat to the strategy implementation and dialogue⁴⁴. Another transnational body active in the Danube region is the International Commission for the Protection of the Danube River (ICPDR). It was established to implement the Danube River Protection Convention. It has 14 countries as signatories and the European Union⁴⁵.

As the Danube region is composed of States organised in diverse political systems, the local and regional governance capacities vary. According to the European Regional Competitiveness Index⁴⁶, the best

⁴³ ICPDR, 2022: [River Basin | ICPDR - International Commission for the Protection of the Danube River](#).

⁴⁴ [Governance - EUSDR - Danube Strategy Point \(danube-region.eu\)](#)(2020).

⁴⁵ [About Us | ICPDR - International Commission for the Protection of the Danube River](#) (2004).

⁴⁶ [European Regional Competitiveness Index - Regional Policy - European Commission \(europa.eu\)](#)(2020).

performing regional institutions are in Germany and Austria (average 69 and 68 points respectively) while the lowest average scores are in Bulgaria and Romania (6.6 and 14.6 respectively).

As they address the challenges of different geographic levels and aim to develop coherent and holistic policies, RIS3 strategies in the Danube region were issued at national and regional levels in the framework of the Smart Specialisation initiative. The objective of that initiative is to support regions in specialisation, to help policy makers define their regional competitive advantages and identify market opportunities, to communicate potential synergies, cross-cutting policy solutions and to maximise the positive impact of public and private financial expenditure.

Among the observed EU countries, Austria and Romania have NUTS 2 Smart Specialisation regional strategies, and related governance bodies, while in Germany regional strategies are developed at the NUTS1 level. Czechia, Slovakia, Croatia and Hungary have only national strategies.

Common challenges to different countries and regions are climate change, ageing population and the pandemic, but certain aspects of the strategies vary depending on the type of region (rural-urban), on the GDP level, structure of the state (centralised-decentralised) and also on the political demand of the people.

From the information available of Central Eastern or Eastern EU countries' RIS3 strategies, (Czechia, Hungary and Romania), commonly described weaknesses are the low innovation performance of local businesses, inadequate efficiency and effectiveness of public administration, incomplete infrastructure, unstable and unpredictable business and policy environment, lack of certain skills, low international embeddedness of local SMEs, low level of cross-sectoral and interdisciplinary cooperation. In addition, most of the countries highlighted in their Recovery and Resilience Plans (RRF)⁴⁷ the need for a nature monitoring system (biodiversity, water treatment, circular economy).

4.3. Demographic background

The Danube basin has always served as a cultural hub, with rivers having central roles in history and connectivity of the region. The Danube River itself connects different European cultures and people flowing through nine European countries. Being a home to 115 million people⁴⁸ who speak different languages and have different interests from 14 countries, it is of crucial importance to commonly approach all generations on the importance of protecting our common resources and how to value nature.

Between 2015 and 2020, the population of the Danube area had a slight average growth of 0.4 % which is above the EU average of 0.01 %, but with various realities in the different regions and countries. One can also observe that in the higher income countries of the Danube region, the average population growth is 3 %⁴⁹. On the other hand, there is a 3 % average decrease in the population in countries with a GDP per capita below EUR 20 000.

Some regions suffered a significant decrease of population (11 % in Vidin, Bulgaria, 9 % in Teleorman, Romania) while some regions had significant growth (9 % in Landshut, Germany, 8 % in Regensburg, Germany, 13 % in Ilfov, Romania). Most of the regions with growth are in higher income regions or around capital city regions, like Pest (Budapest), Vienna, Bratislava, Ilfov (Bucharest). Similarly, in Bulgaria the only region with a (slightly) positive population growth was the capital region, while other regions' populations declined significantly. Further centralisation of population can be observed in Slovakia and in Hungary as well, where regional differences are high: 7.11 % growth in Bratislava compared to an average population stagnation in other Slovakian regions, and a population increase of 5.79 % in Pest and of 4.53 % in the city region of Győr-Moson-Sopron, versus an average 2.52 % decrease in the rest of Hungary.

At the national level, the average growth in population of Austrian NUTS3 regions was 1.92 % over the past five years, and 3.81 % for German regions. At the same time, Bulgaria has an average negative population growth in its NUT3 regions of -6.32 % (Hungary: -1.75 %, Romania -3.3 %). It is partially caused by emigration, by the low birthrate and by an ageing population. Among countries with GDP per capita lower than EUR 20 000, only Slovakia shows an average population stagnation due to the high growth rate of Bratislava (while the regions outside the capital display negative growth). Slovenia and Czechia have a stagnating average population as well.

Migration statistics show another aspect of population (negative) growth over the period of 2015-2019, which is particularly important when observing the Danube region. The net migration indicator shows severely negative flow from Romania (-370 000), Bosnia and Herzegovina (-107 900) and Albania (-70 000) as well as

⁴⁷ Recovery and Resilience Facility | European Commission (europa.eu)(2021).

⁴⁸ The Danube Region - EUSDR - Danube Strategy Point (danube-region.eu)(2020).

⁴⁹ Considering countries with GDP per capita PPP above 20 000 EUR: Slovenia, Czechia, Austria, Germany.

from Croatia (-40 000), Bulgaria (-24 000), Moldova (-6 900) and Montenegro (-2 400). At the same time positive net migration could be seen in Czechia (110,100), Hungary (50 000), Serbia (20 000), Slovenia (10 000) and Slovakia (7 400). Drastic positive net migration happened in Germany (2.7 million) and in Austria (325 000)⁵⁰.

In terms of population size, the Danube basin is composed of very different regions, and one can observe that the most populated regions are the capitals (Wien, Bucarest, Budapest, Sofia, Pest). It is also interesting that Austria has the largest gap in the population size, as both the least and the most population NUTS3 region are Austrian.

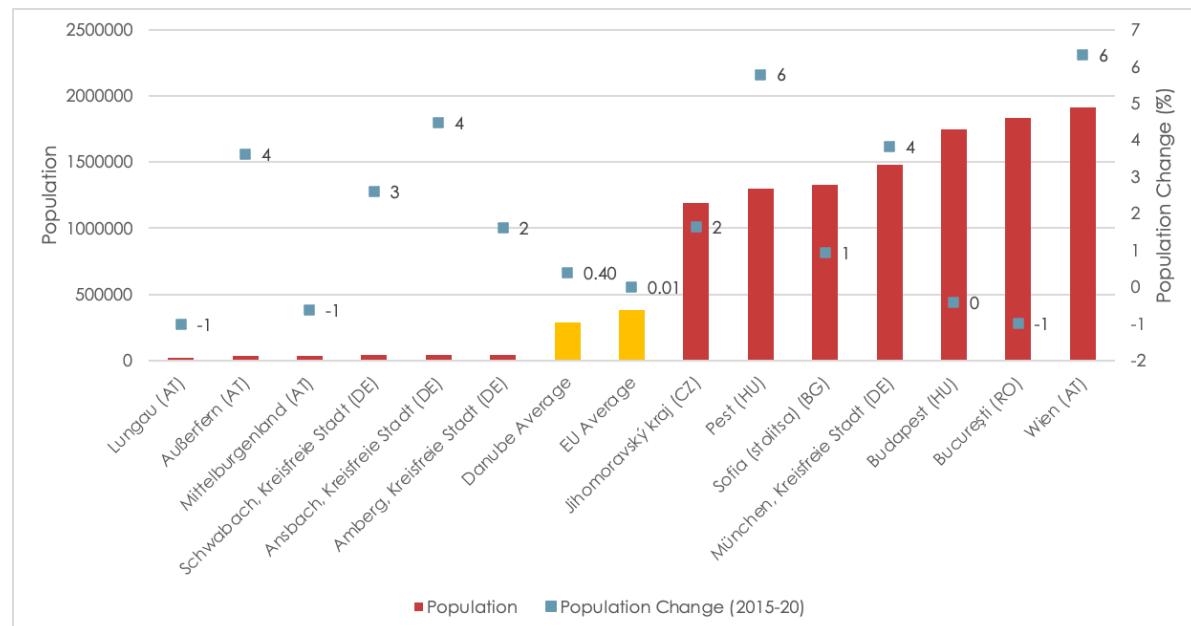


Figure 44 Population and population growth in Danube regions (NUTS3)

Source: Eurostat

Ageing population is a major problem in Europe, which causes an increasing old-age dependency for most of the European countries. Current tendency shows that a major structural problem will occur in the future as the amount of active labour force will not be sufficient to balance additional healthcare and pension costs of the retired population. According to national dependency ratios, the Danube region shows a relatively high dependence with 28.5 % which is lower than the EU average (34.8 %). The highest dependency ratios within the region are observed in Bulgaria and Germany with 33.8 % and 33.7 % respectively, while the lowest is in Moldova with 17 %⁵¹, indicating a younger population than most European and Danube countries. High age-dependency can imply the need for further immigration in higher performing countries and regions, as in Germany and Austria. These countries satisfy the need for workforce by immigration (mostly from less developed regions) and sustain the age-dependency issue with a growing population.

Among the observed regions, the Danube area has the lowest average life expectancy, ranging from 81 years in Austria and Germany to 72 years in Moldova. We can see a parallel between life expectancy and the economic performance. That means that within the Danube basin the most developed economies tend to have a longer life expectancy than in lesser developed regions. However, when looking at the expected healthy life, the story is slightly different. The expected healthy life years at birth shows the number of years before suffering from activity limitation. According to this indicator, performances are more varied. Among all regions within the Danube area, Bulgaria outperforms other countries with an average of 68.25 years, leaving Germany behind which has an average of 66.35 years. Hungary is the third with 62.45 years, then Czechia 62.35, Slovenia with 61.1, Romania 60.75, Croatia 58.1 and Austria with 57.35 years⁵². This indicator shows that economic development might be related to a longer life expectancy but does not automatically imply an increase of healthy years.

⁵⁰ International Data | Migration data portal (2020).

⁵¹ Old-age dependency ratio increases across EU regions - Products Eurostat News - Eurostat (europa.eu) (2021).

⁵² Healthy life years at birth. EUROSTAT, (2019) <https://ec.europa.eu/eurostat/databrowser/bookmark/75922e3b-ee38-4257-af8f-ecd884bef469?lang=en>.

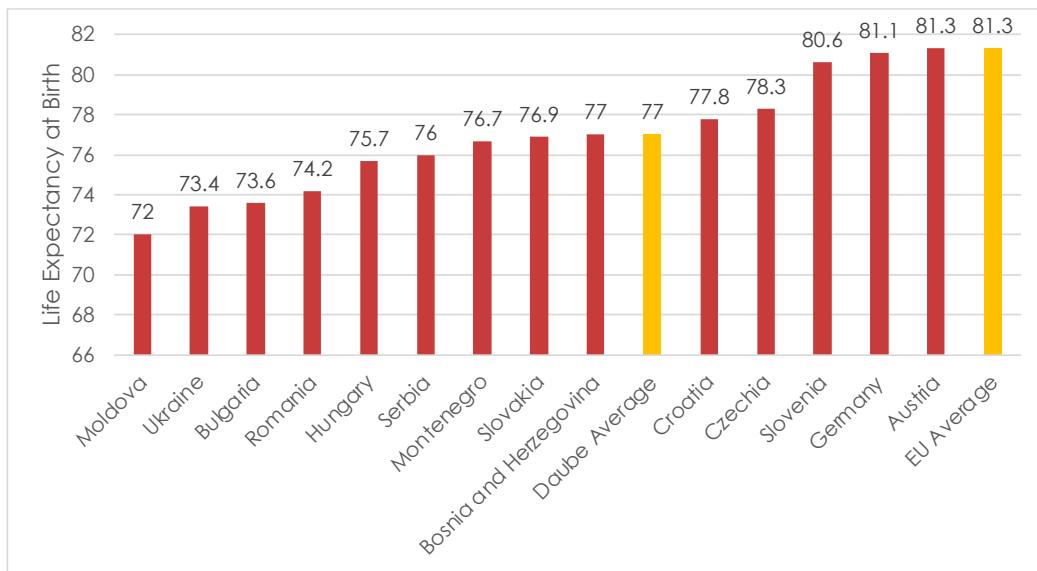


Figure 45 Life expectancy in Danube countries (national level)

Source: Eurostat

In terms of urbanisation, in the Danube area most of the regions are close to a city and approximately half of the regions are rural while the other half is urban or intermediate. Although the Danube itself flows through four capital cities (Vienna, Bratislava, Budapest, Belgrade), only 6.8 % of the basin regions (15 out of 219) are considered as predominantly rural.

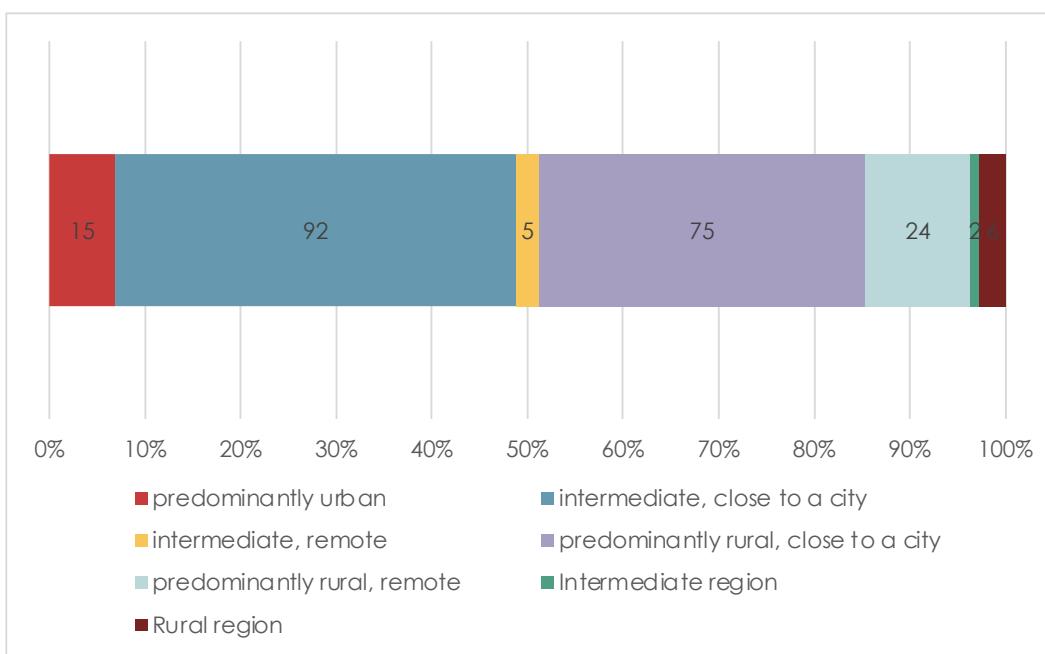


Figure 46 Distribution of Danube regions in terms of urbanisation (NUTS3)

Source: Eurostat

Hence, the Danube crosses a few regions with very high population density, while it also flows through rural and protected nature areas with low density. In general, the Danube basin is not densely populated, and the average density (149 people/km²) is above the average density of other observed regions in EU (117 people / km²), but this is driven by Germany, with the highest population density among the Danube region countries (238 people /km²), the Danube region average density without taking into account Germany is around 88 people / km². As shown in Figure 47, the majority of the regions are less populated than the EU average. Low population density has implications in the different approach towards water and land management. Due to the lesser importance of urban issues and the greater importance of agriculture related ones, the need for a well-balanced policy approach is necessary in the lesser populated areas.

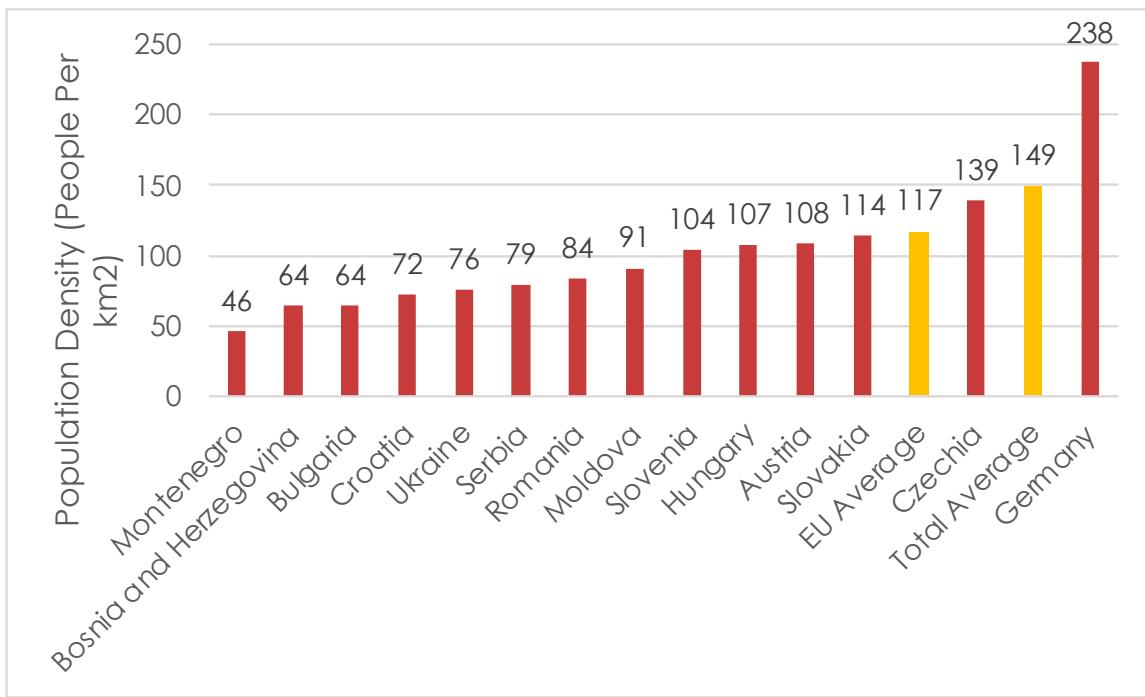


Figure 47 Population density in Danube countries (national)

Source: Eurostat

4.4. Socio-economic background

As briefly discussed in section 3.2, the Danube area contains different economic and social developmental pathways with different histories, various European cultures, policy approaches and understanding of contemporary trends. The basin contains EU and non-EU, high- and low-income countries, with different socio-economic backgrounds. This is illustrated by the cohesion policy status of the Danube region, with only 17 (approximately 40 %) of the NUTS2 regions considered as "more developed" while the large majority is "less developed" and only three are "in transition" (Figure 48). **This distribution with the very large majority of regions at the two extremes and almost none in the middle shows the important polarisation and regional disparities in development occurring in the Danube basin** and underlines the importance of "catching up" mechanisms.

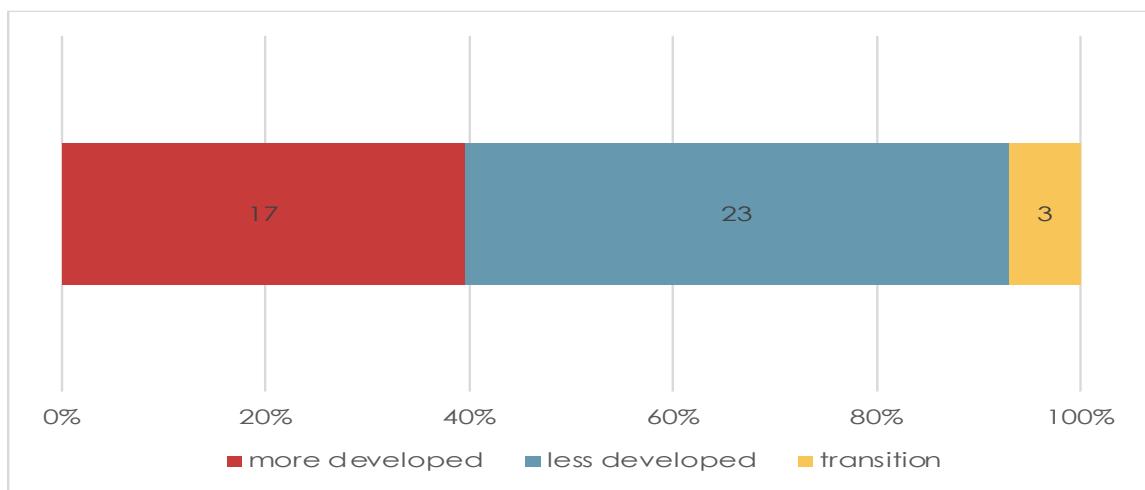


Figure 48 Distribution of Danube regions in terms of cohesion policy categorisation (NUTS2)

Source: Eurostat

Regarding the GDP per capita, the median of the Danube region was EUR 14 800, while the average is EUR 22 782. The difference between both statistics shows the existence of disparities, with a few high GDP per capita regions pulling the average up. Among the regions where data is available, Serbian regions have the lowest GDP per capita (regions of Južne and Šumadije) with EUR 4 200 and EUR 4 400 respectively. The highest income regions are in Germany (region of Oberbayern) with EUR 59 700 and Austria (region of Salzburg) with EUR 53 600. From Central and Eastern European countries, only Slovakia has a region in the 20 % of GDP per capita, which is the capital region of Bratislava with EUR 39 700.

In terms of GDP growth, we observe interesting trends according to the cohesion status. The difference in growth between the “more developed” and “less developed” regions shows the pace of economic cohesion. More developed countries’ (AT, DE) regional average growth (over the last five years) was 14.87 %, while the “less developed” regions’ average growth was 37.6 %.

When looking into intra-national growth disparities, one can observe that there were low regional growth differences in Austria, Germany, Czechia and Slovenia⁵³. Slovakia has a catch-up process in place, as the most developed region (Bratislava) has an average growth of 17.38 % while less developed regions’ GDP grows faster, at the pace of 26.4 %. In the case of Hungary, the region of Észak-Alföld is problematic as it is the least developed region of the country, but it has a nearly identical growth to the country average, meaning that the internal disparities are not resolving.

Romania has an average growth of 51.7 %. Within the country, a significant catching-up process could only be observed in Sud-Muntenia which is among the poorest regions and has a growth rate of 64.8 %. Other regions with high growth are among the most developed regions within the country. On the contrary, the Nord Est region which is the least developed region in Romania had a 53.2 % growth which is only slightly higher than the national average, while the poorest region (Sud-Muntenia) performed well below (39 %). In Bulgaria, the most significant growth was achieved by Bulgaria’s most developed region (Sofia) with 55.8 % growth while in other regions the average growth was only 38.4 %, displaying low internal cohesion processes.

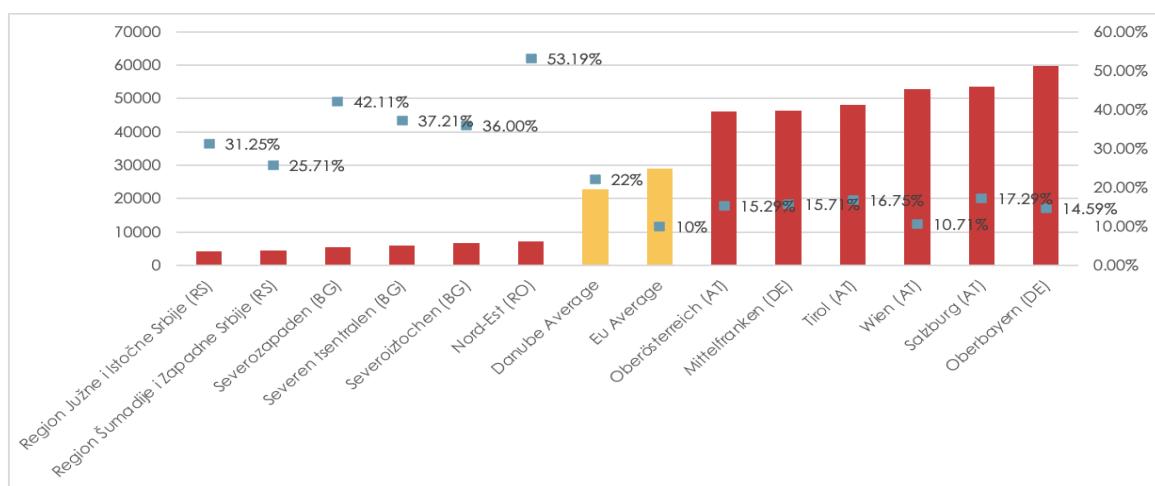


Figure 49 Top and bottom GDP per capita and GDP growth (2014-2019) in Danube regions (NUTS2)

Source: Eurostat

Overall, in the Danube region, the region’s GDP grew at a similar pace compared to other regions, but it contains high differences between regions as discussed above (see figure below).

⁵³ (Standard deviation (STDev) 2 % points in Austria and Germany, 1 % points in Czechia and Slovenia).

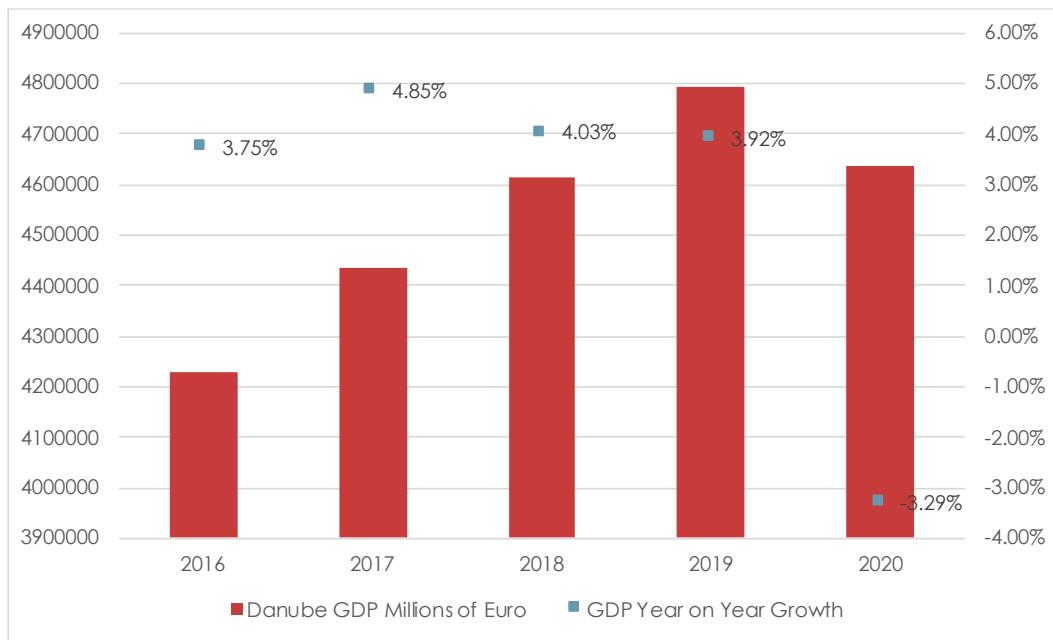


Figure 50 Aggregated GDP and GDP growth at the Danube basin level (2016-2020)

Source: Eurostat

The indicator of the enterprise birth rate is an indicator which needs to be taken within a context and can be compared to the business survival rate⁵⁴. The combination of both shows if an economy is mature with higher business survival rate but lower birth rate or is emerging with higher birth rate but lower survival rate. If an economy displays low birth rate and low survival rate, it can mean that the regulatory framework is hampering the creation and success of new enterprises holding back the economic growth and the innovation potential.

In the Danube region, Austria has the lowest enterprise birth rate (6.04 %) and Croatia the highest (12.7 %), while their business survival rates are both approximately 50 %. This shows that entrepreneurship activity is considerably more vibrant in Croatia than in Austria. As observed above, Croatia has a negative migration rate, and the creation of new, prospering businesses can help to retain talents. Hungary and Slovakia both have favourable environments for business creation with an enterprise birth rate of 12 %, but Slovakian enterprises survive better with a business survival rate of approximately 58 % while Hungary's is 45 %, close to the EU average. Overall, the Danube region performs better than the EU average in terms of business creation, with an average of 10.45 % (against 9.7 % for the EU), and seven countries above the EU average.

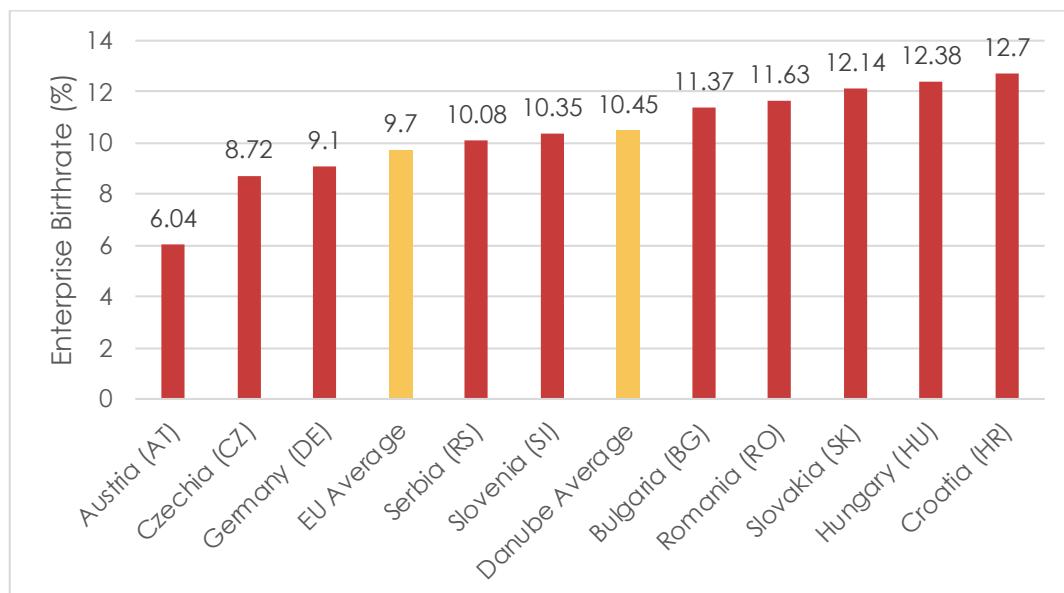


Figure 51 Enterprise birth rate in Danube countries (national)

Source: Technopolis Group based on Eurostat

⁵⁴ [One_,_three_and_five-year_survival_rates_of_enterprises,_business_economy,_2018_\(%\)_.png \(1500x942\) \(europa.eu\)](#).

Start-up activity is a key element to creating an innovative business environment and cross-cutting solutions and increase the competitiveness of a given region. In this perspective, the top start-up ecosystem in the Danube region appears to be Munich which has more than double the start-ups than the Danube average and than most of the region's capitals.

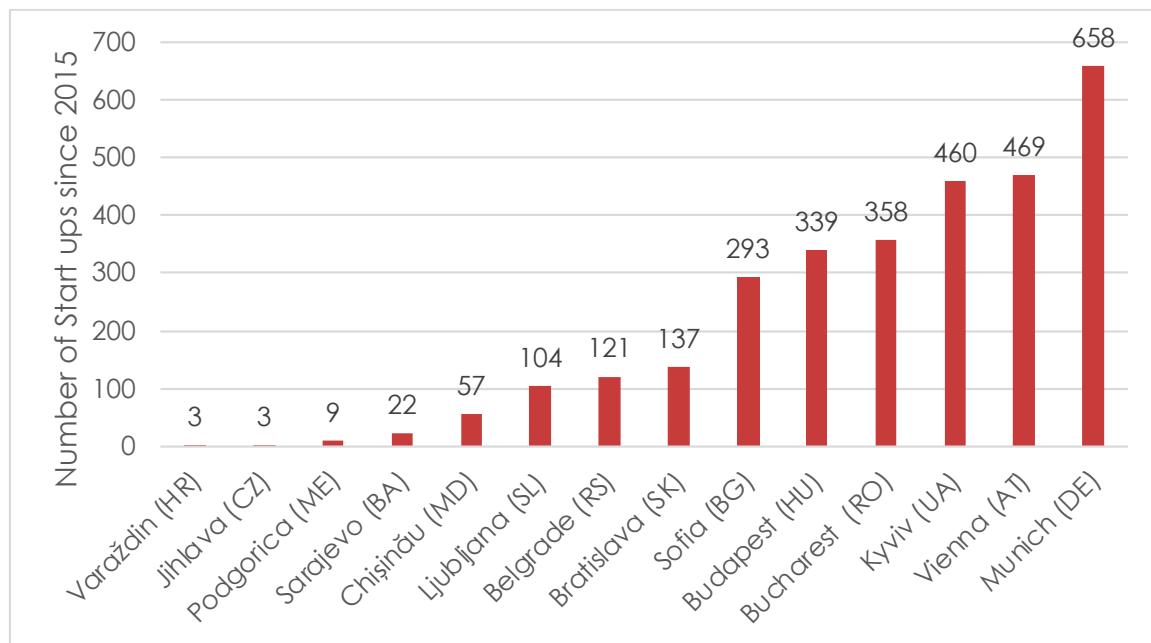


Figure 52 Top and bottom start-up activity in Danube regions (City level)

Source : Technopolis Group based on Crunchbase

Related to the labour market, the Danube region shows a mostly positive picture in terms of employment rates as it is better performing on average than other observed lighthouse regions. Most of the Danube regions' unemployment rates are considerably below the EU average of 6 %. The same conclusion applies to the youth unemployment rate. However, the Eastern non-EU countries experience higher unemployment rates, in particular Serbia and Montenegro where all regions of the lighthouse display rates above the EU average. These high unemployment figures are likely to worsen the emigration issue.

On the contrary, several regions from Czechia and Germany display particularly low unemployment among the youth, with rates below 2.5 %. Additionally, in these two countries the low unemployment rates are quite homogenous within the country, with no rate exceeding 4 %.

Tertiary education attainment provides a partial foresight on a nation's potential for sustainable development towards higher value-added jobs linked to a high skilled labour force. Countries with lower skilled labour force and lower GDP can face the issue of the "middle-income trap" - the fail to transition to a higher income economy due to the declining competitiveness.⁵⁵ In this perspective, Slovenia is the top performing country with 45.4 % of its adult population having a tertiary education degree, followed by Austria (41.4 %), while the lowest rates in the Danube basin area are in Romania (24.9 %) and Hungary (30.7 %). It is interesting to note that Germany has one of the lowest tertiary education attainments, despite displaying top GDP per capita and low unemployment rates.

⁵⁵ Middle-Income Trap | Frontiers in Development Policy (worldbank.org) (2011).

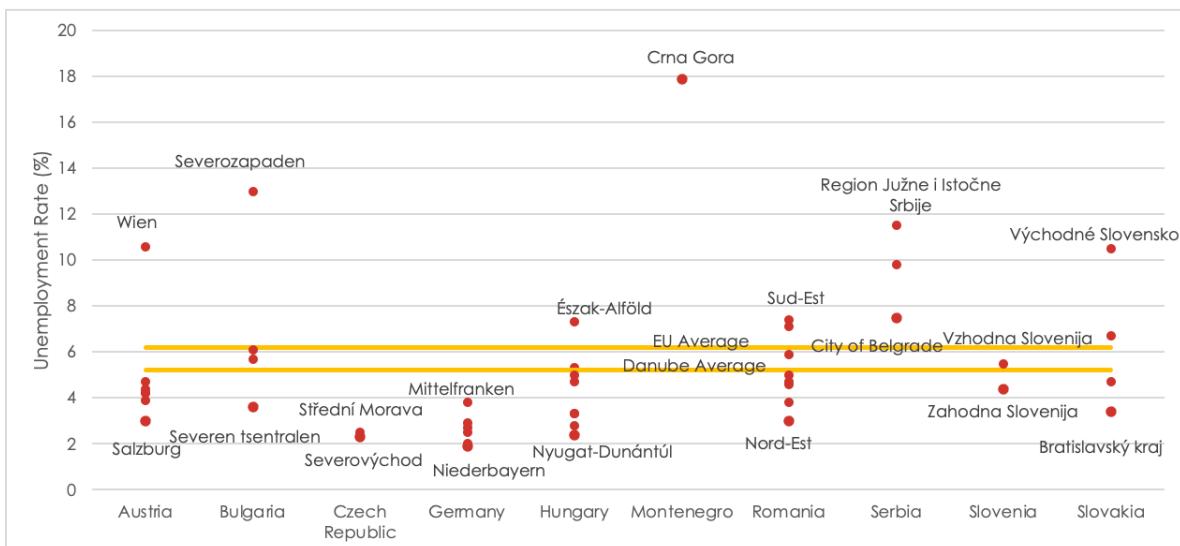


Figure 53 Distribution of unemployment rate in Danube regions (NUTS2) per country

Source: Eurostat

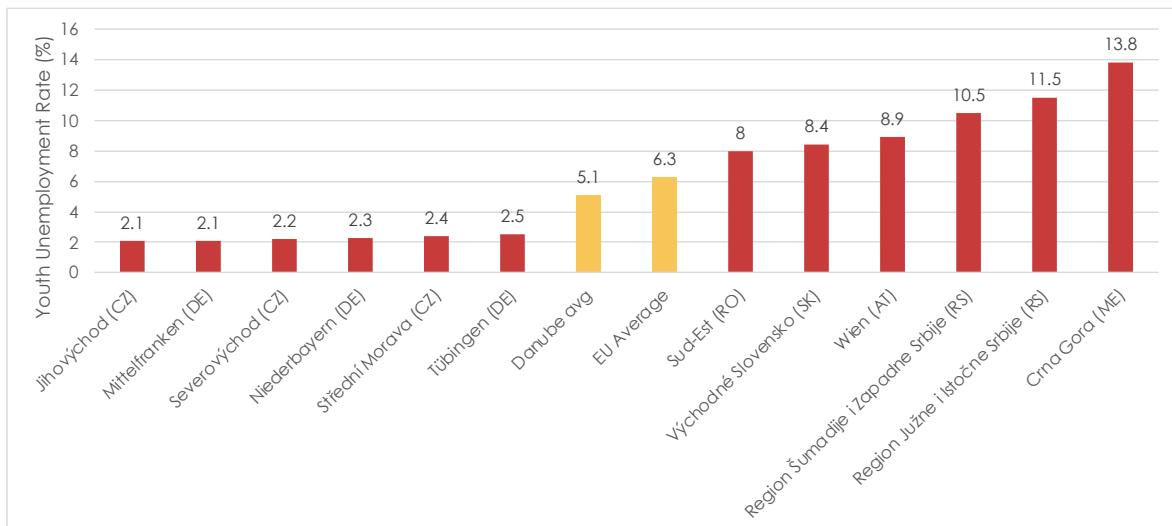


Figure 54 Top and bottom youth unemployment rate in Danube regions (NUTS)

Source: Eurostat

The risk of poverty rates in Central and Eastern EU countries are very diverse, ranging from 2.4 % to 35.6 %. Interestingly, both the top and the worst performing regions are located in Romania (respectively Bucureşti-Ilovo and Nord-Est), which indicates regional disparities in the poverty issue across Romania and can induce rural-urban migration.

Urbanised regions' population (capital regions) appears to be less exposed to risk of poverty. Out of the six least exposed regions, three are capital city areas and in Bulgaria, those living in the capital region are the least exposed to poverty within the country.

Another indicator used to depict the social and poverty issue of a country/region is the material and social deprivation rate, in other words the share of citizens that lack necessary items to lead an adequate life. The best performing countries in these terms are Czechia (5 %), Austria (5.6 %), Slovenia (6.1 %) Germany (6.2 %), while the most exposed citizens are in Bulgaria (33.7 %), Montenegro (34 %) and Romania (38.9 %).

Finally, one can observe that often at-risk of poverty and material and social deprivation go hand in hand. The six regions that are the most exposed to poverty are in Bulgaria and Romania, where more than a third of the population is in a situation of material and social deprivation.

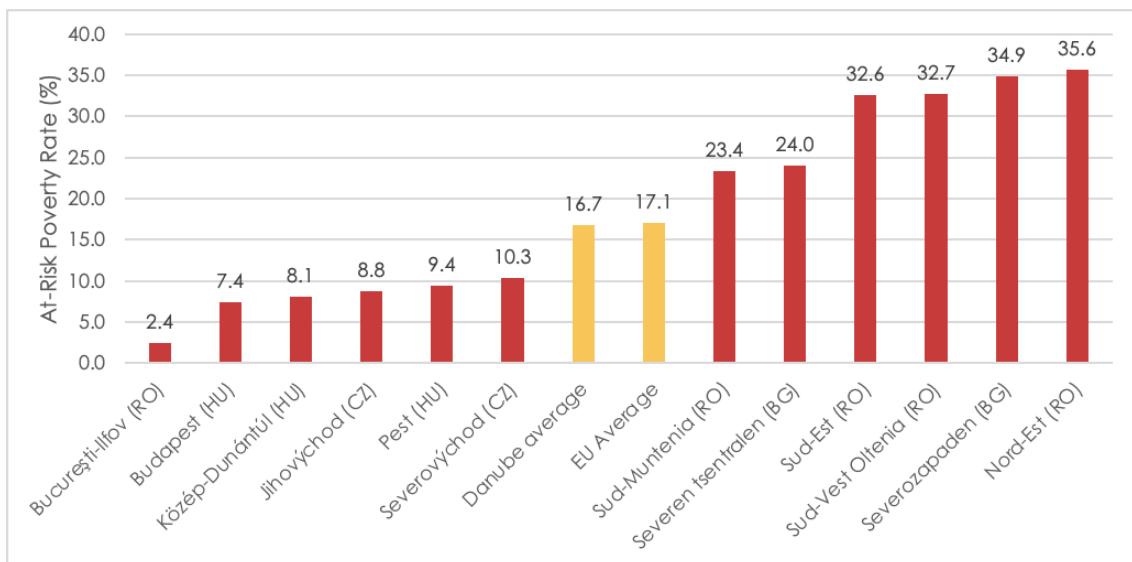


Figure 55 Top and bottom at-risk-of-poverty rate in Danube regions (NUTS2)

Source: Eurostat

The table below shows **high socio-economic disparities among regions within the Danube basin area**. Except for unemployment, which provides a positive picture of the regions (most of the regions have lower unemployment than the average), income, and risk of poverty indices have significant spread not only within non-EU and EU but also within EU country regions. The distance between the top performers and the next group of regions (above average performers) in terms of GDP per capita is very high (GDP per capita in Oberbayern is roughly 5 times as high as the top region with above average performance in the basin, Yugozapaden in Bulgaria). Furthermore, there is a deep rift between the living standards in top performing regions (stemming from Germany, Czech Republic, Slovakia, Austria, Hungary), and the bottom performing regions (located in Romania, Bulgaria, Serbia, Hungary, Montenegro). It would also merit a separate focus that both the best-performing and worst performing regions in terms of risk-of-poverty can be found in Romania (Bucharest and Nord-Est).

Danube	GDP Per Capita	Unemployment Rate	At-Risk-of Poverty
Average (mean)	22782.97872	5.25744681	16.4551724
% Above	40 %	33 %	38 %
% Below	60 %	67 %	62 %
Top Performers	39 000 to 59 700	2 to 3	2.4 to 10.3
Above Average Performers	10 150 to 14 800	3 to 4.4	10.3 to 14.1
Disadvantaged performers	10 150 to 14 800	4.4 to 6	14.1 to 21.4
Bottom Performers	4 200 to 10 150	6 to 17.9	21.4 to 35.6

Table 10 Aggregated status of the cohesion/socio-economic disparities for regions in the Danube basin

Source: Technopolis Group based on Eurostat

Table 11 below shows the list of regions in the Danube area grouped according to the scores they reached most consistently for the GDP per capita, unemployment and at-risk-of-poverty indicators.

PERFORMANCE GROUP	NUTS CODE	REGION NAME	COUNTRY
Socio-economic bottom performers	BG31	Severozapaden	Bulgaria
	BG33	Severoiztochen	Bulgaria
	ME00	Crna Gora	Montenegro
	RO22	Sud-Est	Romania
	RS21	Region Šumadije i Zapadne Srbije	Serbia
	RS22	Region Južne i Istočne Srbije	Serbia
	BG32	Severen tsentralen	Bulgaria
	HU32	Észak-Alföld	Hungary
	RO12	Centru	Romania
	RO31	Sud-Muntenia	Romania
	RO41	Sud-Vest Oltenia	Romania
	RS11	City of Belgrade	Serbia
	RO21	Nord-Est	Romania
Socio-economic disadvantaged regions	SK03	Stredné Slovensko	Slovakia
	SK04	Východné Slovensko	Slovakia
	HU23	Dél-Dunántúl	Hungary
	HU31	Észak-Magyarország	Hungary
	RO42	Vest	Romania
	HU33	Dél-Alföld	Hungary
	RO11	Nord-Vest	Romania
	SI03	Vzhodna Slovenija	Slovenia
	AT13	Wien	Austria
	AT21	Kärnten	Austria
	SI04	Zahodna Slovenija	Slovenia
	AT11	Burgenland	Austria
	AT12	Niederösterreich	Austria
	AT22	Steiermark	Austria
Socio-economic above average performers	BG41	Yugozapaden	Bulgaria
	HU12	Pest	Hungary
	HU22	Nyugat-Dunántúl	Hungary
	RO32	Bucureşti-IIfov	Romania
	SK02	Západné Slovensko	Slovakia
	CZ05	Severovýchod	Czech Republic
	CZ07	Střední Morava	Czech Republic
Socio-economic top performers	HU11	Budapest	Hungary
	HU21	Közép-Dunántúl	Hungary
	AT31	Oberösterreich	Austria
	AT32	Salzburg	Austria
	AT33	Tirol	Austria
	DE25	Mittelfranken	Germany
	CZ06	Jihovýchod	Czech Republic
	SK01	Bratislavský kraj	Slovakia
	DE14	Tübingen	Germany
	DE21	Oberbayern	Germany
	DE22	Niederbayern	Germany
	DE23	Oberpfalz	Germany
	DE27	Schwaben	Germany

Table 11 List of regions in Danube Area grouped by socio-economic performance

4.5. R&I performance in the Danube basin

R&I activities, supported by governments, policies and businesses, is crucial to create successful, innovative and competitive regions. The EU provides more than 20 % of all publications in the world which positions it as one of the key producers of excellent science⁵⁶; but at the same time there are major disparities among regions and this translates in the Danube basin. The Danube region has one of the major R&D and innovation hubs in Europe, which is Munich (and surrounding areas) in Germany. Munich's NUTS2 region, Oberbayern, has one of the most important Government Expenditures in R&D (GERD), with 4.49 %. Other regions with an important GERD share are mostly among Austrian and German regions, in particular Steiermark in Austria with 5.15 % and Tübingen in Germany with 5.27 % - these rates are among the highest in Europe.

On the contrary, the lowest spenders in R&D are mostly Eastern European regions. Hence, the Danube average GERD is above the European average, but this is very much driven by German and Austrian regions as well as capital areas of Czechia (2.48 %), Hungary (2.42 %) and Slovenia (2.39 %). The majority of other

⁵⁶ Science, Research and Innovation Performance of the EU 2020 - Chapitre 6 (europa.eu).

regions are well-below the average. The highest GERD in other countries within the region are all capital regions: capital region of Serbia: 1.55 %, capital region of Slovakia: 1.42 %, capital region of Bulgaria: 1.22 %, capital region of Romania: 1.08 %.

Businesses Expenditures in R&D (BERD) shows how much businesses spend on research and development activities in the country, compared to its GDP, and can in some cases mean that businesses move their high value-added operations to a country because of its favourable environment (policy, financial, social, labour...etc.). Again, Austria and Germany are the best-performers, with BERD of 2.33 % and 2.19 % respectively, which confirms the important innovation activities in these countries. It also shows that government spendings (GERD) in innovation are not intended to compensate low private R&D activity, but that GERD and BERD are complementary. Among Central and Eastern European countries (where data is available), Slovenia is leading (1.51 %), followed by Czechia (1.2 %), Hungary (1.11 %) and Slovakia (0.45 %).

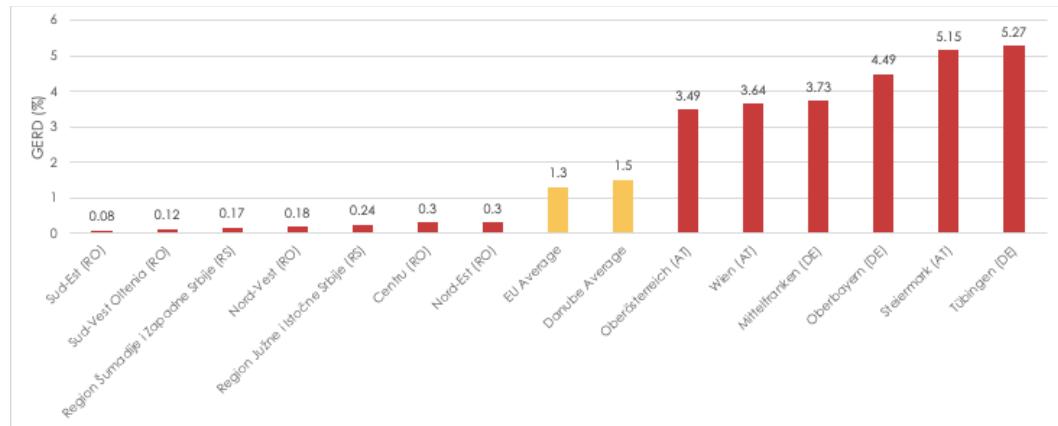


Figure 56 Top and bottom Government Expenditure in R&D (as % of GDP) in Danube regions (NUTS2)

Source: Eurostat

In terms of human capital, and more specifically of Human resources in science & technology (HRST), the picture is different. The Danube region underperforms compared to other regions and several Eastern regions perform among the best, in particular the capital regions of Budapest (RO), Bratislava (SK) and Wien (AT) that appear to have a very skilled labour force. However, besides the capital regions, almost all other regions from those countries perform worse than average. This shows a high concentration of STI staff in capital cities. Romania seems particularly polarised in terms of human capital, as the five regions with the lowest HRST are Romanian.

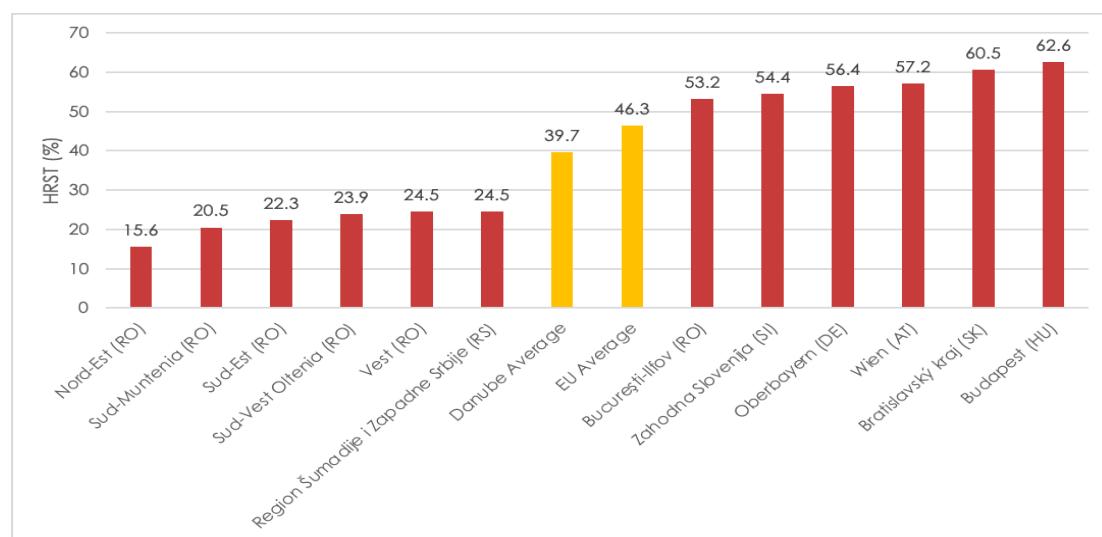


Figure 57 Top and bottom Human Resources in Science & Technology in Danube regions (NUTS2)

Source: Eurostat

Austrian and German regions perform the best in the Regional Innovation Scoreboard, with all but one German region performing above the EU average. It is also very visible that capital regions perform better in the Regional Innovation Scoreboard than the other national regions. Hungary should also focus on its other regions' innovative landscape as those are underperforming compared to the Danube basin average while those have some potential (according to their patent and publication production).

Zagreb and Belgrade are effective innovators too, with a lower amount of investment but higher innovation outcome. To the contrary, despite high expenditure and high number of STI personnel, Bucharest is underperforming which can mean an inefficient R&D system. This is also supported by the data that show that other regions of Romania are among the worst performing ones.

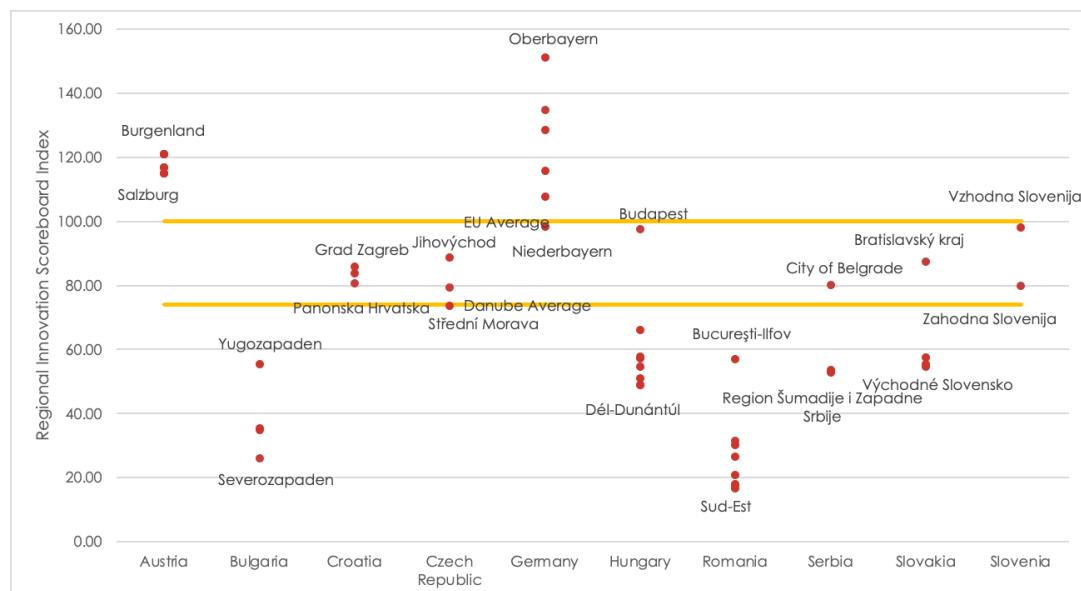


Figure 58 Distribution of Regional Innovation Scoreboard performance in Danube regions (NUTS2)

Source: Technopolis Group based on European Commission, Regional Innovation Scoreboard, 2021

Munich is undoubtedly the Danube powerhouse for patent production, which can be partly explained by the fact that many major advanced companies⁵⁷ that patent regularly have their headquarters in Munich (and its metropolitan area). It is also considered to be one of the most important economic and research centres of Europe which makes it hardly comparable with other Danube regions.

Munich R&I activity increases sharply the regional average for patents, and in consequence Budapest (762) and Central Slovenia (402) are the only Central and Eastern European regions that perform above the basin average. This means that these regions are able to turn R&I activity and spending into marketable products and knowledge.

While the Danube average for patent production is slightly below the EU average, the average publication activity lags behind EU standards. Several regions have little to no publications' activity, in particular in Romania and Bulgaria, but also in Austria (Lungau) and Germany (Weiden i. d. Opf, Kreisfreie Stadt), although it is less common.

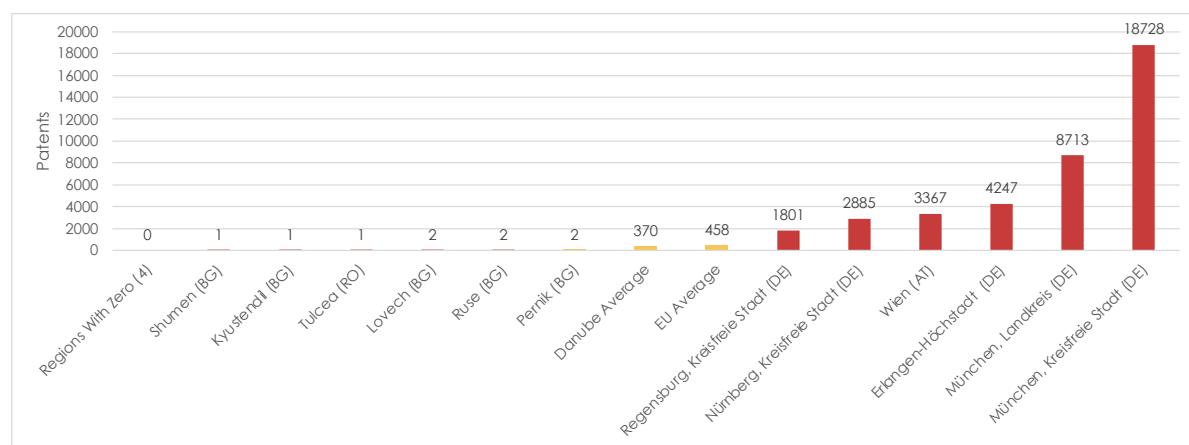


Figure 59 Top and bottom number of patents per Danube region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2020)

⁵⁷ BMW AG, Siemens AG, Audi AG, Merck among several financial, IT and pharmaceutical companies.

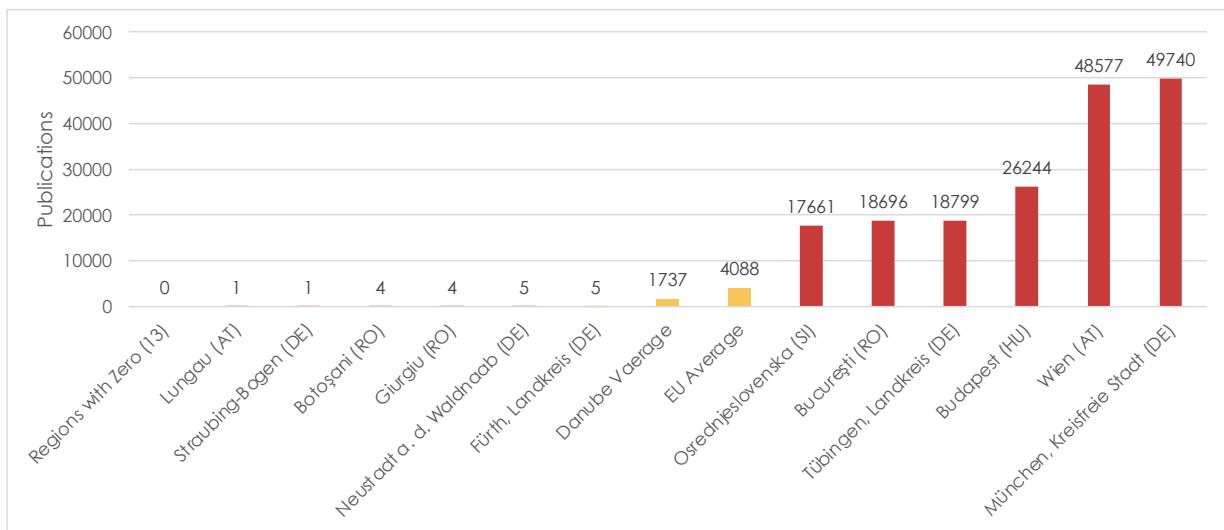


Figure 60 Top and bottom number of scientific publications per Danube region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2020)

Figure 61 shows the total number of participations in H2020 projects per region and indicates a positive picture for some Central Eastern and Eastern European countries. Again, we can see Munich and capital regions performing best.

At the basin level, the Danube area is underperforming in H2020 participation, compared to other regions. In Horizon Europe, the European Commission aims to integrate more Central European and Eastern European regions to Horizon projects by helping widening regions in constructing cooperation with those which have already been engaged in excellent science and international cooperation. More developed regions are also motivated by Horizon Europe to include these cooperation activities that can channel regions with potentials to the global R&I mainstream.

Another possibility for regions to engage with key stakeholders in STI is to found Digital Innovation Hubs (DIH) and construct collaborative clusters around those. This concept was well recognised by widening regions as among the top six performers, five are from those regions.

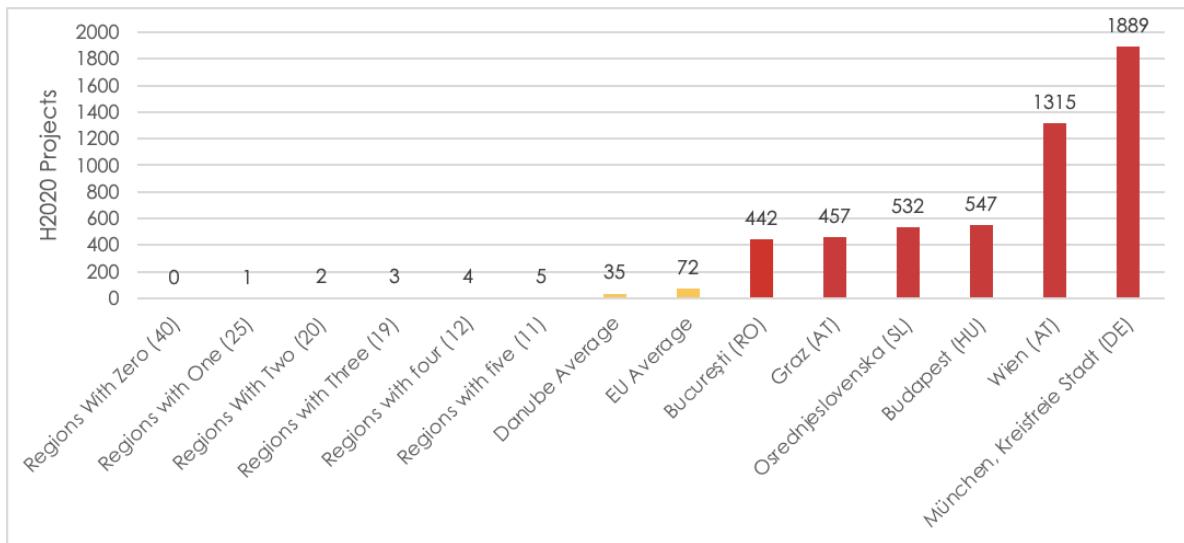


Figure 61 Top and bottom number of participations in H2020 projects per Danube region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2020)

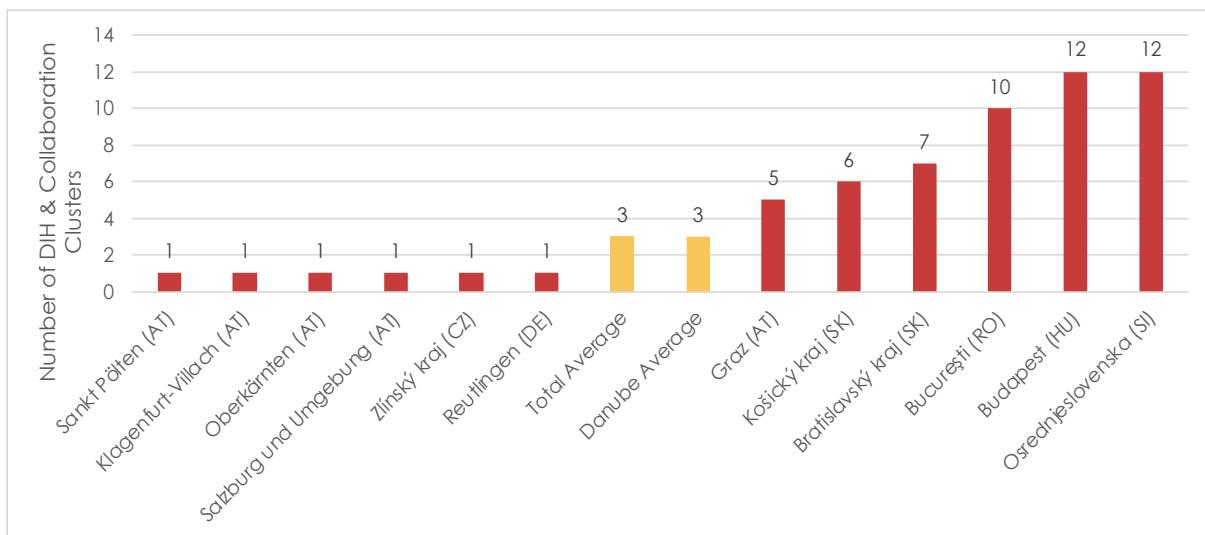


Figure 62 Top and bottom participations in DIH and collaborations clusters per Danube region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2020)

As the Table below suggests, major disparities exist within regions in the number of H2020 projects, participation in EU networks, publications and in number of patents. This was also mentioned in Section 4.5 with some key messages:

- there is an international R&D&I powerhouse in the region with globally competitive potentials (Munich, Germany)
- a division is visible between Western and Eastern countries and their spending on R&D. In Austria and Germany the average GERD is around 3 % while in Eastern countries, regional GERD surpasses 2 % only in capital regions.
- the vast majority of patents, 93.7 %, in the Danube area are produced in the regions in Germany and Austria. The regions produce 87 378 patents of the Danube regional total (93 245). Bavaria itself produces 66 250 which is 71 % of the total regional output. Highest patent providers of the region from Eastern countries are the capital area of Hungary (HU11)12, capital region of Slovenia (SI04) 654 and Eastern Slovenia (SI03) 567, capital region of Czechia (CZ06) 452.

Danube	Gross R&D expenditure per inhabitant and as % of GDP (GERD)	Human resources in science and technology	Regional Innovation Scoreboard index	H2020 Projects	Number of patents	Number of publications	Participation in EU R&I networks and structures
Average	1.52	39.65	74.34	176.70	1864.90	8757.78	2.42
% Above	40 %	50 %	50 %	25 %	18 %	29 %	31 %
% Below	60 %	50 %	50 %	75 %	82 %	71 %	69 %
Worst Performers	0.08 to 0.5	15.6 to 30.25	17 to 51	0 to 424	0 to 49	0 to 1437	0
Below average performers	0.5 to 1.08	30.25 to 37.6	51 to 74	24 to 46	49 to 171	1437 to 3757	0 to 1
Above average performers	1.08 to 2.12	37.6 to 48.8	74 to 108	46 to 150	171 to 643	3757 to 8429	1 to 3
Top performers	2.12 to 5.27	48.8 to 62.6	108 to 151	150 to 2277	643 to 41489	8429 to 86899	3 to 13

Table 12 Aggregate status of the R&I disparities for the Danube regions

Source: Technopolis Group

We highlight below some regions that perform just below the average in terms of R&I inputs and performance but are in **the disadvantaged areas group** and present the potential to be better integrated into international (EU, regional) projects with high value creation, or that have lower-than average or low GDP per capita providing a relatively good number of patents, and publications despite their lower GDP :

- HU33 Dél-Alföld has an average GERD (1.27 %) but provides regionally good numbers (185 patents, 6 309 publications) and has experience in H2020 projects (53) as well as being a part of EU R&I networks and structures (5).
- HU23 Dél-Dunántúl, with a lower-than-average GDP per capita (10.300) and GERD 0.7 %, provides the 4th highest number of publications in Hungary (3 447). This region is highlighted due to its low participation in H2020 projects (15) but its higher number of EU R&I partnerships.
- HU32 Észak-Alföld, with low GDP per capita (9 700 EUR) and lower-than-average GERD (0.93 %), provides publications around the basin average (6 109) and patents around the average without Austria and Germany (122). It has also participated in three EU R&I structures.
- RO11 Nord-Vest (EUR 10 500 GDP per capita) has very low GERD (0.18 %) but took part in 74 H2020 projects and provided 122 patents and 10 135 publications which is higher than average.
- RO12 Centru has a GDP per capita of EUR 10 900 EUR, and GERD of 0.3 %, took part in 57 H2020 projects, produced 102 patents and its publication level was around the regional average of 4 068. The region has a good embeddedness in EU R&I structures as well.
- RO21 Nord-Est provided a number of publications close to the Danube basin regional average with 7 447, while its GERD is only 0.3 % and its GDP per capita is among the lowest ones in the basin (EUR 7 200).
- RO42 also can be considered as an interesting region with potential for more development in terms of R&I, as, despite the low GERD (0.39 %) and lower than average participation in H2020 projects, the number of patents (291) and publications (5 208) are around the basin average and it also has relatively good international cooperation linkages.

Special focus should be given to Bulgaria as a whole as there is a lack of integration in international projects and low R&I productivity in other parts of the country (besides its capital city region). Croatian regions have the potential as well (HR02, HR06) but there is not enough data available on GERD and HRST for more detailed investigation.

PERFORMANCE GROUP within Danube area	NUTS CODE	REGION NAME	COUNTRY
R&I bottom performers	BG31	Severozapaden	Bulgaria
	BG32	Severen tsentralen	Bulgaria
	RS21	Region Šumadije i Zapadne Srbije	Serbia
	RS22	Region Južne i Istočne Srbije	Serbia
	BG33	Severoiztochen	Bulgaria
	HU31	Észak-Magyarország	Hungary
	ME00	Crna Gora	Montenegro
	RO31	Sud-Muntenia	Romania
	RO41	Sud-Vest Oltenia	Romania
	RO22	Sud-Est	Romania
	HR02	Panonska Hrvatska	Croatia
	HR06	Sjeverna Hrvatska	Croatia
	HU23	Dél-Dunántúl	Hungary
	RO21	Nord-Est	Romania
R&I disadvantaged regions	HU22	Nyugat-Dunántúl	Hungary
	RO11	Nord-Vest	Romania
	HU21	Közép-Dunántúl	Hungary
	RO12	Centru	Romania
	RO42	Vest	Romania
	SK02	Západné Slovensko	Slovakia
	SK03	Stredné Slovensko	Slovakia
	AT31	Oberösterreich	Austria
	CZ05	Severovýchod	Czech Republic
	HU32	Észak-Alföld	Hungary
	AT11	Burgenland	Austria
	HU12	Pest	Hungary
	RS11	City of Belgrade	Serbia
	CZ07	Střední Morava	Czech Republic
R&I above average performers	SK04	Východné Slovensko	Slovakia
	HR05	Grad Zagreb	Croatia
	DE22	Niederbayern	Germany
	HU33	Dél-Alföld	Hungary
	AT32	Salzburg	Austria
	BG41	Yugozapaden	Bulgaria
	DE27	Schwaben	Germany
	SI03	Vzhodna Slovenija	Slovenia
	AT21	Kärnten	Austria
	CZ06	Jihovýchod	Czech Republic
Socio-economic top peformers	AT12	Niederösterreich	Austria
	AT33	Tirol	Austria
	DE23	Oberpfalz	Germany
	RO32	București-IIfov	Romania
	SK01	Bratislavský kraj	Slovakia
	DE14	Tübingen	Germany
	AT13	Wien	Austria
	AT22	Steiermark	Austria
	HU11	Budapest	Hungary
	SI04	Zahodna Slovenija	Slovenia
	DE21	Oberbayern	Germany
	DE25	Mittelfranken	Germany

Table 13 List of regions in Danube area grouped by R&I performance

Source: Technopolis Group

5. MEDITERRANEAN BASIN

5.1. Geographical and natural characteristics

The Mediterranean Sea basin is a semi-enclosed sea for 19 countries, situated at the south east of the European continent.⁵⁸ The basin itself hosts eight EU Member States, namely, Croatia, Cyprus, France, Greece, Italy, Malta, Slovenia and Spain. Additionally, the Mediterranean Sea is also a geographical border for five African countries (Algeria, Egypt, Libya, Morocco and Tunisia), Balkan countries, Albania, Montenegro and Bosnia and Herzegovina, and some other southeast countries, namely, Israel, Jordan, Lebanon, Palestine, Turkey⁵⁹. It is surrounded by 68 271km of coastline and 764 911.40 km² of land.

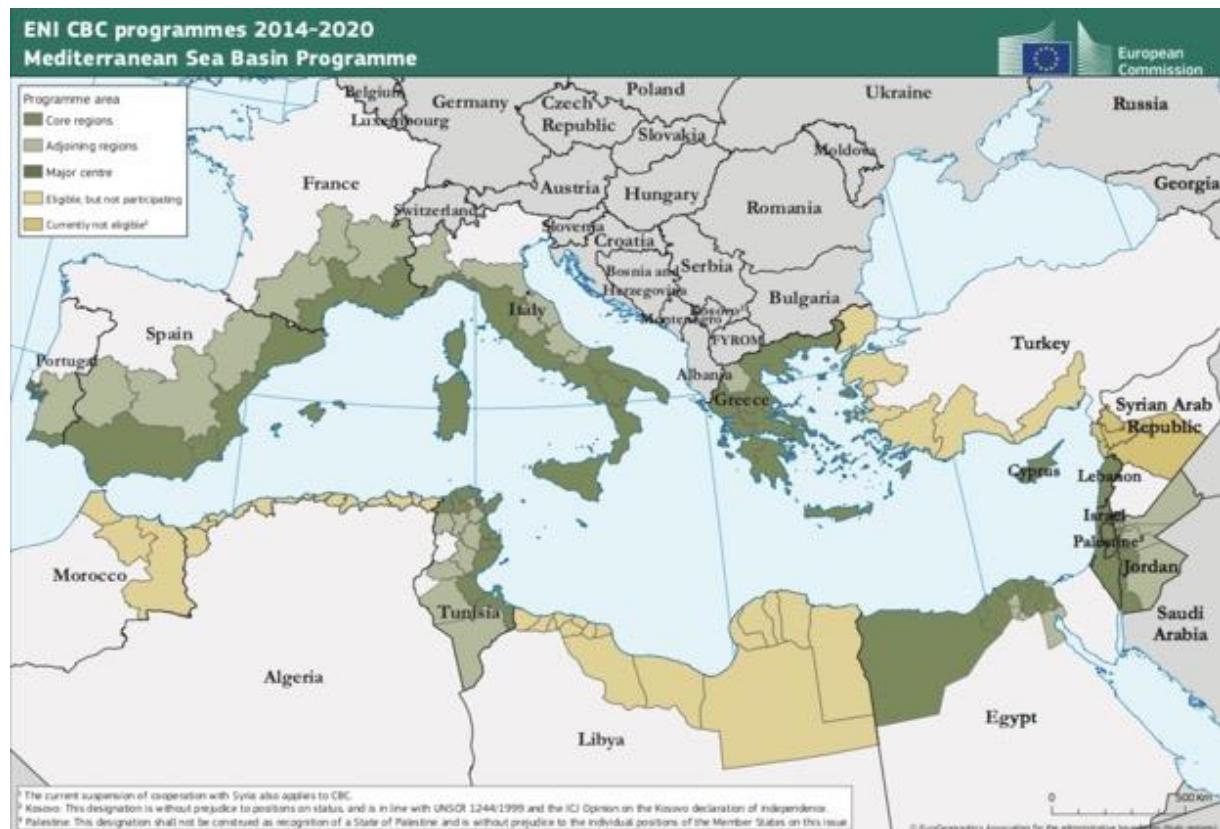


Figure 63 Regions covered by the Mediterranean Sea Basin

Source: InterReg CBC Mediterranean Programme, <https://interreg.eu/programme/eni-cbc-mediterranean-sea-basin/> the categorisation of regions that is shown in this map is not relevant for the Mission Lighthouse on the Mediterranean area. The map is provided here for illustrative purposes.

As depicted in Figure 64, Greece ranks the highest with the longest **national coastline** among the depicted countries with 15 147 km of shore within the lighthouse area, followed by Italy with 9 226 km. Jordan ranks at the lowest with 27 km. Regarding total area (km²), Spain regions absorb 387 330 km², followed by Italy regions which in total sum 264 368 km².

⁵⁸ the proposed geographical delimitation is similar to the geographical delimitation of the Interrec CBC Mediterranean Sea Basin Programme, building on existing cooperation experience.

⁵⁹ Due to lack of data, Morocco and Montenegro have not been reported on in this study.

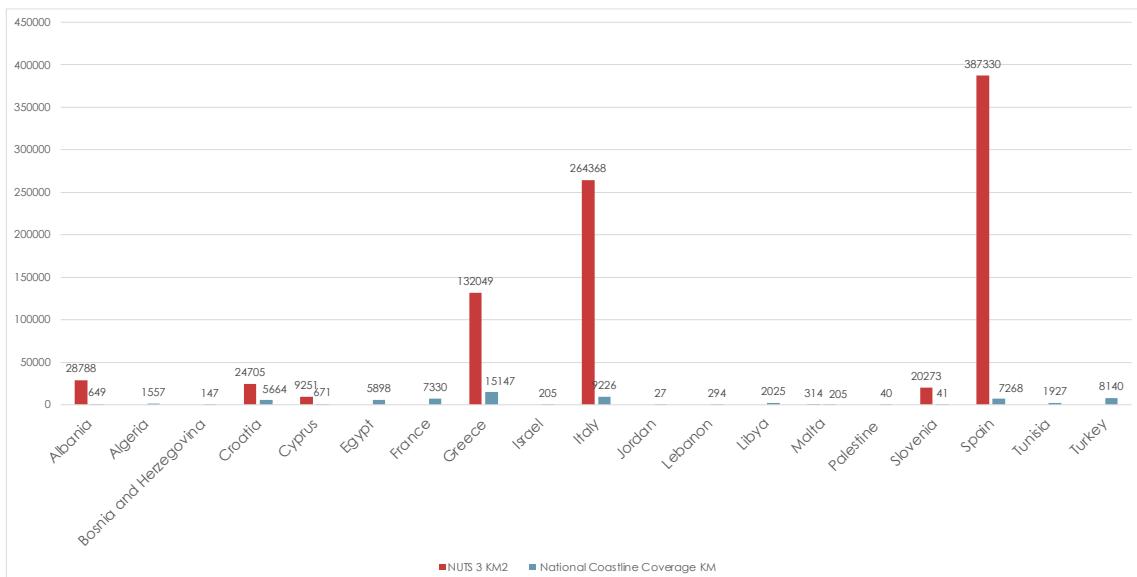


Figure 64 Total lighthouse area per country and total national coastline in Mediterranean countries

Source: Eurostat

5.2. Policy context and governance analysis

The policy and governmental ecosystem within the Mediterranean Sea basin is covered by several initiatives that bring together the interest of the countries which border the sea. The relevance of these initiatives within the basin is particularly important, given the tremendous environmental pressures that the basin experiences as a result of being the number one tourism destination in the world.

In particular, the European Commission is engaged in three different initiatives:

- Union for Mediterranean action on blue economy
- Western Mediterranean (WestMED) initiative
- EU strategy for the Adriatic and Ionian region (EUSAIR)

The **Union for Mediterranean (UfM)** is an intergovernmental Euro-Mediterranean organisation where all the countries of the EU and 15 countries of the Southern and Eastern Mediterranean shores convey to enhance regional cooperation.

During November 2015, the Ministers of the Union adopted the UfM Ministerial declaration on Blue Economy⁶⁰. This Declaration aims to enhance the potential of the blue economy in the Mediterranean region, as well as improving maritime governance and achieving a conducive environment to promote jobs, innovation and knowledge-based business opportunities through the development of key maritime sectors.

As a follow up of this declaration, and with the support of the European Commission, the **WestMED Initiative** was created in 2017 as a cooperation activity between five EU Member States (France, Italy, Portugal, Spain and Malta) and five Southern partner countries (Algeria, Libya, Mauritania, Morocco and Tunisia)⁶¹.

The Framework for Action of the WestMED outlines the goals and priorities of the consortium. Three goals are enclosed within this Framework:

- a safer and more secure maritime space
- a smart and resilient blue economy
- improved maritime governance

⁶⁰ EU, UfM & Kingdom of Jordan (2015). Declaration of the Union for the Mediterranean Ministerial Conference on Blue Economy.

⁶¹ European Commission (2017). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 'Initiative for the sustainable development of the blue economy in the western Mediterranean' COM(2017) 183 final.

To achieve such goals, the WestMED Initiative involves all relevant actors and stakeholders from both sides of the Western Mediterranean, whose interests are subject to the objectives of the initiative.

Six years after the 2015 declaration, the Ministers of the UfM adopted a new declaration on Sustainable Blue Economy in 2021⁶², where a commitment to improve cooperation to address common challenges in the blue economy sectors was made. They agreed to promote transformative policies and tools such as maritime clusters or maritime spatial planning and support the transition to carbon neutral and circular blue economy.

Focused on the challenges of the Adriatic and Ionian region, the EC, together with the involved region, developed the EU strategy for the **Adriatic and Ionian region (EUSAIR)**⁶³. It is embedded as one of the strategies within the 'Macroregional strategy' framework endorsed by the European Council, and it involves nine countries: four EU countries (Croatia, Greece, Italy, Slovenia) and five Western Balkan countries (Albania, Bosnia and Herzegovina, Montenegro, North Macedonia and Serbia). The Strategy is founded on four thematic pillars, namely, blue growth, connecting the region, environmental quality and sustainable tourism.

Partly funded by EU's research and innovation programme Horizon 2020, the Partnership on Research and Innovation in the Mediterranean Area (PRIMA) aims to develop solutions for a more sustainable management of water and agri-food systems in the basin. Within the initiative there are 19 countries participating: Algeria, Croatia, Cyprus, Egypt, France, Germany, Greece, Israel, Italy, Jordan, Lebanon, Luxembourg, Malta, Morocco, Portugal, Slovenia, Spain, Tunisia and Turkey.

Regarding the **institutional capacity** score, the basin average scores 24.44; however, the scores range widely. France regions score the highest with an average of 52.6, closely followed by Malta scoring 49.07. Spain and Slovenia rank similarly with an average of 41.01 and 41.08, respectively. The worst scorers are Greece (12.73) and Italy (16.78).

5.3. Demographic background

The Mediterranean basin population residing in EU countries has decreased by 0.98 % over the period between 2015 and 2020, being the only basin with a negative population change over this period.

As expected, big cities such as Barcelona (5.6 million), Roma (4.25 million), Milano (3.26 million), Napoli (3 million), Valencia (2.56 million) and Torino (2.23 million) are the most populated, while Greece coastal regions and islands have the lowest populations (Eurostat). The regions belonging to Greece (-0.39) and Italy (-2.37) are the only nations with a declining population, while Malta (+13.10), Cyprus (+4.84), France (1,91), Spain (+0.97) and Slovenia (0,78) have seen growth in the last five years. (Eurostat)

⁶² European Commission (2021). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions concerning the European Union on a new approach for a sustainable blue economy in the EU Transforming the EU's Blue Economy for a Sustainable Future. COM(2021) 240 final.

⁶³ European Commission (2014). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions concerning the European Union Strategy for the Adriatic and Ionian Region. COM(2014) 357 final.

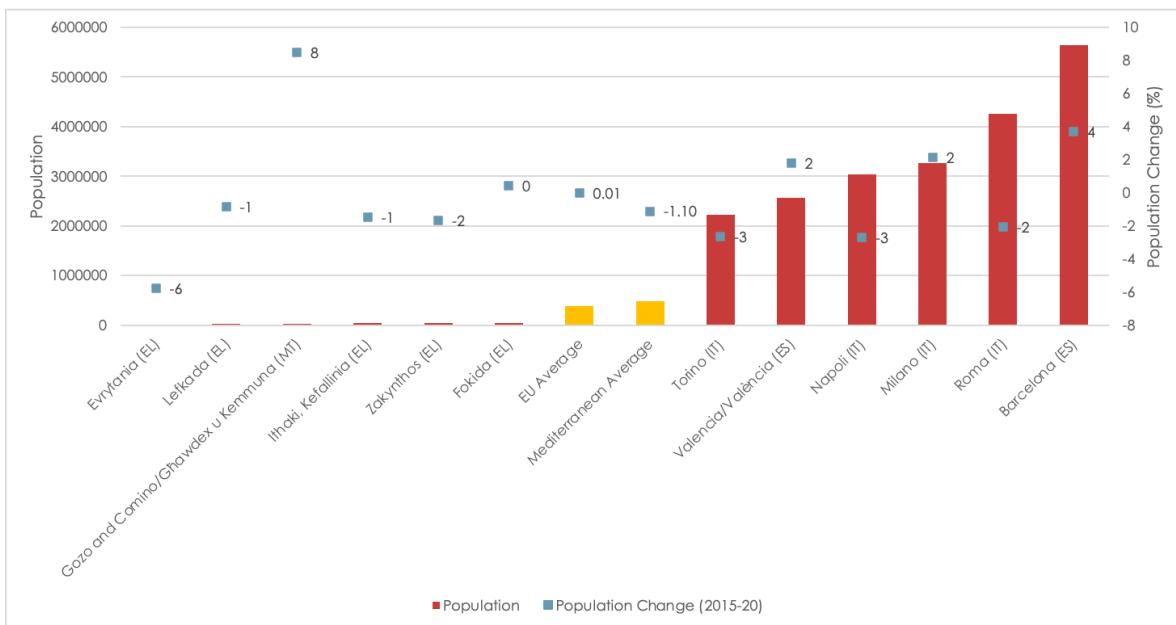


Figure 65 Top and bottom population and population growth in Mediterranean regions (NUTS3)

Source: Eurostat

Compared to the EU average (81.3 years old), citizens within the Mediterranean basin (including non-EU countries in the basins) have a shorter **life expectancy**, with an average life of 79 years old (Eurostat). As shown in Figure 66, all EU Member States, except Croatia, have a longer life expectancy than the basin average, with Malta ranking first with a life expectancy of 82.6 years old. The highest life expectancy is in Israel (83 years old) expectancy. Non-EU countries such as Egypt, Libya, Jordan, show the lowest life expectancy in the basin (72, 73, 75 and 77 years respectively).

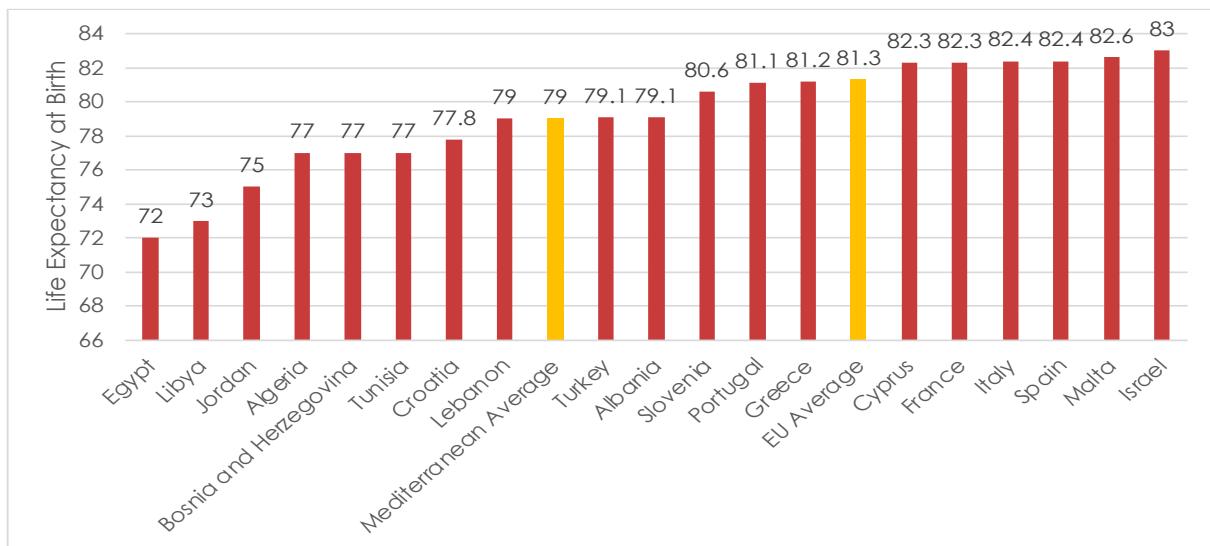


Figure 66 Life expectancy in Mediterranean countries (national level)

Source: Eurostat

As illustrated in Figure 67 below, the overall **population density** at the national level is estimated at an average of 230 people per km² and significantly higher in comparison to the rest of the EU. Malta (1 642 people per km²) is the biggest outlier pulling the mean of the Mediterranean further up to 230. The rest of the EU countries are under the basin average and score from 200 people per km², in the case of Italy, to 72 people per km², for the case of Croatia. Outside the EU, Lebanon and Israel are the only countries with an average density higher to the basin average, with 667 and 426 people per km², respectively. Significantly below average, Algeria has 18 people per km², and lastly is Libya with the lowest population density of four people per km².

Regarding the **distribution of Mediterranean regions**, almost 70 % of the regions are either located in an urban area (56 regions) or close to a city (77 regions) (Eurostat). Moreover, around 20 % of the regions are remotely located in rural areas.

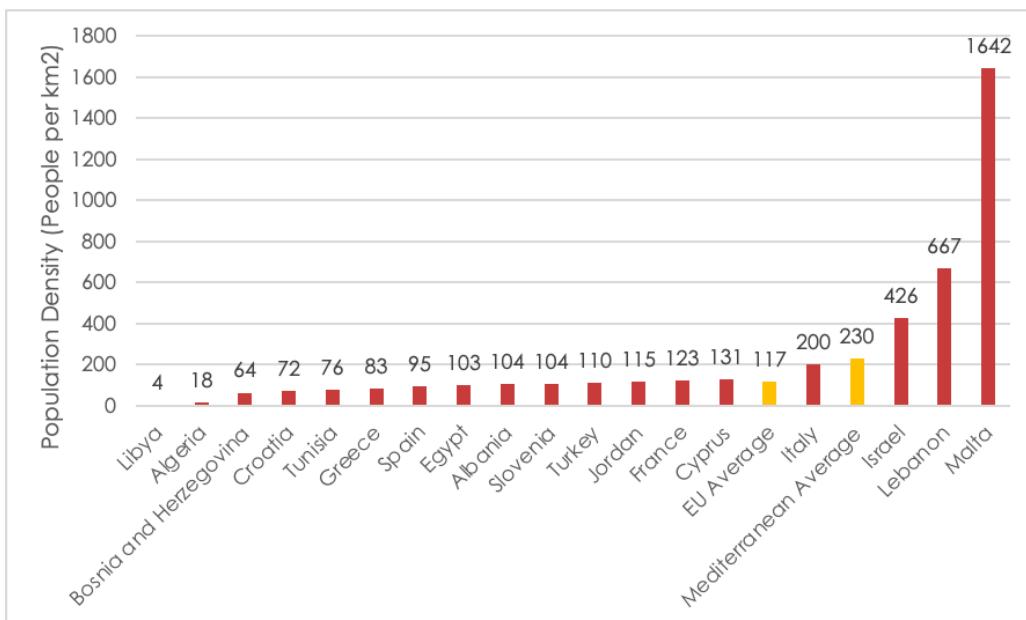


Figure 67 Population density in Mediterranean countries (national)

Source: Eurostat

In terms of level of **urbanisation**, the Mediterranean regions are predominantly non-remote, with almost 70 % of the regions being either located in an urban area (56 regions) or close to a city (77 regions) (Eurostat). There are also 50 regions, out of 242, located in rural and remote environments.

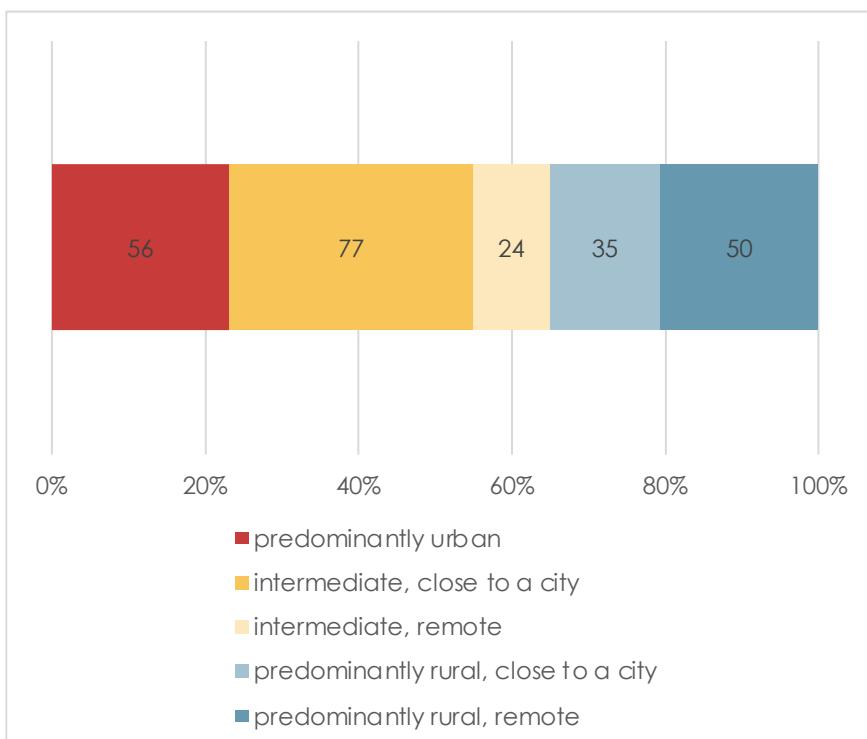


Figure 68 Distribution of Mediterranean regions in terms of urbanisation (NUTS3)

Source : Technopolis Group, based on Eurostat

5.4. Socio-economic background

The Mediterranean area contains different economic and social development pathways as the countries within it have different histories, cultures and contexts. In particular, the basin contains EU and non- EU countries which have significantly different socio-economic backgrounds. Countries such as Greece, Spain and Albania have many disadvantaged regions and do fall behind the other regions within the basin. While many French and Italian regions are considered advanced in terms of socio-economic standing, relative to the other regions in the Mediterranean area.

Studying the **ranking according to the EU cohesion policy categorisation** for NUTS 2 regions, helps to provide a picture of the stage of development at which many of the EU regions in this basin are at. As shown below, the Mediterranean basin is considered less developed with over half of the regions (27) considered *less developed* regions (reaching below 75 % of the EU GDP per capita PPS). Within this category, 11 out of the 13 Greek regions are considered less developed, and two regions are in a transition (reaching between 75 % and 100 % of EU GDP per capita). Only 12 regions are considered more developed, of which nine are Italian regions (see figure below).

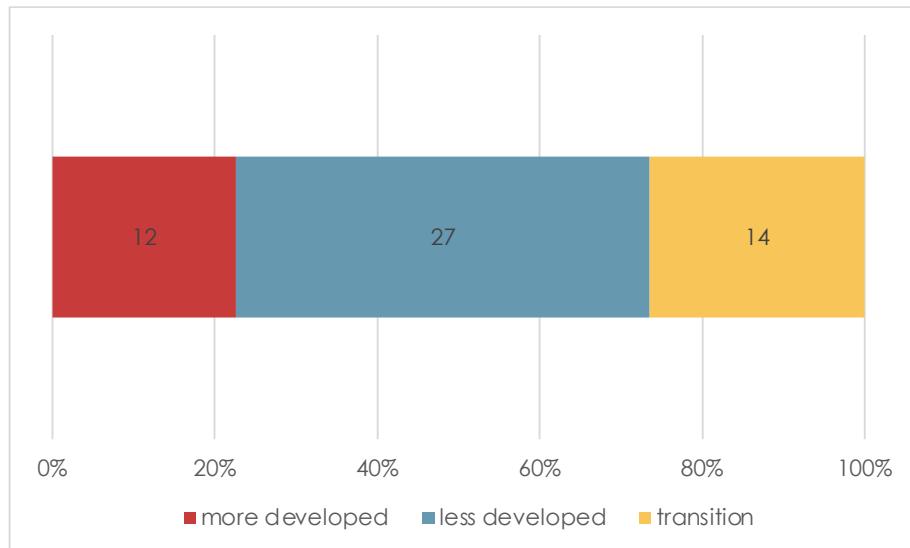


Figure 69 Distribution of Mediterranean regions in terms of cohesion policy categorisation (NUTS2)

Source: Technopolis Group based on European Commission, DG Regio

The Mediterranean basin presents disparities regarding **GDP** amongst regions and nations, with an average of EUR 386.78 billion total GDP per country. The aggregated basin GDP has grown steadily from 2016 to 2019, with the biggest growth period being from 2018 to 2019. However, and as a result of the restrictions imposed by the COVID pandemic, a sharp decrease in GDP was recorded in 2020. EU countries recorded the largest GDP within the basin, namely, France (EUR 2 302.86 billion), Italy (EUR 1 653.58 billion) and Spain (EUR 1 121.94 billion) (2020) (Eurostat). Outside the EU, Turkey (EUR 626.58 billion), Israel (EUR 357.02 billion) and Egypt (EUR 320.32 billion) had the largest GDP. Recording the lowest GDP we find Albania (EUR 13.07 billion) and Bosnia and Herzegovina (EUR 17.51 billion) outside the EU, while Malta (EUR 13.08 billion) and Slovenia (EUR 46.91 billion) have the lowest total GDP values among EU Member States.

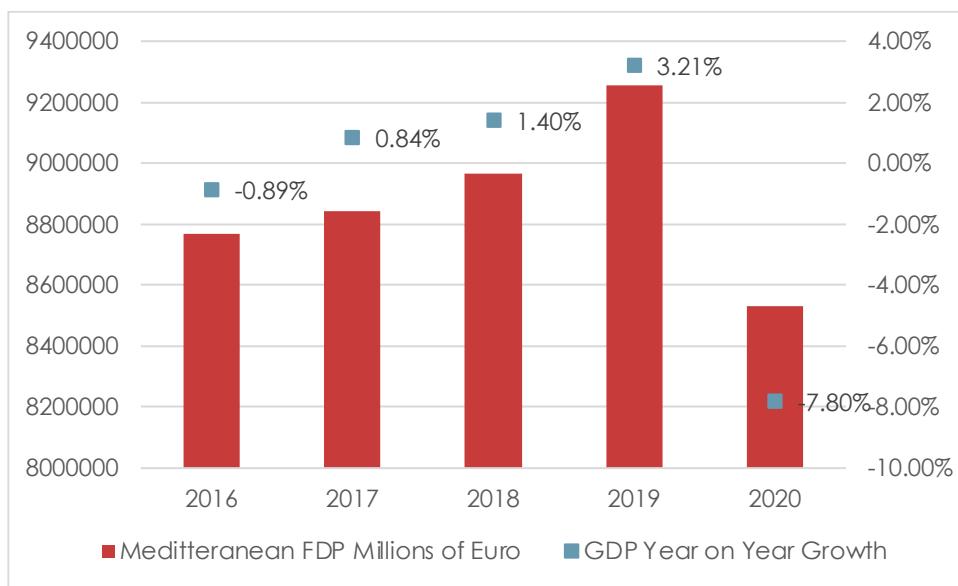


Figure 70 Aggregated GDP and GDP growth in the Mediterranean Sea Basin (NUTS2)

The Mediterranean regions vary greatly in terms of **GDP per capita** and growth. The basin has a significant difference of EUR 35 600 between the GDP per capita in the region, Lombardy, Italy and the region with the lowest GDP per capita (Veri, in Albania). The median GDP for the regions is EUR 21 450 and the mean is

EUR 22 275, falling below the EU basin average of EUR 28 070 (Eurostat). As shown in Figure 71 below, the GDP per capita grew by 12 % on average throughout the basin in 2014-2019, with the three bottom regions growing the most. On the other hand, Greek regions had the lowest growth over the period between 2014 and 2019 (2.1 %), partially explained by the sharp GDP decrease within the regions of Dytiki Makedonia (-20 %) and Voreio Aigaio (-13 %) (Eurostat). Additionally, there are three Greek regions scoring under the basin average, while four Italian regions and two French regions are among the six richest. Lombardia is the richest region with an average of EUR 39 500 per capita (Eurostat).⁶⁴

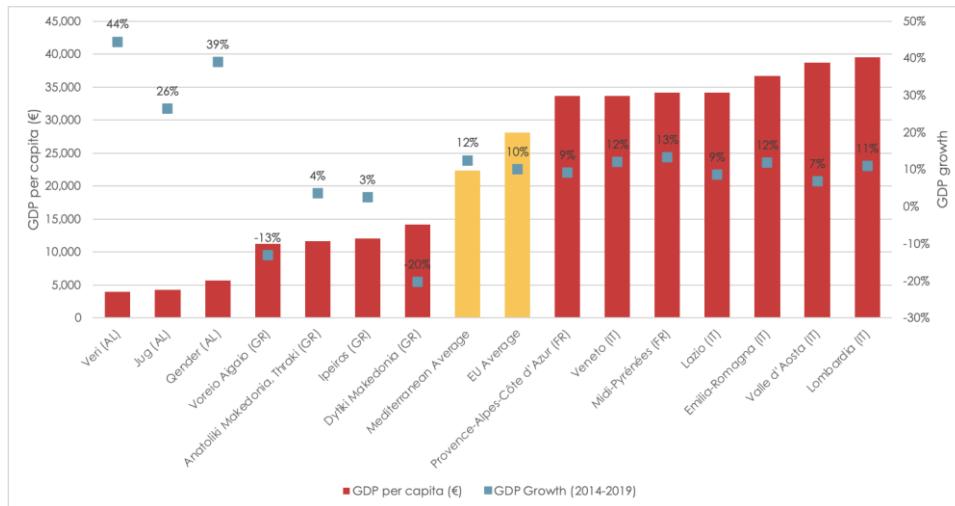


Figure 71 Top and bottom Mediterranean regions in terms of GDP per capita and GDP growth

Source: Technopolis Group, based on Eurostat.

Entrepreneurial activity within the basin varies greatly among nations. Greece has the lowest **enterprise birth rate** (4.76 %) and Malta the highest (13.86 %). Turkey (13.34 %), Croatia (12.7 %), France (12.07 %) and Slovenia (10.35 %) are all the top performers with a higher average than the basin.

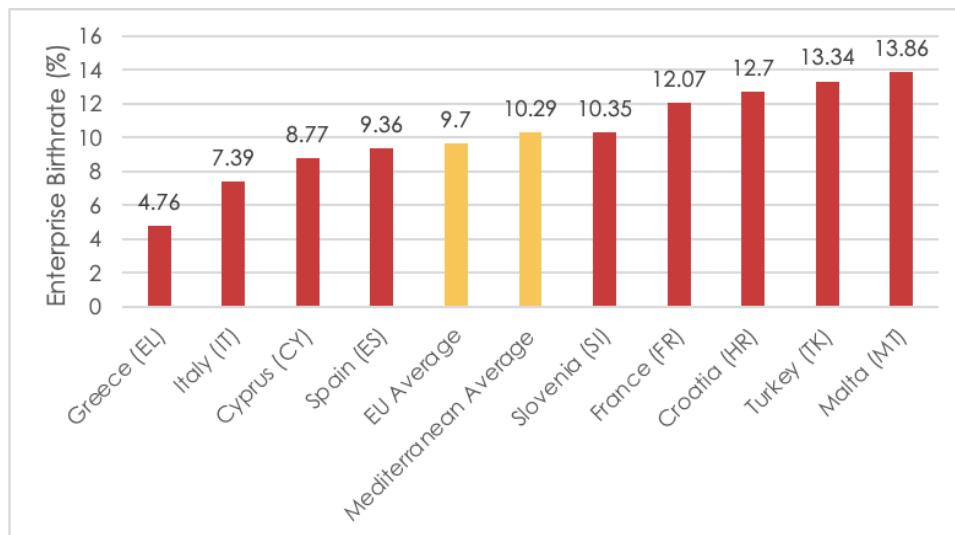


Figure 72 Enterprise birth rate in Mediterranean countries (national)

Source: Technopolis Group, based on Eurostat.

When analysing the **number of start-ups** created since 2015, Barcelona (1 395) and Cairo (680) are the outliers, with a strong start up ecosystem located in these two cities. Unexpectedly, even if the Israel start-up ecosystem is generally considered vibrant, the number of start-ups recorded on the Crunchbase platform for Jerusalem add up to 439. The regions of Varaždin (Croatia) and Tripoli (Libya), have the weakest start up creation ecosystem.

⁶⁴ It should be noted GDP per capita and GDP growth is limited to EU countries and Albania.

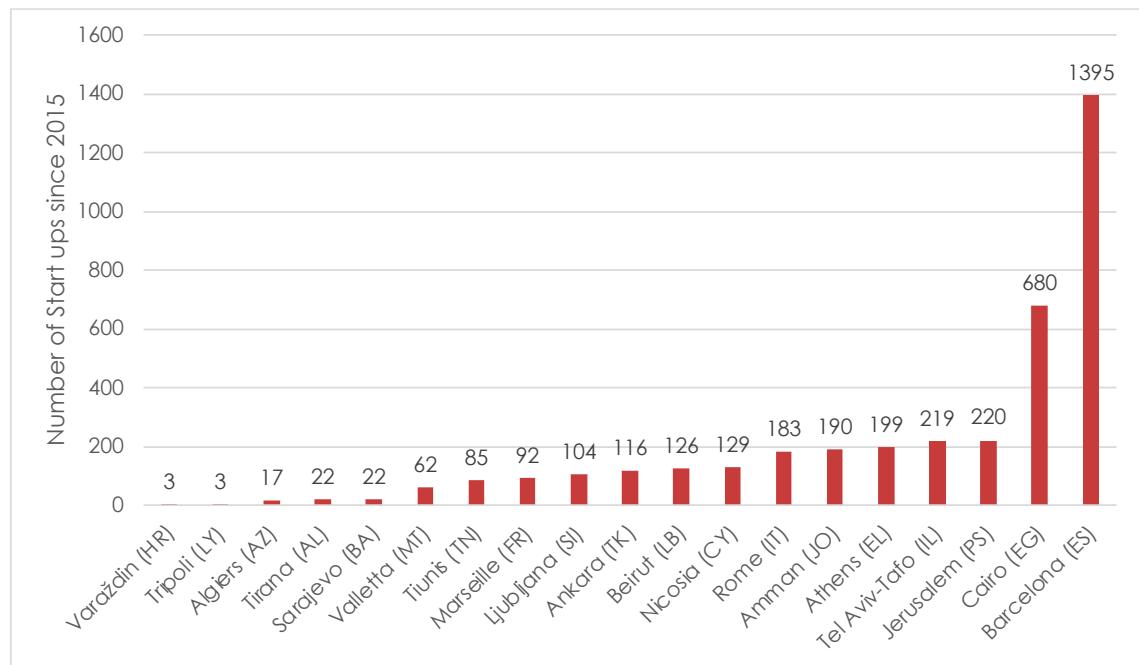


Figure 73 Top and bottom start-up activity in Mediterranean regions (City level)

Source: Technopolis Group, based on Crunchbase.

As a result of its background diversity, the Mediterranean basin has wide discrepancies amongst nations and regions regarding **labour force** indicators. The Mediterranean basin has an average employment rate of 45.39 %, with Cyprus (59 %) and Malta (56 %) having the top ranking, while Jordan (31 %) and Algeria (35 %) have the lowest employment rate (Eurostat).

Nations outside of the EU have the lowest **dependency ratio** with Jordan (6 %) and Libya (7 %) having the lowest, while nations such as Italy (36.4 %) and Greece (35.1 %) have the highest rates (Eurostat). The mean for the regions is 21.63 % (ibid)

The **attainment of tertiary education** has a ranging rate of 28.9 % and a mean of 43.28 % (Eurostat). Cyprus has the largest rate with 57.8 % of their population reaching tertiary education, while only 28.9 % of the Italian population has received tertiary education.

Analysing the NUTS 2 level, the **unemployment average** of the EU regions within the basin is 12.75 %, doubling the EU average of 6 %. Similarly, the basin **youth unemployment rate** (11.2 %) almost doubles the EU average rate (6.3 %). Southern Spanish regions, namely, Andalucia, Extremadura and the cities of Ceuta and Melilla, have the highest rates of unemployment and youth unemployment, with averages of 18.27 % and 16.31 %, respectively (Eurostat). In particular, the Spanish region of Ciudad de Ceuta is the worst performer for both youth (19.7 %) and total (24.5 %) unemployment (Eurostat). A similar case happens within the Greek regions, with a high average for unemployment (17.38 %) and youth unemployment (14.78 %) (Eurostat). Italian regions range widely with better performers such as Lombardia with a rate of 5 % of unemployment, and bad performers such as Calabria with an unemployment rate of 20.1%.

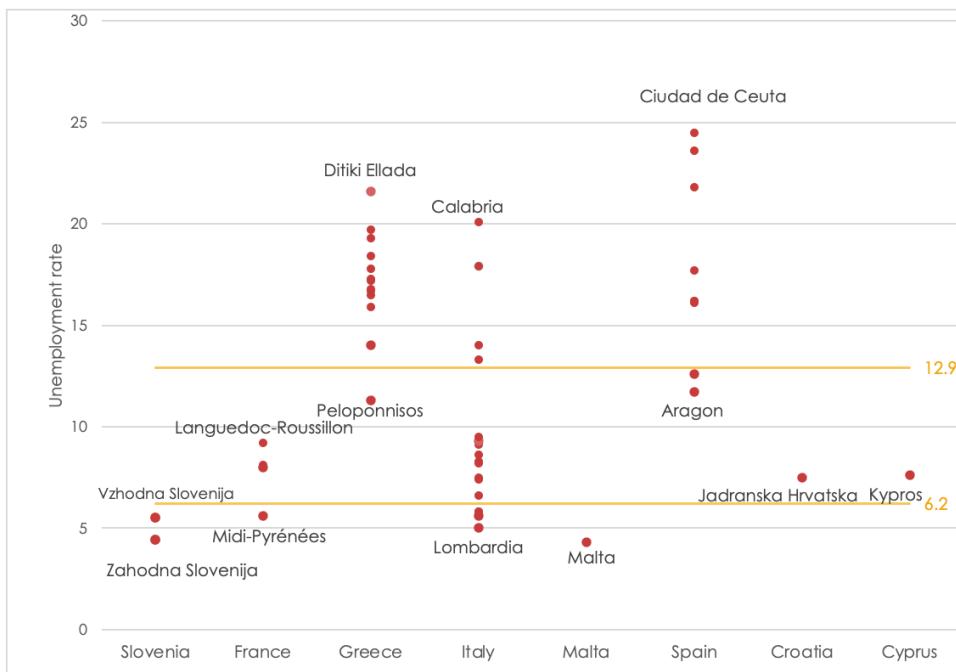


Figure 74 Distribution of unemployment rate in Mediterranean regions (NUTS2) per country

Source: Technopolis Group, based on Eurostat. Horizontal lines represent Mediterranean basin average (lower yellow bar) and EU average (upper yellow bar).

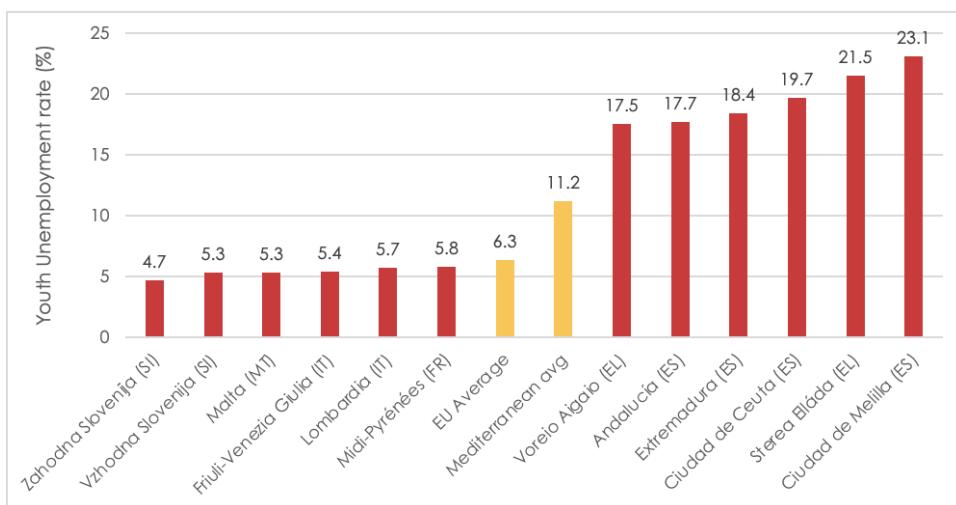


Figure 75 Top and bottom youth unemployment rate in Mediterranean regions (NUTS3)

At-risk poverty rates are massively diverse within the Mediterranean basin, ranging from 6.1 % to 44.4 %. As shown below, Italy has the lowest rate of at-risk poverty while also having some of the highest. The lowest region of Valle d'Aosta (6.1 %) and Sicilia (44.4 %) with a range of 38.3 % (Eurostat). Slovenia has the lowest mean rate at 12.2 % while Spain (25.3 %) has the highest. Many of the regions fall in the bracket of 15 % to 30 %, totalling 22 NUTS 2 regions (Eurostat).

Regarding material and social deprivation at the national level, there is a massive range of 55.2 % and a mean of 19.79 %; the highest being Albania (61.3 %) and lowest being Slovenia (6.1 %) (Eurostat). The best performing countries in these terms are Slovenia (6.1 %), Croatia (6.4 %) and Malta (6.4 %) while the most exposed citizens are in Albania (61.3 %), Greece (30.4 %) and Turkey (29.6 %).

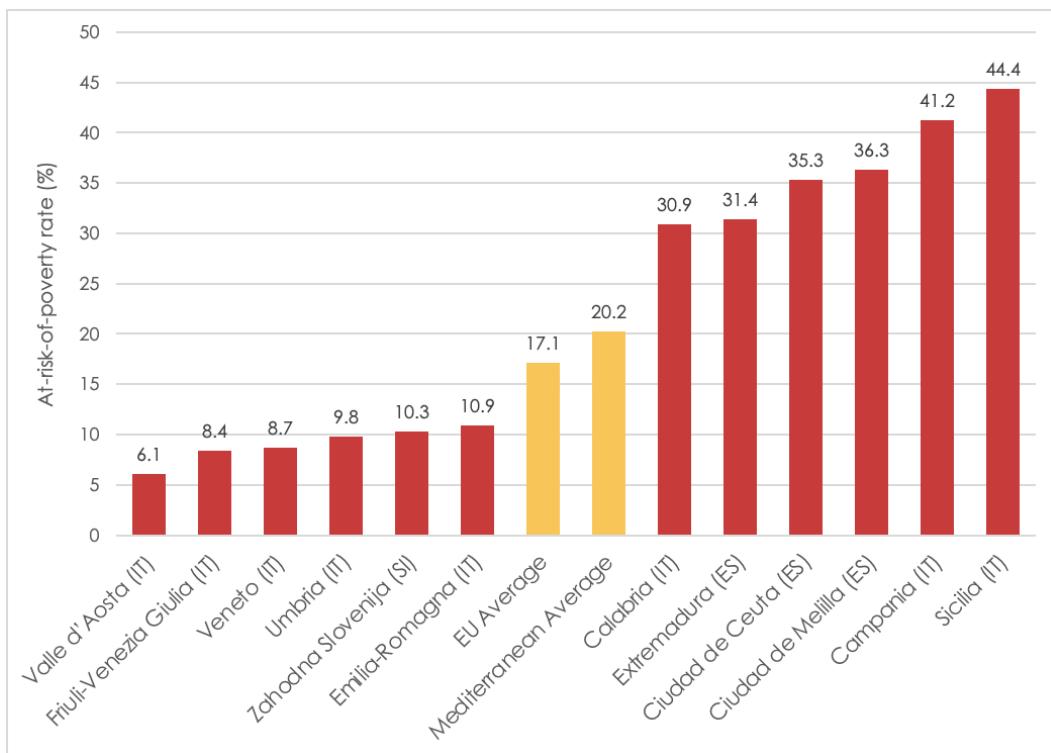


Figure 76 Top and bottom at-risk-of-poverty rate in Mediterranean regions (NUTS2)

Source: Eurostat

All in all, the Mediterranean basin is quite **disadvantaged in terms of socio-economic indicators** (based on data available for the Mediterranean regions within the EU and its neighbourhood). Over half of the regions (54 %) are below average for GDP per capita, unemployment and at-risk-of-poverty. Moreover, the average unemployment rate at Mediterranean level (12.76 %) is double the size of the EU average (6.2 %), and the at-risk-of-poverty average rate (20.4 %) is higher than the EU average (17.1 %). Italy shows the highest within country regional disparities, with Italian regions positioned both among the top performers and the bottom performers for socio-economic indicators.

Mediterranean	GDP Per Capita	Unemployment Rate	At-Risk-of Poverty
Average (mean)	22 275.93	12.76	20.41
% Above	46 %	49 %	48 %
% Below	54 %	51 %	52 %
Top Performers	28 757 to 39 500	4.3 to 7.55	6.1 to 13.9
Above Average Performers	21 450 to 285 75	7.55 to 12.6	13.9 to 19.7
Disadvantaged performers	15 625 to 21 450	12.6 to 17.5	19.7 to 25.82
Bottom Performers	3 900 to 15 625	17.5 to 24.5	25.82 to 41.4

Table 14 Aggregated status of the cohesion/socio-economic disparities for regions in the Mediterranean basin

Source: Technopolis Group

Those who are considered the bottom performers consistently score in the 75th to 100th percentile for unemployment and at-risk poverty rate while in the 1st to 24th percentile for GDP. It includes fourteen regions in total. Three regions come from Albania, four regions from Spain, four Greek regions and three Italian regions.

Those who are considered **disadvantaged regions** are the regions which consistently score in the 50th to 74th percentile for unemployment rate and at-risk poverty, while for GDP per capita it is 25th to 49th. It consists of 14 regions in total:

- Seven of these regions came from Greece, with six of them being the worst performers in terms of GDP per capita, namely, Voreio Aigaio, Kriti, Anatoliki Makedonia, Thraki, Ipeiros, Thessalia and Peloponnisos.
- There are also three Spanish regions, namely Castilla-La Mancha, Comunitat Valenciana and Región de Murcia. The GDP per capita within the region of Comunitat Valenciana is above average; however, the rates of unemployment (16.2 %) and at-risk-of-poverty (24.6 %) are significantly high and pull the region to the disadvantaged group.

- Within this percentile, there are also four Italian regions, namely, Molise, Puglia, Basilicata, and Sardinia. Although the region of Basilicata has the biggest GDP of the group, an unemployment rate below average; it, however, has one of the highest at-risk-of-poverty rates with 27.1 %.

Those who are considered above average score in the 50th to 74th percentile for GDP per capita and 25th to 49th percentile for unemployment rate and at-risk poverty consists of one Cyprian region, one Greek region, three Spanish regions, one French region, one Croatian, one Slovenian and three Italian.

Top performing regions are those who lie in the 75th to 100th percentile for GDP and 1st to 24th percentile for unemployment and at-risk poverty. It consists of three French regions, nine Italian, one from Malta and one Slovenia. The region of Emilia- Romagna, region of the city of Bologna is the top performer within the group.

PERFORMANCE GROUP	NUTS CODE	REGION NAME	COUNTRY
Socio-economic bottom performers	AL01	Veri	Albania
	EL63	Dytiki Elláda	Greece
	EL52	Kentriki Makedonia	Greece
	EI53	Dytiki Makedonia	Greece
	EL64	Stereia Elláda	Greece
	ES43	Extremadura	Spain
	ES61	Andalucía	Spain
	ES63	Ciudad de Ceuta	Spain
	ES64	Ciudad de Melilla	Spain
	ITF3	Campania	Italy
	ITF6	Calabria	Italy
	ITG1	Sicilia	Italy
	AL02	Qender	Albania
	AL03	Jug	Albania
Socio-economic disadvantaged regions	EL41	Voreio Aigaio	Greece
	EL51	Anatoliki Makedonia, Thraki	Greece
	EL54	Ipeiros	Greece
	ES42	Castilla-La Mancha	Spain
	ITF4	Puglia	Italy
	EL43	Kriti	Greece
	EL61	Thessalia	Greece
	EL65	Peloponnisos	Greece
	ITF2	Molise	Italy
	EL42	Notio Aigaio	Greece
	ES52	Comunitat Valenciana	Spain
	ES62	Región de Murcia	Spain
	ITF5	Basilicata	Italy
	ITG2	Sardegna	Italy
Socio-economic above average performers	EL62	Ionia Nisia	Greece
	ES53	Illes Balears	Spain
	HR03	Jadranska Hrvatska	Croatia
	CY00	Kýpros	Cyprus
	EL30	Attiki	Greece
	ES51	Cataluña	Spain
	FRJ1	Languedoc-Roussillon	France
	ITF1	Abruzzo	Italy
	SI03	Vzhodna Slovenija	Slovenia
	ES24	Aragón	Spain
	ITI2	Umbria	Italy
	ITI4	Lazio	Italy
	FRL0	Provence-Alpes-Côte d'Azur	France
	FRM0	Corse	France
	MT00	Malta	Malta
Socio-economic top performers	ITC3	Liguria	Italy
	ITI1	Toscana	Italy
	ITI3	Marche	Italy
	SI04	Zahodna Slovenija	Slovenia
	FRJ2	Midi-Pyrénées	France
	ITC1	Piemonte	Italy
	ITC2	Valle d'Aosta/Vallée d'Aoste	Italy
	ITC4	Lombardia	Italy
	ITH3	Veneto	Italy
	ITH4	Friuli-Venezia Giulia	Italy
	ITH5	Emilia-Romagna	Italy

Table 15 List of Mediterranean regions grouped by socio-economic performance

5.5. R&I performance

The Mediterranean shows large disparities in terms of R&I performance. Many regions and countries are lagging behind, especially those outside the EU. However, countries such as Greece, Spain and Croatia have many disadvantaged regions also, while many French and Italian regions are considered advanced in terms of R&I.

R&I inputs in the Mediterranean basin vary greatly. Regarding **Government expenditure in R&D (GERD)**, the basin average is 1 %, with Malta (0.57 %) having the lowest average GERD of the basin while Slovenia (2.39 %) has the highest. Italian regions are well placed being five out of the six top performing regions. Out of the five regions with the lowest GERD, three of them come from Spain while the other two come from Greece.

Encouragingly, the basin average **business R&D expenditure (BERD)** is 1.46 %, slightly higher than the EU average of 1.3 % (Eurostat, national level data only). This takes into account highly innovative countries such as Israel, which, at the national level, has the highest rate at 4.39 %, while Greece has the lowest rate at 0.59 % (Eurostat).

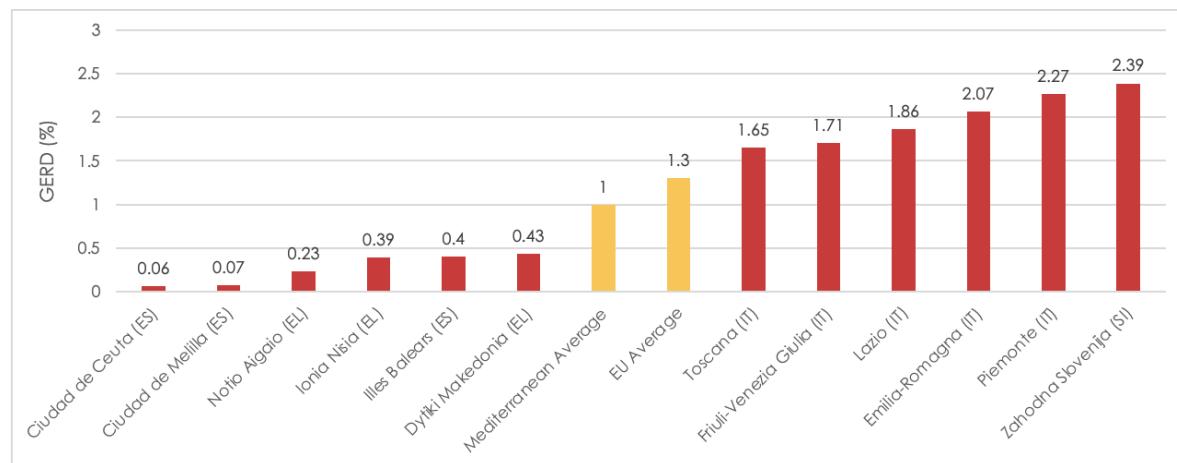


Figure 77 Top and bottom government Expenditure in R&D (as % of GDP) in Mediterranean regions (NUTS2)

Source: Eurostat

Regarding **human resources in science & technology**, the Mediterranean average (39.7 %) falls significantly below the EU average (46.3 %). As illustrated in Figure 78, French regions have the highest rates of HRST, while the average for Greek regions is the lowest (35.1 %). In line with this, France makes up four of the top six regions while Greece accounts for four of the bottom six regions (Eurostat). The disparity between the top and bottom performers is 27.6 %, namely between the bottom region of Notio Aigaio (28.5 %) to the top region of Midi-Pyrénées (56.1 %) (Eurostat).

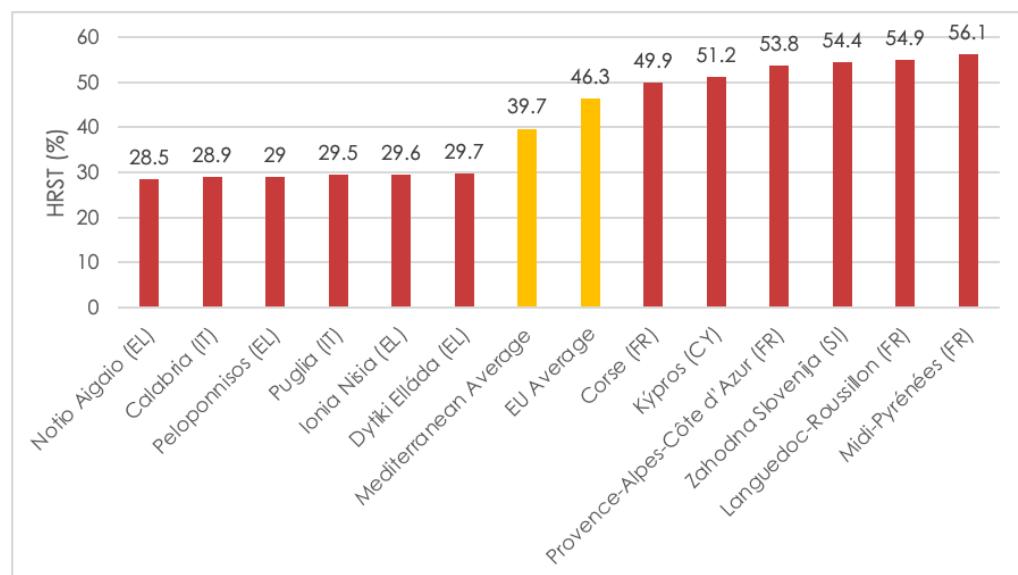


Figure 78 Top and bottom Human Resources in Science & Technology in Mediterranean regions (NUTS2)

Regarding **regional innovation**, previously mentioned factors and their outcomes are visible. Lower expenditure means mostly lower performance.

In this regard, the Mediterranean basin does not score well in general. The mean score for the global innovation scoreboard for the Mediterranean is 37.41 out of a possible 100. Algeria (19.9) has the lowest score while France (55) has the highest score (GII, 2020). Israel (53.4) is the only other region which scores above 50.

For the Regional Innovation Scoreboard, the majority of the regions are significantly below the EU average of 100, at 78.7. France has the highest joint scoring regions of Languedoc-Roussillon and Midi-Pyrénées at 117.2. Greece has the lowest average score at 64.65 and has the lowest scoring region of Dytiki Makedonia with 49.47 (EC, 2021).



Figure 79 Distribution of Regional Innovation Scoreboard performance in Mediterranean regions (NUTS2)

Source: Technopolis Group based on European Commission, Regional Innovation Scoreboard (2021); upper yellow bar is EU average score (100); lower yellow bar is Mediterranean average score (79)

On average, the Mediterranean is only a moderate performer in terms of **knowledge production**, but there are wide disparities between regions that should be discussed. As shown in Figure 80, the Mediterranean average in **number of patents** (199) is below the EU average (458). Regarding the **number of publications**, the basin average (4 092) is almost equal to the EU's (4 088).

At the NUTS 3 level, 20 regions have produced zero patents, with thirteen of these regions coming from Greece. Greece also has 16 regions with zero publications. Milan (4 481), Italy, is front runner in terms of patents with Barcelona (3 131) following. Milan and Barcelona regions also appear as the largest producers of publications with 67 263 and 80 105 respectively (based on data from DG RTD, Knowledge ecosystems project, 2021). For both patents and publications, Italy has the best performing regions with three in the top six for both indicators.

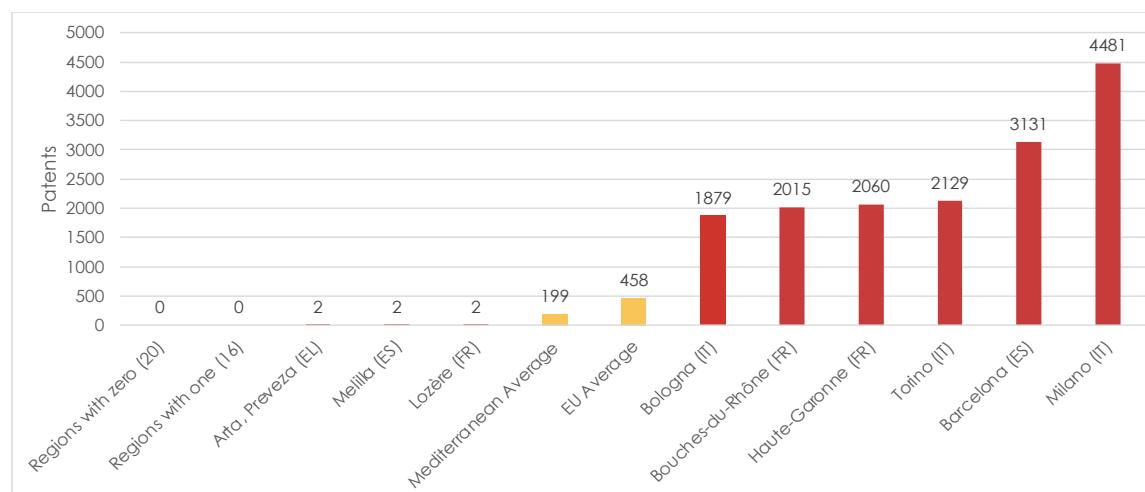


Figure 80 Top and bottom number of patents per Mediterranean region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2021); Regions with zero patents: 4 Croatia, 13 Greece, 2 Spain, 1 Italy; Regions with one patent: 14 Greece, 1 Spain, 1 Croatia

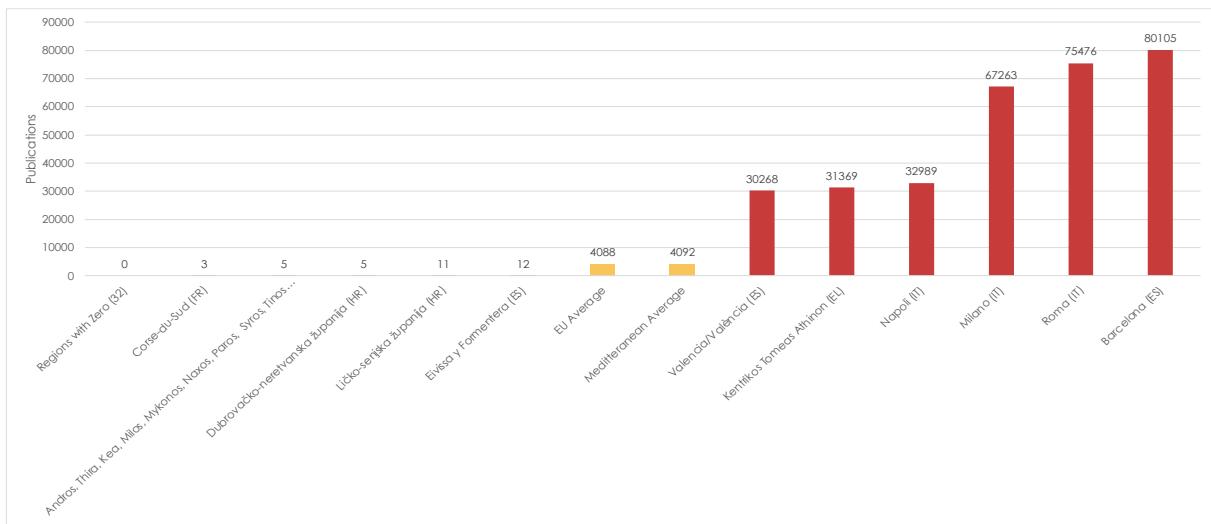


Figure 81 Top and bottom number of scientific publications per Mediterranean region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2021);

The Mediterranean average is also low in the **participating in H2020 projects** and varies widely. The basin lies just below the EU average (72) for H2020 projects at 68, with 46 regions with zero projects (including 12 Albanian, 10 Greek and 11 Italian regions). Barcelona is the region which participates most accounting for 2 155 H2020 projects and 36 in EU R&I structures and networks, followed by Milan with 1 175 H2020 projects and eight R&I Structures (ATI).

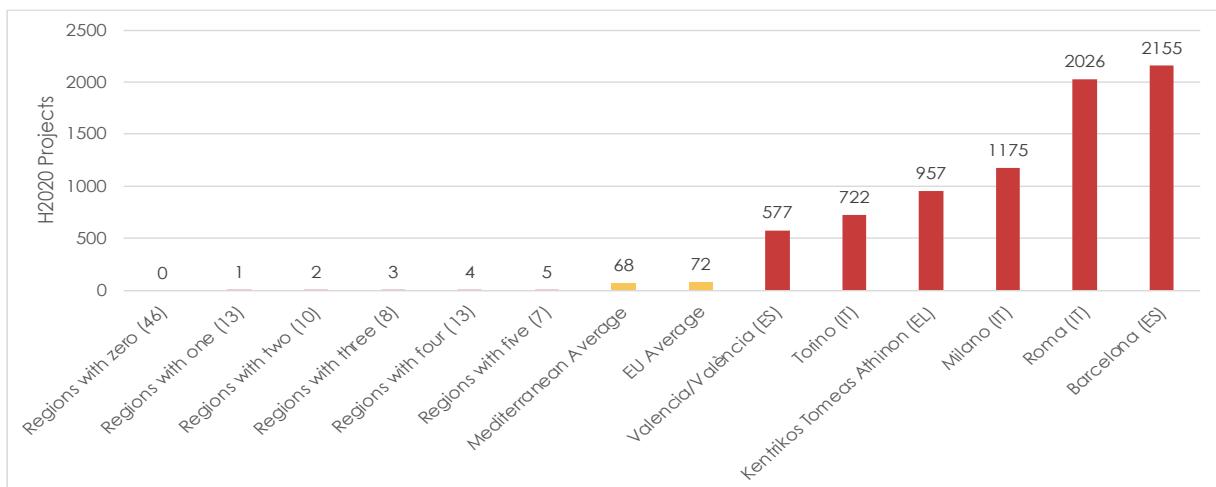


Figure 82 Top and bottom number of participations in H2020 projects per Mediterranean region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2021);

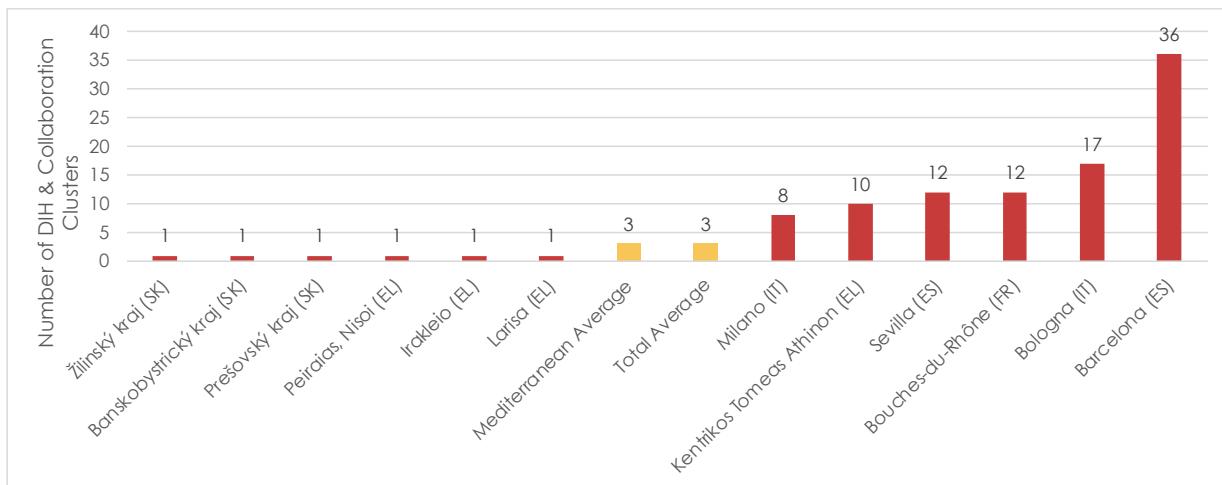


Figure 83 Top and bottom number of participations in DIH and collaborations clusters per Mediterranean region (NUTS3)

Source: based on data provided by AIT for the DG RTD, Knowledge Ecosystems in the New ERA project (cut-off date May 2021);

In order to understand those who are the innovation leaders, those who are performing well, those who are disadvantaged regions and those who are the worst performing, we selected the indicators: (GERD), HRST, Regional Innovation Scoreboard, H2020 projects, number of patents, number of publications and Participation in EU R&I networks and structures. These indicators were chosen as they represent the R&I inputs, outputs and connectedness. From these indicators, we identified the regions performance by understanding in which quadrant their indicators usually lie. This can also be seen in the table below.

The basin performance is moderate for most R&I indicators with a high majority of regions falling below the mean. The only indicators that are more evenly distributed are GERD and the Regional Innovation Scoreboard. Similar to other lighthouse areas, the region shows a pattern of concentration of R&I activities in 'R&I Hubs', as **roughly 70 % of regions are performing below average in terms of R&I networks and outputs** (with below average participation in H2020 projects, number of patents and number of publications produced).

Mediterranean	Gross R&D expenditure per inhabitant and as % of GDP (GERD)	Human resources in science and technology	Regional Innovation Scoreboard index	H2020 Projects	Number of patents	Number of publications	Participation in EU R&I networks and structures
Average	1.04	38.60	79	307	897	18 450	5
% Above	45 %	39 %	51 %	28 %	19 %	32 %	39 %
% Below	55 %	61 %	49 %	72 %	81 %	68 %	61 %
Bottom Performers	0.06 to 0.63	28.5 to 32.7	34 to 66	0 to 17	0 to 17	0 to 1 316	0
Below average performers	0.63 to 0.96	32.7 to 37.4	66 to 80	17 to 82	17 to 104	1 316 to 6 116	0 to 2
Above average performers	0.96 to 1.44	37.4 to 42.5	80 to 95	82 to 434	104 to 801	6 116 to 25 291	2 to 6
Top performers	1.44 to 2.39	42.5 to 56.1	95 to 117	434 to 23 75	801 to 10 862	25 291 to 10 7276	6 to 39

Table 16 Aggregate status of the R&I disparities for the Mediterranean regions

We highlight below some regions that perform just below the average in terms of R&I inputs and performance but are in **the disadvantaged areas group** and present the potential to be better integrated into international (EU, regional) projects with high value creation, or that have lower-than average or low GDP per capita providing a relatively good number of patents, and publications despite their lower GDP:

- The region of Comunitat Valenciana (ES) is in the socio-economic disadvantaged area group. However, with a GERD of 1.09 %, it is a top performer in R&I with 715 H2020 projects, 856 patents and 43 949 publications.
- The region of Castilla- La Mancha has a GDP of EUR 21 000 per capita and a GERD of 0.59 % of GDP, both numbers below the basin average. The region, however, has produced a relevant number of publications (9 184) and patents (108) and has participated in 62 H2020 projects.
- The region of Sicilia (ITG1) has a GDP of EUR 17 000 per capita and a GERD of 0.84 % of GDP, both numbers below the basin average. However, it has participated in 99 H2020 projects, created 356 patents and 25 005 publications.
- The region of Calabria (ITF6) has a GDP of 17 400, a GERD of 56, both numbers below the basin average. However, regarding knowledge creation activities, the region registered 141 patents and 10 441 publications, both numbers above the basin average.
- The region of Dytiki Makedonia (EL53), with a GDP of EUR 14 200 per capita has a GERD of 1.4, the highest of the disadvantaged regions groups. Regarding knowledge creation, the region accounts for 6 093 publications and 19 patents, and it has participated in 135 H2020 projects.

PERFORMANCE GROUP	NUTS CODE	REGION NAME	COUNTRY
R&I bottom performers	AL01	Veri	Albania
	AL02	Qender	Albania
	AL03	Jug	Albania
	EL42	Notio Aigaio	Greece
	EL62	Ionia Nisia	Greece
	EL65	Peloponnisos	Greece
	ES63	Ciudad de Ceuta	Spain
	EL64	Stereia Elláda	Greece
	ES64	Ciudad de Melilla	Spain
	ITC2	Valle d'Aosta/Vallée d'Aoste	Italy
	EL41	Voreio Aigaio	Greece
	EI53	Dytiki Makedonia	Greece
	EL51	Anatoliki Makedonia, Thraki	Greece
	FRM0	Corse	France
	ES62	Región de Murcia	Spain
	ITG2	Sardegna	Italy
	HR06	Sjeverna Hrvatska	Croatia
R&I disadvantaged regions	EL54	Ipeiros	Greece
	EL61	Thessalia	Greece
	ES43	Extremadura	Spain
	HR03	Jadranska Hrvatska	Croatia
	ITF2	Molise	Italy
	HR02	Panonska Hrvatska	Croatia
	ES42	Castilla-La Mancha	Spain
	ES53	Illes Balears	Spain
	ITF6	Calabria	Italy
	EL63	Dytiki Elláda	Greece
	ITF5	Basilicata	Italy
	HR05	Grad Zagreb	Croatia
	ITG1	Sicilia	Italy
	EL43	Kriti	Greece
	MT00	Malta	Malta
	ITF1	Abruzzo	Italy
R&I above average performers	ITF4	Puglia	Italy
	EL52	Kentriki Makedonia	Greece
	ITF3	Campania	Italy
	ITI2	Umbria	Italy
	ES24	Aragón	Spain
	ES61	Andalucía	Spain
	ITC3	Liguria	Italy
	ITI3	Marche	Italy
	SI03	Vzhodna Slovenija	Slovenia
	CY00	Kýpros	Cyprus
	ITH3	Veneto	Italy
	ITH4	Friuli-Venezia Giulia	Italy
	ITI1	Toscana	Italy
	FRJ1	Languedoc-Roussillon	France
	ES52	Comunitat Valenciana	Spain
	ITC4	Lombardia	Italy
R&I top performing I regions	SI04	Zahodna Slovenija	Slovenia
	EL30	Attiki	Greece
	ITC1	Piemonte	Italy
	ITH5	Emilia-Romagna	Italy
	ES51	Cataluña	Spain
	FRJ2	Midi-Pyrénées	France
	FRL0	Provence-Alpes-Côte d'Azur	France
	ITI4	Lazio	Italy

Table 17 List of regions in the Mediterranean area grouped by R&I performance

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Appendix B Methodology for calculating the regional disparities

For the socio-economic and R&I dimensions, a data analysis was conducted to identify the NUTS3 regions that are leaders, are performing well, have potential, or are lagging behind at the dimension level.

Several indicators were selected for each dimension, according to the data availability and their relevance.

R&I dimension	Socio-economic dimension
Gross R&D expenditure per inhabitant and as % of GDP (GERD)	GDP per capita (annual)
Human resources in science and technology	Unemployment rate
Regional Innovation Scoreboard index	At-risk-of-poverty rate (after social transfers)
H2020 Projects	
Number of patents	
Number of publications	
Participation in EU R&I networks and structures	

Table 18 Selected indicator for the identification of disadvantaged areas

Step 1

For each of these indicators, quartiles have been defined based on performance:

- First quartile: the lowest 25 % of observations
- Second quartile: observations between 25 % and 50 % (up to the median)
- Third quartile: observations between 50 % to 75 %
- Fourth quartile: the highest 25 % of observations

An alternative method for this step is to sort observations based on standard deviation from the mean instead of quartiles. However, the Jarque-Bera test indicated that the datasets do not have a normal distribution, preventing us from using a standard deviation-based method.

Step 2

A score was assigned to each observation according to its quartile, so that the best performers get the highest score:

- First quartile: 0 point
- Second quartile: 1 point
- Third quartile: 2 points
- Fourth quartile: 3 points

(In the case of « reverse » indicators where the best performance corresponds to the lowest number (e.g. at-risk-of-poverty rate), the best score are assigned to the first quartile.)

Step 3

For each region, the scores obtained in each indicator of the dimension were aggregated through a simple average to obtain the aggregate performance in R&I/socio-economic dimension.

Step 4

The regions are classified in four performance groups, for both the R&I dimension and the socio-economic dimension:

Performance group	Definition	R&I dimension	Socio-economic dimension
Top performers	Regions with an aggregate score in the top 25 %	R&I hubs, leading the innovation activity in Europe	Best socio-economic conditions in Europe
Above average performers	Regions with an aggregate score in the top 25 % to 50 %	Regions with well-developed R&I activities	Socio-economic conditions above EU average but not optimal
Disadvantaged performers	Regions with an aggregate score in the bottom 50 % to 25 %	Disadvantaged regions that show blooming R&I activity and where support is most relevant to reach their full potential	Regions with a socio-economic background that is insufficient
Bottom performers	Regions with an aggregate score in the bottom 25 %	Regions with very limited R&I activities and resources	Least favorable socio-economic conditions

Table 19 Breakdown in 4 performance groups

TASK 2 –LIGHTHOUSE SPECIFIC BASELINE– ATLANTIC, ARCTIC, DANUBE AND MEDITERRANEAN LIGHTHOUSE AREAS

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ATLANTIC/ARCTIC

1. INTRODUCTION

This chapter provides an overview of the work performed for the development of environmental baselines for the Atlantic and Arctic Lighthouse Area under the contract: *Baseline study for the implementation of lighthouses of Mission ‘Restore our ocean and waters by 2030’*. The chapter includes/presents the following: indicators that are relevant to establishing environmental baselines aimed at monitoring progress towards the achievement of mission objectives in the Lighthouse Area; six in-depth case studies of mission-relevant projects implemented in the Lighthouse Area; and a database of other mission-relevant projects implemented in the Lighthouse Area.

For the Atlantic and Arctic Sea basin lighthouse areas, the following three targets have been set under Mission objective 1 “Restore marine and freshwater ecosystems and biodiversity”:

- 1) Protect a minimum of 30 % of the EU’s Sea area and integrate ecological corridors, as part of a true Trans-European Nature Network;
- 2) Strictly protect at least 10 % of the EU’s Sea area;
- 3) Contribute to relevant upcoming marine nature restoration targets including degraded seabed habitats and coastal ecosystems.

Where needed, this report refers to EU policies that are relevant to the Mission Objective 1. The objectives, reporting requirements, existing indicators and data flows associated to these policies have been screened, and their suitability to inform the achievement of the mission objectives reviewed. As such, the report captures the embeddedness of existing marine protection and restoration initiatives in the “bigger picture” of EU policies regarding the state of the marine environment in the Atlantic and Arctic areas. The report also considers recent relevant policy developments such as the Commission’s adoption (22 June 2022) of a proposed EU Regulation on nature restoration⁶⁵, which reflects an ambitious step forward towards the EU’s commitment to scale up marine ecosystem restoration, as set out in the EU Biodiversity Strategy to 2030 and the European Green Deal.

The information presented in this chapter is structured along the three above targets. After an introductory section presenting the geographic scope of the Lighthouse Area and the relevant environmental reporting obligations for the countries included in this scope, section 3.1 presents indicators for Targets 1 and 2 as regards the protection of marine ecosystems. The following section 3.2 presents propositions of restoration indicators in line with Target 3. In both these sections, indicators are presented using the categories adopted by the EC Better Regulation Guidelines and Toolbox⁶⁶. The six in-depth best practice marine and coastal ecosystem restoration case studies and the database of relevant projects are presented in sections 4 and 5 respectively. The six case studies that were selected and reviewed in detail to showcase best examples in marine and coastal ecosystem restoration, can be found in Annex C of this report.

2. THE ATLANTIC AND ARCTIC LIGHTHOUSE AREA

2.1. Geographic scope

The Atlantic and Arctic Lighthouse Area covers exclusively marine space that is under national jurisdiction, including the marine space of EU Member States, of EU Overseas Countries and Territories (OCTs), and of countries that are part of the European Economic Area (EEA). Areas Beyond National Jurisdiction (ABNJ) are not included in the geographic scope of the Lighthouse Area, since marine waters in ABNJ are by legal definition not under the sovereignty of States, and thus beyond the scope of this study.

The delineation of the Atlantic and Arctic Lighthouse Area is as follows:

Atlantic: the North-East Atlantic including the Celtic Seas (Ireland), the Bay of Biscay (France), and the Iberian coast (Portugal and Spain), as well as the Macaronesia including the Azores and Madeira (Portugal) and the Canary Islands (Spain).

Arctic: the marine waters of the Faroe Islands (OCT), (Eastern) Greenland (OCT), and of Iceland and Norway (EEA).

⁶⁵ https://environment.ec.europa.eu/publications/nature-restoration-law_en

⁶⁶ https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en

The map in the figure below provides an overview of the OSPAR Atlantic and Arctic areas.

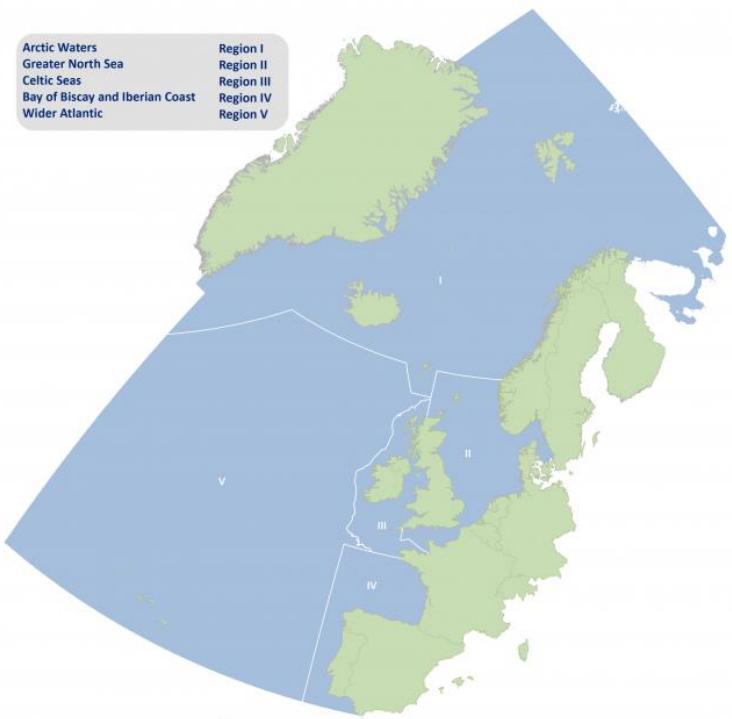


Figure 84 The North-East Atlantic and Arctic areas⁶⁷ (Source: OSPAR)

2.2. Reporting obligations and relevant initiatives for Atlantic and Arctic countries

Environmental reporting obligations for the countries included in the geographical scope of the Atlantic and Arctic Lighthouse Area provide the basis for important information flows and allow for getting a clear overview of the data available as regards the state of the marine environment in EU waters and associated regional seas. Table 20 provides an overview of the reporting obligations for countries part of the Atlantic and Arctic Lighthouse Area, including with respect to the European Commission's (EC) Water Framework Directive (WFD), the Marine Strategy Framework Directive (MSFD), and the Marine Spatial Planning Directive (MSPD). In addition, the table provides an overview of the participation of these countries in the Horizon Europe programme, and of whether countries are members of the European Environment Agency⁶⁸, and/or Contracting Parties to the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention).

State	Sea Basin		Type of entity	EU reporting obligations			Horizon Europe	Eur. Env. Agency Member	OSPAR Party
	Atlantic	Arctic		WFD	MSFD	MSPD			
Spain	Y	N	MS	Y	Y	Y	Y	Y	Y
Portugal	Y	N	MS	Y	Y	Y	Y	Y	Y
France	Y	N	MS	Y	Y	Y	Y	Y	Y
UK	Y	N	Other	Y	N/Y	N/Y	N/Y	N	Y
Ireland	Y	N	MS	Y	Y	Y	Y	Y	Y
Iceland	Y	Y	EEA	Y	Y	N	N	Y	Y
Faroe Islands	Y	Y	OCT	Y	N	N	N	N	Y
Greenland	Y	Y	OCT	N	N	N	N	N	Y
Norway	N	Y	EEA	Y	Y	N	N	Y	Y

Table 20 Reporting obligations and participation in EU programmes and OSPAR

⁶⁷ OSPAR regions map has been used to show the Atlantic and Arctic OSPAR regions. EU maps are available from the EEA geospatial data catalogue (<https://sdg.eea.europa.eu/catalogue/srv/eng/catalog.search#/home>) but cannot be used to showcase only Atlantic and Arctic Areas.

⁶⁸ Member countries of the European Environment Agency are also part of the European Environment Information and Observation Network (Eionet), a partnership network of the Agency and its 38 member and cooperating countries.

In terms of relevant initiatives to the lighthouse missions and the new EU restoration law, it is worth mentioning that OSPAR's North-East Atlantic Environment Strategy (NEAES) 2030 seems in line with the lighthouse mission objectives. NEAES is the means by which OSPAR's 16 Contracting Parties will implement the OSPAR Convention until 2030 and sets out a series of objectives to tackle biodiversity loss, pollution, including marine litter, and climate change. Some relevant specific NAES strategic objectives include:

- Strategic objective 5: Protect and conserve marine biodiversity, ecosystems and their services to achieve good status of species and habitats, and thereby maintain and strengthen ecosystem resilience.
- Strategic Objective 6: Restore degraded benthic habitats in the North-East Atlantic when practicable to safeguard their ecosystem function and resilience to climate change and ocean acidification.
- Strategic objective 7, operational objective S7.06 "minimise, and where possible eliminate, incidental by-catch of marine mammals, birds, turtles and fish so that it does not represent a threat to the protection and conservation of these species".
- Strategic Objective 9: Safeguard the structure and functions of the seabed/marine ecosystems by preventing significant habitat loss and physical disturbance due to human activities.

3. BASELINE INDICATORS

A full indicator set for the Mission is proposed in Appendix G. This indicator set includes common indicators for the three lighthouse areas as well as indicators for each specific area. The indicators are classified as output, outcome and impact indicators (please see Appendix G for definitions of these terms). Within this indicator set, key performance indicators are proposed for each lighthouse area.

This section presents key indicators proposed for each of the three targets formulated under Mission Objective 1 "Restore marine and freshwater ecosystems and biodiversity". A summary of these indicators is presented in Table 21, which also includes comments regarding the limitations of each indicator, in terms of definition, data availability, and consistency, which may in turn impact the definition of an environmental baseline for the Atlantic and Arctic Lighthouse Area.

		Key indicators	Potential limitations
Target 1	Protect a minimum of 30 % of the EU's Sea area and integrate ecological corridors.	Marine Protected Areas (MPA) coverage	No unique source of data for the entire Lighthouse Area: need for combining databases with different standards
		Connectivity or Fragmentation	Lack of data
Target 2	Strictly protect at least 10 % of the EU's Sea area.	"Strict MPA" coverage	Need for a common definition at EU and national levels
Target 3	Contribute to relevant upcoming marine nature restoration targets.	Status of ecosystems Levels of human pressures	Few available indicators exist

Table 21 Key indicators proposed for Mission Objective 1 and associated targets.

Each indicator included in Table 18 is presented in greater detail in the following subsections. In addition, a list of refined possible protection and restoration indicators that could be extracted from existing datasets is proposed. The indicators were selected in line with Mission Objective 1, and are presented using the categories adopted by the "Better Regulation Guidelines and Toolbox"⁶⁹, defined as follows:

- Outputs: the immediate tangible and countable products/services produced as a consequence of the initiative;
- Outcomes: the immediate direct effects of the initiative (on the environment);
- Impacts: the long-term, wider effects (on the environment).

⁶⁹ Based on the Better Regulation Toolbox, Tool 43, p. 358, available at: https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en.

3.1. Targets 1 and 2: Indicators for assessing the protection level of marine ecosystems

A crucial issue for the development of baseline indicators for targets 1 and 2 is the distinction between MPA coverage and “strict MPA” coverage (see section 6 for further details about challenges and recommendations in this topic).

Further, a review of existing datasets allowed for identifying six MPA datasets deemed relevant to the development of indicators to assess the protection level of marine ecosystems in the Atlantic and Arctic Lighthouse Area:

- [Common Database on Designated Areas \(CDDA\) dataset – EEA](#)
- [Natura 2000 data - the European network of protected sites](#)
- [OSPAR MPA dataset](#)
- [EMODNet datasets \(MPA + Natura 2000\)](#)
- [Protected Planet dataset](#)
- [MPA Atlas dataset](#)

To identify the most suitable dataset among the above, the following three criteria were set:

- The dataset must include waters under national jurisdiction for all included countries; offer the possibility to exclude Mediterranean MPAs for Spain and France; and offer the possibility to exclude French Outermost Territories MPAs (beyond the Northeast Atlantic).
- The latest update of the dataset must be as recent as possible, and no older than 2020.
- The metadata associated must, for target 2, include data on protected area management categories (e.g., using the IUCN management categories typology).

The results of the review of the relevant datasets are presented in Table 22.

Datasets		CDDA (EEA)	N2K (EEA)	OSPAR	EmodNet	Protected Planet	MPA Atlas
Geographic coverage	Spain	Y	Y	Y	Y	Y	Y
	Incl. Macaronesia	Y	?	N	Y	Y	Y
	Incl. Mediterranean	Y	?	N	Y	Y	?
	Portugal	Y	Y	Y	Y	Y	Y
	Incl. Azores	Y	?	?	Y	Y	Y
	France	Y	Y	Y	Y	Y	Y
	Incl. Outermost Territories	Y	?	Y	Y	Y	?
	Incl. Mediterranean	Y	?	?	Y	Y	?
	UK	N	N	Y	N	Y	Y
	Ireland	Y	Y	Y	Y	Y	Y
	Iceland	N	?	Y		Y	Y
	Faroe Islands (DNK)	N	?	Y	Incomplete		?
	Greenland (DNK)	Y	?	Y	Y	Y	
	Norway	Y	?	Y	Y	Y	Y
Last update		2021	2020	2022	2021	2022	?
Format		CSV	CSV	Table	GIS	CSV	Data temporarily unavailable for public use
Metadata	IUCN categories	Y	?	N	Y	Y	?
	Other management categories	N	?	N	N	N	N
Inclusion of N2000 sites		Y	Y	?	Y	?	?
Web		Link	Link	Link	Link	Link	Link
Suitability		Best source to date.	Data are included in CDDA.	Best additional source, although inconsistencies with CDDA were noticed. Dataset not available online.	No added value as Derived from EEA dataset.	Appears as a precise source, which will probably implement the MPA Guide categories.	Only includes fishing protection levels

Table 22 Assessment of existing MPA datasets.

Source: own elaboration

Legend: Y = Yes; N=No; ?=Information unavailable from dataset description

The analysis presented in Table 22 led to consider the CDDA dataset as the most suited one to inform the development of indicators for assessing the protection level of marine ecosystems in the Atlantic and Arctic Lighthouse Area. The CDDA dataset⁷⁰ provides an exhaustive list of designated sites for protection – both terrestrial and marine – across EU Member States. Information is provided per designated sites with the following information: country, area (in ha) and IUCN management category. However, the absence of data for Iceland requires complementing the CDDA dataset with another one – preferably the OSPAR MPA dataset. For the Atlantic and Arctic Lighthouse, data extracted from the CDDA dataset met the following criteria:

- Geographical coverage: countries included in the Atlantic and Arctic Lighthouse Area (i.e., France – manually excluding Mediterranean and outermost territories; Ireland; Portugal – including the Azores; Spain – including Macaronesia and manually excluding Mediterranean waters; Greenland – manually excluding sites outside Atlantic and Arctic waters; and Norway)⁷¹.
- Type of sites: “Marine” as well as “Marine and terrestrial” sites (considering only the marine portion of “marine and terrestrial sites” – available in the metadata).

⁷⁰ Available in .csv format from the [EEA website](#).

⁷¹ As noted in Table 19, the CDDA database does not include Iceland, the Faroe Islands, nor the UK.

Table 23 presents the data extracted from the CDDA database for the Atlantic and Arctic Lighthouse Area.

	Total	Portugal	Spain	France	Ireland	Norway	Greenland	Iceland	Faro e	U K
Marine Protected areas (km²)	422 010	248 524	1 168	13 281	179	90 818	68 040	No data		
Atlantic and Arctic jurisdiction (EEZ+TS+IW*) (km²)	6 737 079	1 795 230	867 336	264 096	465 060	1 076 734	No data			
Marine Protected areas (% jurisdiction)	6.26 %	13.84	0.13	5.03	0.04	8.43				
Number of designated sites	1 094	63	63	37	48	882	1			
<i>Ia</i> (km ²)	3 016	196	0	0	53	2 763	0	No data		
(%total)	0.7 %	0	0	0	31.5	3	0			
<i>Ib</i> (km ²)	70 383	5 293	371	0	0	64 719	0			
(%total)	16.7 %	2.1	31.7	0	0	71.2	0			
<i>II</i> (km ²)	89 453	0	78	0.44	0	2133 5	68 040			
(%total)	21.2 %	0	6.7	0	0	23.5	100			
<i>III</i> (km ²)	5	0	1	496	0	2.8	0			
(%total)	0 %	0	0	3.7	0	0	0			
<i>IV</i> (km ²)	108 054	106 439	113	12 785	122	883	0			
(%total)	25.6 %	42,8	9.7	96.2	68.5	0.97	0			
<i>V</i> (km ²)	13 749	417	114	0	0	433	0			
(%total)	3.2 %	0.17	9.7	0	0	0.48	0			
<i>VI</i> (km ²)	136 223	136 178	46	0	0	0	0			
(%total)	32.3 %	54,8	3.9	0	0	0	0			
<i>Not assig.</i> (km ²)	446	0	446	0	0	0	0			
(%total)	0.1 %	0	38.1	0	0	0	0			
Strictly protected areas (km ²)	73 399	5 489	371	0	53	67 482	0	No Data		
(%EEZ)	0.01 %	0.003	0,0	0	0	0.06	0			

Table 23 Area-based protection of EU marine ecosystems in the Atlantic and Arctic Lighthouse Area – 2021

Source: EEA.

* Legend : EEZ= Exclusive Economic Zone; TS= Territorial Sea; IW= Internal Waters.

The following information can be extracted from the CDDA database:

- Total MPA coverage (km²) in the Atlantic and Arctic Lighthouse area.
- Total MPA coverage (km²) per country in the Atlantic and Arctic Lighthouse Area (Atlantic and Arctic waters only).
- Percentage of area under jurisdiction⁷² (EEZ, TS and IW) covered by MPAs (% per country).
- Total protected area coverage (km² and %) under each IUCN management category in the Atlantic Lighthouse area (overall and per country).

In light of the preceding, to develop a baseline for target 1 “Protect a minimum of 30 % of the EU’s Sea area and integrate ecological corridors”, and target 2 “Strictly protect at least 10 % of the EU’s Sea area”, a key indicator is presented for each target; sub-indicators, based on currently available the series of indicators presented in Table 24 are proposed.

⁷² Exclusive Economic Zones (EEZ), Territorial Seas (TS), and Internal Waters (IW)surfaces have been extracted from marineregions.org website, a reference database in the field. A cross-check with national data available from institutional websites (e.g., <https://limitesmaritimes.gouv.fr/ressources/tableau-des-superficies>) has been conducted to ensure the robustness of our data.

Category	Indicator name	Source	Coverage (ATL; ARC)
Outcomes: Target 1	Designation of new or expanded Marine Protected Areas (MPAs)	CDDA (EEA)	Both (limited for the Arctic)
	Total MPA coverage (km ²) per country in the Atlantic and Arctic Lighthouse Areas (Atlantic and Arctic waters only)	As above	As above
	Total MPA coverage (km ² and %) in the Atlantic and Arctic Lighthouse areas	As above	As above
	Percentage of area under jurisdiction (EEZ, TS and IW) covered by MPAs (% per country)	As above	As above
	Total MPA coverage (km ² and %) against 30% protection target (overall and per country)	As above	As above
Outcomes: Target 2	Designation of new Strictly protected Marine Protected Areas (MPAs)	As above	As above
	Total MPA coverage (km ² and %) currently designated under strict protection against the 10% target (overall and per country) *	As above	As above

Table 24 Proposed key indicators on marine protection for the Atlantic and Arctic Lighthouse Area

* Using IUCN or MPA guide management categories as a reference. See section 6 for further discussion. See Appendix G for the full list of proposed indicators.

The proposed indicators should be monitored at two different spatial scales: for the entire lighthouse area; and per country (considering only their waters within the lighthouse area). Annual updates will be required to monitor progress towards the targets. It should be noted that the sea area within the Arctic basin, legally speaking, does not belong to the EU's Sea Area.

3.1.1. Examples of indicators

The following Figures 85, 86 and 87 illustrate examples of baseline indicators that have been developed with the CDDA data. These indicators can be employed to give a sense of distance to targets 1 and 2.

For example, an analysis of the data indicates that only Portugal and Norway have to this day designated significant shares of their EEZs as protected areas. Still, their current percentages – 13.84 % designated by Portugal and 8.43 % designated by Norway – remain significantly below the 30 % target set by the EU Biodiversity Strategy. Furthermore, all other Member States are found to have much lower area-based marine protection level, as down as less than 1 % in the case of Spain and Ireland.

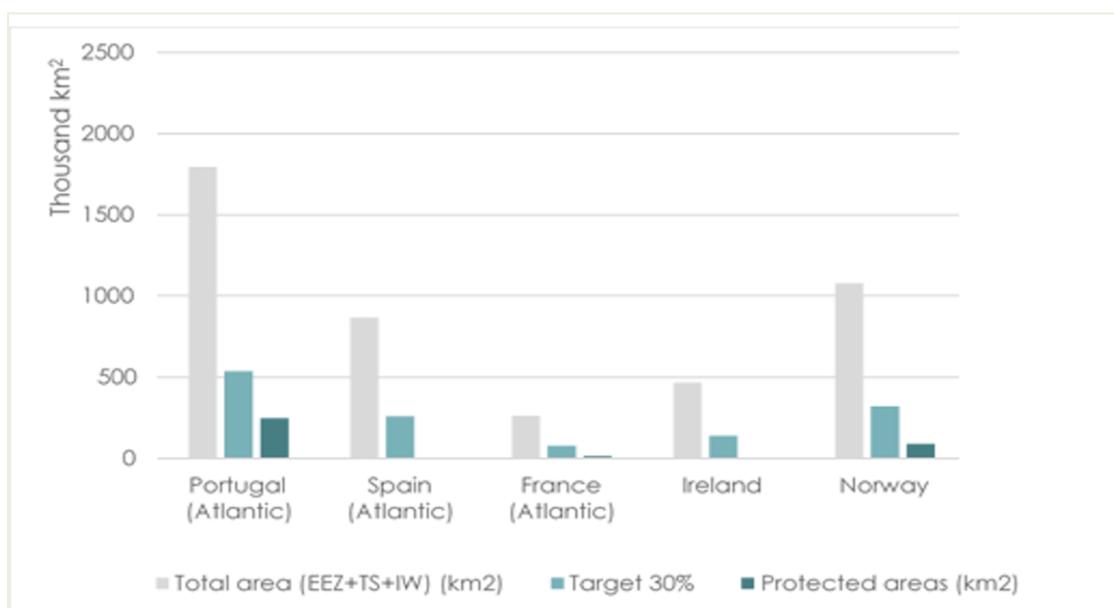


Figure 85 Marine protected area coverage in the Atlantic and Arctic Lighthouse Area against total area of national marine waters and the EU 30 % protection target (Km2)*

Source: CDDA (EEA)

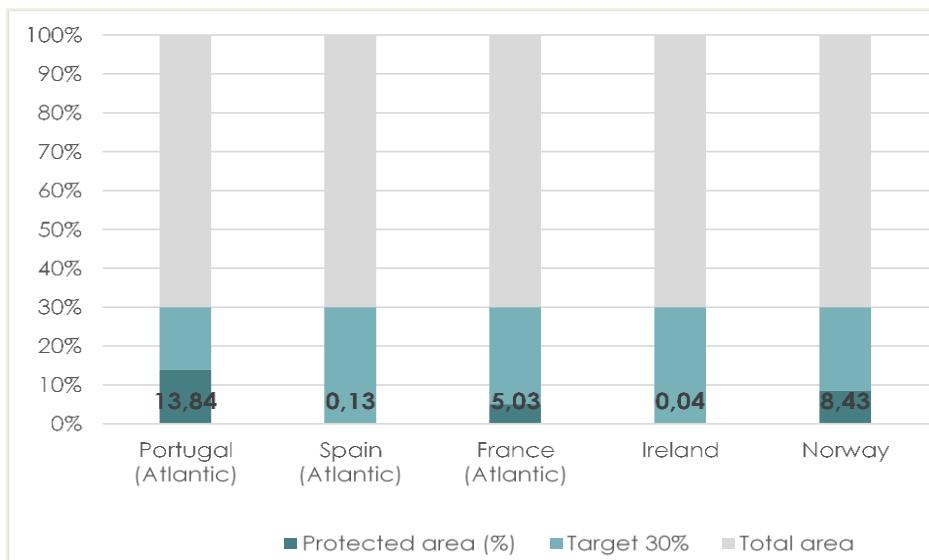


Figure 86 Percentage of marine protected area coverage in the Atlantic and Arctic Lighthouse Area against total area of national marine waters and EU 30 % protection target (%)*

Source: CDDA (EEA)

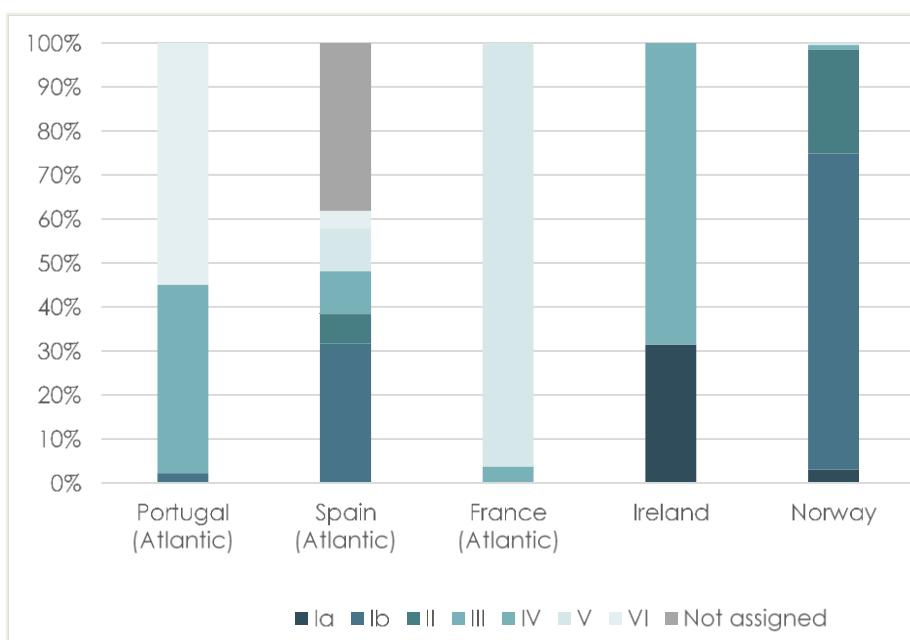


Figure 87 Marine protected areas in the Atlantic and Arctic Lighthouse Area per IUCN categories (% of total protected area).

Source: CDDA (EEA)

Considering Mission target 2, while Norway has designated a large share of its MPAs (74.3 %) under strict IUCN categories (Ia and Ib), this is neither the case for Portugal (only 2.13 %), nor France (0 %).

3.2. Target 3: Key indicators for assessing the restoration level of marine ecosystems

For the Atlantic and Arctic Lighthouse Area, target 3 specifically addresses the restoration of marine ecosystems and biodiversity by contributing to relevant upcoming marine nature restoration targets including degraded seabed habitats and coastal ecosystems. The new proposed regulation explicitly targets the restoration of nature in Europe with the overall target to repair the 80 % of European habitats that are in poor condition, and to bring back nature to all ecosystems, from forest and agricultural land to marine, freshwater and urban ecosystems. Under this proposal for a Nature Restoration Law⁷³, legally binding targets for nature restoration in different ecosystems will apply to every Member State, complementing existing laws. The aim is to cover at least 20 % of the EU's land and sea areas by 2030 with nature restoration measures, and eventually extend these to all ecosystems in need of restoration by 2050.

⁷³ https://environment.ec.europa.eu/publications/nature-restoration-law_en

Article 5 of the proposed regulation – Restoration of coastal and marine ecosystems – lays out provisions relevant for the Atlantic and Arctic Lighthouse Area. These are:

- Restore 30 % by 2030, 60 % by 2040 and 90 % by 2050 of specified coastal and marine habitat types.
- Put in place re-establishment measures on areas representing at least 30 % of the additional overall surface needed to reach the favourable reference area of these habitat types by 2030, 60 % by 2040 and 100 % by 2040.
- Put in place restoration measures for the habitats of species protected by the Habitats and Birds Directives, as well as several other marine species.
- Restoring marine habitats such as seagrasses or sediment bottoms and restoring the habitats of iconic marine species such as dolphins and porpoises, sharks and seabirds,
- Targets for marine ecosystems refer to the marine (and coastal) habitats listed in the Habitats Directive annexes, as well as some additional ones and species.

In addition, according to Article 11 of the proposed regulation, Member States shall prepare national restoration plans to quantify the area that needs to be restored and to reach the restoration targets set out, taking into account the condition of the habitat types. On a content level, the plans need to address, among other things (Article 12):

- the quantification of the areas to be restored to reach the restoration targets
- a description of the restoration measures planned
- an indication of the measures to ensure that the areas covered by the habitat types listed do not deteriorate in the areas in which good condition has been reached and that the habitats of the species do not deteriorate in the areas in which the sufficient quality of the habitats of the species has been reached
- consider the marine strategies for achieving good environmental status for all Union marine regions prepared in accordance with Directive 2008/56/E
- the timing for putting in place the restoration measures
- information of financing and subsidies needed

The proposed regulation calls for the European Commission's Joint Research Centre (JRC) to support on the preparation monitoring and indicator methodologies. Consequently, indicators for the regulation will be under development at EU level.

In this section, a set of potential restoration indicators which could support the progress towards the Mission Objective and also closely match the requirements in the proposed restoration regulation are presented. Ultimately, restoration is deeply and even intrinsically associated with the reduction or suppression of human-induced pressures and the restoration of natural values of sites.

- Measuring progress towards restoration will therefore mean:
 - Assessing a reduction of human-induced pressures, and
 - Assessing an improvement of environmental status.
- Indicators for restoration could therefore be indicators related to:
 - Human activities: intensity, associated pressures and impacts.
 - Ecosystems: environmental status.

- In the Atlantic and Arctic area, most relevant data providers for such types of indicators are:
 - EEA
 - OSPAR
 - ICES
 - EmodNet

Based on the above, a series of baseline indicators for target 3 are proposed in Table 25.

Category	Indicator name	Source	Coverage (ATL; ARC)
Outcomes: Target 3	Designation of new and/or expanded coastal protected areas	EEA/CDDA and Mission projects and actions	Both
Impacts: Target 3	Improvement in status of marine and coastal habitats	EEA (EUNIS)	Atlantic (EU seas), possibly for Norway and Iceland too
	Reduction in pressures and combined effects of human activities on marine ecosystems	EEA (<i>updates, coverage uncertain</i>)	<i>To be determined</i>

Table 25 Proposed key restoration indicators for the Atlantic/Arctic area

Note: See Appendix G for the full list of proposed indicators.

3.2.1. Examples of Impact indicators

For the proposed key impact indicators presented in the table above, an illustrative analysis of existing datasets and information has been conducted and is presented below.

3.2.1.1. *Impact indicator - Conservation status of marine and coastal habitats*

This EEA Wise Marine dataset details the proportion of habitat assessments in each conservation status class per marine region⁷⁴. It is based on D1 & D6 MSFD and was last updated in 2020.

In 2018, Member States had to update the Good Environmental Status (GES) assessments performed under the MSFD Article 8. The present dashboard displays the overall status reported by countries for the features, where the results show the percentage of assessments where GES has been achieved, not achieved, is unknown or not assessed.

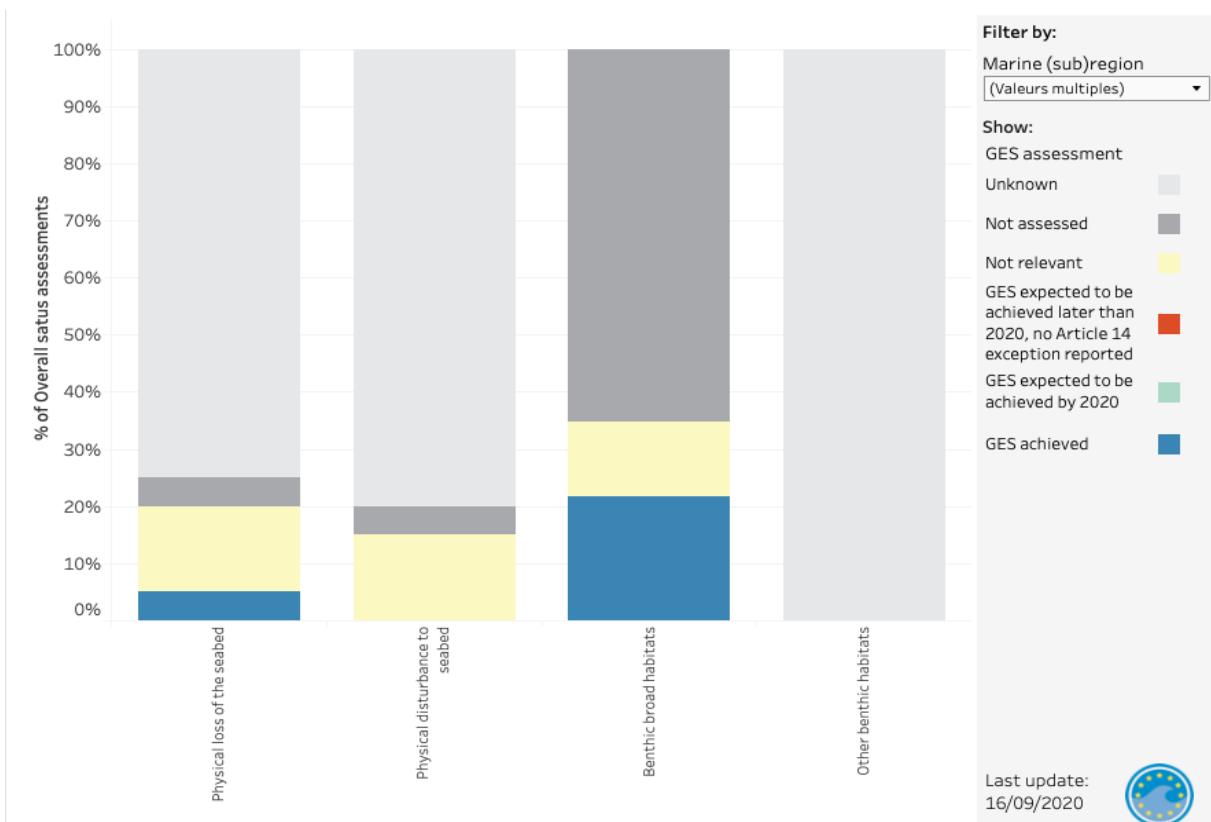


Figure 88 Proportion of habitat in each conservation status class in the Atlantic Marine Region.

Source: EEA Wise Marine

For pelagic habitats (for Bay of Biscay and the Iberian coast and Macaronesia) – there is a margin of progress in assessment before any action.

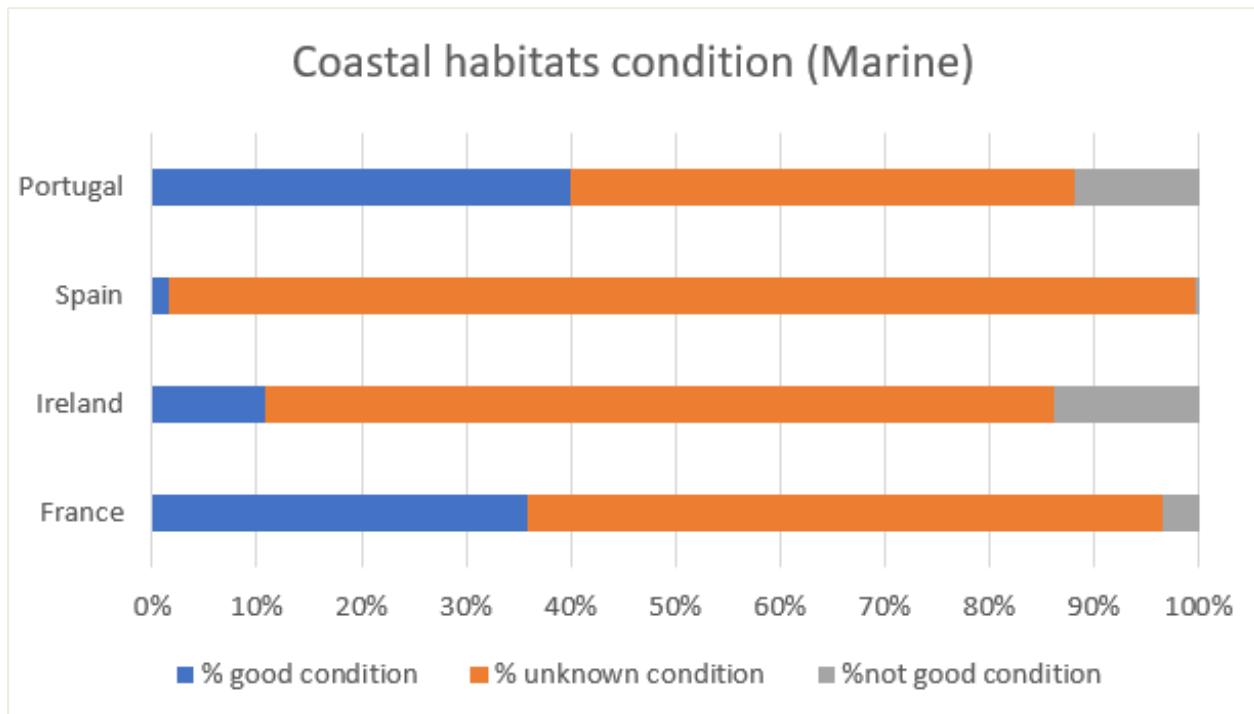


Figure 89 Distribution of coastal habitats conditions in the Atlantic LA countries.

Source: EEA Wise Marine

For a large majority of coastal habitats, conditions are still unknown.

Units	Conservation status
Geographic coverage	Atlantic marine region
Last update	2020
Format	Graphs – .xls
Data source	EEA
Link	https://tableau.discomap.eea.europa.eu/t/Natureonline/views/S0Nrestoration/Story1?:isGuestRedirectFromVizportal=y&:display_count=n&:showAppBanner=false&:origin=viz_share_link&:showVizHome=n&:embed=y

Table 26 Impact Indicator 6 - Conservation status of marine habitats

3.2.1.2. *Impact indicator - Combined effects of human activities and pressures*

This indicator, developed by the European Topic Centre on Inland, Coasts and Marine Waters (ETC-ICM) and used by the EEA in their marine messages II report published in 2019⁷⁵, illustrates an spatial assessment of combined effects of multiple pressures and provides information about the risks of human activities on marine ecosystem health. One of the steps in assessing cumulative effects, a term used in Article 8 of the MSFD, is to study the synergistic and antagonistic effects from different pressures. Current knowledge of synergistic and antagonistic effects is still incomplete at the level of Europe's seas, and it has not been feasible to assess these effects so far. This is why the assessment uses the term combined effects instead of cumulative effect.

The results of the analysis are presented in Figure 90. This figure shows the combined effects of human activities and pressures (panel A) and ranking of key groups of pressures causing ecosystem effects and ecosystem components being affected by them (panel B) in Europe's seas. Under Panel (A) the following pressures are considered: Hazardous substances, bycatch by bottom touching mobile gears, extraction of species commercial fishing, bycatch by pelagic towed gears, input of continuous anthropogenic sound, input of impulsive anthropogenic sound, physical loss of seabed, physical disturbance to seabed, nutrients, invasive species, input microbial pathogens, disturbance of species due to human presence, changes to hydrological conditions. For panel (B) and in terms of measuring ecosystem effects, the following are considered: Fish, small-toothed cetaceans, deep diving toothed cetaceans, seals, baleen whales, Bathal seabeds, turtles, offshore circalittoral sand, cold-water corals and other coralligenous formations, breeding birds.

⁷⁵ <https://www.eea.europa.eu/publications/marine-messages-2/download>

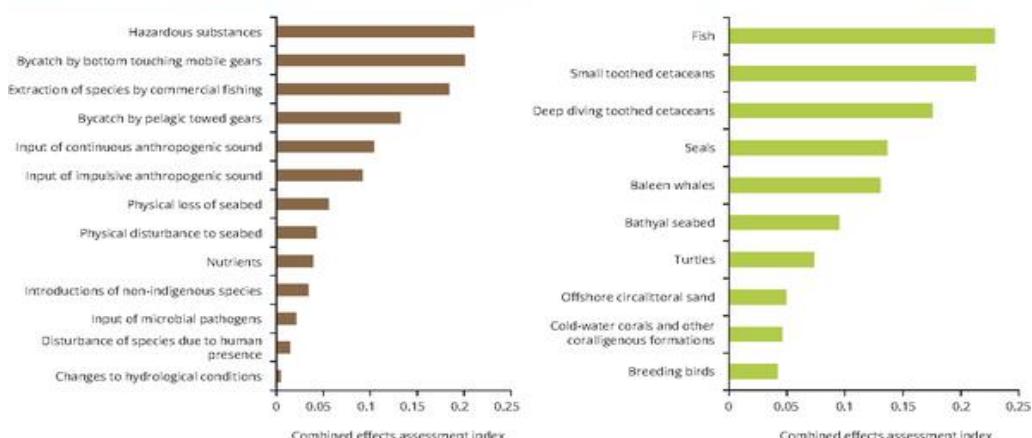
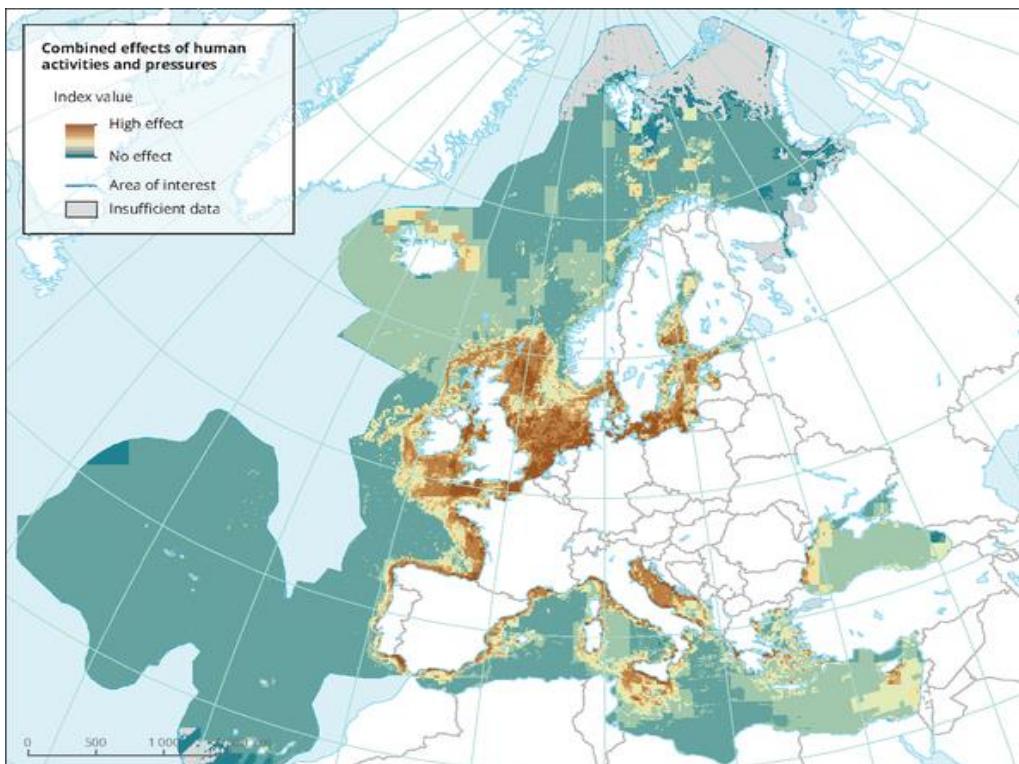


Figure 90 Combined effects of human activities and pressures in Europe's seas

Source: EEA

Units	Combined effect assessment index. range index value: high to low effect
Geographic coverage	Adriatic Sea Aegean Sea (Greece) Baltic Sea Barents Sea Bay of Biscay Celtic Sea Eastern Mediterranean English Channel (United Kingdom) Ionian Sea Kattegat Levantine Sea Mediterranean Sea North Sea Norwegian Sea Tyrrhenian Sea Western Mediterranean
Last update	2011-2016 (file last updated 17 Jun 2021)
Format	GIS
Data source	EEA
Link	https://www.eea.europa.eu/data-and-maps/figures/combined-effects-of-human-activities-1 Link to data and metadata: https://www.eea.europa.eu/data-and-maps/data/combined-effects-of-human-activities

Table 27 Impact Indicator - Combined effects of human activities and pressures

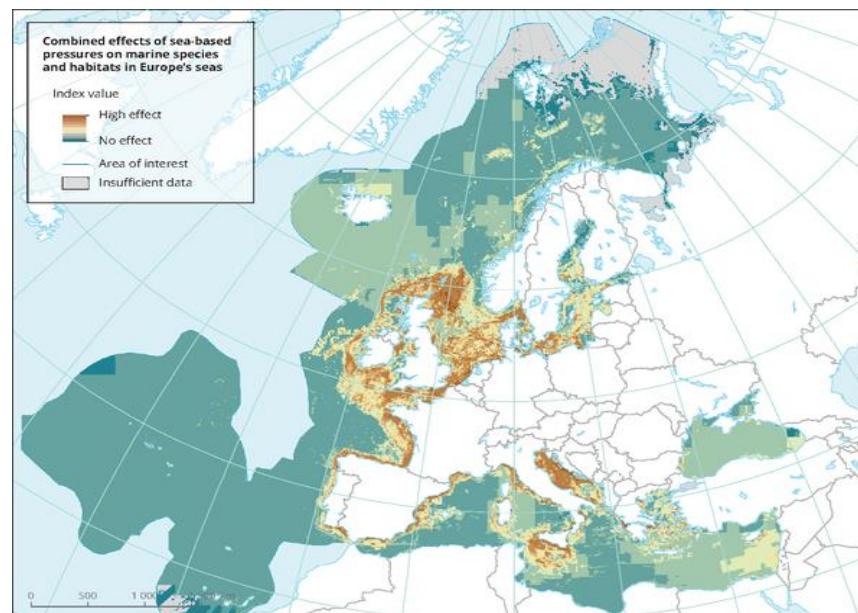
3.2.1.3. *Impact indicator - Combined effects of human activities sea-based and their associated multiple pressures*

Also developed by ETC/ICM (2019) for the EEA, this indicator measures the potential combined effects of land-based pressures on marine species and habitats. Estimates were developed using the method for assessment of cumulative effects and apply for the entire suite of pressures and a selected set of marine

species groups and habitats by a normalised index. See EEA 2019 for more information⁷⁶. The spatial assessment of combined effects of multiple pressures informs of the risks of human activities on the marine ecosystem health. Methods build on spatial layers of pressures and ecosystem components and an estimate of ecosystem sensitivity through an expert questionnaire.

Figure 91 describes the combined effects index values for pressures on marine species and habitats in Europe's seas. The relative values indicate areas where the pressures potentially affect the marine ecosystem. The table shows the spatial coverage of the sea-based pressures in three marine zones. The following pressures are covered for this indicator: continuous noise, physical disturbance, non-indigenous species, extraction of fish, bycatch demersal, bycatch pelagic, physical loss and impulsive noise for coastal strip, shelf and beyond shelf.

This may be a good indicator to reflect areas where action is needed. Either for further protection or restoration based on the incidence of pressures.



	Coastal strip	Shelf	Beyond shelf
Continuous noise	86 %	97 %	96 %
Physical disturbance	79 %	43 %	3 %
Non-indigenous	53 %	22 %	4 %
Extraction of fish	27 %	37 %	4 %
Bycatch demersal	26 %	35 %	3 %
Bycatch pelagic	18 %	20 %	3 %
Physical loss	23 %	2 %	0 %
Impulsive noise	11 %	17 %	3 %

Figure 91 Combined effects of human activities sea-based and their associated multiple pressures

Source: EEA

Units	Index value, % of occurrence
Geographic coverage	Adriatic Sea Aegean Sea (Greece) Baltic Sea Barents Sea Bay of Biscay Black Sea Celtic Sea Eastern Mediterranean English Channel (United Kingdom) Ionian Sea Levantine Sea Mediterranean Sea North Atlantic Ocean North Sea Norwegian Sea Tyrrhenian Sea Western Mediterranean
Last update	2011-2016
Format	GIS
Data source	EEA
Link	https://www.eea.europa.eu/data-and-maps/figures/combined-effects-of-sea-based

Table 28 Impact Indicator - Combined effects of human activities sea-based and their associated multiple pressures

⁷⁶ <https://www.eea.europa.eu/publications/marine-messages-2/download>

3.2.1.4. Impact indicator - Combined effects of land-based pressures on species and habitat in Europe's seas

Following the previous impact indicator, these EEA indicators developed by ETC-ICM in 2019 describes combined effects index values for pressures caused by land-based human activities. The relative values (table 29) indicate areas where the pressures potentially affect the marine ecosystem. The table shows the frequency of assessment units indicating pressure.

	Baltic Sea	Black Sea	Mediterranean	NE Atlantic
Eutrophication	87 %	52 %	16 %	13 %
Nutrients	98 %	31 %	42 %	6 %
Direct effects	97 %	92 %	7 %	6 %
Indirect effects	69 %	48 %	10 %	1 %
Hazardous substances	96 %	91 %	87 %	75 %
Water	94 %	79 %	98 %	95 %
Biota	77 %	58 %	32 %	43 %
Sediment	89 %	99 %	89 %	92 %
Hydrographic alterations	16 %	3 %	14 %	6 %
Species disturbance	40 %	22 %	38 %	26 %

Table 29 Combined effects from land-based pressures to European seas

The potential combined effects of land-based pressures on marine species and habitats were estimated using the method for assessment of cumulative effects, for the entire suite of pressures and a selected set of marine species groups and habitats by an index⁷⁷. The spatial assessment of combined effects of multiple pressures informs of the risks of human activities on the marine ecosystem health. Methods build on spatial layers of pressures and ecosystem components and an estimate of ecosystem sensitivity through an expert questionnaire.

Units	Combined effect assessment index, range index value: high to low effect
Geographic coverage	Adriatic Sea Aegean Sea (Greece) Baltic Sea Barents Sea Bay of Biscay Black Sea Celtic Sea Eastern Mediterranean English Channel (United Kingdom) Ionian Sea Levantine Sea Mediterranean Sea North Atlantic Ocean North Sea Norwegian Sea Tyrrhenian Sea Western Mediterranean
Last update	2011-2016
Format	GIS
Data source	EEA
Link	https://www.eea.europa.eu/data-and-maps/figures/combined-effects-of-land-based

Table 30 Impact Indicator - Combined effects of land-based pressures on species and habitat in Europe's seas

4. CASE STUDIES: RELEVANT PROJECTS FOR THE MISSION OBJECTIVE

This section showcases best-example case studies of recently completed and ongoing research projects that illustrate innovative solutions in particular nature-based solutions to address climate change impacts/ climate change adaptation such as sea level rise in vulnerable coastal communities on the Atlantic/Arctic coast and/or that involve large scale marine and coastal ecosystem restoration.

Following a screening of possible case studies, six projects have been identified as particularly relevant to Mission Objective 1 in the Atlantic and Arctic Lighthouse Area. These have been documented and analysed in detail through desk-based research as well as interviews and informal exchanges with the project teams. The projects selected for in-depth case studies are listed in Table 31.

⁷⁷ Halpern, B. S., et al., 2008, 'A global map of human impact on marine ecosystems', Science 319(5865), pp. 948-952 (DOI: 10.1126/science.1149345).

	Funding instrument	Area	Focus	Timeline
MarHa	LIFE	France (Atlantic & Med)	Natura 2000 – cumulative impacts	2017-2025
Adapto	LIFE		Nature Based Solutions - Natura 2000 - Climate Change	2017-2022
FutureMares	H2020	Europe, South America and Western Asia	Marine restoration - Climate change (CO ² Storage)	2020-2024
Rest-Coast	H2020	EU regional seas	Coastal restoration - Climate change adaptation	2021-2026
ECOTIP	H2020	Arctic	Arctic biodiversity change and its consequences: Assessing, monitoring and predicting the effects of ecosystem tipping cascades on marine ecosystem services and dependent human systems	2020-2024
FACE-IT	H2020	Arctic	Enabling the adaptive co-management of social-ecological fjord systems in the Arctic	2020-2024

Table 31 Case studies of projects relevant to Mission Objective 1 for the Atlantic and Arctic Lighthouse Area.

The factsheets for each of these case studies are provided in Annex C. The projects being at different stages of implementation, the extent of information available – including on aspects such as potential for replicability, varies. Information is lacking in particular for the Rest-Coast project, the most recent of the six selected projects.

4.1. Conclusions

Regardless of their different stages of implementation, these six case studies present important lessons learned for future initiatives to achieve Mission Objectives in the Atlantic and Arctic Lighthouse Area:

- Understanding environmental issues such as climate change and ecosystem degradation holistically, therefore employing an interdisciplinary approach considering political, social, technical, ecological, economic and legal factors;
- Working with local authorities to ensure that research/protection/restoration efforts are tailored to the local context, thereby also supporting replication and upscaling of efforts beyond the research pilots;
- Recognizing that ecosystem protection and restoration may be politically and socially contentious, and that this may influence the scope and results of research (e.g. in the ADAPTO project, some pilot sites had to be excluded due to political contention around adaptive coastal management);
- Securing a long-term approach beyond the project duration, to ensure that both pilot operations and well as research efforts are continued;
- Considering how to finance ecosystem restoration and protection actions beyond the project duration;
- Building on and collaborating with past and ongoing research activities and projects through long-lasting research collaborations;
- Working with citizens, including children, to build knowledge and understanding and improve ocean literacy as part of research projects;
- Co-producing knowledge with local and indigenous communities, therein paying attention to the needs of communities and considering that some communities are overexposed to research projects.

4.2. Limitations and gaps

While the six case studies are not representative of all research being conducted in the Arctic and Atlantic Lighthouse Area, some potential limitations and gaps have been identified:

- Some areas are more accessible for research than others: research in the European Arctic is especially difficult and costly due to remoteness and harsh conditions;

- Research and efforts (Life projects) in the Atlantic Sea basin focusses on areas that are part of the Natura 2000 network, potentially overlooking undesignated marine areas. The efforts highlight the challenge related to the existing MPAs (ie Natura 2000) in order to meet their objectives before designating new ones;
- Research projects tend to work with communities and local authorities that are in favour of ecosystem protection and restoration, thus not including socially and/or politically challenging contexts and potentially resulting in biased results;
- It is difficult to maintain research, as well as restoration and protection efforts in the long-term beyond project duration, especially in changing social, political, economic, and environmental contexts.

5. DATABASE OF PROJECTS AND ACTIVITIES

The database compiles information on key current and planned EU projects that could contribute to the Mission objectives. For the Atlantic part of the Atlantic and Arctic Lighthouse Area, a non-exhaustive inventory of such projects has been conducted using the [Maritime Datahub portal](#), which has been populated by the Atlantic Action Plan assistance mechanism to report on the projects supporting the Atlantic Action Plan from 2013 to 2020 and from 2020 onwards. The identification of projects was done using the following criteria:

- "Project Priority" of Atlantic Action Plan (AAP)
 - AAP (2013-2020): Protect, secure and enhance the marine and coastal environment
 - AAP 2.0 (2020-onwards): Healthy oceans and resilient coasts.

The identification of projects was then followed by manual screening: relevance to the LA objective. In addition, the websites of the OSPAR Convention as well as of national environmental agencies were used.

A total of 49 relevant projects in the Atlantic and Arctic area have been identified and documented (location, type, funding sources, budget, leader, partners, contacts, etc.). The data collection has focused on large collaborative EU projects. Of the documented projects, the majority were funded by the LIFE and by Horizon 2020 Programmes, with a smaller proportion of projects funded through Interreg and by the EMFF. 35 of the identified projects, were considered addressing the target 1(30 % protected areas in the EU's seas), and a further two were considered addressing the target 2 (10 % strictly protected area). Other three projects were considered addressing more than one objective, and two of these addressed the third objective on nature restoration. The database of projects and activities for the Atlantic and Arctic area are provided in the Database of the Baseline study.

5.1. Conclusions and lessons learnt

In conclusion, ensuring adequate and ambitious marine conservation and restoration is essential to achieve the mission objectives and restore the health of the Atlantic and Arctic Sea basins. The identified projects represent different types of actions, with some being nature-based solutions (e.g. restoration interventions), others focusing on management actions (e.g. MPA management; fisheries management), while others are rather analytical and focus on monitoring (e.g. development/assessment of indicators) or on knowledge generation, modelling and data management.

Several of the projects identified deal with designation and effective management of marine protected areas, which is key to protecting marine biodiversity while delivering co-benefits to climate and coastal communities. Ecosystem restoration as a continuum of practices ranges from impact reduction, e.g. of pollutants, to remediation and rehabilitation, to ecological restoration that initiates or partly/fully restores (degraded) native ecosystems. The database of projects and actions indicates that in order to reach the mission objectives, all these different approaches are required and often need to go hand in hand. Active ecological restoration of marine ecosystems is carried out by several projects, focusing predominantly on coastal and estuarine ecosystems, or reefs. Climate change is an overarching theme that many of the projects identified address, whether with a focus on climate impacts on coastal and marine ecosystems, or with a restoration component based on climate model scenarios, adaptive coastal management, demonstrating the adaptive potential of restoring certain ecosystems, or improving the conservation status of certain species facing climatic and other impacts. Increasingly, projects show that the cumulative nature of pressures is being studied and addressed in many projects in order to achieve a better evidence base for management actions and policy. Deep-sea ecosystems are also covered, however only with one project that acts at the science-policy interface. Some projects focus on pollution (e.g. from sewage) which, although not directly within the scope, is certainly also crucial to ensuring healthy marine ecosystems in the Atlantic basin as holistic protection with reduction of

stressors from source-to-sea can ensure that marine ecosystems are able to recover. Some projects focus on funding, such as funding transnational research projects to promote enhanced cooperation and capacity building. A number of projects deal with (ecosystem-based) fisheries management, where climate change is also represented in efforts to mainstream adaptation in fisheries. Use of novel technology as well as novel materials is key for some restoration efforts, such as artificial reefs 3D-printed from natural renewable material.

All projects in the database serve as best practice examples in their respective categories and contribute to making Europe's marine ecosystems more functional and resilient again. It becomes clear that (increased) funding is required from a variety of different funding streams, including H2020 but also other sources (e.g. Interreg, LIFE, etc.) to rebuild marine biodiversity and achieve favorable conservation status for key species and habitats.

5.2. Recommendations

To develop meaningful output indicators to evaluate the immediate tangible and countable products/services produced because of the lighthouse mission initiative for the Atlantic and Arctic areas, an exhaustive review of a database that includes all relevant initiatives/projects is needed. This means developing stricter criteria for selection of projects and the identification of different funding sources at different geographical scales. Our recommendation would be that the Commission sets a specific database for lighthouse mission specific projects/initiatives for its evaluation purposes.

6. IDENTIFYING CURRENT GAPS IN DATA, KNOWLEDGE, MONITORING AND IMPLEMENTATION OF RELEVANT EU LEGISLATION

6.1. Target 1 and 2: MPA definition and types

Several issues arose when designing indicators for Targets 1 and 2. These issues pertained in particular to the need for a consolidated definition of MPAs, the lack of a consistent MPA typology and the meaning behind the "strict MPA" designation. The text below introduces our recommendations and rationale for the development of baseline indicators.

While no definition of MPAs has been agreed upon internationally, legally speaking, the most widely accepted and used one remains the one formulated by the International Union for the Conservation of Nature (IUCN):

*"Any area of intertidal or subtidal terrain, together with its overlying waters, and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment"*⁷⁸.

This generic definition has, however, evolved in subsequent discussions and treaty negotiations over the years⁷⁹, and continues to do so. Catalysing the interests of diverse actors – particularly in the international biodiversity conservation policy-making fora⁸⁰, MPAs vary greatly in both purpose and application⁸¹. Most MPAs to date are implemented to either protect or sustainably manage resources, or a combination of both⁸² – although the fisheries' management prospects for MPAs remain controversial and debated⁸³. For another, the goals of MPAs are fluid among concerned stakeholders, and a discrepancy is often observed between the stated and empirically observed goals⁸⁴. In this regard, the above IUCN definition of MPAs presents several issues. Beyond the official geographical designation of sites that it alludes to, this commonly used

⁷⁸ Kelleher, G. (1999). Guidelines for Marine Protected Areas. IUCN, Gland, Switzerland and Cambridge, UK. xxiv +107pp. Available at: <https://www.iucn.org/sites/dev/files/import/downloads/mpaguid.pdf>.

⁷⁹ Agardy, T., Bridgewater, P., Crosby, M. P., Day, J., Dayton, P. K., Kenchington, R., Laffoley, D., McConney, P., Murray, P. A., Parks, J. E., et al. (2003). Dangerous targets? Unresolved issues and ideological clashes around marine protected areas. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 13 (4): 353-367. doi: <https://doi.org/10.1002/aqc.583>.

⁸⁰ Gray, N. J., Gruby, R. L. & Campbell, L. M. (2014). Boundary Objects and Global Consensus: Scalar Narratives of Marine Conservation in the Convention on Biological Diversity. *Global Environmental Politics*, 14 (3): 64-83. doi: https://doi.org/10.1162/glep_a_00239.

⁸¹ Sanders, J. S. & Cochrane, K. L. (2014). The "rise" of marine protected areas as a tool in an ecosystem-based fisheries management environment. In Bryceson, I., Francis, J., Western Indian Ocean Marine Science, A., Norges miljø- og biovitenskapelige, u. & Norad (eds) *Marine protected areas (MPAs) in relation to fisheries management: challenges and experiences from developing countries*. Zanzibar, Tanzania: WIOMSA.

⁸² Chaigneau, T. & Brown, K. (2016). Challenging the win-win discourse on conservation and development: analyzing support for marine protected areas. *Ecology and Society*, 21 (1). doi: <https://doi.org/10.5751/es-08204-210136>.

⁸³ Kolding, J. (2014). MPAs in relation to fisheries – what are the biological and fish stock implications? In Bryceson, I., Francis, J., Western Indian Ocean Marine Science, A., Norges miljø- og biovitenskapelige, u. & Norad (eds) *Marine protected areas (MPAs) in relation to fisheries management: challenges and experiences from developing countries*. Zanzibar, Tanzania: WIOMSA.

⁸⁴ Jentoft, S., Chuenpagdee, R., & Pascual-Fernandez, J. J. (2011). What are MPAs for: On goal formation and displacement. *Ocean & Coastal Management*, 54(1), 75-83. doi: <https://doi.org/10.1016/j.ocecoaman.2010.10.024>.

definition lacks clarity vis-à-vis the governance⁸⁵ and regulation⁸⁶ of MPAs. Finally, the use by different governments of their own definition of MPAs constitutes a recurrent problem. This prevents the assessment of progress in terms of both MPA coverage and effectiveness⁸⁷. This calls for areal targets to be complemented by qualitative assessments of management effectiveness.

Assessing the protection level of Protected Areas has been a focus of researchers and international organisations for over two decades. To date, the most widely used typology globally remains that developed by the IUCN (Table 32).

Protected Area Category and International Name	Management Objectives
Ia - Strict Nature Reserve	Strictly protected area set aside to biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values.
Ib – Wilderness Area	Usually large, unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition.
II – National Park (ecosystem protection; protection of cultural values)	Large natural, or near natural, areas set aside to protect largescale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.
III – Natural Monument	Areas set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove.
IV – Habitat/ Species Management	Areas to protect particular species or habitats and management reflects this priority. Many category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.
V – Protected Landscape or Seascapes	Areas where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value, and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.
VI – Protected Area with Sustainable Use of Natural Resources	Areas that conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims.

Table 32 IUCN protected area management categories.

Source: Day et al. (2012)⁸⁸.

In 2021, a new MPA typology was introduced: the Protected Planet **MPA Guide**⁸⁹. It was described in detail in a peer-reviewed study published in the journal *Science* in September 2021⁹⁰. The Guide provides a novel scientific framework to consistently understand, plan, establish, evaluate and monitor ocean protection through MPAs, by categorising each area according to four levels of protection – fully, highly, lightly or minimally protected (Table 33).

MPA Guide Typology	
Fully protected	No extractive or destructive activities are allowed, and all abatable impacts are minimised
Highly protected	Only light extractive activities are allowed, with low total impact, and all other abatable impacts minimised
Lightly protected	Some protection of biodiversity exists but moderation to significant extraction and other impacts are allowed
Minimally protected	Extensive extraction and other impacts are allowed, but site still provides some conservation benefit to the area

Table 33 The MPA Guide typology and its four levels of protection.

⁸⁵ Jentoft, S., van Son, T. C., & Bjørkan, M. (2007). Marine Protected Areas: A Governance System Analysis. *Human Ecology*, 35(5), 611-622. <https://doi.org/10.1007/s10745-007-9125-6>.

⁸⁶ Horta e Costa, B., Claudet, J., Franco, G., Erzini, K., Caro, A., & Gonçalves, E. J. (2016). A regulation-based classification system for Marine Protected Areas (MPAs). *Marine Policy*, 72, 192-198. <https://doi.org/https://doi.org/10.1016/j.marpol.2016.06.021>.

⁸⁷ Morgan, L., Pike, E., & Moffitt, R. (2018). How much of the ocean is protected? *Biodiversity*, 19(1-2), 148-151. <https://doi.org/10.1080/14888386.2018.1469432>.

⁸⁸ Day, J., Dudley, N., Hockings, M., Holmes, G., Laffoley, D., Stolton, S. & Wells, S. (2012). Guidelines for applying the IUCN Protected Area Management Categories to Marine Protected Areas. Gland, Switzerland: IUCN.

⁸⁹ <https://mpa-guide.protectedplanet.net/resources>

⁹⁰

Although, both the IUCN and the MPA Guide typologies are elaborated based on the types of human activities allowed in a given MPA, significant differences exist between the two typologies. For this reason, a standardised approach to bridge both typologies appear to be a necessity in the mid-term. A tentative solution is presented in Table 34. It would, however, need to be clarified further, since for example certain IUCN Category IV areas could be considered “fully protected”, according to the MPA guide typology, and not merely “lightly protected”.

IUCN MPA category		MPA Guide
No intervention – scientific research	Ia	No extractive or destructive activities are allowed, and all abatable impacts are minimised
Vast natural areas	Ib	Only light extractive activities are allowed, with low total impact, and all other abatable impacts minimised
Recreational activities compatible with conservation	II	
Protection of a specific natural monument	III	Some protection of biodiversity exists but moderation to significant extraction and other impacts are allowed
Interventions to protect particular species or habitats	IV	
Protection and sustainability of important seascapes	V	Extensive extraction and other impacts are allowed, but site still provides some conservation benefits to the area

Table 34 Comparison between IUCN protected area management categories and the MPA Guide typology.

For the purpose of the Baseline, it is recommended to use the IUCN management categories, since this typology remains the most commonly used classification system in European and international databases. In addition, the categories proposed by the MPA Guide to identify stages of establishment of MPA (proposed/committed; designated; implemented; actively managed)⁹¹ could also be considered as a potential metric. In addition, consideration for funding, as well as for monitoring and surveillance capacities, would certainly provide a more robust understanding of the effectiveness of Atlantic and Arctic MPAs and their potential to contribute to the Mission Objective. To date, there are, however, no exhaustive datasets available on any of these aspects.

What should be considered as a Strict MPA?

With the aim to collect perspectives on the subject, the project team attended the LIFE Platform Meeting held in La Rochelle (FR) on 22 and 23 March 2022, which focused on Strictly Protected Areas and brought together MPA managers, French and European officials, researchers, and fisheries representatives. Discussions highlighted that the definition of strict protection at sea remains largely subject to debate, and that no consensus has yet been achieved.

To date, the most recent definition from the Commission is as follows: “Strictly protected areas are fully and legally protected areas designated to conserve and/or restore the integrity of biodiversity-rich natural areas with their underlying ecological structure and supporting natural environmental processes. Natural processes are therefore left essentially undisturbed from human pressures and threats to the area’s overall ecological structure and functioning, independently of whether those pressures and threats are located inside or outside the strictly protected area”⁹². This source notes that this definition corresponds with IUCN categories Ia and Ib and parts of areas designated as IUCN category II (national parks) may be strictly protected, as category II allows zoning, but this is site-specific – for example, for sections of category II areas would have the same restrictions as category Ia and Ib areas.

This definition of “strict protection” is still incomplete, especially as regards the potential human activities that could take place in strictly protected areas. As of now, both no-take zones (where non-extractive activities can occur: boating, diving, etc.) and no-go zones (where no human presence is allowed, except for scientific purposes) can be considered as “Strict MPAs”. For the purpose of the Baseline, it is suggested to use IUCN categories Ia and Ib as indicators of strict protection. However, these could be refined by integrating no-take zones included in the Protected Planet database (see following section), as well as looking more precisely at management practices in MPAs listed under IUCN category II (and potentially also category IV). In this case, more detailed reporting will be needed to identify the parts of categories II and IV MPAs with strict protection.

⁹¹ See <https://mpa-guide.protectedplanet.net/>.

⁹² Commission staff working document - Criteria and guidance for protected areas designations – 28.01.2022.

6.2. Target 1: Connectivity of MPAs

With target 1 (30% MPA protection), the lighthouse mission objective proposes a move away from a focus on individual MPAs to MPA networks instead, which integrate ecological corridors, as part of a true Trans-European Nature Network. Evidence suggests that MPA networks have a greater ability to achieve conservation goals more effectively and efficiently than individual MPAs⁹³. The role of ecological connectivity in the effective design and management of MPA networks is gaining attention in the field of marine conservation⁹⁴. However, progress in its application is slow. A recent survey found out that only 11% of 746 MPAs examined worldwide had so far considered connectivity as an ecological criterion⁹⁵.

As part of the information scoping process for the development of indicators, a major limitation is the lack of available data on connectivity of MPAs and/or fragmentation of marine ecosystems. This echoes the EEA recommendation to improve the understanding of how marine systems are interconnected in order to better designate and plan MPAs across European seas, and to improve the connectivity and representativity of MPA networks⁹⁶. With the aim to bridge this gap, the following recommendations are found in the relevant literature as regards the information that could be reported to the CDDA and that could be used to develop future indicators: (i) determine whether to prioritize connectivity as an ecological criterion; (ii) identify the role of an MPA in supporting connectivity; (iii) identify the appropriate spatial and temporal scale of connectivity; and (iv) improve regional knowledge of connectivity patterns.

6.3. Target 3: Ecosystem restoration

This section reports on other potential sources of data for the development of baseline indicators. This review includes data reported under the EC Habitats Directive (Natura 2000), the EC MSFD reporting flows, as well as data available on portals such as EMODNET or WISE marine.

The EEA reports data on the status and need for improvement of coastal habitats designated under the Habitats Directive. This data covers Natura 2000 sites and not all protected areas. Table 35 provides an overview of the data available. While the reporting by Member States provides an overview of the coastal habitats to be improved to good condition, it should be noted that the conservation status is unknown for most of these habitats – nearly 62 % - and consequently the reported extent of areas to be improved is likely to be underestimated.

	Overview				Area to be improved	
	Total area (km2)	% good condition	% not good	% unknown	km2	% of total
ATLANTIC						
BE	4 694	53.26	4.71	42.03	477	10.16
DE	16 049	32.6	15.51	51.9	3,324	20.71
DK	8 960	1.55	92.86	5.6	6,307	70.39
ES	2 524	1.6	0.3	98.1	10	0.38
FR	41 003	35.9	3.5	60.6	1,615	3.94
IE	28 594	10.87	13.84	75.29	3,958	13.84
NL	15 044	0.01	44.43	55.56	9,353	62.17
PT	5 689	No info	No info	No info	No info	No info
SE	1 310	0	0	100	0	0
Total	123 867	19.3	19	61.7	5,043	20.22
MACAR.						
ES	2 800	0	0	100	0	0
PT	52 101	No info	No info	No info	No info	No info
Total	54 901					

Table 35 Overview of EU coastal Natura 2000 sites in the Atlantic

Notes: Data is provided for the Atlantic biogeographical region and the Macaronesian biogeographical region (the latter is comprised of the Azores, the Canaries and Madeira). The table above is extracted from [data published by EEA](#) to support the 2020 report on State of Nature in the EU. Data were reported by MS for 2018 or latest year available. The dataset notes that coastal habitats include salty habitats which can occur in non-coastal areas.

For the MSFD, Member States reported data on the descriptors in 2018 (though some reported late). Moreover, some of the data refers to earlier periods, e.g. 2010-16, for some descriptors and some Member States. Data for MSFD descriptors is available on the WISE Marine website. But reported data cannot be

⁹³ <https://nmsmarineprotectedareas.blob.core.windows.net/marineprotectedareas-prod/media/docs/2020-ecological-connectivity-for-mpas.pdf>

⁹⁴ <https://medpan.org/ecological-connectivity-for-marine-protected-areas/>

⁹⁵ Balbar, Arieanna & Metaxas, Anna. (2019). The current application of ecological connectivity in the design of marine protected areas. Global Ecology and Conservation. 17. e00569. 10.1016/j.gecco.2019.e00569.

⁹⁶ <https://www.eea.europa.eu/publications/marine-protected-areas/download>

used in its current format for the development of indicators. This is because there are many gaps in the data as well as inconsistencies.

The European Marine Observation and Data Network (EMODnet) data Portfolio, prepared in August 2021, was reviewed. EMODnet provides marine habitats' maps. A recent (2021) EEA report explains how this data has been used to establish that Europe's marine biodiversity remains under pressure and to develop further indicators that are relevant for the baselines. Overall, there are dozens of marine habitat types covered in the EMODnet classification. This information has already been included in available EEA work as it is linked to the EUNIS database⁹⁷.

Recommendation: the EUNIS habitat classification database⁹⁸ may also prove as a good source of data for the further identification and development of indicators for prioritisation of restoration areas. The raw data is available from the EEA⁹⁹ and EMODnet¹⁰⁰.

⁹⁷ <https://emodnet.ec.europa.eu/en/map-week-habitat-classification-eunis-2019>

⁹⁸ <https://emodnet.ec.europa.eu/en/map-week-habitat-classification-eunis-2019>

⁹⁹ The classification covers all types of habitat types from natural to artificial, from terrestrial to freshwater and marine. See :

<https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification-1>.

¹⁰⁰ <https://emodnet.ec.europa.eu/en/map-week-habitat-classification-eunis-2019>

DANUBE

1. INTRODUCTION

This report provides the baseline of the Danube. The purpose is to present existing data on the different indicators related to the Mission's target and highlight what kind of measures (and funding of the measures) have contributed to making the Danube waters and its river basin more ecologically intact. It does so, by presenting existing data on different indicators that account for the status of free-flowing rivers, the status of biodiversity and assesses the potential of restoration measures to reach the two overarching targets.

The main sections of this report (Section 1-2) is structured along the Mission's two targets for the Danube, by presenting the information on the indicators per target respectively. After an introductory section, the first section covers indicators for Target 1: "Restore at least 25 000 km of free-flowing rivers in Europe". The second section provides insight into activities that relate to target 2: "Restore certain coastal and freshwater ecosystems and habitats (Art 4 of the proposed regulation on nature restoration)". The third section provide indicators related to the "Good Ecological Status" and shows how the Danube projects progress for this. The fourth section presents the status of activities related to indicators on freshwater protected areas and their contribution to Mission objectives and targets. This section, as well as the database are currently only in draft status and will be more elaborate in the final report. Five case studies were prepared for a detailed insight in completed projects of river restoration illustrate the potential of restoration projects, these can be found in the Annex E to the report.

Wherever appropriate, there are references made to the general development of policies on the EU level that provide the framework for most of the activities. We aim to show how closely the running measures and projects are embedded in the 'bigger picture' of EU policies regarding the natural state of rivers. This is illustrated with figures and maps that show regional and member state data to the completed and future efforts in river restoration.

The baseline of the lighthouse mission of the Danube is guided by the targets of the overall mission and characterized by the Danube basin specific context from hydrological circumstances to the transboundary regulation of the basin. Therefore, the baseline captures the current status and presents pathways for the future of the Danube River Basin development. The Danube River Basin suits the lighthouse Mission as a project area because many activities to protect and restore are already underway, though more work is needed for an integrated approach to support a healthy Danube.

On the 22 of June 2022 the Commission proposed the first-ever legislation that explicitly targets the restoration of Europe's nature, to repair the 80% of European habitats that are in poor condition, and to bring back nature to all ecosystems, from forest and agricultural land to marine, freshwater and urban ecosystems. Under this proposal for a Nature Restoration Law, legally binding targets for nature restoration in different ecosystems will apply to every Member State, complementing existing laws. The aim is to cover at least 20% of the EU's land and sea areas by 2030 with nature restoration measures, and eventually extend these to all ecosystems in need of restoration by 2050.

The following specific targets of the proposed regulation on nature restoration¹⁰¹ are relevant for the Danube as a lighthouse area.

- Target 1: Restore at least 25 000 km of free-flowing rivers in Europe (Art 7 of the proposed regulation on nature restoration¹⁰²). Thereby Member States shall remove the barriers to longitudinal and lateral connectivity of surface waters focusing on obsolete barriers (those that are no longer needed for renewable energy generation, inland navigation, water supply or other uses). Member States shall complement the removal of the barriers referred above by the measures necessary to improve the natural functions of the related floodplains.

Most European rivers, including the Danube, are interrupted due to human interventions, such as dam building. Barriers alter a river's natural flow, lead to shifts in sediment transportation, limit fish and other species' ability to migrate both up- and downstream. Barriers also led to habitats being fragmented. As a result, the living environment of aquatic species and the ecosystem as a whole is compromised.¹⁰³

The European Commission published a [Guidance document on barrier removal for river](#) restoration in late 2021 stating that: the concept of free-flowing rivers is mainly to be achieved through barrier removal and the restoration of floodplains and wetlands. The guidance names various reasons for the close interlinkage of the Water Framework Directive (WFD), as well as the Birds and Habitats Directives. For instance, in Biodiversity

¹⁰¹ <https://environment.ec.europa.eu/system/files/2022-06/Proposal%20for%20a%20Regulation%20on%20nature%20restoration.pdf>

¹⁰² While the restoration regulation is still in the proposal stage, the same target is already included in the EU biodiversity strategy (2020)

¹⁰³ European Environment Agency. (2021). Tracking barriers and their impacts on European river ecosystems.

<https://www.eea.europa.eu/themes/water/european-waters/water-use-and-environmental-pressurestracking-barriers-and-their-impacts>

Strategy (BDS)' work river function units are based on the WFD work and existing legislation through the Birds and Habitats Directive is acknowledged. These laws are the cornerstones of EU nature protection policy and have brought about the creation of Natura 2000, the world's biggest network of protected areas. This matters, because the proper fulfilment of river restoration measures is seen as a key step towards reaching the biodiversity targets, according to the European Environment Bureau.¹⁰⁴ According to DG Environment mitigation measures, such as fish ladders can be effective, but often the removal of barriers is necessary to enable fish mitigation and especially the unfolding of the entire aquatic ecosystem.¹⁰⁵

Under Common Implementation Strategy for the WFD, further work on defining free flowing rivers, exchange best practice and identify issues for further information exchange will be carried out by the ECOSTAT Working group¹⁰⁶. The Commission focuses on both longitudinal and lateral connectivity of rivers and information on their barriers, because more experience and data are available on these two dimensions as compared to the vertical and temporal connectivity. When it comes to barrier removal, the commission focuses on removal of primarily obsolete barriers (low-hanging fruit).¹⁰⁷

In the past 30 years there has been a mix of small to large scale barrier removal and renaturation activities in the Danube. The projects differ from the planning phase and the funding schemes, as well as the operational implementation. By presenting five case studies with details, we provide in-depth insights into some of the projects in Annex E.

- **Target 2: Restore certain coastal and freshwater ecosystems habitats (Art 4 of the proposed regulation on nature restoration)** Member States shall put in place the restoration measures that are necessary to improve to good condition areas of habitat types listed in Annex I¹⁰⁸ which are not in good condition. Such measures shall be in place on at least 30 % of the area of each group of habitat types listed in Annex I that is not in good condition, as quantified in the national restoration plan referred to in Article 12, by 2030, on at least 60 % by 2040, and on at least 90 % by 2050

In Annex I of the proposed regulation a long list of specific aquatic ecosystems in line with type names as referred in Annex I of Council Directive 92/43/EEC is given, for which the target should be valid.

According to Art 11 of the proposed regulation Member States shall prepare national restoration plans to quantify the area that needs to be restored and to reach the restoration targets set out, taking into account the condition of the habitat types. On a content level, the plans need to address, amongst other things (Art 12):

- the quantification of the areas to be restored to reach the restoration targets
- a description of the restoration measures planned
- an indication of the measures to ensure that the areas covered by the habitat types listed do not deteriorate in the areas in which good condition has been reached and that the habitats of the species do not deteriorate in the areas in which the sufficient quality of the habitats of the species has been reached
- inventory of barriers and the barriers identified for removal, the plan for their and an estimate of the length of free-flowing rivers to be achieved by the removal of those barriers by 2030 and by 2050, and any other measures to re-establish the natural functions of floodplains
- the timing for putting in place the restoration measures; information of financing and subsidies needed

Once the national restoration plans are being developed, they should provide a good basis to complete and expand this mission on a national level. Due to a lack of data, the database for the Danube for this baseline does not include a detailed inventory of the members states national plans and implemented projects. This information gap should be closed, when the restoration regulation enters into force. However, the extent to which transboundary cooperation is required or incentivized is not specified in the proposed regulation on nature restoration. If the restoration regulation does not lead to integrated, transboundary projects as they might be required to protect and enhance nature, the mission can play in enabling transboundary projects, as natural habitats don't stop at borders.

¹⁰⁴ European Commission DG Env (2021) 42nd Meeting of the WFD CIS Working Group on Ecological Status (ECOSTAT) Draft Minutes, Page 6

¹⁰⁵ European Commission DG Env (2021) 42nd Meeting of the WFD CIS Working Group on Ecological Status (ECOSTAT) Draft Minutes, Page 6

¹⁰⁶ See draft Minutes of the 42nd Meeting of the WFD CIS Working Group on Ecological Status (ECOSTAT) 14-15 October 2021

¹⁰⁷ European Commission DG Env (2021) 42nd Meeting of the WFD CIS Working Group on Ecological Status (ECOSTAT) Draft Minutes, Page 6

¹⁰⁸ For details see Annex I under <https://environment.ec.europa.eu/system/files/2022-06/Annexes%20to%20the%20proposal%20for%20a%20Regulation%20on%20nature%20restoration.pdf>

For this, the ICPDR plays a major role to evaluate and prioritize areas of high biodiversity and important habitats. In order to enhance nature conservation along the Danube, the ICPDR regularly compiles an inventory of the species and habitats conserved in protected areas based on a list officially nominated by the Danube Basin States. The DRBMP Update 2015 [map shows 55 protected areas](#) containing aquatic, wetland or waterside habitats of basin-wide importance. The national laws of Danube Basin and other European states are crucial factors, since each state is authorised to define the limits, extents, and restrictions for every protected area within their territory.

2. BASELINE AND INDICATOR DEVELOPMENT

A full indicator set for the Mission is proposed in Appendix G. This indicator set includes common indicators for the three lighthouse areas as well as indicators for each specific area. The indicators are classified as output, outcome and impact indicators (please see Appendix G for definitions of these terms). Within this indicator set, key performance indicators are proposed for each lighthouse area.

This section provides an overview of key indicators for the Danube River Basin for the Mission two targets. The indicator framework for the baseline aims to give insights into the status of the Danube River Basin ecological status and the implications that shape the two targets. The framework and its indicators were set up through careful consideration of past, current and planned activities and measures that influence the river basin in any way. This includes data on different regional levels ranging from public engagement to the effectiveness of restoration measures.

2.1. Structure and approach of the document

The Danube baseline is built on a set of three indicator blocks:

- 1) Indicators related to the target of restoration of 25 000 km of free-flowing river
- 2) Indicators for proposed nature restoration targets
- 3) Indicators related to Good Ecological Status under the Water Framework Directive serving both targets

The indicator blocks each contain various indicators to best reflect the status of the river basin. This baseline also includes information on planned activities, assessments of needs, as well as country and project specific information, including information on funding schemes. The document builds on [the updated River Basin Management Plan](#) of the International Commission on the Protection of the Danube, published in 2021, by evaluating the implications for the success of the mission targets.

The proposed measures from this report shed light on the progress of the indicators of the Danube Lighthouse Area, by using the data for the evaluating the different issue areas along the indicator blocks:

Key elements for the indicator framework, aligned to the mission targets, include (but are not limited to) the following elements:

- 1) **Indicators related to the target of restoration of 25 000 km of free-flowing river**
 - Hydrological alterations and river morphology (length of river stretches), to measure how well the river provides a habitat for sediment, fish and other species
 - Wetlands/floodplains with potential for reconnection and those reconnected, because it is important from a species perspective, that the banktop vegetation and surrounding terrestrial area is rather natural.
 - **Interruptions of river continuity for fish migration**, because the interruptions of fish migration are a key measure of the (absence of) free flowing rivers.

2) Indicators for proposed nature restoration targets

- **Number, surface area and status of protected areas in river, lake and transitional waters, as well as those in coastal waters and relevant marine areas**, to assess what the share of protected areas is (in the different areas) respectively and evaluate how they (potentially also depending on their size) they protect wildlife and ecosystems due to their protectes status
- **status of freshwater habitats**, to show qualitatively and quantitatively how well the aquatic systems serve as habitats

3) Indicators related to Good Ecological Status under the Water Framework Directive serving both targets

- **Ecological status of water bodies (WFD)**, because free flowing rivers and nature restoration seek to restore freshwater ecosystems, and this is a key measure of that underlying goal

The elements above were analysed for the Danube River Basin based on a set of indicators. The information for each indicator is presented in this section.

However, it should be noted that with the published proposal on restauration targets and the included reporting and monitoring requirements different indicators need to be developed, for which the existing ones can be used as a baseline and source of inspiration. However, it should be noted that with the published proposal on restoration targets and the included reporting and monitoring requirements different indicators need to be developed, for which the existing ones can be used as a baseline and source of inspiration.

2.1.1. Available Data from the Danube River Basin Management Plan

The recently published 2021 Update of the Danube River Basin Management Plan (DRBMP)¹⁰⁹ of the International Commission for the Protection of the Danube River (ICPDR)¹¹⁰ includes several analyses that are relevant for the Danube lighthouse area. The available data are usually presented in the form of tables per Danube country and/or in the form of maps. (It should be noted that only Danube countries with a catchment area of more than 2000 km² are included in the analysis of the DRCMP: Italy, Poland, Switzerland, Albania and North Macedonia are thus not included.¹¹¹)

The report puts forward a comprehensive list of restoration measures and their status of implementation. For each issue area such as nutrient pollution of surface water or sediment balance, there is a vision with management objectives. The Joint Programme of measures 2021 also gives updates on the implementation of measures.

2.1.2. Indicators related to the target 1 on restoration of 25,000 km of free-flowing rivers

Although today, there is no agreed-upon definition for free-flowing rivers, there is consensus on minimizing barriers to allow the rivers to flow freely. In [the guidance document on barrier removal for rivers](#) it is proposed to define a free-flowing river as one that supports connectivity of water, sediment, nutrients, matter and organisms within the river system and with surrounding landscapes, in all of the following four dimensions:

- longitudinal (connectivity between up- and downstream);
- lateral (connectivity to floodplain and riparian areas);
- vertical (connectivity to groundwater and atmosphere); and
- temporal (connectivity based on seasonality of fluxes).

On this basis, the following key indicators are proposed. Sub-indicators, based on currently available data, are then presented for each key indicator. These are described in the following sections.

¹⁰⁹ <https://www.icpdr.org/main/wfd-fd-plans-published-2021>

¹¹⁰ <https://www.icpdr.org/main/>

¹¹¹ The Joint Programme of Measures (JPM) of the DRBMP provides an overview of the planned restoration projects to 2027 that address hydromorphological and hydrological alterations. The analysis only includes partly data from Bosnia and Herzegovina on the Republic of Moldova.

	Indicators	Data source
Outcomes: Target 1	Number of measures and length of restored river stretches	ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021 – plus future updates. www.icpdr.org
	Hydrological alterations - Expected Restoration Measures by 2027 (length of restored river stretches)	
	Alterations of river Morphology - Expected Restoration Measures by 2027 (length of restored river stretches)	
	Interruptions of River continuity for Fish Migration - Expected Restoration Measures by 2027 (number of removed interruptions)	
Impacts: Target 1	Wetlands/Floodplains with Reconnection Potential - Expected Restoration Measures by 2027 (number of reconnected wetlands/floodplains)	ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021 – and future updates. www.icpdr.org
	Increase in free-flowing river sections	
	Free-flowing river stretches (length of river stretches)	

Table 36 Key indicators related to the target on restoration of 25.000 km of free-flowing river

See Appendix G for the full list of proposed indicators.

The following sections provide examples of these indicators, using existing datasets.

a) Length of free-flowing river stretches

The Danube River is a heavily impacted river that may, depending on how “free-flowing” is defined, still includes some free-flowing sections.

There is an EEA dataset on free-flowing rivers in Europe (see Figure 92) that is based on a global study. Although the Danube region is covered in this dataset it is likely not to be accurate enough for our purposes and, as already mentioned before, there is no uniform definition of free-flowing rivers currently available in the European Union. Therefore, no list on km of free-flowing river stretches for the Danube lighthouse can be provided at the moment.

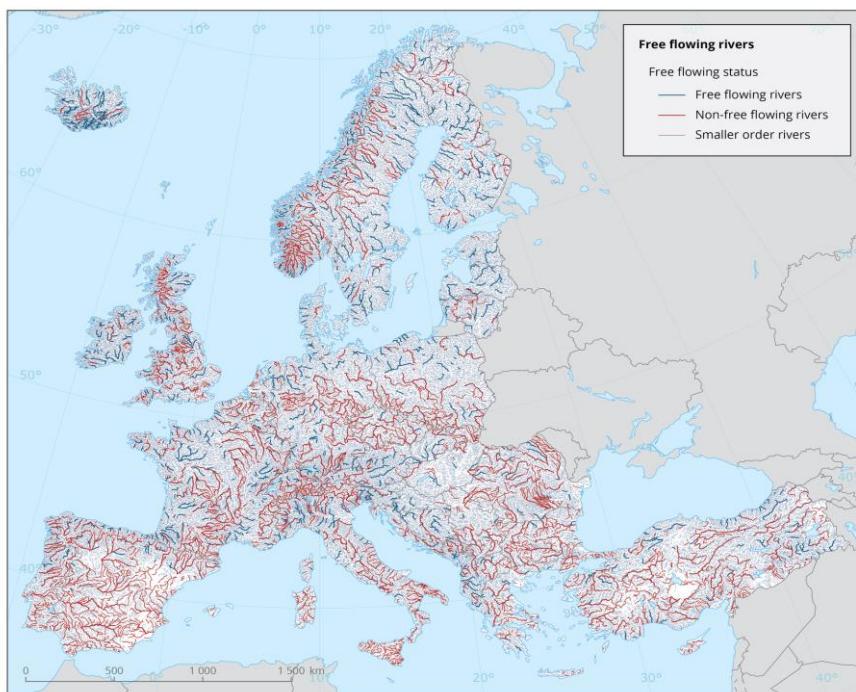


Figure 92 European Map of free-flowing rivers

Source: <https://www.eea.europa.eu/data-and-maps/figures/free-flowing-rivers-in-europe>¹¹²

¹¹² "Free Flowing Rivers In Europe". 2022. EEA. <https://www.eea.europa.eu/data-and-maps/figures/free-flowing-rivers-in-europe>.

However, several detailed data sets are available from the 2021 Update of the Danube River Basin Management Plan that could be used as a basis for deriving km of free-flowing river sections as soon as an agreed upon definition for “free-flowing” rivers becomes available. These datasets are listed in the following chapters (2.2.2.-2.2.7) and can be used as indicators to gain an understanding of the current impairment of the river.

b) Barriers that cause interruptions of river continuity hindering fish migration

One of the most important indicators that determine whether a section in the river is “free-flowing” or not is the presence of barriers in the river. In this context both, the number and type of barriers, play a role. Structures such as dams or weirs hinder fish from passing and the natural migration along the river of flora and fauna is limited.¹¹³

On European level, data on barriers in rivers are available through the Amber Project¹¹⁴ (see Figure 93). The dataset provides information on the location and type of barrier but contains limited information on the Danube basin. Consequently, while it might provide useful data for other parts of the EU, its value for the Danube lighthouse is limited.

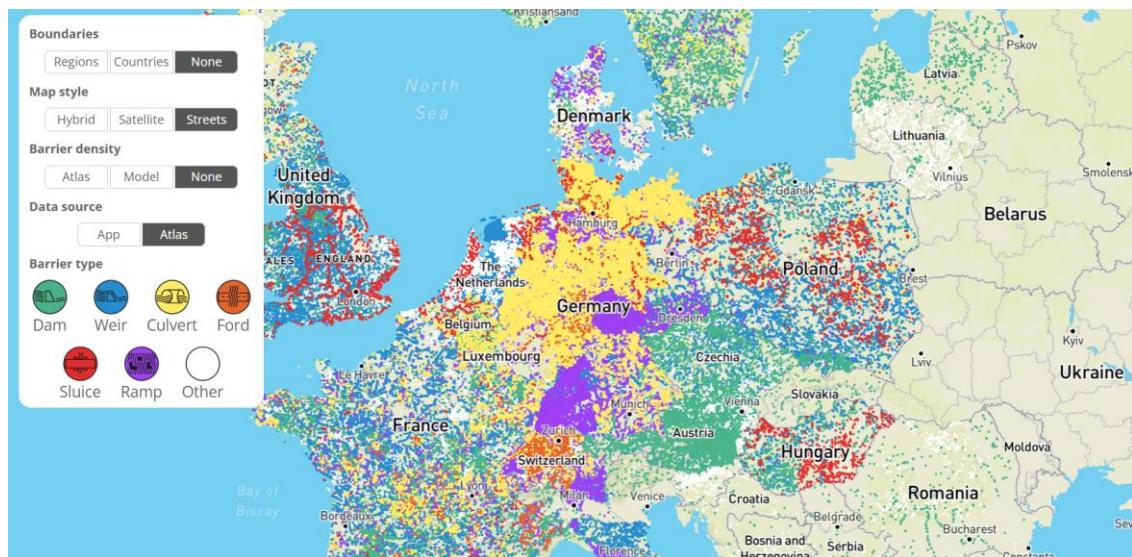


Figure 93 Barriers in rivers in Europe,

Source: Amber Consortium, 2020

More detailed information on barriers located in the Danube River basin is available through the Danube River Basin Management Plan from the ICPDR. The ICPDR performed a significant pressures assessment to determine which barriers hinder fish migration in the Danube. The river continuity pressure in this case is any transversal structure (barrier), that interrupts fish migration and their access to habitats. The ability of fish to migrate along a river is essential for fish populations and an important parameter for an ecologically intact river system. If barriers hinder the fish to move from one section of a river to another, they may not be able to reproduce or eat sufficiently. Other organisms and flora also rely on the connectivity of a river for their reproduction and life overall.¹¹⁵ The results of this analysis are presented in the Management Plan and provide information about the type of barrier and the possibility for fish. The ICPDR made the following remarks about barriers:

“There are 965 interruptions located in DRBD rivers with catchment areas >4,000 km². 640 of the interruptions are dams/weirs, 218 are ramps/sills and 107 are classed as other types of interruptions. The key driving forces causing interruption of river continuity are hydropower generation (56%), flood protection (19%) and water supply (15%). 20% of barriers are not linked to a single purpose due to their multifunctional characteristics (e.g. hydropower use and navigation). 528 significant interruptions are present on Heavily modified water bodies (HMWB) or Artificial water bodies (AWB) and 437 significant interruptions on natural water bodies. 186 significant interruptions are also decisive criteria for designation of 96 HMWB out of 377 HMWB (of which 52 are provisionally HMWB) in the DRBD.”¹¹⁶

¹¹³ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 54-55

¹¹⁵ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 40

¹¹⁶ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 55

The analysis provides a strong added value for the targets of the mission, because it reveals hotspots or risks and detrimental effects on the environment at its root (i.e. barriers in rivers and other types of modifications that can be harmful for the Danube). This pressure map is also one piece of the basis of strategies, such as the Danube river basin plan, where different aspects such as DPSIR results, local variability in hydromorphology amongst others are considered altogether to develop an appropriate plan for the Danube river basin. It is valuable to have this analysis already in place and will be essential to support its continuation, also to guide operational aspects of the proposed restoration regulation.

See Map 14 in Annex D: Interruptions of river continuity for fish migration – current situation, Source: ICPDR 2021

On the level of water bodies, the ICPDR reports that “Out of the 975 water bodies in the DRBD, 357 are affected by significant interruptions for fish migration, out of which 93 are passable for fish. Consequently, 264 water bodies in the DRBD are significantly altered by interruption of river continuity and are un-passable for fish. This is 27% of the total number of DRBD water bodies (Table 37).”¹¹⁷

	Number of WBs	WBs with un-passable barriers	% of WBs with un-passable barriers
Danube River	63	20	32%
DRBD tributaries	912	244	27%
All DRBD rivers	975	264	27%

Table 37 Number of river water bodies significantly altered by interruptions of river continuity unpassable for fish species in DRBD

Source: ICPDR, 2021

Various actions aimed directly or indirectly at enhancing river continuity have been implemented in the Danube Basin in the past three decades. According to the ICPDR, “158 measures were indicated to be implemented by 2021 and 139 measures were finally agreed on national level to be implemented by 2021”¹¹⁸ (see Table 38). These findings are part of the 2021 update, analysing progress that has been made since the 2015 report.

Number of measures to be implemented by 2021		Implementation status			
Indicated in the DRBMP Update 2015	Finally agreed measures at national level	Not started	Planning on-going	Construction on-going	Completed
158	139	37 (27%)	47 (34%)	8 (6%)	47 (34%)

Table 38 Progress in implementing of measures on restoration of interruption of river continuity for fish migration

Source: ICPDR 2021

There are still a number of significant interruptions present in the Danube. The ones that have no active purpose anymore should be removed, but other barriers that serve a purpose, such as hydropower generation should also be considered to be removed and not built in first place. The 2021 RBMP provides information on the planned restoration measures for river continuity until 2027 stating that:

“By 2027, 424 fish migration aids are planned to be constructed in the DRBD that should ensure the migration of all fish species and age classes according to best available techniques. For 90 continuity interruptions, no measures are necessary for the achievement of GES/GEP. No measures are yet indicated for 13 continuity interruptions and for 29 continuity interruptions measures are not applicable. For 97 continuity interruptions no measures are planned by 2027.”¹¹⁹

The information is also available in the form a map.

See Map 36 in Annex 1: Interruptions of river continuity hindering fish migration: Expected restoration measures by 2027 (Source: ICPDR, 2021, Map 36)

c) Morphological alterations (length of river stretches)

Another important piece of information from the 2021 RBMP that is relevant for free-flowing rivers is the status of the river morphology of the main stream and the main tributaries in the Danube basin. River stretches that are heavily impacted in their morphological conditions are likely not to be classified as free-flowing. Morphological alterations include pressures that are causing changes to river bed, banks and floodplains, for

¹¹⁷ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 56

¹¹⁸ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 175

¹¹⁹ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 177

instance when the proportion of the width and depth of the river changes because the river is widened to accommodate for more water.

The morphological alterations matter because they strongly influence the development of a river in terms of the sediment movement and processes of deposition and erosion that form the flow of the river. Morphological alterations through humans have been undertaken for decades and the historic imprint of resectioning (including straightening, over-deepening or over-widening) and interfering in the riverbed- and bank structure has strong impacts. Especially the bedload transport of the river determines the river morphology. In the Danube, in total about 733 rkm (29%) of the Danube River is dominated by erosion (56% when including 670 river kms with erosional trend in the Lower Danube) and 857 river kms (34%) of the Danube River by sedimentation.¹²⁰

Five classes of morphological conditions were defined from Near-natural to slightly altered (class 1-2) to Slightly altered to severely altered (class 2-5). The outcome of the assessment for the Danube by the ICPDR assessment illustrates that river stretches that fall under class 1 are only present in the lower parts of the Danube basin.¹²¹

The pressure analysis concludes that 155 out of a total 931 river water bodies (~2,900 km) are near natural to slightly altered (17%). 147 water bodies (~4,780 km) were reported to be moderately altered (16%) and 215 (23%, ~4,070 km) extensively to severely altered (see Map 14). 145 water bodies (~6,270 km) reported in the 2-class system are near natural (16%) and 208 (~8,560 km) are slightly to severely altered (22%). For the remaining 49 water bodies (5%, ~1,700 km) no information on the classification of river morphology is yet available.¹²²

See Map 15 in Annex D: Alterations of River Morphology (Source ICPDR, 2021, Map 15)

d) Wetlands/Floodplains with Reconnection Potential - Expected Restoration Measures by 2027

In terms of lateral connectivity the connection of floodplains/and wetlands to the river is important and contributes to a free-flowing river section. Wetlands and floodplains enhance the retention capacity during flood events and are crucial for aquatic ecosystems and the water quality. The main pressures on floodplains and wetlands is the intensive land use and river regulation works that lead to disconnection of floodplain areas (DRBMP 2009, DRBMP Update 2015 and DRBMP Update 2021). There are hundreds of water bodies in the DRBD (in absolute numbers and percentage) which have the potential to benefit from reconnected wetlands/floodplains:

	Number of WBs	WBs with disconnected wetlands/floodplains and reconnection potential	% of WBs with disconnected wetlands/floodplains and reconnection potential
Danube River	63	11	17
DRBD tributaries	912	11	1
All DRBD rivers	975	22	2

Table 39 Number of water bodies with disconnected wetlands/ floodplains, having a reconnection potential in the Danube River and main Tributaries

Source: ICPDR, 2021, P. 64

Figure 94 shows the floodplain reconnection potential per country with the respective status: totally reconnected/ partly reconnected/ reconnection potential. This potential can be tapped by extending existing projects or new projects that are aimed specifically at the reconnection of floodplains.

¹²⁰ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 44

¹²¹ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 47

¹²² ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 46

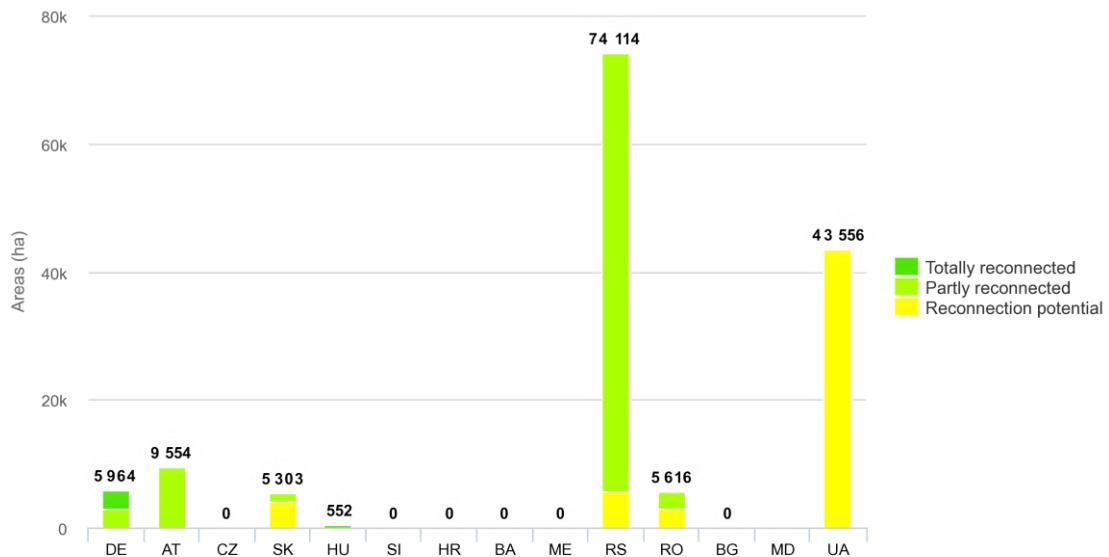


Figure 94 Area [ha] of DRBD wetlands/ floodplains (>500ha or of a basin-wide importance) which are reconnected or with a reconnection potential per country

Source: ICPDR, 2021, P. 65

e) Hydrological alterations

A free-flowing river stretch is likely to be characterised by an undisturbed hydrological regime which is important to preserve quantity and dynamics of river flow. Besides the presence of barriers, which has already been covered in this chapter, a number of other hydrological pressure are reported by the ICPDR (in the 2021 RBMP) including impoundments, water abstractions and hydropowering.

2.1.2.1. Impoundments

In total, 422 impoundments are located in the DRBD rivers with catchment area > 4,000 km², 26 of them in the Danube River itself. For 48 impoundments, restoration/mitigation measures have already been implemented for the achievement of the Good Environmental Status (GES) and Good Environmental Potential (GEP) by 2021. For 204 impoundments restoration measures are planned to be implemented by 2027. For 93 impoundments no measures are necessary for the achievement of the GES/GEP. For 77 impoundments measures were not yet indicated (see Figure 95)¹²³:

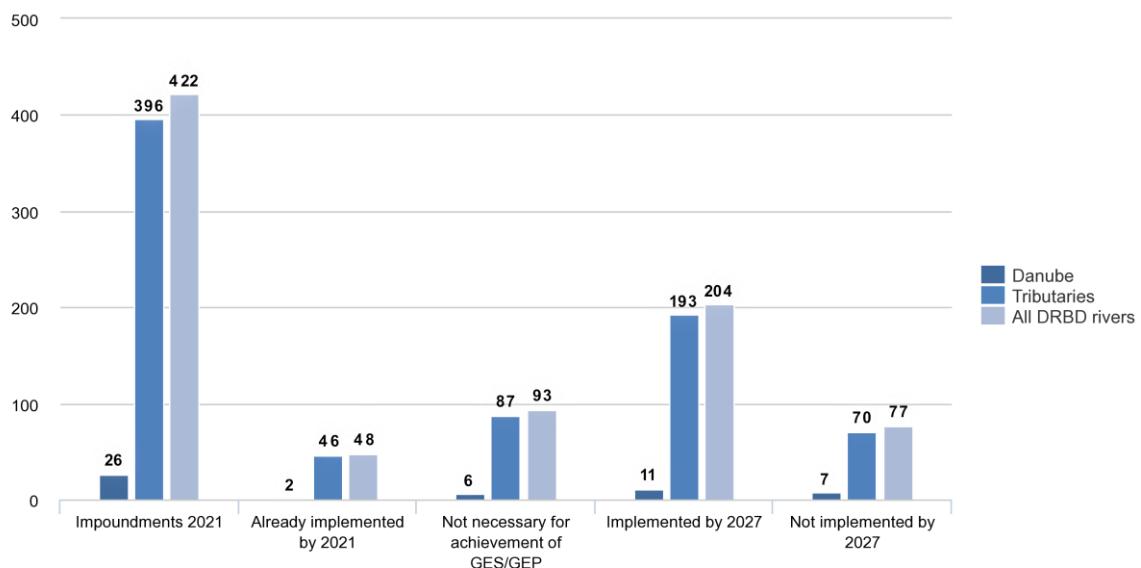


Figure 95 Impoundments 2021 and in planning until 2027

Source: ICPDR, 2021 (figure 83)

123 ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 70

The table below shows that there were several measures of impoundments planned to be completed by 2021, with the majority of them not having started yet (status 2021). This shows, that while many national plans accounted for the need to remove impoundments, there is little progress in their actual removal.

Number of measures to be implemented by 2021		Implementation status			
Indicated in the DRBMP Update 2015	Finally agreed measures at national level	Not started	Planning on-going	Construction on-going	Completed
41	32	22 (63%)	2 (6%)	1 (3%)	10 (29%)

Table 40 Progress of implementation in measures of impoundments

Source: ICPDR 2021

The location of the impoundments in the Danube river basin including those that are expected to be restored by 2027 is shown in Map 33.

See Map 33 in Annex 1: Expected restoration measures of impoundments by 2027 (Source: ICPDR 2021)

2.1.2.2. Water abstractions

Water abstractions relate mainly to groundwater abstractions and play an important role in the availability of water in the Danube River Basin. For example, abstractions can damage freshwater ecosystems and habitats, and thus need to be addressed as part of nature restoration measures. Groundwater is strongly interconnected with the surface water in that the surface water infiltrates into the groundwater, especially during high flow.¹²⁴

The ICPDR found for the water abstractions: "In total, 69 cases of water abstractions were identified in the DRBD, 5 of them in the Danube River itself. For 3 water abstractions, ecological flow requirements for the achievement of GES/GEP have already been achieved in 2021. For 46 water abstractions, restoration measures are planned to be implemented by 2027 (Figure 98). For 18 water abstractions, no measures are necessary for the achievement of GES/GEP and for 2 water abstraction measures will not be implemented by 2027."¹²⁵ (see Figure 96)

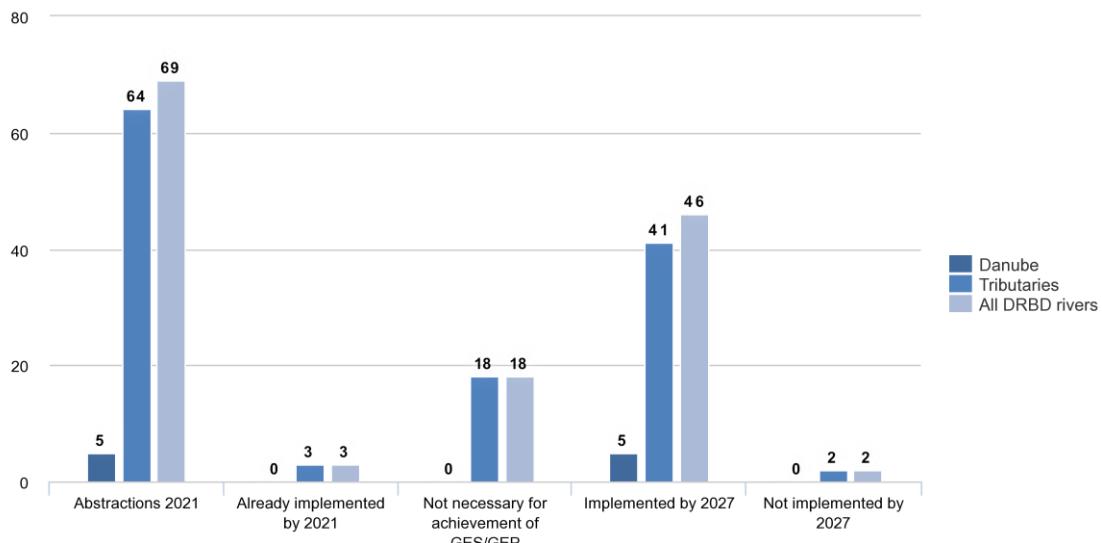


Figure 96 Number of water abstractions and expected restoration measures by 2027

Source: ICPDR 2021, figure 84

The location of the water abstraction sites including those that are expected to be restored by 2027 is shown in map 14.

See Map 14 in Annex 1: Expected restoration measures of water abstractions by 2027, Source: ICPDR 2021

¹²⁴ ICPDR. (2015). Groundwater's essential role in the Danube River Basin.

https://www.icpdr.org/main/sites/default/files/nodes/documents/icpdr_groundwater_layout2.pdf

¹²⁵ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 171

2.1.2.3. Hydropeaking

Hydropeaking remains one of the key pressures that require measures on the basin-wide scale. Hydropeaking occurs especially in heavily modified water bodies, because the natural retention possibilities when it comes to fluctuations in water volume cannot be balanced well. Managing hydropeaking is important for the status of free-flowing rivers, because it is tied to obtaining the good ecological potential.¹²⁶ Possible measures include improving river morphology in the head sections of reservoirs or ensuring ecological flows and by addressing artificial flow fluctuations.¹²⁷

In its 2021 RBMP, the ICPDR found for hydropeaking:

"In total, 42 cases of hydropeaking were identified in the DRBD, one of them in the Danube River itself. For 4 cases, restoration/mitigation measures have already been implemented by 2021 for the achievement of GES/GEP. For another 32 cases of hydropeaking restoration/mitigation measures are planned to be implemented by 2027 and for another 3 cases the restoration measures will not be implemented by 2027, For 2 cases, no measures are necessary for the achievement of GES/GEP and for one case, the measures are not yet determined. Table 41 further below provides more detailed information for each Danube country."¹²⁸ (see Figure 97)

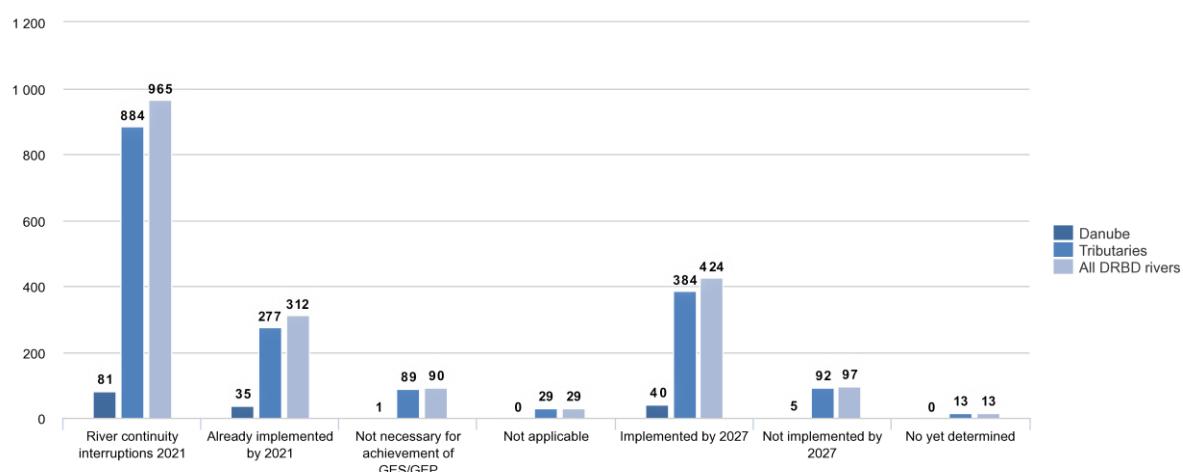


Figure 97 Number of cases of hydropeaking and expected restoration measures by 2027

Source: ICPDR 2021, p. 173

Table 5 presents the progress of implementation of measures on hydropeaking, revealing the status of the ongoing projects.

Number of measures to be implemented by 2021		Implementation status			
Indicated in the DRBMP Update 2015	Finally agreed measures at national level	Not started	Planning on-going	Construction on-going	Completed
4	4	0 (0%)	2 (50%)	1 (25%)	1 (25%)

Table 41 Progress in implementation of measures on hydropeaking

Source: ICPDR, 2021

Table 41 shows the different measures that were supposed to be implemented by 2021, but only 25% of the measures have been completed so far. To get an insight into what is planned until 2027, Table 41, which shows the hydropeaking measures that were planned and what has been implemented already. Only very few parts are marked in orange, meaning that few initiatives are planned for 2027 and not fulfilled. It may be that generally less projects were planned to be completed by 2027.

See Map 35 in Annex 1: Hydrological alterations: Hydropeaking- Expected restoration measures by 2027,
Source: ICPDR 2021

¹²⁶ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 169

¹²⁷ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 173

¹²⁸ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 53

2.1.2.4. Sediment balance

The longitudinal continuity is interrupted by transversal structures in the rivers like dams and weirs, but they also disturb the sediment transport and lead to river bed incision and/ or aggradation.¹²⁹ The ICPDR has identified sediment balance alteration as a significant water management issue in the DRBMP Update 2021, as the sediment balance in the Danube is often disturbed or severely altered. This hinders the achievement of environmental objectives in the Danube River Basin.

According to the ICPDR, flood protection, hydropower, water supply, commercial dredging, navigation, and land use (e.g. agriculture) are the main drivers for the alteration of the sediment regime in the Danube.¹³⁰ Additionally, heavy modifications of the Danube and a reshaping of its banks and lack of floodplain has increased erosion and sediment transport is sped up in many parts of the free-flowing Danube sections. In effect, the flood risk increases and possibilities for hydropower and transportation in the Danube are limited. The DTP DanubeSediment Project, to be found as one of the case studies in the Annex E, thoroughly studied the effects of the compromised sediment balance.¹³¹ By setting the Danube sediment balance as a significant water management issue, the ICPDR assigns more attention to this topic. For target 1 and 2 of this mission, this indicator is very important.

2.1.2.5. Planned renaturation projects under the Floods Directive

The 2021 Update of the Danube Flood Risk Management Plan of the ICPDR includes a whole chapter dedicated to water retention¹³² that provides information on the implementation of natural water retention measures (NWRM). These are measures that aim at enhancing and safeguarding the water storage potential of the landscape, soil and aquifers by restoring ecosystems, natural features of water courses and by using natural processes. NWRM measures provide multiple benefits beyond the field of flood protection by improving water quality and quantity and contributing to the adaptation to climate change. These planned activities are supporting the achievement of Target 1.

NWRM measures include measures for increasing the storage capacity alongside the river including restoration of wetlands, floodplains, lake, basins and ponds, re-meandering and natural bank stabilization.

Successful projects in this field in the Danube region include projects such as the “Coca-Cola - WWF “Partnership for a living Danube” (see excel database for more details) which was a seven years partnership with the aim to restore wetlands, river sections and floodplains in the Danube basin by 2020. The programme included nine restoration projects in six countries (Hungary, Croatia, Serbia, Romania, Bulgaria and Austria).

The Flood Risk Management Plan contains a chapter¹³³ on national activities towards water retention that includes NWRM but provides specific project information only for some countries. For instance, Croatia is involved in the DravaLife Project and the INTERREG WetlandRestore - Restoration of Wetlands in Middle Danube Project. The overview of measures in Annex 2 of the FRMP shows that a lot of countries are listing restoration under their measures, but no detailed project information is available.

Indicators for Target 2: Restore certain coastal and freshwater ecosystems habitats (Art 4 of the proposed regulation on nature restoration)

¹²⁹ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 54

¹³⁰ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 57

¹³¹ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 57

¹³² <https://www.icpdr.org/main/publications/danube-flood-risk-management-plan-dfrmp-update-2021>, chapter 6, p.83

¹³³ <https://www.icpdr.org/main/publications/danube-flood-risk-management-plan-dfrmp-update-2021>, chapter 6.4, p. 91

	Indicators*	Data source
Target 2: outcomes	Designation of new or enlarged protected areas to maintain or improve freshwater and coastal habitat conditions	Mission projects; EEA (Natura 2000 viewer and database)
Target 2: impacts	Improvement in freshwater and coastal habitat condition	
	Restoration of coastal and freshwater ecosystems and habitats (Art 4 of the proposed regulation on nature restoration)	Reporting under the Habitats Directive and Management plans of N2000 sites
	Area covered by restoration measures that are necessary to improve to good condition of coastal and freshwater habitat types	
	Change in area (km2)/ number of coastal and freshwater habitats that are in good condition	
	Change in connectivity of habitats, including longitudinal, lateral, vertical and temporal river connectivity	

Table 42 Key indicators for nature restoration target 2: Restoration of coastal and freshwater ecosystems and habitats (Art. 4 of the proposed regulation on nature restoration)

See Appendix G for the full list of proposed indicators.

* The targets should be valid for the specific aquatic ecosystems with type names as referred to in Annex I of Council Directive 92/43/EEC

As mentioned in the introduction, due to the delay in publication of the EU restoration law the indicators cannot be based on the framework of the law. Instead, here we present existing information tools in a descriptive manner:

- The [Natura 2000 viewer by the EEA](#) is a strong database, where different filters can be applied to understand what the regions size of protected area is, however there is no information on the state of protection and restoration. The data was last updated in 2018, and shall be updated again by 2024.
- For the Danube specifically, there are a few other starting points that serve the analysis of the restoration potential, such as:
 - 1) the MARSPLAN BS-II project, incl. for biodiversity and natural habitats could be found in the Deliverable: WP1: Defining and analyzing existing conditions in the maritime space, 2020, <https://drive.google.com/file/d/1cJ4rWOksltMXeOBvxFwnJrRcEN7CkojO/view>
 - 2) The [GIS database](#), a MARSPLAN BS-II PROJECT for the Danube area, it covers part of the Danube only
 - 3) Up to date data on Natura 2000 sites (species and habitats), for instance for Bulgaria: related documents are available on the [website of the Information System for the protected areas of the Natura 2000 ecological network](#), incl. spatial data.

Lastly, the biodiversity targets are also relevant for the restoration targets, which are described with more detail in the upcoming section:

2.1.3. Relevant biodiversity targets 2030

The lighthouse Mission is strongly tied to the EU Biodiversity Strategy to 2030, and its goal of restoring environmental flow and restoration of at least 25,000 km of EU rivers to a free-flowing state but also to the restoration of coastal and freshwater ecosystems. Therefore, tracking nature restoration targets is crucial to ensure that the Danube River Basin performs well in contributing to these targets. The EU Biodiversity Strategy's 2030 target to restore free-flowing rivers will be part of the ECOSTAT work programme for 2022-2024.¹³⁴

According to the ICPDR, the implementation of the concept "Giving more space to rivers" is recognised as one of the most important recommendations for achieving common synergies and benefits between WFD and FD objectives.¹³⁵

Due to the size of the river basin and its floodplains, the interconnectedness and therefore need to cooperate for the protection and restoration of it is immense. According to Funk et al. (2019) systematic planning is

¹³⁴ European Commission DG Env (2021) 42nd Meeting of the WFD CIS Working Group on Ecological Status (ECOSTAT) Draft Minutes, Page 6
¹³⁵ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 192

required for the restoration of floodplains. The paper studies biodiversity using selected species and three ecosystem services (flood regulation, crop pollination, and recreation), focused on the navigable main stem of the Danube River and its floodplains.¹³⁶

Large near-natural areas are found along the Upper and Middle Danube, but near-natural areas are found only to a limited extent along the Lower Danube, and show a relatively low distance to the ideal point of 100% coverage with semi-natural area:

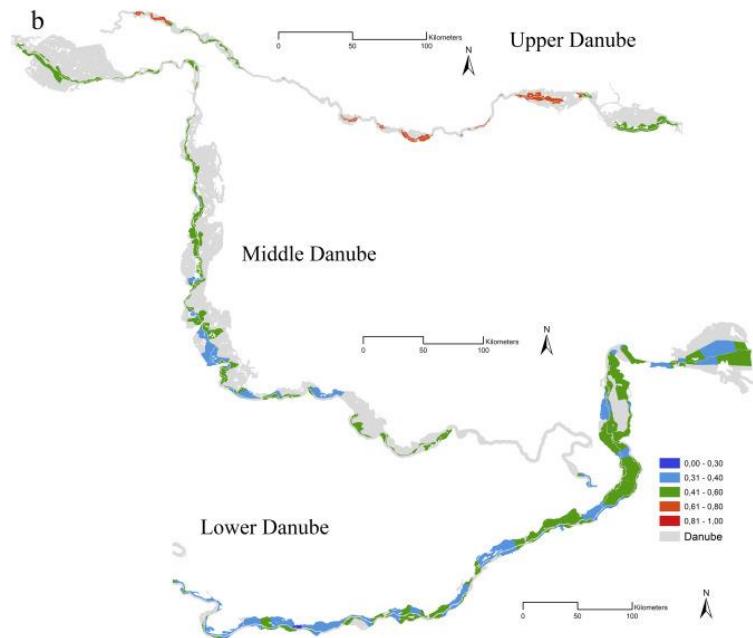


Figure 98 5-class classification for the natural state of the Danube, blue being the category least modified

Source: Funk et al., 2019

According to the authors, the challenges in streamlining efforts for restoring floodplains lay in inconsistencies in legislation related to river management. The authors have used the 5-class classification system, which has been applied mainly by western European countries to describe the status of the natural state of rivers. The WFD classification scheme for surface water ecological status includes five categories: high, good, moderate, poor and bad. ‘High status’ means no or very low human pressure. ‘Good status’ means a ‘slight’ deviation from this condition, ‘moderate status’ means ‘moderate’ deviation, and so on.¹³⁷

[Paragraphs on national biodiversity plans will be added: some of the plans will only be published in the future and existing information is only in terms of pledges, not on what they have achieved thus far, see: Part 3]

2.1.4. Indicators related to Annex I Directive 92/43/EEC

Based on the proposed regulation on nature conservation targets the following indicators can be proposed:

- 1) Area covered by restoration measures that are necessary to improve to good condition of habitat types
- 2) Change in area (km^2)/ number of habitats that are in good conditions
- 3) Change in connectivity of habitats, measured by¹³⁸:
 - longitudinal – linear connectivity (number of obsolete obstacles removed, including intermediate weirs and deflectors)

¹³⁶ Funk, A., Martínez-López, J., Borgwardt, F., Trauner, D., Bagstad, K. J., Balbi, S., Magrach, A., Villa, F., & Hein, T. (2019). Identification of conservation and restoration priority areas in the Danube River based on the multi-functionality of river-floodplain systems. *Science of the Total Environment*, 654, 763–777. <https://doi.org/10.1016/j.scitotenv.2018.10.322>

¹³⁷ European Commission. (2010). The EU Water Framework Directive. <https://ec.europa.eu/environment/pubs/pdf/factsheets/water-framework-directive.pdf>

¹³⁸ Welsh Environment Agency, Scottish Environmental Protection Agency, Environment and Heritage Survey: Field Survey Guidance Manual Version 1, manual document can be requested at: <https://www.therrc.co.uk/river-habitat-survey>

- lateral – floodplain connectivity (m^2 of complex vegetation cover and land use on bankface and banktop)
- vertical – hyporheic (below the stream bed)(presence of permeable river substrate)
- temporal (time) – many scales; seasonal, multiyear, generational

Currently information is only available for the second indicator at designated N2000 area, biogeographical area or at MS level¹³⁹. For this indicator, moreover, Danube region aggregated information can not be found, only data for protected areas of basin wider relevance are shown, without a status assessment.¹⁴⁰

2.1.4.1. Indicators for Target 1 and 2

The good ecological status is a crucial standard for measuring how intact an ecosystem, it features (and therefore also a habitat is). It makes assessments of the natural environment, including the effects of man-made direct modifications and treatment of the environment, in this case water tangible and comparable. Under the WFD Annex V the good status of surface water bodies is generally described as: “*The values of the biological quality elements for the surface water body type show low levels of distortion resulting from human activity, but deviate only slightly from those normally associated with the surface water body type under undisturbed conditions.*”

As the further definition of good ecological status refers to hydromorphological quality elements and biological quality elements (such as e.g. fish) the status can be used as a (supportive) indicator for both targets.

2.1.4.2. Ecological status of surface water bodies 2021

The good ecological status of surface water is affected by hydromorphological pressures. Therefore, measures such as the restoration of (former) floodplains or the creation of buffer strips are closely linked to ecological status.

See Map 27a in Annex 1: Ecological Status of SWBs exemptions, Source: ICPDR 2021

2.1.4.3. Ecological status of surface water bodies 2027

The ICPDR has prepared the following chart to estimate the potential risk of the surface waters of the DRB not achieving good ecological status by 2027 shown in kilometres.

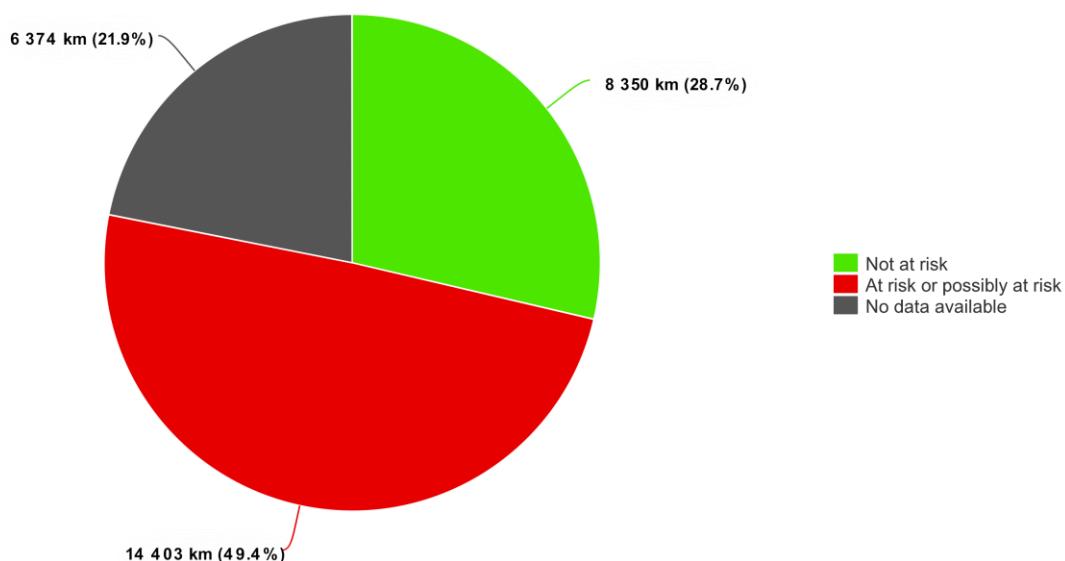


Figure 99 Risk Assessment Surface Waters (River WBs) – Risk of failure to achieve good ecological status by 2027

Source: ICPDR 2021, p. 6

¹³⁹ <https://www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-17-national-summary-dashboards/condition-of-habitat>
¹⁴⁰ https://www.icpdr.org/main/sites/default/files/DRBMPmap09_PA.pdf

The calculations are based on pressures by organic pollution, nutrient pollution, hazardous substances pollution and hydromorphological alterations.

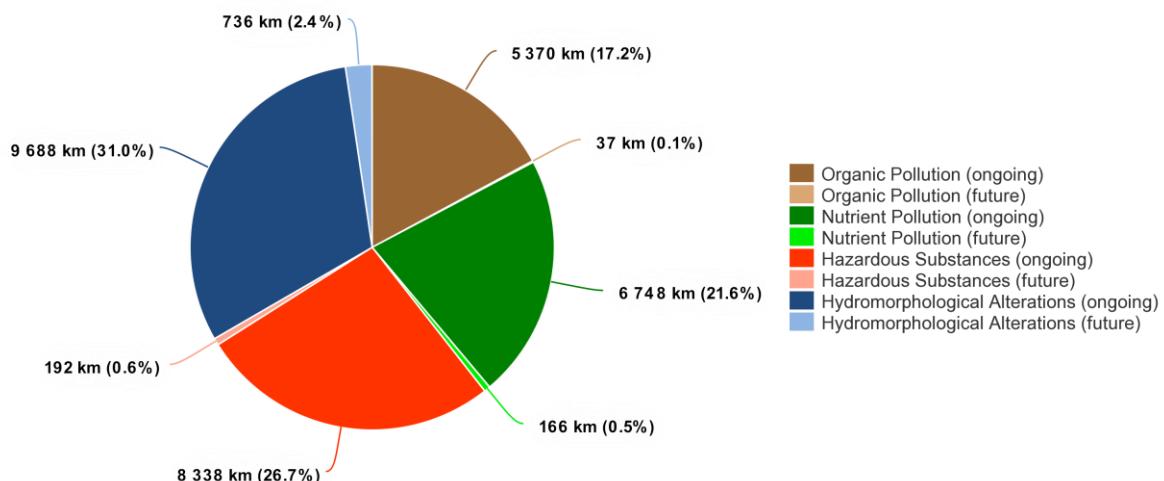


Figure 100 Surface Waters (River WBs) – Pressures leading to the risk of failure to achieve good ecological status by 2027

Source: ICPDR 2021, p. 6

To note: "Figure 15 distinguishes between the ongoing pressures persisting from the past and the pressures, which may emerge in the future due to long-term trends and new developments. This information is crucial for the design of the JPM and for taking the necessary actions for achieving the environmental objectives by the year 2027."¹⁴¹

The WFD enables a better basis for a multitude of restoration measures.¹⁴² To achieve the good ecological status the WFD requires that the water body be in a condition that is consistent with the achievement of slightly impacted biological values to have strong hydromorphological quality elements.¹⁴³ According to the information reported for the second river basin management plans in accordance with the Water Framework Directive, barriers constitute significant pressures for about 20% of European surface water bodies. They are one of the main reasons for rivers failing to reach good ecological status.¹⁴⁴

2.1.4.4. Ecological prioritization in the Danube

Ecological prioritisation gives detailed information about how watershed processes and habitats have changed or about how those changes affect important species in order to identify areas, like hotspots, that should be protected with priority, or have special needs. It can also include the "analyses of habitat loss or degradation, changes in watershed processes, and importance of specific habitat losses to one or multiple species".¹⁴⁵

An ecological prioritisation of measures to restore river and habitat continuity in the Danube River Basin was carried out for the DRBMP 2009.¹⁴⁶ Overall, the ecological prioritisation approach was continued and updated in the 2021 assessment, including:

- Key migration routes for long and medium distance migrants of the DRB
- An assessment of which measures for river continuity should be prioritized. This assessment "provided useful information on the estimated effects of national measures in relation to their ecological effectiveness at the basin-wide scale and served as a supportive tool for a number of countries in the implementation of measures."¹⁴⁷ It thereby serves as a good tool to check from the national to the transboundary level and the other way around which steps are important.

¹⁴¹ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 6

¹⁴² Voulvoulis, N., Arpon, K. D., & Giakoumis, T. (2017). The EU Water Framework Directive: From great expectations to problems with implementation. *Science of the Total Environment*, 575, 358–366. <https://doi.org/10.1016/j.scitotenv.2016.09.228>

¹⁴³ European Commission. (2021). Biodiversity Strategy 2030 Barrier Removal for River Restoration. <http://www.europa.eu>, Page 11

¹⁴⁴ European Environment Agency. (2021). Tracking barriers and their impacts on European river ecosystems. <https://www.eea.europa.eu/themes/water/european-waters/water-use-and-environmental-pressures/tracking-barriers-and-their-impacts>

¹⁴⁵ Beechie, T., Pess, G., Roni, P., & Giannico, G. (2008). Setting River Restoration Priorities: A Review of Approaches and a General Protocol for Identifying and Prioritizing Actions. *North American Journal of Fisheries Management*, 28(3), 891–905. <https://doi.org/10.1577/m06-174.1>, Page 892

¹⁴⁶ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 176

¹⁴⁷ ICPDR. (2021). Danube River Basin Management Plan Part A-Basin-wide overview Update 2021. www.icpdr.org, Page 176

- Criteria related to the distance from the river mouths, reconnected habitat lengths, protected sites and habitat quality
- An assessment of Long Distance Migratory Species' needs for additional measures

Apart from the ecological prioritisation, other factors, such as technical, economic and/or administrative aspects also determine the choice of the measure.

The ICPDR also assessed river and habitat connectivity in relation to the ecological prioritization and which river restoration activities should receive priority, shown through the river section and location they are at.

See Map 39 in Annex 1: Priority for River and Habitat Continuity (Source: ICPDR 2021, Map 39)

3. DATABASES OF PROJECTS, ACTIONS AND ACTIVITIES OF THE DANUBE

The database is in the format of a searchable excel- file and is submitted as a separate document (please see the separate Excel file that compiles the databases from all three lighthouse areas).

In total, 41 projects were identified, most of which received EU funding (Interreg; ERDF; EU Life +, IPA, Horizon 2020), complemented by additional funds from national budgets, private funding or the organizations budget. However, some projects are also entirely financed through national budgets, NGO fundraising or industries.

Most of the projects involve two or more countries, and most of them are located in the upper part of the Danube basin. Therefore, more attention should be put on the lower Danube. While some projects have a clear research focus, others are more applied by implementing restauration measures, or more integrated by doing capacity building on more social aspects.

On a content level there are no topics that are over proportionally covered, because the projects cover very different topics for the mission, such as: sediment balance, conservation status, or wetland restoration.

4. SUMMARIES OF GAPS IN DATA, KNOWLEDGE, IMPLEMENTATION OF EU LEGISLATION IN THE DANUBE

One key gap in data and knowledge is that a final definition of free-flowing rivers has not been set at either EU or Danube River Basin level. Instead, there is consensus on the characteristics of rivers that contribute to being labelled as free-flowing. The EC interprets 'free-flowing rivers' "to mean rivers or other surface water bodies (e.g. lakes) that are not impaired by artificial barriers and not disconnected from their floodplain" and includes in this definition barriers to longitudinal and latitudinal connectivity of rivers. The guidance on barrier removal and interpretation of free-flowing rivers was published in late 2021, and gives direction for handling the definition, also in the Danube. However, related to the lack of an agreed-upon definition are:

- Deviations across member states in the scale of evaluating the condition of river morphology (1-5; 1-3...) (see also 2))
- Deviations across parameters that are considered in the evaluation (what do they factor in?)

As a result of a lack of an agreed-upon definition of free-flowing rivers, there is no dataset currently available on free-flowing rivers in Europe. For the purposes of the Mission (and the proposed restoration regulation), it is important to take steps towards defining 'free-flowing rivers' and kick off action to collect data.

The last Danube-wide assessment (2008) of the ICPDR uses a five-class assessment scheme for channels, banks and floodplains:

- "Channel (including flow conditions) in five classes: Degree of morphological and flow condition alterations (based on hydrological alterations, navigation map, historical maps (as reference base), plan form, validated by field survey) taking into account the types-specific reference conditions.
- "Banks in five classes (integration of left and right banks): Bank dynamics (based on navigation map, validated by field survey) taking into account the type-specific reference conditions.

- Floodplain in five classes (integration of left and right floodplain): Based on the four ecological quality classes ("ecological potential") according to the DPRP Wetland study 1999 (floodplain width (relation between active and morphological floodplain) and land use)¹⁴⁸

Each component thus receives scores from 1 to -5, ranging from nearly natural/ with high ecological value to totally modified, respectively. When the different classes are visualized on maps, one colour per category shows what status class the parameter scores in. Technically, the status assessment of the channels, banks and floodplains could give rise to the state of free-flowing rivers.

It should be noted, however, that Member States establish specific and different categorisations and standards (i.e. condition of river morphology). This makes it hard to compare efforts and implementation of actions concerning channels, banks and floodplains. Indeed, in the Danube River Basin, bordering countries can have different categorisations for the hydromorphological characteristics of the river(s). Therefore, it is not possible to make statements on how free-flowing the Danube is based on these assessments.

With regard to the target for nature restoration, national biodiversity plans provide valuable information on freshwater and coastal habitats. However, these plans are published at different times and with different time frames. This is due to different approaches of Member States, and makes it difficult to compare them. Those biodiversity strategies that exist and reveal the plans of countries for 2030 only include pledges and no information on progress and hard facts on which measures are successfully implemented.

Consequently, for target 2, no Danube wide assessment exists, only national or bioregional information. There are also several nature protection areas in the Danube whose status is unclear: Even though indicators for protection areas exist, assessments have not been made or the data is not publicly available. So it remains unclear how great the distance to target 2 is.

Regarding the implementation of EU legislation, an overview can be prepared based on overviews reported prepared by the European Commission. It should be noted that the most relevant reports are those for the implementation of the Water Framework Directive, specifically the reports on the second cycle of River Basin Management Plans – these second cycle plans date to 2016. (The current, 2021 plans are only being reported now and their assessment will not be available before the end of this project.)

5. CONCLUSIONS AND RECOMMENDATIONS FOR LIGHTHOUSE WORK

Currently running and planned projects concerning river restoration in the Danube River Basin vary strongly in their temporal and spatial scope. In general, there are over-proportionally more activities and projects with regard to river restoration and river connectivity in the upper part of the DRB (e.g. Germany, Austria). This can be explained on the one hand by the distribution of alterations in the Danube and on the other hand by lack of budgets in many downstream countries.

Therefore, *it is recommended that the focus of the mission should be on the lower Danube* with regard to financial support and project replications. It is also recommended that upstream learnings are transferred to future downstream projects under the mission.

Assuming that the proposed nature restoration regulation will come into force and MS are required to prepare national restorations plans, *the ICPDR should take an active role in coordinating these plans as regards to water issues*. Such a coordination is strongly needed in order to ensure that fragmentation of ecosystem is reduced and connectivity across Danube countries is increased. Also, when developing the restoration plan, there is a need to strengthen the indicators, to be able to compare the status across different river sections and hold countries accountable to make the assessments, and potentially changes.

River restoration projects often face difficulties with funding, especially when it comes to securing funds for possible project-extensions or unexpected additional measures identified during the implementation phase.

Therefore, *financing river restoration projects should be done with a mix of financial contributions, and should also have mechanisms in place to cover unexpected, additional costs* which may arise to ensure that the projects can be run well. It is important to note that access to EU or international funds is an important enabling factor for larger projects.

¹⁴⁸ Schwarz, U., & Kraier, W. (2008). ICPDR / International Commission for the Protection of the Danube River / www.icpdr.org Imprint. www.icpdr.org, Page 7

The broad range of funding possibilities for river restoration projects involving also different donors requires project developers to have a good overview of these possibilities. To achieve that, often time-consuming investigations are needed in order to match the project idea with the right funding scheme. This requires often discussions with a broad range of institutions. In order to ease that process, the principle of a *one stop shop could at MS level be envisaged*. The Points of Single Contact are e-government portals that allow project developers to get the information they need and complete administrative procedures online. However such a structure would require the development of new government structures in many MS.

MEDITERRANEAN

1. INTRODUCTION

Task 2 for the Mediterranean focused on Mission Objective 2 relating to the prevention and elimination of pollution. Five key research topics were studied in this respect:

- The current state of pollution in the Mediterranean
- Mediterranean pollution hotspots
- Past, ongoing and future activities to limit pollution in the Mediterranean
- A presentation of the reaction to large pollution incidents framework in the Mediterranean
- Waste management in ports

The indicators developed for this task are thus largely aligned with these research topics.

As concerns the key pollutants and their concentration levels, a list of **43 key pollutants** was drawn, associated to MSFD Descriptors (5, 8, 10, 11). Most of these have a legal threshold, but some are still under development, such as marine litter. In 2018, Good Environmental Status (GES) was not achieved for a majority of Mediterranean states. MFSD5 showed the best results, with 48% of localities reporting achievement. MFSD 8 reported 33% of achievement, MFSD10 9% and MFSD11 none at all (results were either unknown or not assessed). In the context of the Mission, it was suggested to rely on the MFSD WISE database to monitor the evolution of pollutants in the Mediterranean, rather than others, such as Emodnet.

The research identified **68 “hotspots”** in the Mediterranean overall, based on reporting for the MSFD. A hotspot is taken to mean a location for which an evaluation of the MSFD descriptors indicate that at least one of the components does not reach the level for good environmental status (GES), according to the levels established¹⁴⁹.

77% of identified hotspots have more than 2 descriptors under noncompliance (only 23% have exclusively one descriptor in bad state). **Spain concentrates a total of 11 hotspots, France 7, Italy 13, Slovenia 3, Croatia 15 and Greece 17.** The analysis of Malta and Cyprus MSFD reports indicate the achievement of GES for all sampled locations, so that no pollution hotspots have been identified for these countries. Descriptors with the highest non-compliance levels in the hotspots include metals (present in all locations), floating litter and seabed litter (present in only some locations). Heavy metals (frequently Mercury) are the most frequent descriptor that determines that locations do not reach GES (75% of hotspots). When the data on litter (D10) is available, the status is of 95% to 96% of noncompliance for Litter floating and litter seabed, and 54% for micro-litter floating.

A total of **83 projects related to the objective 2 of the Mission** in the Mediterranean were identified (for projects starting in 2016 and later). Sources were drawn from varied databases, including JRC, H2020, LIFE, Interreg and the Union for the Mediterranean (UfM). The majority of these projects are collaborative. Moreover, there are slightly more consortiums comprised of partners from both EU and non-EU countries than those with only EU partners, indicating good cooperation also outside of the European Union. **Most of the projects focus on removing and reducing marine litter, including plastic pollution**, from the sea. These include activities such as mapping and tracking marine pollution, and solutions to remove marine litter. **A majority of projects were research projects (41%)**, while pilot implementation projects represented 34% of projects funded overall, and studies 25%. Projects focused mainly on cleaning and monitoring technologies as well as developing action and management plans. Monitoring and exchange networks as well as the development of toolkits constitute a smaller range of products (respectively 11% and 8%). **European funding sources compile the vast majority of investments**, with Horizon 2020 and Interreg the largest funding mechanisms. The projects funded under Horizon 2020, Interreg and LIFE amount to an estimated total of € 47,8 million, € 27,8 million and € 11 million respectively.

A brief analysis was made on the current capacity to identify, monitor and react to large pollution incidents. While policy and legal frameworks for oil spill detection and industrial accidents exist both internationally and at EU level, the data collection process and monitoring mechanisms show **limited information on implementation in Mediterranean Member States**. While national reaction agencies seem to be implemented in all EU countries, their effectiveness is hard to measure solely through desk research.

¹⁴⁹ The descriptors are established according to Decision 2017/848/EU, and the levels for GES by Regulation (EC) No. 1881/2006 and its amendment 1259/2011.

Finally, a case study on waste management in ports underlines that addressing waste discharges from ships also plays an essential role in preserving marine and coastal ecosystems. It is therefore key to **involve ports in the framework of the Mission**. At present, waste management data coming from ports is not easily accessible and locked inside EMSA. The waste gap for marine litter ranges from 7-34% for marine litter (including plastics) in the EU overall, which is much higher than for other categories of waste. Various fee systems have been implemented to incentivize ships to deliver their waste at port. There is still a debate between those in favour of implementing green fee systems and those advocating for a harmonised fee system in Europe, to avoid competition scenarios where ship owners can seek the cheapest services.

2. MISSION INDICATORS FOR THE MEDITERRANEAN

A full indicator set for the Mission is proposed in Appendix G. This indicator set includes common indicators for the three lighthouse areas as well as indicators for each specific area. The indicators are classified as output, outcome and impact indicators (please see Appendix G for definitions of these terms). Within this indicator set, key performance indicators are proposed for each lighthouse area.

The key indicators below have been developed to address as best as possible the overarching objectives of the Mission in the Mediterranean. To the extent possible, they rely on existing data collection mechanisms to facilitate processes and avoid the duplication of efforts.

These indicators address the Mission **objective 2 (Prevent and eliminate pollution)**. The Mission has the following three targets for the Mediterranean lighthouse area:

- 1) Reduce by at least 50 % plastic litter at sea
- 2) Reduce by at least 30 % microplastics released into the environment
- 3) Reduce by at least 50 % nutrient losses, the use and risk of chemical pesticides.

The indicator framework for the baseline aims to give insights into the status of the Mediterranean's ecological status. The framework and its indicators were set up through careful consideration of the current state of pollution, pollution hotspots and past, current and planned activities that influence the Mediterranean.

The full Mediterranean indicator baseline is built on a set of four blocks:

Indicators relating to the achievement of Good Environmental Status for several different MSFD categories

- 1) Indicators relating to the hotspots
- 2) Indicators relating to waste management in ports
- 3) Indicators relating to oil and industrial pollution accidents.

The following key indicators are proposed for the Mediterranean lighthouse area.

	Indicators	Data sources
Outcomes: Target 1	Reduction in plastic litter in hotspots	Mission projects; reporting for the MSFD descriptors
Outcomes: Target 2	Reduction in microplastics in hotspots	
Outcomes: Target 3	Reduction in nutrients, chemicals and pesticides in hotspots	
Impacts: all three targets	Reduction in the number of hotspots not meeting GES Improvement in achievement of GES (under MSFD), focusing on the following descriptors: Descriptor 5 (eutrophication) Descriptor 8 (contaminants) Descriptor 10 (marine litter) Descriptor 11 (underwater noise)	

Table 43 Overview of key indicators for the Mission in the Mediterranean

See Appendix G for the full list of proposed indicators.

The following sections provide an overview of currently available data relevant for these key indicators.

3. RESEARCH TOPICS

3.1. Current state of pollution

3.1.1. Main conclusions

The objective of this task was to short-list key pollutants in the Mediterranean lighthouse area and assess their current concentration levels in recent years. A list of **43 key pollutants** was drawn, associated to MSFD Descriptors (5, 8, 10, 11). These pollutants are described in the table below.

Category	Number of pollutants identified for the study	Reference to MSFD qualitative indicators	Description
Eutrophication	2	Descriptor 5	The overloading of seas, lakes, rivers and streams with nutrients (nitrogen and phosphorus) can result in a series of adverse effects known as eutrophication. Phosphorus is the key nutrient for eutrophication in fresh waters and nitrate is the key substance for salt waters.
Contaminants / Cyclodiene pesticides	4	Descriptor 8	Aldrin, Dieldrin, Endrin and Isodrin are grouped under the category of Cyclodiene pesticides in Directive 2008/105/EC. The Cyclodiene pesticides are currently listed and banned in Europe through the Stockholm convention: Aldrin, Dieldrin, Endrin.
Contaminants	5	Descriptor 8	The pollutants listed in this group include Phthalates, Chlorobenzenes, HCHs and Metals which all appear in Directive 2008/105/EC.
Contaminants / Polyaromatic hydrocarbons (PAH)	5	Descriptor 8	Polycyclic aromatic hydrocarbons (PAHs) are a group of xenobiotic chemicals which are made up of carbon and hydrogen. They represent a group of contaminants with high melting and boiling points, low vapor pressure, and very low water solubility.
Main pollutants in the field of water policy	8	Descriptor 8	These include nitrates, phosphates, Organohalogen compounds and substance, Organophosphorous compounds, Organotin compounds, Persistent hydrocarbons, Metals and compounds, Biocides and plant protection products.
Marine litter that does not cause harm to the coastal and marine environment	4	Descriptor 10	Marine litter comprises Rubber, Cloth/textile, Chemicals (paraffin, wax, oil and tar), Metals and Microplastics (more generally understood as part of the microliter category). Marine litter is widely defined as any persistent, manufactured or processes solid material that is discarded, disposed of or abandoned directly or indirectly, intentionally or unintentionally in the marine and coastal environment.
Underwater noise	2	Descriptor 11	The Marine Strategy Framework Directive identifies anthropogenic inputs of substance and energy into the maritime environment like underwater noises as pollution. Underwater noise refers to sounds made by human activities that can interfere with or obscure the ability of marine animals to hear natural sounds in the ocean. Underwater noise is a relatively new topic, and there are still knowledge gaps on the effects of anthropogenic noise and at this stage defining internationally agreed threshold values is therefore difficult.
Perfluorooctanoic Acid (PFOA), Perfluoroctyl Sulfonate (PFOS)	11	Descriptor 8	PFAS are a group of more than 4 700 man-made chemicals, the two most well-known of which are perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) . PFAS are used in a wide variety of consumer products and industrial applications because of their unique chemical and physical properties, including oil and water repellence, temperature and chemical resistance, and surfactant properties. PFAS have been used in firefighting foams, non-stick metal coatings for frying pans, paper food packaging, creams and cosmetics, textiles for furniture and outdoor clothing, paints and photography, chrome plating, pesticides and pharmaceuticals. Very limited information is available regarding which specific PFAS are used in which applications and at what levels in Europe.

Table 44 Pollutant groups

A number of pollutants, notably chemicals, have a **legal threshold** which is referenced by legislative texts (WFD, EQS). Other pollutants do not have agreed legal thresholds at the EU level, and although they are being reported under the MSFD, their threshold value is still in the process of being defined conjointly by the European Commission and Member States (ex. Underwater pollution; plastic litter). Member States thus still

define many thresholds independently for pollutants. In the case of plastics and micro-litter, the JRC notes that there is a lack of harmonization on the environmental compartments been investigated (e.g., seabed sediment, beach sediment, surface water, water column, biota), the temporary resolution of surveys and reference units and values (size, weight, shape, colour, etc.)¹⁵⁰.

It was debated whether using EMODnet data or WISE was most useful in the context of this baseline. The final decision has been to **rely on WISE data** for the following key reasons:

The WISE database provides access to data on 19 pollutants (from the total of 43 identified) for a total of 7 countries (Croatia, Cyprus, France, Italy, Spain, Slovenia, Malta) for the year 2018. The EMODnet database provides access to data on 18 pollutants (including 3 that are not in WISE). However, the for the period running from 2015-2018, data is only available for Italy.

The data is practically more accessible through WISE as the indicators are exportable under Excel or csv. EMODnet's raw data would need to be aggregated in indicators, requiring methodological development and the use of software.

Other research analysis on pollutants in the context of the Mediterranean has also relied on EEA data and the MSFD framework (subsequent analysis of pollution hotspots and pollution sources).

Ultimately, EMODnet at present provides a suitable database for scientists but our recommendation for this Mission is to align with the policy framework and its indicators in place.

The tables below indicate the achievement of MSFD descriptors for each group of pollutant category. **Our suggestion is to use these indicators for the baseline.**

Member State	Marine report unit	2018 GES reporting	Notes on 2018 data
Croatia	MAD-HR-MRU_2	GES achieved	
	MAD-HR-MRU_3	GES achieved	
	MAD-HR-MRU_4	GES achieved	
	MAD-HR-MRU_5	GES achieved	
Cyprus	MAL-CY-MS	GES achieved	
France	MWE-FR-MS-MO-LARGE	Unknown	
	MWE-FR-MS-MO-MEC2016	Unknown	
	MWE-FR-MS-MO-ZI	Unknown	
Italy	IT-CAS-0001	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
	IT-ISCMS-0001	Not achieved	GES expected to be achieved by 2020
	IT-NAS-0001	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
	IT-SAS-0001	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
	IT-WMS-0001	Not achieved	GES expected to be achieved by 2020
Malta	MT-MS-01	GES achieved	
Slovenia	MAD-SI-MRU-11	GES achieved	
	MAD-SI-MRU-12	GES achieved	
Spain	MWE-ES-SD-ESAL-ALBC1(D5)	Not achieved	GES expected to be achieved by 2020
	MWE-ES-SD-ESAL-ALBC2(D5)	Not achieved	GES expected to be achieved by 2020
	MWE-ES-SD-ESAL-ALBO1(D5)	GES achieved	
	MWE-ES-SD-ESAL-ALBO2(D5)	Not achieved	GES expected to be achieved by 2020
	MWE-ES-SD-ESAL-ALBP1(D5)	GES achieved	
	MWE-ES-SD-ESAL-ALBP2(D5)	Not achieved	GES expected to be achieved by 2020
	MWE-ES-SD-LEV-LEVC1(D5)	GES achieved	
	MWE-ES-SD-LEV-LEVC2(D5)	GES achieved	
	MWE-ES-SD-LEV-LEVDE(D5)	Not achieved	GES expected to be achieved by 2020
	MWE-ES-SD-LEV-LEVMM(D5)	Not achieved	GES expected to be achieved by 2020
	MWE-ES-SD-LEV-LEVON(D5)	GES achieved	

Table 45 Achievement of MSFD descriptor 5 (eutrophication) in the EU Mediterranean Sea area

Source: EEA/WISE Marine, based on national reporting

¹⁵⁰ JRC, 'Threshold Values for Marine Litter'. Available at: <https://mcc.jrc.ec.europa.eu/documents/202008030949.pdf>

Member State	Marine report unit	Feature	2018 GES reporting	Notes on 2018 data
Croatia	MAD-HR-MRU_1	Acute pollution events	Not assessed	
		Contaminants - non UPBT substances	Not achieved	GES expected to be achieved by 2020
		Contaminants - UPBT substances	Not achieved	GES expected to be achieved by 2020
Cyprus	MAL-CY-MS	Acute pollution events	Unknown	
		Contaminants - non UPBT substances	GES achieved	
		Contaminants - UPBT substances	GES achieved	
France	MWE-FR-MS-MO-ZC12M	Contaminants - non UPBT substances	Unknown	
		Contaminants - UPBT substances	Unknown	
	MWE-FR-	Contaminants - non UPBT substances	Unknown	
	MS-MO-ZL12M	Contaminants - UPBT substances	Unknown	
Italy	IT-AS-0001	Acute pollution events	GES achieved	
		Contaminants - non UPBT substances	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
		Contaminants - UPBT substances	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
	IT-ISCMS-0001	Acute pollution events	GES achieved	
		Contaminants - non UPBT substances	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
		Contaminants - UPBT substances	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
	IT-WMS-0001	Acute pollution events	GES achieved	
		Contaminants - non UPBT substances	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
		Contaminants - UPBT substances	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
Malta	MT-MS-02	Acute pollution events	GES achieved	
		Contaminants - non UPBT substances	GES achieved	
		Contaminants - UPBT substances	GES achieved	
Slovenia	MAD-SI-MRU-1 MAD-SI-MRU-11	Acute pollution events	GES achieved	
		Contaminants - non UPBT substances	GES achieved	
		Contaminants - UPBT substances	Not achieved	GES expected to be achieved later than 2020, Article 14 exception reported
	MAD-SI-MRU-12	Contaminants - non UPBT substances	GES achieved	
		Contaminants - UPBT substances	Not achieved	GES expected to be achieved later than 2020, Article 14 exception reported
Spain	MWE-ES-SD-ESAL	Acute pollution events	Unknown	
		Contaminants - non UPBT substances	Not assessed	
		Contaminants - UPBT substances	Not achieved	GES expected to be achieved later than 2020, Article 14 exception reported
	MWE-ES-SD-LEV	Acute pollution events	Unknown	
		Contaminants - non UPBT substances	Not achieved	GES expected to be achieved later than 2020, no Article 14 exception reported
		Contaminants - UPBT substances	Not achieved	GES expected to be achieved later than 2020, Article 14 exception reported

Table 46 Achievement of MSFD descriptor 8 (contaminants) in the EU Mediterranean Sea area
Source: EEA/WISE Marine, based on national reporting

Member State	Marine report unit	2018 GES reporting	Notes on 2018 data
Croatia	MAD-HR-MRU_1 - MAD-HR-MRU_1 (Adriatic Sea)	Not assessed	
Cyprus	MAL-CY-MS - MAL-CY-MS (Aegean-Levantine Sea)	Unknown	
France	MWE-FR-MS-MO - SRM MO (Western Mediterranean)	Not assessed	
Greece	Marine reporting unit 1	No data	
Italy	IT-AS-0001 - Mediterranean Sea: Adriatic Sea	Not achieved	GES expected to be achieved later than 2020
	IT-ISCMS-0001 - Ionian Sea and Central Mediterranean Sea	Not achieved	GES expected to be achieved later than 2021
	IT-WMS-0001 - Mediterranean Sea: Western Mediterranean Sea	Not achieved	GES expected to be achieved later than 2022
Malta	MT-MS-02 - Area designated for hydrocarbon exploration and exploitation	GES achieved	
Slovenia	MAD-SI-MRU-1 - marine waters	Not achieved	GES expected to be achieved later than 2020
Spain	MWE-ES-SD-ESAL - MWE-ES-SD-ESAL	Not achieved	GES expected to be achieved later than 2020
	MWE-ES-SD-LEV - MWE-ES-SD-LEV	Not achieved	GES expected to be achieved later than 2021

Table 47 Achievement of MSFD descriptor 10 (marine) in the EU Mediterranean Sea area

Source: EEA/WISE Marine, based on national reporting

Member State	Marine report unit	Feature	2018 GES reporting	Notes on 2018 data
Croatia	MAD-HR-MRU_1	Impulsive sound in water	Not assessed	
Cyprus	MAL-CY-MS	Impulsive sound in water	Unknown	
France	MWE-FR-MS-MO	Continuous low frequency sound	Unknown	
		Impulsive sound in water	Unknown	
Italy	IT-AS-0001	Continuous low frequency sound	Not assessed	
		Impulsive sound in water	Not assessed	
	IT-ISCMS-0001	Continuous low frequency sound	Not assessed	
		Impulsive sound in water	Not assessed	
	IT-WMS-0001	Continuous low frequency sound	Not assessed	
		Impulsive sound in water	Not assessed	
Malta	MT-MS-02	Continuous low frequency sound	Not assessed	
		Impulsive sound in water	Not assessed	
Slovenia	MAD-SI-MRU-1	Continuous low frequency sound	Not assessed	
		Impulsive sound in water	Not assessed	
Spain	MWE-ES-SD-ESAL	Continuous low frequency sound	Unknown	
		Impulsive sound in water	Unknown	
	MWE-ES-SD-LEV	Continuous low frequency sound	Unknown	
		Impulsive sound in water	Unknown	

Table 48 Achievement of MSFD descriptor 11 (underwater noise) in the EU Mediterranean Sea area

Source: EEA/WISE Marine, based on national reporting

3.1.2. Detailed findings

This subsection offers more detail on the data sources and explains the conclusion to use WISE data rather than data currently available through EMODnet.

3.1.2.1. EMODnet

EMODnet Chemistry allows the visualisation and extraction of data on numerous chemical substances present in marine environments over time.

The data provided covers six major European marine regions, including the Mediterranean, and provides information on chemicals related to contaminants and eutrophication in marine environments. Finally, there are three different areas of analysis, biota (marine life), sediments (sea bed level) and water.

Today, EMODnet is built around a network of 48 connected marine monitoring and research institutes and oceanographic data management experts from 32 countries and 5 international organisations.

The complexity and heterogeneity of the information provided by the EMODnet platform is due to several factors:

The number of variables analysed, which are divided into three main themes (biota, sediment and water), each of which is subdivided into a large number of different chemicals and pollutants (each with different measurement methods, estimates and protocols).

- Heterogeneity of data distribution in time and space;
- Different data sources (countries, organisations, research institutes, etc.);
- Heterogeneous data policies.
- As far as data sources are concerned, they come mainly from three types of entities:
- National Oceanographic Data Centres (NODCs);
- Monitoring Agencies responsible for national monitoring programmes;
- Research Institutes for specific project's needs.

Thus, the EMODnet platform provides a wide range of information for a relatively long period. However, the presence of data depends on a multitude of factors (data policies, measurement systems, presence of scientific expeditions, etc). The data thus covers a relatively wide field as long as the period studied is also as wide as possible.



Figure 101 Geographical location of scientific surveys for contaminants in water between 1974 and 2021 (left map) and between 2015 and 2021 (right map)

For example, the data related to the water profile between 1974 and 2021 covers a large part of the Mediterranean (left map in the figure above). However, when the spectrum of analysis is reduced to the period 2015/2021, the data we can extract and analyse are mainly concentrated around Italy, Greece and Cyprus (right map).

Of the 48 pollutants of interest for the Mediterranean Sea, 18 are covered by the EMODnet Chemistry databases (4 concern eutrophication / main pollutants in the field of water policy and 14 concern Contaminants / Cyclodiene pesticides / Polyaromatic hydrocarbons (PAH)) (Table 49).

Name of the pollutant	EMODnet Chemistry databases information
Dissolved Inorganic Nitrogen (DIN)	
Dissolved Inorganic Phosphorus (DIP)	
Nitrates	
Phosphates	
Aldrin	
Dieldrin	
Endrin	
Isodrin	
Di(2-ethylhexyl)-phthalate (DEHP)	bis(2-ethylhexyl)phthalate available
Hexachloro-benzene	
Hexachloro-cyclohexane	alpha-hexachlorocyclohexane available gamma-hexachlorocyclohexane available
Lead and compounds	Lead
Mercury and compounds	Reactive mercury Total mercury
Benzo(a)pyrene	
Benzo(b)fluor-anthene	
Benzo(k)fluor-anthene	
Benzo(g,h,i)-perylene	
Indeno(1,2,3-cd)-pyrene	
Organohalogen compounds and substance	NA
Organophosphorous compounds	NA
Organotin compounds	NA
Persistent hydrocarbons	NA
Metals and compounds	NA
Biocides and plant protection products	NA
Artificial polymer materials	NA
Rubber	NA
Cloth/textile	NA
Chemicals	NA
Anthropogenic impulsive sound in water	NA
Anthropogenic continuous low-frequency sound in water	NA
Plastics	NA
Micoplastics	NA
Trifluoroacetic Acid (TFA) - degradation product of F-gases and PFAS used in biocides, PPP and pharmaceuticals.	NA
Perfluorooctane Sulfonate (PFOS)	NA
Perfluorooctanoic Acid (PFOA)	NA
Perfluorohexanoic Acid (PFHxA)	NA
Perfluoroheptanoic Acid (PFHpA)	NA
Perfluorohexane Sulfonate (PFHxS)	NA
Perfluorobutane Sulfonate (PFBS)	NA
Perfluorodecanoic Acid (PFDA)	NA
Perfluorononanoic Acid (PFNA)	NA
Perfluoropentanoic Acid (PFPeA)	NA
Perfluorobutanoic Acid (PFBA)	NA
TOTAL	18

Table 49 Presence of the various pollutants of interest in the EMODnet Chemistry databases

3.1.2.2. WISE

The Marine Strategy Framework Directive (MSFD) requires EU Member States to take measures to achieve and maintain Good Environmental Status (GES) in the marine environment.

The information provided by the database is not as precise and detailed as that provided by EMODnet. The database simply allows us to know whether EU members achieve and maintain a Good Environmental Status (GES) in the marine environment. Thus, for each pollutant and for each country, the information variable can take 4 forms: "Good", "Not good", "Not assessed" or "Unknown".

The **WISE Marine database gives indications for 19 of the 43 pollutants present in the scope of analysis**. These mainly concern contaminants, pollutants related to water eutrophication and other main pollutants of marine water such as plastic for example. The countries for which data is available and which fall within the scope of the study are Croatia, Cyprus, France, Italy, Malta, Slovenia and Spain.

It should also be noted that not every country has information for every pollutant. For example, for Cyprus, we only have information for lead and mercury (cf. Figure 102 below).

Thus, the Wise Marine database makes it possible to obtain simple information that is easy to interpret and whose data is easily accessible (download of Excel/CSV files, etc.). However, this information remains relatively limited, particularly for certain countries where the number of pollutants measured remains low.

Name of the pollutant	Wise Marine databases information
Dissolved Inorganic Nitrogen (DIN)	DIN (TDIN)
Dissolved Inorganic Phosphorus (DIP)	NA
Nitrates	NA
Phosphates	NA
Aldrin	Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin) (EEA_32-02-0)
Dieldrin	Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin) (EEA_32-02-0)
Endrin	Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin) (EEA_32-02-0)
Isodrin	Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin) (EEA_32-02-0)
Di(2-ethylhexyl)-phthalate (DEHP)	Di(2-ethylhexyl)phthalate (DEHP) (CAS_117-81-7)
Hexachloro-benzene	Hexachlorobenzene (CAS_118-74-1)
Hexachloro-cyclohexane	Hexachlorocyclohexane (CAS_608-73-1)
Lead and compounds	Lead and its compounds (CAS_7439-92-1)
Mercury and compounds	Mercury and its compounds (CAS_7439-97-6)
Benzo(a)pyrene	Benzo(a)pyrene (CAS_50-32-8)
Benzo(b)fluor-anthene	Benzo(b)fluoranthene (CAS_205-99-2)
Benzo(k)fluor-anthene	Benzo(k)fluoranthene (CAS_207-08-9)
Benzo(g,h,i)perylene	Benzo(g,h,i)perylene (CAS_191-24-2)
Indeno(1,2,3-cd)-pyrene	Indeno(1,2,3-cd)pyrene (CAS_193-39-5)
Organohalogen compounds and substance	NA
Organophosphorous compounds	NA
Organotin compounds	NA
Persistent hydrocarbons	NA
Metals and compounds	NA
Biocides and plant protection products	NA
Artificial polymer materials	Artificial polymer materials (ARTPOLY)
Rubber	Rubber (RUBBER)
Cloth/textile	Cloth/textile (TEXTILE)
Chemicals	Chemicals (CHEM)
Anthropogenic impulsive sound in water	NA
Anthropogenic continuous low-frequency sound in water	NA
Plastics	NA
Microplastics	NA
Trifluoroacetic Acid (TFA) - degradation product of F-gases and PFAS used in biocides, PPP and pharmaceuticals.	NA
Perfluorooctane Sulfonate (PFOS)	Perfluorooctane sulfonic acid (PFOS) and its derivatives (CAS_1763-23-1)
Perfluorooctanoic Acid (PFOA)	NA
Perfluorohexanoic Acid (PFHxA)	NA
Perfluoroheptanoic Acid (PFHpA)	NA
Perfluorohexane Sulfonate (PFHxS)	NA
Perfluorobutane Sulfonate (PFBS)	NA
Perfluorodecanoic Acid (PFDA)	NA
Perfluorononanoic Acid (PFNA)	NA
Perfluoropentanoic Acid (PFPeA)	NA
Perfluorobutanoic Acid (PFBA)	NA
TOTAL	19

Table 50 Presence of pollutants in the Wise Marine database

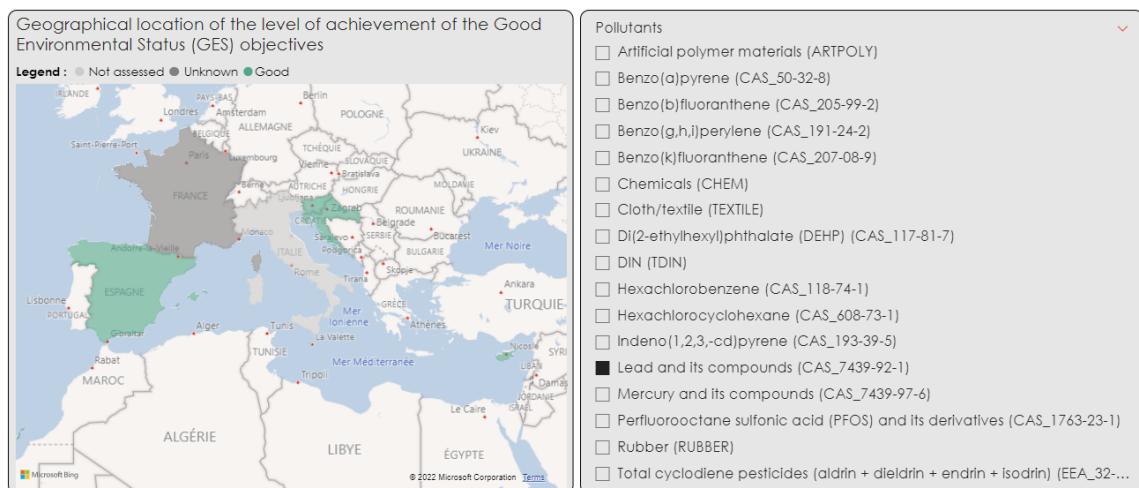


Figure 102 Visualisation of Wise Marine data for lead and its compounds in the Mediterranean Sea

Source: WISE Marine

3.2. Mediterranean pollution hotspots and pressures from continental sources

3.2.1. Main conclusions

The “hotspots” described here refer to areas in which an evaluation of the environmental descriptors established according to regulations (Decision 2017/848/EU) indicate that at least one of the environmental statuses does not reach GES, according to the levels established by Regulation (EC) No. 1881/2006 and its amendment 1259/2011.

The analysis has shown that **77% of identified hotspots have more than 2 descriptors under noncompliance** (only 23% have exclusively one descriptor in bad state). There is a high probability that once a hotspot is identified, various descriptors fail to comply to rules (the average number of non-compliant descriptors is of 3.6).

This analysis focuses on EU member states. Those outside the EU have not been considered as they are already identified in the UNEP/MAP (2012) report, and more recent information is not available. **Spain has a total of 11 hotspots, France 7, Italy 13, Slovenia 3, Croatia 15 and Greece 17.** The analysis of Malta and Cyprus MSFD reports indicate GES for all sampled locations so that no pollution hotspots have been identified for these countries according to the available reports.

Descriptors with the highest non-compliance levels in selected hotspots include metals (present in all locations), litter floating, litter seabed (present in only some locations). Heavy metals (frequently Hg) are the most frequent descriptor that determines that locations do not reach GES (75% of hotspots). When the data on litter (D10) is available, the status is of 95% to 96% of noncompliance for Litter floating and litter seabed, and 54% for micro-litter floating.

A preliminary analysis of pollutant patterns according to location characteristics does not allow us to draw clear conclusions. Some pollutants are found everywhere (eg D5C1 nitrogen and phosphorous), whereas others are more frequently found in rivers (D8C1, PCB) or port and urban locations (D8C1-Organochlorine compounds (OCC)).

Looking at country reports, **Spain and Croatia show the highest levels of non-compliance with descriptors in their hotspots.** Italy is close or below average for all descriptors, and Greece is systematically below average for all indicators. France is below average for all descriptors save for certain pollutants (PAH, PCB, PBDE-Biocides, Organochlorine compounds).

3.2.2. Detailed findings

3.2.2.1. Pollution hotspot definition

This task consists in the analysis of pollution hotspots in the Mediterranean lighthouse area per pollutant/pollutant category and cumulative. The definition of polluting hotspots requires some previous conceptualization.

Firstly, the concept of 'hotspot' has been used to define locations where there is a high concentration of indicators of the subject under consideration. Examples are a) 'biodiversity hotspots' defined as a biogeographic region with significant levels of biodiversity that is threatened by human habitation (151), b) hotspots for crime or c) high frequency traffic casualties just to mention some domains where the denomination of 'hotspots' is used. Several algorithms are used to generate hotspots map in the continuous surfaces usually supported by statistical techniques (e.g., multicriteria, cluster, etc..).

In marine policy, we have adopted a definition of environmental hotspots as relevant polluting sources. This definition has been used previously for UNEP (UNEP/MAP 2012) and it has been also used by the EU in reports regarding water scarcity (EEA Environmental Indicator Report) although the definition of 'hotspot' should be adapted to the domain under research (e.g. biodiversity hotspot vs. pollution hotspot).

For pollution hotspots, we have followed EU criteria for defining Good environmental status compliance/noncompliance that follows the **One-Out, All-Out principle** used in the Water Framework Directive water bodies classification. Nevertheless, as demonstrated in this analysis, **77% of identified hotspots have more than 2 descriptors under noncompliance** (only 23% have exclusively one descriptor in bad state), so that there is a high probability that once a hotspot is identified, various descriptors fail to comply to rules (the average number of non-compliant descriptors is of 3,6).

Consequently, a pollution hotspot is understood as a location where at least one descriptor fails to achieve good status and the characteristic of the location indicates that it may be a stable pollution origin.

3.2.2.2. *Background*

Based on the available indicators, the key and secondary polluting hotspots have been mapped for each category of pollutant. Furthermore, polluting hotspots relevant for all indicators together have been mapped.

In the Mediterranean, there has been some previous research identifying hotspots. UNEP/MAP(2012) declared the pollution hotspots based on a) Organic-matter b) heavy metals detection both in sediments (Pb, Hg, Cd) and biomarkers such as Blue Mussels (*Mytilus Galloprovincialis*); c) Persistent Organic Pollutants (POPs), d) Eutrophic and hypoxic conditions and e) marine litter.

Regarding plastic litter, WWF identified a total of nine main litter pollution sources in the Mediterranean in 2019¹⁵². A more detailed analysis of plastic debris in the Mediterranean shows that the most contaminated areas are located in the Cilician subbasin, Catalan Sea, near the Po River Delta and Venice Lagoon, Gulf of Izmir (Turkey), the Saronic Gulf (Greece), Buna-Bojana River Mouth (Montenegro), Gulf of Naples (Italy), Gulf of Marseille (France), and Valencia Gulf (Spain). (Liubartseva, Coppini et al. 2018).

Our approach is more comprehensive and based on the full list of MSFD descriptors to identify critical pollution hotspots in the EU Mediterranean coastline for European Union countries.

3.2.2.3. *Material & method*

The material used relies on both qualitative and quantitative sources of data. This data includes:

- Available information in WISE
- Country reports for MSFD for Mediterranean Member States (Spain, France, Italy, Slovenia, Croatia, Greece, Malta and Cyprus)
- Albaiges, J., Murciano, C., & Pon, J. (2011). Hazardous substances in the Mediterranean: a spatial and temporal assessment. In UNEP/MAP, Consultation Meeting to Review MED POL Monitoring Activities Athens (Vol. 22, p. 106).
- Published Scientific Articles

The hotspots refer to areas in which an evaluation of the environmental descriptors established according to regulations (Decision 2017/848/EU) indicate that at least one of the environmental descriptors does not reach GES, according to the levels established by Regulation (EC) No. 1881/2006 and its amendment 1259/2011.

¹⁵¹ Myers, et al. (2000). Biodiversity hotspots for conservation priorities. *Nature*, 403(6772), 853-858.

¹⁵² WWF (2019). Stop the Flood of Plastic: How Mediterranean countries can save their sea.

A detailed factsheet for each of the selected locations is available in Appendix B (enclosed as a separate document).

The map below shows the selected hot spots in the Mediterranean coast for each country evaluated (Figure 105). **Spain has a total of 11 hotspots, France 7, Italy 13, Slovenia 3, Croatia 15 and Greece 17.** The analysis of Malta and Cyprus MSFD reports indicate GES for all sampled locations so that those countries have not pollution hotspots according to the available reports.



Figure 103 Location of selected hotspots

Source: Own (QGIS)

The countries assessed are EU Member State countries. Those outside the EU have not been considered as they are already identified in the UNEP/MAP (2012) report, but no more recent information is available. Another reason is the objective of the project itself, which only intends to focus the analysis on European countries, except for Israel. There is no data available for Israel either although there is evidence of hotspots such as Haifa Bay (Shoham-Frider, Gertner et al. 2020) explained by relic pollution (Hg) seeping into the sea groundwater from an industrial plant (closed year 2000) as the source of Hg to the sea. Unfortunately, comprehensive reports for Israel are not available beyond the mentioned UNEP/MAP document.

3.2.2.4. Results

Results show that those 65 locations overall have been selected in the Mediterranean area which have at least one noncompliance descriptor. Noncompliance means that the descriptor does not reach the GES threshold. Table 51 summarizes the results. The pollution level is analysed according to the good environmental status (GES) through the indicators established according to the Directive (Decision 2017/848/EU). To determine the pollution status, the relevant descriptors are those in the four categories D5, D8, D9 and D10. In the analysis, the possible indicator states are a) GES: descriptor achieves good environmental status, b) "Non-compliance" when the descriptor does not achieve GES as levels evaluated within each descriptor exceed the threshold according to regulations and c) "No data": when country report gives none or inadequate information to evaluate its environmental status.

Descriptor		GES	Non-compliance	No data
D5C1	Nitrogen	50	15	0
D5C1	Phosphorus	52	13	0
D5C2	Chlorophyll	50	15	0
D8C1	Metals (Hg,Pb,Cd...)	16	49	0
D8C1	PAHs	39	25	0
D8C1	PCBs	44	21	0
D8C1	PBDE (Biocides)	41	24	0
D8C1	Organochlorine compounds	61	4	0
D9C1	Biomarker	42	10	13
D10C1	Litter floating	1	23	41
D10C1	Litter seabed	1	20	44
D10C2	Micro-litter floating	11	13	41

Table 51 Frequency of state of pollution descriptor in selected hotspots (2016-2018).

Source: own based on country report MSFD reporting.

It should be noted that the time for the evaluation of each descriptor is different depending on the report made by the corresponding ministry of each country. Indeed:

- For Spain: D5, D8 and D9, year 2016; D10, year 2018
- For France and Greece: all data for year 2018
- For Italy: all data for year 2017
- For Croatia: D5 year 2015, D8 and D9 year 2017 and D10, year 2019
- For Slovenia: 2019
- Malta and Cyprus have reported GEs for all coastal waters for the year 2018.

Table 48 shows that:

a) Regarding descriptor information:

- All locations have available data for the most frequent pollutants: D5C1 (Nitrogen), D5C1 (Phosphorus), D5C2 (Chlorophyll), D8C1 (Metals -Hg, Pb, Cd), D8C1 (PAHs), D8C1 (PCBs), D8C1 (PBDE-Biocides), D8C1 (Organochlorine compounds);
- Biomarker are not reported for 20% of locations;
- Litter (D10C1 and D10C2) is not reported for 63% to 68% of locations;
- D5C5 (Oxygen) shows GES in all locations.

b) Regarding descriptor frequency of sites not reaching GES:

- Only 6% of locations does not reach GES for Organochlorine compounds;
- For Biomarkers, 19% of locations (when information is reported) do not reach GES;
- 20 to 23% of N, P, Chlorophyll do not reach GES;
- Between 32%-39% of PAHs, PCBs and PBDE (Biocides) do not reach GES;
- 75% of metals do not reach GES;
- Litter (seabed & floating) data, (when available), show that 95-96% of sampled sites do not reach GES.

We may conclude from this preliminary analysis that:

- “D8C1-Heavy metals” (generally Hg in sediments) is the most frequent descriptor that determines the location not reaching GES (75% of hotspots)
- On the contrary, the descriptor “D8C1-Organochlorine compounds” is only found over threshold in only four (4) locations (6%), those are: Toulon, Nice and Fos sur Mer (FR) and Pula (CR)
- Descriptor “D10-Litter” has no common methodology at EU level for measuring the pollutant and consequently, some MS do not include it in the reporting. When the data is available, the **status is of 95% to 96% of noncompliance for floating litter and seabed litter, and 54% for floating micro-litter.**

The application of **One-Out, All-Out principle** to define pollution hotspots resulted in 77% of identified hotspots having at least 2 noncompliance statuses for descriptors. Only 23% of hotspots have exclusively one descriptor not achieving GES. There is a high probability that once a hotspot is identified, various descriptors fail to comply with the rules.

Figure 106 shows the total number of non-compliance descriptors in each of the 65 hotspots.

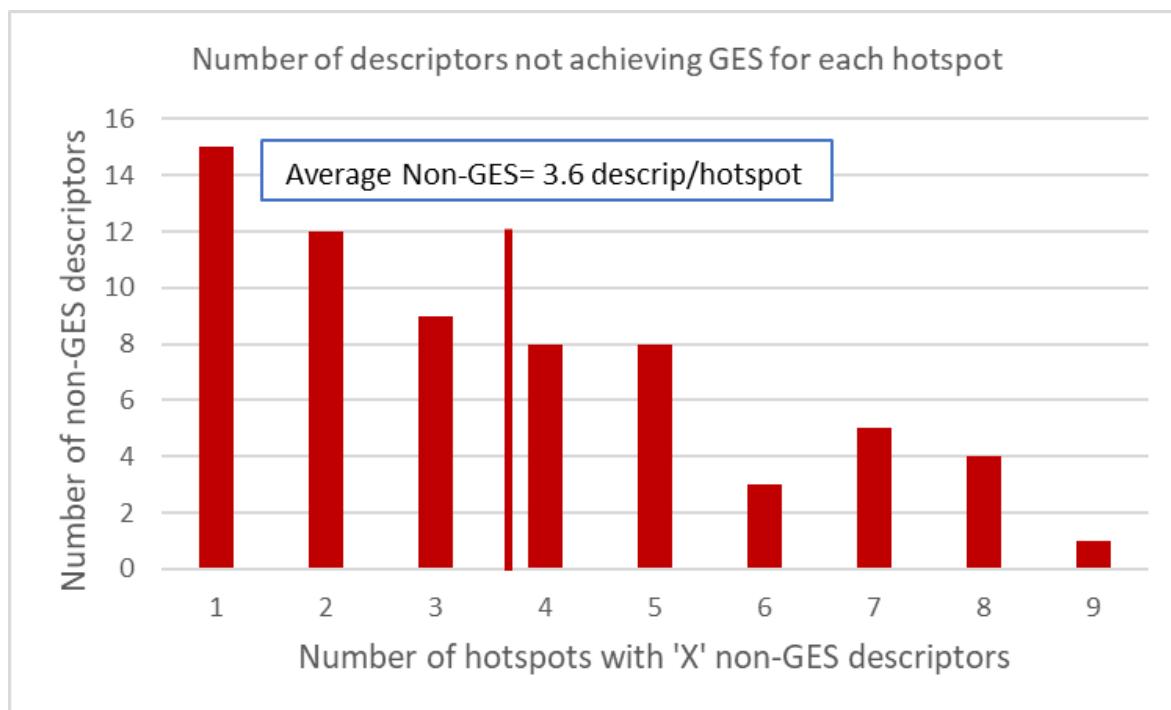


Figure 104 Frequency of descriptors 'noncompliance' state in selected hotspots

Source: Own analysis of WISE data

A preliminary analysis has been done to identify patterns of pollutants according to location characteristics. Three typologies have been examined: a) River mouth, b) Urban -Port - Industrial site and c) 'others'.

Type of hotspot	River mouth (1)	Urban/ Port/Ind (2)	Other (3)	All hotspots (all classes)
D5C1-Nitrogen	13%	22%	31%	22%
D5C1-Phosphorus	25%	18%	23%	19%
D5C2-Chlorophyll	13%	22%	31%	22%
D8C1-Metals (Hg,Pb,Cd...)	88%	76%	62%	73%
D8C1-PAHs	43%	44%	15%	38%
D8C1-PCBs	63%	33%	8%	31%
D8C1-PBDE (Biocides)	38%	35%	31%	36%
D8C1-Organochlorine compounds	0%	8%	0%	6%
D9C1-Biomarker	38%	35%	38%	34%
D10C1-Litter floating	88%	98%	100%	99%
D10C1-Litter seabed	88%	98%	100%	99%
D10C2-Micro-litter floating	75%	86%	77%	84%

Table 52 Share (%) of non-GES descriptors in hotspots by location type (2016-2018)

Source: Own analysis of WISE data.

Notes:

[1] Rivers in this class are Licata (IT), Evros (GR), Rhone (FR), Ebro (ES), Po (IT), Neretva (CR), Rasa (CR). Pollution of smaller rivers (e.g., Guadalhorce in Malaga or Llobregat in Barcelona (ES)) are assumed to be negligible compared to port/urban/industry impact.

[2] This class integrates ports, urban and industrial sites as they are usually concomitant

[3] Locations included in this class are Corigliano Gulf, Squillace Gulf (IT), Oinousses, Korinthiakos Gulf, Euboea Gulf, Strymonikos Gulf (GR), Port of Agde and Sete, Martigues (FR), Portman Bay, Mar menor, Almeria Port/Bay (ES), Ploce-Lastovo-Hvar-Mljet-, Korcula and Velebitski canal (CR).

3.2.2.5. Comments

The preliminary analysis of pollutant patterns according to location characteristics does not allow us to draw clear conclusions. The assignation of a hotspot to any of the three classes is uncertain. For example, Barcelona has been classified as belonging to the class "port/urban/industrial" but additionally, Barcelona Bay also receives the discharge of the Llobregat river although we have considered that river impact is negligible compared to the urban pressure.

The comments below should be taken with precaution as they belong to only one reporting cycle. Nevertheless, some preliminary findings are summarised below.

- Descriptors for D8C1-Organochlorine compounds (OCC) do not meet GES only in four locations, all of them in the class of "ports/urban locations". These are: Pula (CR) and Toulon, Nice and Fos sur Mer (FR).

- D5C1 (Nitrogen and Phosphorus) does not meet GES in 22% and 19% of locations respectively, with a homogeneous distribution around these values for all classes.
- PCBs are more frequently found in river mouths (63%) compared to 'ports/urban/industry' (33%) and 'others' (8%). This fact may indicate that PCBs are more likely to be found in rivers than other locations. The rivers where PCBs are found are Evros (GR), and Neretva, Krka and Rasa (CR).
- D8C1-Heavy Metals non-GES status is more frequently associated to rivers (88% with all rivers presenting non-GEs for heavy metals except Ebro [ES]). This share is higher than ports/urban/industrial (76%) and 'others' (62%).

Regarding country reports, some patterns can be found:

- Spain shows above average non-compliance for the eleven selected hotspots (descriptor over threshold) for Nitrogen (90%), Phosphorous (81%) and heavy metals (90%) over global average (22%, 19% and 73% respectively).
- Croatia shows noncompliance for its twelve hotspots (descriptor over threshold) for heavy metals (100%) and PBDE- Biocides (93%), above the average (73% and 34% respectively).
- Slovenia shows noncompliance for the three selected hotspots (descriptor over threshold) for heavy metals (100%) and Litter floating (100%).
- Italy is close or below average for all descriptors (11 hotspots).
- France (7 hotspots) is below average in all descriptors, but it is over average in PAH (86%, PCBs (71%), PBDE-Biocides (57%) and Organochlorine compounds (42%).
- Greece (17 hotspots) is below average for all indicators (descriptor over threshold).

This preliminary analysis should be taken with precaution as it has been drawn on a limited sample of evidence in the context of this baseline study.

3.3. Past, ongoing and planned activities falling within the Mission objective and targets

3.3.1. Main conclusions

A total of 83 projects related to the objective 2 of the Mission in the Mediterranean were identified. These are projects started from 2016 on. Sources were drawn from several databases, including JRC, H2020, Interreg and the Union for the Mediterranean (UfM). The majority of these projects are collaborative. Moreover, there are slightly more consortia with both EU and non-EU partners than those with only EU partners, suggesting a good level of cooperation with organisations outside of the European union. **25 out of 83 projects mapped are coordinated by a governmental institution** as the lead organisation. **The majority of the projects identified are conducted by a variety of types of organisations**, ranging from academic institutions, companies, research centres to government bodies. It was found that **only a minority of projects are conducted by a single organization**, particularly those funded by the Interreg mechanism.

Most of the projects mapped focus on **removing and reducing marine litter**, including plastic pollution, from the sea. These include activities such as **mapping and tracking marine pollution, and solutions to remove marine litter**. **A majority of projects were research projects** (41%), while pilot implementation projects represented 34% of projects funded overall, and studies 25%. Projects focused mainly on funding cleaning and monitoring technologies as well as developing action and management plans. Monitoring and exchange networks as well as the development of toolkits constitute a smaller range of products (respectively 11% and 8%).

European funding sources finance the vast majority of investments, with **Interreg and Horizon 2020 as the predominantly available funding mechanisms**. The projects funded under Horizon 2020, Interreg and LIFE amount to an estimated total of **€ 47.8 million, € 27.8 million and € 11 million respectively**.

Although this mapping aimed to be as exhaustive and detailed as possible, there are inherent limitations to the current list of projects. The search list focused on a select number of funds and a key word search. Some information was not available for certain projects which may have influenced the overall outcome of the analysis.

3.3.2. Detailed findings

The objective of this subtask is to provide a list of past, ongoing, and planned activities and projects related to the Mission objective in the Mediterranean Sea basin to prevent and eliminate pollution. These include technology projects but are not the main focus.

A selection of **83 projects related to the Mission objectives** has been identified so far by the Project Team for the Mediterranean Sea basin. In order to conduct the search, a particular focus was given to recent projects that were concluded or that are currently on-going (i.e., from 2016 onwards). The projects listed include those coming from the databases for H2020, Interreg, LIFE, JRC and GreenerMed (UfM).

Since the geographical scope of this sub-task is to review the Mediterranean Sea basin, the project search included only projects located in those specific countries. It was found that some projects tackle the issue of pollution **within the complete basin**, whereas other focus on specific countries or conduct pilots for implementation in specific locations. Also, the work expected from this sub-task primarily focuses on projects or activities funded with **EU resources**.

The majority of research projects found are collaborative: France is the only country with a high number of projects, 15, that only have national partners. It is interesting to note that there are slightly more consortiums with both EU and non-EU partners than those with only EU partners. Countries outside Europe with partners that were frequently part of a consortium include Jordan, Lebanon, Tunisia and Turkey. This analysis by itself should not be considered sufficient to prove there is a good level of repartition of investments among EU countries.

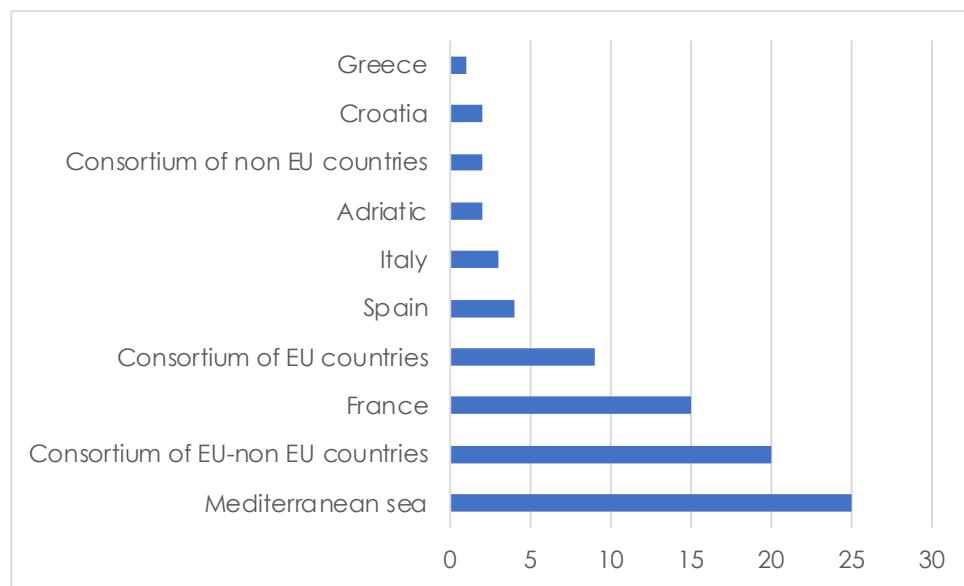


Figure 105 Geographical distribution of the projects (N=83)

Source: Technopolis Group, project compilation review (2022)

Projects and activities within the Mediterranean countries (both EU and non-EU Member States) were reviewed, with a particular focus to those funded with EU resources (e.g., Horizon 2020, LIFE, Interreg, EMMF), as well as from other funding sources (World Bank, United Nations, NGOs, etc.). Regarding those funded by the EU, focus was given to the following mechanisms:

- First, Horizon 2020 is a financial instrument aiming at improving Europe's global competitiveness. It was the biggest EU funding programme for the period 2014 until 2020, with an available budget of € 80 billion, with research and innovation at its core to produce accessible science and deliver innovation for both the public and private sectors. The programme has been succeeded for the following 7 years by Horizon Europe, which is currently being implemented.
- Second, Interreg is one of the instruments of the EU to support cooperation across borders through project funding, with an overall budget of € 10 billion, to tackle challenges in the field of environment, among many others. Particularly, Interreg develops three types of programmes (cross-border cooperation, transnational cooperation, and interregional) to ensure cooperation among regions, which encompasses both EU and non-EU countries in the Mediterranean basin.

- Moreover, the European Maritime and Fisheries Fund (EMFF) aims at helping fishers to adopt sustainable fishing practices as well as improving the quality of life along European coasts, with a total fund allocation of € 6,4 billion between 2014 and 2020. The latter objective aligns to the Mission objective in the Mediterranean Sea basin, where different projects were mapped.
- Finally, another funding instrument that was consulted is the LIFE programme, which focuses solely on the environment and climate action, with an overall budget of €3.4 billion for the period 2014-2020.

Most of the projects mapped focus on **removing and reducing marine litter**, including plastic pollution, from the sea. These include activities such as **mapping and tracking marine pollution, and solutions to remove marine litter**. Additionally, some of the projects also include the objective of **creating awareness about marine pollution** and actions to reduce it. Moreover, and to a lesser extent, **reducing coastal litter** also appeared to be a recurrent project objective with specific actions such as beach cleaning and litter collection activities. Regarding microplastics, **only a few projects aim to reduce microplastics** released in the environment. Moreover, the **reduction of noise pollution** was also found to be a thematic area for a few projects in the basin. Finally, the **improvement of water quality** was a salient topic for certain projects, either with the objective of reducing pollutants or by improving wastewater treatment from agricultural processes and avoiding runoffs.

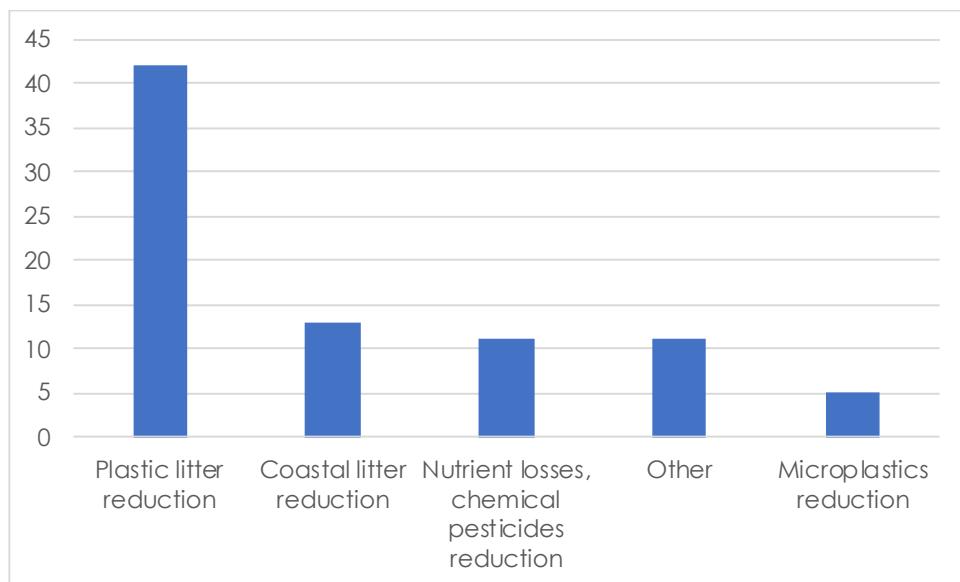


Figure 106 Overview of projects and their link to mission targets (N=83)

Source: Technopolis Group, project compilation review (2022)

A majority of projects were research projects (41%), while pilot implementation projects represented 34% of projects funded overall, and studies 25%. Projects focused mainly on funding cleaning and monitoring technologies as well as developing action and management plans. Monitoring and exchange networks as well as the development of toolkits constitute a smaller range of products (respectively 11% and 8%).

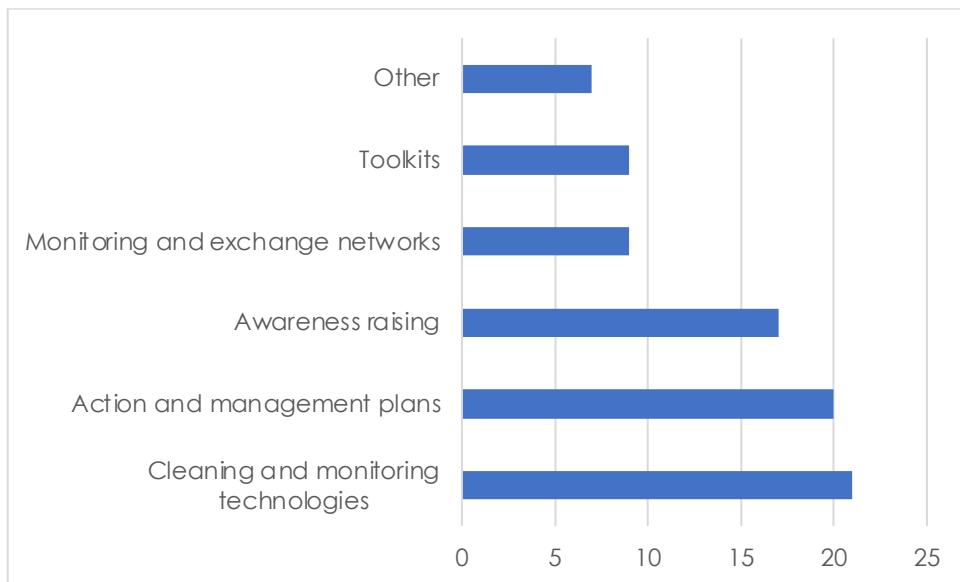


Figure 107 Types of solutions offered by the projects (N=83)

Source: Technopolis Group, project compilation review (2022)

Over half of projects overall (52) are considered to still be active today and should be given priority attention by the Mission to create synergies. It is often the case that older projects that are no longer active are harder to contact.

Among these projects, European funding sources provide the vast majority of financing, with **Interreg and Horizon 2020 as the predominantly available funding mechanisms**. The projects funded under Horizon 2020, Interreg and LIFE amount to an estimated total of **€ 47.8 million, € 27.8 million and € 11 million respectively**. The magnitude of the amounts allocated within the basin are coherent with the size and total funds available for each mechanism to support a wide array of projects. More precisely:

Funds from the Horizon 2020 mechanism in the region correspond to 11 projects that are either completed or undergoing at this time. This instrument is supporting on average around € 4.2 million per project.

Furthermore, through the Interreg financial instrument a total of 22 projects have been found to be in line with the Mission's objectives in the Mediterranean, which an average investment of € 1.2 million per project.

Finally, the mapping exercise identified 4 projects funded through the LIFE mechanism that are currently ongoing or completed, with an average amount of € 2.7 million per project.

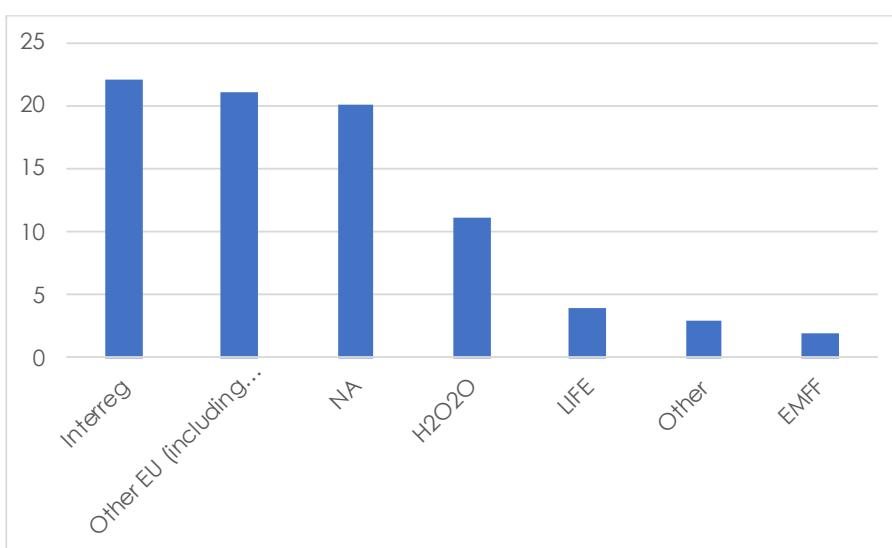


Figure 108 Funding sources for projects (N=83)

Source: Technopolis Group, project compilation review (2022). Projects included under "Other EU" include Era Net, EEA, DG ENV, cofunding opportunities (eg, with UNEP), JPI. "Other" refers to investments made by GIZ, donations, crowdfunding, national, regional or local government, multi donor trust funds.

Projects in the Mediterranean basin are coordinated by various types of institutions. 25 out of 83 projects mapped are coordinated by a governmental institution as the lead organisation. This is followed by projects that are led by academic organisations (including research centres) with a total of 19 coordinated projects included in the database. Similarly, 13 out of 83 projects are coordinated by an enterprise. It was also found that government bodies at different levels (national, regional, municipal, or local) are in charge of the coordination of projects within the Mission objective in the Mediterranean. Moreover, the majority of the projects identified are conducted by a variety of types of organisations, ranging from academic institutions, companies, research centres to government bodies. It was found that only a minority of projects are conducted by a single organization, particularly those funded by the Interreg mechanism.

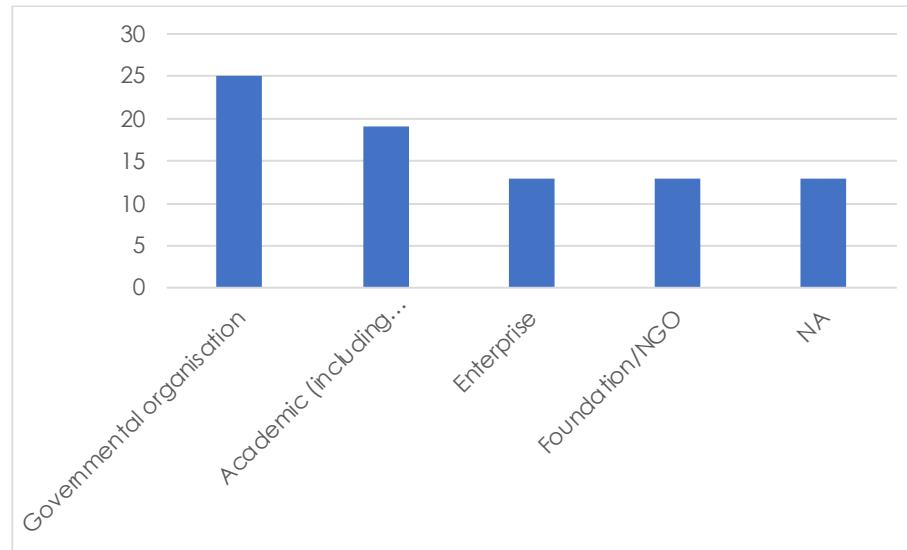


Figure 109 Lead organisations in charge of coordinating projects (N=83)

Source: Technopolis Group, project compilation review (2022).

The results of this sub-task are linked to the outputs from Task 3 and Task 5. In fact, the relevant activities mapped are sometimes included within the scope of work of the selected organizations mapped within Task 3. Also, relevant initiatives regarding ocean literacy are also complementary to the activities from Task 2.

3.3.3. Detailed findings

The list of projects is presented as a concise and searchable database in an Excel format, as an annex to this report.

3.4. Capacity to identify, monitor and react to larger pollution incidents

3.4.1. Main conclusions

This subtask presents the legal framework for identifying, monitoring and reacting to large pollution included in the Mediterranean. Large pollution incidents are taken to refer to shipping accidents, in particular oil spills, as well as large coastal industrial accidents. For oil spills, a legal framework has existed for over 50 years. Statistics show there is a downward trend for oil spills worldwide¹⁵³, but accidents continue to impact Mediterranean areas. Monitoring and enforcement remain a problem, particularly in non-EU Mediterranean states. Legislation on industrial incidents is more recent, and the reports on implementation of the SEVESO Directive show some important gaps in how Member states are enforcing the Directive.

Nonetheless, it was not possible to perform a complete analysis of capacities for pollution incidents, due to a lack of information: this would require a separate study in itself.

¹⁵³ Oil Tanker Spill Statistics 2021, available at: <https://www.itopf.org/knowledge-resources/data-statistics/statistics/>

3.4.2. Detailed findings

Pollution incidents can be taken to refer to:

- **Shipping accidents, in particular (but perhaps not only) oil spills**
- **Large coastal industrial accidents**
- Stormwater overflows from wastewater treatment plants
- Major runoff from solid waste sites

The present section will focus on the first two.

3.4.2.1. Oil spills

3.4.2.1.1 *The history of oil pollution in the Mediterranean Sea*

Historical records show 16 major oil spills occurred between May 1966 and September 2017 and resulted in oil spills ranging between 6,000 and 144,000 tonnes; the largest spill came from the MT Haven tanker after an explosion on board on April 11, 1991 (Andrey G. Kostianoy, 2018). More recently in 2021, a huge leak of over 10,000 tons of heavy fuel oil flowed from the Baniyas Thermal Power Plant on Syria's coast. This area has been a concern for well over a decade and is well-known to European as well as international authorities.

Sources of oil pollution are typical for other seas and include shipping, oil and gas platforms, ports and oil terminals, land-based sources, military conflicts, natural oil seeps and even atmospheric inputs (Andrey G. Kostianoy, 2018). **Shipping activities are the main cause for oil pollution in the Mediterranean Sea** while oil and gas production and exploration are not so important, unlike in the Gulf of Mexico or the Caspian Sea. If we exclude major oil spill accidents from ships, which are very rare events in the Mediterranean, different expert reports and estimates provide total volumes of oil pollution ranging from 1,600 to 1,000,000 tonnes per year. The 625 times difference in values means that the real volume of oil pollution entering the Mediterranean Sea is not known: this is a major problem that needs to be addressed (Andrey G. Kostianoy, 2018).

3.4.2.1.2 *Oil spill intervention in the Mediterranean Sea*

The subsections below summarise the key intervention mechanisms for oil spill intervention in the Mediterranean.

3.4.2.1.2.1 *The International Maritime Organisation (IMO)*

The International Maritime Organization has a role in protecting the Mediterranean Sea and its various regions through the International Convention for the Prevention of Pollution from Ships and its Protocols (MARPOL 73/78 Convention) and sets limits on discharges of oil from ships. IMO also addresses marine litter issues and adopted the IMO Strategy to address marine plastic litter from ships in 2021, with the objective of achieving zero plastic waste discharges to sea from ships by 2025.

3.4.2.1.3 *The Barcelona Convention*

The role of the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention, 1976) and its various protocols provides the key framework under which nations across the Mediterranean region can work together to cooperate in preventing pollution from ships and from offshore exploration and exploitation activities or in the event of an emergency. It appears as a "soft law" (Carpenter, 2017) tool that has the full potential, if implemented at the national level, to tackle oil pollution from all potential sources.

The signatories of the Prevention and Emergency protocol under the Barcelona Convention include the EU, Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Slovenia, Spain, Syrian Arab Republic, Tunisia and Turkey.

3.4.2.1.4 *The role of Regional Marine Pollution Emergency Response Centre (REMPEC)*

The Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) is the key organisation to facilitate cooperation among the Contracting Parties to the Barcelona Convention and its Protocols to respond to pollution incidents which result or may result in a discharge of oil or other hazardous and noxious substances which require emergency actions or immediate response.

REMPEC assists Mediterranean states in ratifying, implementing and administering conventions and generally accepted international rules and standards implemented by competent international organisations (Carpenter, 2017). REMPEC has further committed itself to assisting Contracting Parties of the Barcelona Convention to strengthen preparedness and response capacities through multifarious pragmatic actions, e.g. including remote assistance, on-site assistance, development of contingency planning, development and dissemination of guidelines, training and education and tools. Over the years, there has been a steady increase in the body of general and descriptive literature dedicated to the work of REMPEC (Carpenter, 2017).

3.4.2.1.5 *European Maritime Safety Agency (EMSA) Activities*

The European Maritime Safety Agency supports oil spill detection activities through satellite surveillance across the region. Established in 2002, it provides a pollution prevention and response (PPR) service that provides operational assistance in the event of an oil spill at sea. It also provides an earth observation service with satellite-based oil spill detection through its CleanSeaNet (CSN) Service and vessel tracking through its SafeSeaNet (SSN) Service. This enables EMSA to support both identification of pollution at sea and potentially locate the source of that pollution.

3.4.2.2. *National response bodies*

National organisations in EU Member States are key to contribute to reaction mechanisms with respect to oil pollution. This is the case for instance of Salvamento Marítimo in Spain and Transport Malta in Malta:

The role of the SASEMAR is to coordinate operations at sea such as search and rescue, pollution prevention and response, maritime traffic control and monitoring, maritime safety and navigation aids, towing and vessel assistance and other activities.

Transport Malta (TM) is the national competent authority for marine pollution preparedness and response and is responsible for the maintenance and implementation of the National Marine Pollution Contingency Plan (NMPCP) through its Pollution and Incidence Response Unit (PIRU). TM approves pollution emergency plans of marine terminals and facilities, assists such operators in the development of the said plans, monitor their implementation as well as ordering any changes thereto. In addition, TM can organise periodical national training and drills in pollution emergency and response with the participation of personnel from local operators. TM's mandate extends to oil spills below those declared as national disasters.

3.4.2.3. *Research organisations*

Centre de documentation de recherche et d'expérimentations sur les pollutions accidentielles des eaux (CEDRE) is a French NGO that is responsible, on a national scale, for documenting, research and experimentation on pollutants, their effects and the response means and tools that can be used to combat them. One of Cedre's missions is providing those in charge of spill response with information on the pollutants, their behaviour, the related risks, the best response methods and techniques, the products and equipment to use, and operational data management. Audit services for emergency response plans and equipment recommendations are provided for all situations.

The Joint Research Centre (JRC) is also an actor that actively contributes to monitoring oil spills in European seas, facilitating working groups and research papers on the topic, such as the European Group of Experts on Satellite Monitoring of Sea-based Oil Pollution which ran from 2007 to 2009.

3.4.2.4. *Industrial accidents*

3.4.2.4.1 *IMO*

Under the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), the Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS) was adopted in 2000. It entered into force in 2007. The Protocol "aims to establish national systems for preparedness and response and to provide a global framework for international co-

operation in combating major incidents or threats of marine pollution”¹⁵⁴. Parties to the OPRC-HNS Protocol are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Ships are required to carry a shipboard pollution emergency plan to deal specifically with incidents involving hazardous and noxious substances. The Protocol thus calls on ships carrying hazardous and noxious substances to follow preparedness and response regimes similar to those already in existence for oil incidents.

3.4.2.4.2 Seveso Directive

The Seveso Directive was first adopted following the accident in the town of Seveso in 1976 and prompted the adoption of legislation on the prevention and control of industrial accidents in Europe. Its latest version, Seveso III (Directive 2012/18/EU) was adopted taking into account changes in EU legislation relating to the classification of chemicals and increased rights for citizens to access information and justice. It tightened provisions on public participation and information, land-use planning, public access to justice and introduces stricter inspection standards to ensure the safety rules are being effectively implemented.

The Directive applies to “more than 12 000 industrial establishments in the European Union where dangerous substances are used or stored in large quantities, mainly in the chemical and petrochemical industry, as well as in fuel wholesale and storage (incl. LPG and LNG) sectors”¹⁵⁵. It aims to control major accident hazards involving dangerous substances, especially chemicals and contributes to the technological disaster risk reduction effort¹⁵⁶.

Member states are required to present 4-year implementation reports to the EC. For the period 2015-2018:

- Non-compliance rates for testing external emergency plans (EEP) were high for a number of Mediterranean countries, including Italy (63%, the highest rate), Spain (50%), France (22%).
- Similarly, the share of establishments for which information in Annex V is not kept permanently available includes Italy (70%, highest rate).
- Inspection rates for upper-tier establishments were subjected to yearly site visits for several Mediterranean states (Cyprus, Spain, France), but not all. Some states, such as Italy and Greece, relied on systemic appraisals.

3.5. Waste management in ports

This case study relied on desk research as well as interactions with Euroshore, a European association which aims to promote and further the interests of companies that are active in the area of ship waste management. The objective of the case study is to focus on the current status of waste management in ports and identify best practices and recommendations to help reduce marine litter.

3.5.1. Main conclusions

Although a great proportion of marine litter originate from land-based sources, addressing waste discharges from ships also plays an essential role in preserving marine and coastal ecosystems (EMTER, 2021). A rather detailed framework has been set up for decades now to ensure smooth cooperation and control of prevention and control of pollution from ships at sea, both internationally (MARPOL) and at the EU level (revised Directive 2019/883).

Data from EMSA in 2017 indicated a waste gap of between 7-34% for marine litter (including plastics) in the EU overall. This is a much higher percentage than for other categories of waste which include oily waste (estimated waste gap of 2.5%) and sewage (estimated waste gap of 10%). It is very difficult to obtain up to date data on ship waste at the EU level today: ports do not openly publish such statistics, and data reported by ships and communicated through the SafeSeaNet portal is not freely accessible.

¹⁵⁴ IMO, Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances, 2000 (OPRC-HNS Protocol), available at : [https://www.imo.org/en/About/Conventions/Pages/Protocol-on-Preparedness,-Response-and-Co-operation-to-pollution-Incidents-by-Hazardous-and-Noxious-Substances-\(OPRC-HNS-Pr.aspx](https://www.imo.org/en/About/Conventions/Pages/Protocol-on-Preparedness,-Response-and-Co-operation-to-pollution-Incidents-by-Hazardous-and-Noxious-Substances-(OPRC-HNS-Pr.aspx)

¹⁵⁵ European Commission, available at : <https://ec.europa.eu/environment/seveso/>

¹⁵⁶ European Commission, available at : <https://ec.europa.eu/environment/seveso/>

A present, a major problem for ports is arranging adequate reception facilities for ship-generated waste. Ship wastes are regulated within the regime of marine pollution, and the prevention of ship-source pollution is heavily reliant on the provision of adequate port reception facilities on land. However, the coordination between these facilities and further downstream management operations is still an unresolved issue.

It is generally assumed that there is an inverse relationship between the amount of waste delivered at ports and the amount of marine litter generated. Various fee systems have been implemented to incentivize ships to deliver their waste at port. Euroshore and its members have advocated for a harmonized fee system in Europe, to avoid competition among ports where ship owners can seek the cheapest services. Different systems can generate gaps in the system.

We do not consider that the Mission should focus on actions supporting ship waste management. Mission Funding could, however, be tailored towards improving data management of ship waste from ports (although this remains largely a competence of EMSA and DG ENV) and promoting good practices among ports in waste management.

3.5.2. Detailed findings

3.5.2.1. *How do ship waste and illegal discharges contribute to marine litter?*

Illegal discharges of ship waste continue to be a major problem in the Mediterranean region. Waste from ships' means all waste, including cargo residues, which is generated during the service of a ship or during loading, unloading and cleaning operations and which falls within the scope of Annexes I, II, IV, V and VI to MARPOL Convention, as well as passively fished waste¹⁵⁷. Ship-generated wastes encompass oily waste, food waste, cooking oil, fishing nets, residues of cargo material.

Although a great proportion of marine litter originates from land-based sources, addressing waste discharges from ships also plays an essential role in preserving marine and coastal ecosystems (EMTER, 2021). The quality of the waste management on board (intelligent onboard equipment) is often not satisfactory, and not as efficient as in port reception facilities. Pre-washing treatment techniques on board are considered adequate, but the idea that a ship doesn't discharge anything at a port is unrealistic. Unfortunately, some discharge still occurs, on the grounds that there is a "dilution" effect of the waste at sea. The consequence is that marine litter causes serious environmental and economist impacts, damaging the fishing sector and marine ecosystems.

EMSA commissioned a study in 2017 entitled 'the management of ship-generated waste on-board ships'. The study found an estimated "**waste gap**" of between 7-34% for marine litter (including plastics). This is a much higher percentage than for other categories of waste which include oily waste (estimated waste gap of 2.5%) and sewage (estimated waste gap of 10%). Data collected by Euroshore members in 2019 underline that garbage waste represents 14% of total waste collected, which is the second highest category reported following oil waste (77% of all waste). Oily waste continues to be the vast majority of "business" of ship recycling companies in Europe today.¹⁵⁸

A present, a major problem for ports is arranging adequate reception facilities for ship-generated waste. Ship wastes are regulated within the regime of marine pollution, and the prevention of ship-source pollution is heavily reliant on the provision of adequate port reception facilities on land. However, the coordination between these facilities and further downstream management operations is still an unresolved issue.

3.5.2.2. *A lack of data on ship waste at EU level*

It is challenging to obtain reliable data on ship waste for a number of reasons. EMSA is the authority in charge of monitoring and reporting services for maritime enforcement activities. The **data reported by ships and communicated through the SafeSeaNet portal is not freely accessible** – internally, only DG institutions can make a request to access the data. As most of the data is reported through paper notebooks, the data is difficult to process. For this reason, most recent studies studying the effect of the Ship Waste Directive have collected data independently at port level through surveys. These figures are useful but limited as the number of ships and ports studied is small:

- The Study on the Delivery of Ship-Generated Waste and cargo residues to port reception facilities in EU ports published for EMSA in 2012 collected data through a detailed questionnaire addressed to 40 ports;

¹⁵⁷ Directive 2019/883

¹⁵⁸ Interview with EUROSHORE, April 2022.

- The ex-post evaluation Directive 2000/59/EC on Port Reception Facilities for Ship-generated Waste and Cargo Residues (PRF Directive) in 2015 also relied on an external survey to collect data on implementation;
- A study for EMSA in 2016 entitled 'the Management of Ship-Generated Waste On-Board ships' collected data from ship audits, interviews, a literature survey and an online survey.

EMSA provides reports on detections reported annually. The Directorate General for Mobility and Transport does not provide data on this topic.

It is noteworthy to underline that data on the number of inspections in each port is freely available through the THETIS platform. The data is regularly updated and available for the year 2021. Inspections occur to verify that ships comply with the Directive 2000/59/EC. The ISM deficiencies reported however do not specify if they are related to ship waste delivery. It is thus unlikely that this will serve as a useful indicator for the topic.

3.5.2.3. The legal framework for ship waste in Europe and in the world

The IMO is the global standard-setting authority for maritime safety, providing the framework for cooperation among governments in order to regulate technical matters affecting shipping engaged in international trade. All 27 EU MS have ratified the MARPOL I, II, IV and V conventions which provide the basis for the prevention and control of pollution from ships at sea. MARPOL sets out a classification of pollution risks:

- Annex I contains all the rules relating to the prevention of pollution by oil
- Annex II contains all the rules for the prevention of pollution by noxious liquid substances
- Annex IV contains all the rules relating to the prevention of pollution by wastewater from ships:
- Annex V contains all the rules for the prevention of pollution by ships' rubbish.

The MARPOL Convention further designates the Mediterranean Sea as a Special Area, imposing specific constraints in order to prevent pollution in the Mediterranean by oil and waste.

In addition, several European Directives address the prevention of marine litter entering the sea. The MSFD provides the main driver in the EU for the monitoring and evaluation of marine litter, and a specific law addresses how ships should manage their waste and the control regimes applicable to the management of waste. EU Directive 2015/2087 distinguishes between ship-generated waste and cargo residues. It covers waste falling under Annexes I, II, IV and V of the MARPOL Convention. In 2019, the EU adopted a revised Directive (2019/883) regulating the availability of port reception facilities and the delivery of waste to those facilities, aiming to substantially reduce discharges of ship-generated waste and cargo residues into the sea. The Directive was to be transposed by June 2021 into Member State law.

Article 17 of Directive 2019/883 foresees specific activities relating to exchange of experience. Indeed, the article states that the Commission shall provide for the organisation of exchanges of experience between the Member States' national authorities and experts, including those from the private sector, civil society and trade unions, on the application of this Directive in Union ports.

The Directive incentivises the discharge of ship waste at ports and better **aligning fees with green incentives**. Indeed, the revised Directive has gone a step further to encourage ship owners to discharge, particularly as concerns Annex V. The expert group on ship waste have adopted criteria for reduced fees. One limitation to this is that it does not cover new potential emerging wastes, such as alternative fuels.

In Europe, ship waste recycling companies are usually SMEs.

3.5.2.3.1 Port reception facilities

IMO lists all of the existing Port Reception Facilities available in the Mediterranean¹⁵⁹. A port reception facility is characterized by its services provided to international shipping ports to collect residues, oily mixtures, and garbage generated from an ocean-going or returning vessel.

One port will usually have several different facilities for processing waste, distinguishing between different Annex-related wastes (Annex I (oily waste), Annex II (chemicals), Annex IV (sewage), Annex V (garbage), Annex VI (gas-cleaning residues, ozone-depleting substances). The database includes the name of the service provider, the discharge restrictions and limitations and the charging system (cost charged by the service provider). Unfortunately, fees are rarely listed.

3.5.2.3.2 Different fee systems

With the aim of reducing the incentive to illegally discharge waste and contributing to the protection of the sea from contamination, all ships that stopover in a European Union port are obliged to pay a tariff, whether they deliver waste or not (Pérez, 2017). In the majority of European ports, a single tariff, based on ship size, includes the delivery of oily waste and garbage.

Port charges rewarding greener vessels are nowadays common practice – they are said to exist in about half of EU ports (EU Parliament). Nevertheless, the fee systems are still not completely generalized. There continues to be strong discrepancies in how MS register their waste (as underlined from data by EMSA in 2017).¹⁶⁰

Consultations within the European Sustainable Shipping Forum confirmed that discharges at sea were linked to the lack of incentives to deliver waste and to weak enforcement. Moreover, inconsistencies in definitions and exemptions were seen as sources of unnecessary administrative burden.

It is generally assumed that there is an inverse relationship between the amount of waste delivered at ports and the amount of marine litter generated. Various fee systems have been implemented to incentivize ships to deliver their waste at port. Euroshore and its members have advocated for a harmonized fee system in Europe, to avoid competition scenarios among ports and creating situations where ship owners can seek the cheapest services. Different systems generate gaps in the system.

3.5.2.4. Recommendations for the Mission

We do not consider that the Mission should focus on actions supporting ship waste management. The current legislation should be correctly implemented, and this falls outside the competence of DG RTD. The key target stakeholders are essentially ship companies and port authorities. From a technology perspective, there are limited opportunities.

Our (limited) recommendations in the context of the Mission are as follows:

- Best practices need to emerge focusing on sorting on board and processes to ensure efficiency when delivering waste at port to improve treatment and recycling. This could be the role of the ship waste working group but also of Member States as they implement the revised directive (Article 17 of Directive 2019/883 which specific activities relating to experience sharing).
- Research projects should focus on data accessibility concerning ship waste. The data from EMTER is largely locked in institutionally. Port authorities are currently not incentivised to communicate on their ship waste data. The preferred option is still to focus on improving the current regulatory mechanism for data collection through SafeSeaNet and the application of Directive 2019/883.
- Stronger control and enforcement is needed with regard to existing legislation. Discharges at sea still occur and control mechanisms should be enforced. Cruising lines should be limited in their ability to serve single-use plastic products. The reuse of certain types of waste are also still restricted by legislation (eg., the question of reusing oily waste is barred by legislation). There is generally a lack of means for inspections and associated penalties. With the digitalisation of shipwaste data communicated to EMTER, processes should be improved.

¹⁵⁹ GISIS : Port Reception Facilities : <https://gisis.imo.org/Public/PRF/Browse.aspx>

¹⁶⁰ Data obtained from EMSA for January 2017 indicates that in a month where 60,462 ship calls were registered across Europe in SSN, only 25,057 reported ship waste information, and 29,437 reported security information, meaning that 59% did not report waste information that month, and 51% did not report security information. Two countries, EL and PT did not report any information in either category, and a few others, including FR and UK had high rates (>75%) of missing reports. Around half, however, had rates of missing data below 25%. While this is still in the initial phase of implementation, it demonstrates quantitatively that information collected within the NSWs related to waste and security, as required by RFD 2010/65/EU, is indeed being exchanged through SSN.

- Outside of this, looking specifically at types of projects or research initiatives, technologies allowing for better waste treatment, recovery and recycling still carry a high price. More investment is needed in recycling technologies. As alternative fuels increase, the growing question of how such fuels will be managed in their end-of-life stages is also rising.

Appendix C Case Studies for the Atlantic and Arctic Lighthouse area

C.1 Case study 1: LIFE-ADAPTO: Towards Adaptive Coastal Management

This factsheet has been reviewed by the LIFE-ADAPTO project team in March 2022.

C.1.1 *Introduction and context*

C.1.1.1 Location

The project is implemented in 10 sites of France (Atlantic and Mediterranean +Guyana)



Figure 110 Project location - pilot sites.

Source: Adapto project team

C.1.1.2 Year of completion (or extent of completion in 2021)

Starting in October 2017, the project was expected to end in December 2021. However, it has been extended to **December 2022**, partly due to the COVID-19 crisis. This last year of the project will focus on capitalising on the results (production of summary deliverables, communication, preparation of future actions).

C.1.1.3 Brief overview of the case study

The **Life-Climate project ADAPTO** (Towards Adaptive Coastal Management) explored solutions to the impacts of **climate change** on the coast, such as sea level rise and the increasing frequency of extreme weather events. On 10 pilot sites owned by the Conservatoire du littoral, ADAPTO experimented adaptive coastal management. It helped demonstrate the ecological and economic benefit of improving the resilience of coastal areas to protect human activities by opening more space for the coastline.

Project website, deliverables and emails

Website: <https://www.lifeADAPTO.eu/>

Main deliverables: [I suggest a brief overview and a link to the page with the deliverables]

- A large set of documents per pilot sites (Landscape brochures, mediation brochures, newsletters, videos, sensitivity analyses, management plan brochures, sediment analyses, prospective landscape studies, technical sheets, economic assessments...) available here: <https://www.lifeadapto.eu/ressources.html> ; 125 documents in total
- Synthetic deliverables at national scale will be produced before December 2022.

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C.1.1.4 Link to Mission objectives and targets

- Restoration
- Climate change adaptation

C.1.2 Main objective of the case study project

The project's objectives are the following:

- To make people understand the dynamic nature of the coastline and the need to adapt to it rather than resist it.
- Develop methodological tools to initiate, support and evaluate ecosystem-based adaptation solutions for coastal zones.
- Develop knowledge of these solutions and their recognition at national and transnational level.
- Characterise the role of natural environments in organising an effective land-sea interface in terms of adaptation to climate change.
- To advance the state of the art through concrete implementations on a wide range of local situations covering geographical contexts representative of the diversity of European ecosystems and maritime façades.

On each of the **10 pilot sites**, the ADAPTO project **helped local authorities, managers and users to build their territory project**. To this purpose, ADAPTO offered them an interdisciplinary approach (economic, sociological, biodiversity...).

Criteria for the definition of pilot sites were the following:

- spatial representativity (1 site for each delegation of Rivages – Conservatoire du Littoral antennas)
- possible replicability

- diversity of stages (planning, undergoing, building, etc.)
- political relevance (acceptability)

All sites were at least covered partially by N2000 areas.

In the Atlantic, these areas are representative of two types of coastal environments:

- low, sandy Atlantic coasts (Authie Bay)
- low Atlantic polder coasts (Orne Estuary - Lancieux Bay - Moëze Marsh - Gironde Estuary - Leyre Delta).

Pilot sites surfaces:

Total Area	N2000 area	Cons. du Littoral Area
250 km ² (168 km ² Channel/Atlantic, 23 km ² Med, 59 French Guyana)	179 km ² (159 km ² Atl/Ch, 20km ² Med)	69 km ² (38 km ² Atl/ch, 15 km ² Med, 16 km ² FG)

Table 53 ADAPTO - Pilot sites spatial characteristics

Source: ADAPTO Project team

C.1.3 *Funding sources and total budget*

Budget: EUR 5 269 061 (overall eligible costs)

European Union contribution: 60 %

Other public financial partners (French Water Agencies, French National Biodiversity Agency): 16 %.

Private financial contribution (Total Foundation, French Foundation): 4 %.

Self-financing: 20 %.

C.1.4 *Actors*

C.1.4.1 Main actors and their roles

Main Beneficiary: **Conservatoire du littoral** (French public organisation)

Associated beneficiary: **BRGM** (French public body for geological survey)

Scientific and technical partners: Universities (ULCO; EPHE; ULR; ENSP; UBO); National Museum of Natural History (MNHM); National Union of the Permanent Centres of Initiatives for the Environment (UNCPIE)

C.1.4.2 Societal/citizen engagement and involvement in the project

- Collection of stakeholders' perceptions on the actions of each pilot site. A "site story" will be produced for each site to summarise this work.
- Knowledge outreach toward citizens and schoolchildren.
- Strong linkage with other local management councils (municipalities, waterbodies, natural parks, etc.).



Figure 111 Study trip in Normandy with elected officials and technicians.

Source: Adapto project team

C.1.4.3 Economic/business aspects

Demonstration of the ecological and economic benefit of improving the resilience of coastal areas to protect human activities.

C.1.5 Main results

C.1.5.1 Innovative methods, activities applied/demonstrated

10 practical local case studies

Implementing nature-based solutions through flexible coastline management: restoring mobility to increase resilience to climate and ocean change. This implies sediment management, dune reprofiling and sand recharging for the maintenance of an effective dune belt against flooding, as well as salt marshes' restoration to limit flooding events.

Presents renaturation and urban relocation as adaptation measures.

Supports the consideration of a "land property" protection status.

C.1.5.2 Implementation challenges (proposed addition)

- The most politically contentious pilot sites (limited capacity for political support, existing conflicts of use) were excluded from the selection.
- A need for territories to accept some form of coastal mobility (dunes, salt marshes).
- Stacking of management committees on certain sites (Natura 2000, Parks, local management plans, etc.) with their own inertia.

- Non-hierarchy between different regulatory schemes: urbanism, environmental law, risk management (erosion, submersion).
- Management and setting up of LIFE projects.
- Maintaining the action in the long term, in the face of changing contexts (political, environmental, health).
- Availability of grey literature on flexible adaptation and coastal renaturation, in comparison with hard adaptation approaches.

C.1.6 Project results: achievement of project objectives

Technical results: deliverables

Operational results: engineering and landscaping work on the pilot sites; marine restoration structures. See for instance the renaturation project in Hyères (Mediterranean) in the Figure below.



Figure 112 Adapto - pilot site renaturation in Hyères (Mediterranean France).

Source: [Adapto project team](#)

C.1.6.1 Follow up actions and long-term monitoring

Long term dynamic approaches in each of the pilot sites (governance, economy, society)

The Conservatoire du Littoral has defined as an official objective to replicate the ADAPTO approach in the coming five years on 20 new pilot sites. Ambitions still have to be outlined, but a strong focus should be put on opening the spectrum of partners towards municipalities and the CEREMA (French Institute). The project should be structured around a national expertise cell which would coordinate and support the work of pilot sites, which would involve a multi-funded approach.

Site selection criteria might evolve to expand the diversity of cases.

Project Team hopes to create an “Adapto” trademark that could be disseminated elsewhere.

C.1.7 Implications for Mission activities

C.1.7.1 Potential and hindrances for replication and upscaling

It will be possible to replicate and transfer the implemented coastline mobility methods to other similar French or foreign coastal sites.

Ten diverse practical case-studies with operational approaches that could be disseminated as best practices.

The Conservatoire du Littoral is also involved in INTERREG projects (2Seas; LICO; MAREGO; MANABAS) and aims at other European funds (INTERREG cooperation; LIFE-Governance; FEDER), as well as national and subnational ones.

Replication of actions is not always possible: in the North Sea, restoration is done by moving forward (gaining ground on the sea), whereas the objective of the project is rather to restore by moving back (strategic retreat).

C.1.7.2 Conclusions and lessons learnt

The Adapto project initiates a process of renaturation of coastal sites in mainland France, in order to increase their resilience and absorption capacity in the face of extreme climatic events (e.g. flooding). Its 10 pilot sites are progressively confirming the concrete character and direct benefits of nature-based solutions, not only for ecosystems, but also for populations (socio-economic component of the project). The project is already in the process of being extended (20 new sites in mainland France) and its replication could be envisaged in other countries of the maritime basin. The Conservatoire du Littoral, the project leader, is a particularly active player in the field of coastal ecosystem conservation and could be an interesting partner for Mission Ocean. By advocating the strategic retreat and restoration of the integrity and functionality of coastal ecosystems, the project is an excellent spearhead for the mission objective.

C.2 Case study 2: H2020 FutureMARES - Climate Change and Future Marine Ecosystem Services and Biodiversity

C.2.1 *Introduction and context*

Marine and transitional waters support a large portion of global biodiversity. harbouring key climate-regulating processes and habitats, they contribute to worldwide food security, in addition to other valuable economic and well-being services and resources. When it comes to reducing greenhouse gas emissions, the focus is usually on technological methods and the switch to renewable energies instead of nature-based solutions. At the same time, many natural ecosystems are coming under increasing pressure due to ongoing anthropogenic pressures. The question arises how we can use natural systems to stabilise CO₂ concentrations in the atmosphere while safeguarding and restoring biodiversity and ecosystems.

The natural CO₂ storage capacity of the oceans is enormous, and vegetated nearshore habitats especially contribute significantly to carbon burial in marine sediments (see Duarte et al., 2013). Seagrass beds, for example, are a globally significant carbon sink and an important ecosystem for combating climate change while providing numerous ecosystem services that support coastal communities around the world (e.g. supporting commercial and artisanal fisheries and helping protect coasts from erosion). They also sustain rich marine life. However, seagrass beds are experiencing rapid decline worldwide. Although the importance of "blue carbon" has been recognised, there are still a few projects to restore or conserve seagrass beds, salt marshes, or other such ecosystems that also include sound research to determine, for example, how ecosystem structure relates to service delivery and how climate change is affecting and will affect this interaction in the future. For a holistic approach and to reduce uncertainty with respect to policy decisions, sound knowledge of spatial ecological impacts in a changing climate, impacts on the socio-ecological system, and determining the economic impacts of such projects are key to success.

C.2.1.1 Location

Five case studies around the globe (Europe, South America and Western Asia).

C.2.1.2 Year of completion (or extent of completion in 2021)

September 2020 – August 2024 (around 50 % completed)

C.2.1.3 Brief overview of the case study

The EU-funded FutureMARES project (standing for Climate Change and Future Marine Ecosystem Services and Biodiversity) aims to deliver new solutions to climate change challenges. This highly multidisciplinary project is investigating socially and economically viable **nature-based solutions** for climate change adaptation and mitigation to safeguard future biodiversity, and ecosystem functions, maximising natural capital and its delivery of services from marine and transitional ecosystems. Activities are designed around three Nature-based Solutions (NBS): **Effective Restoration**, **Effective Conservation** and **Sustainable Harvesting of Marine Resources**. Solutions include the restoration of habitat-forming species that can buffer coastal habitats from climate change effects and improve seawater quality, as well as conservation actions and sustainable, ecosystem-based harvesting (capture and culture) of seafood. Overall, the aim is to safeguard these ecosystems' natural capital, biodiversity and services.

FutureMARES explores marine restoration through nine "storylines" (regional applications of NBS) which show what the effects of climate change means for the biodiversity and functioning of systems in specific environments in European Seas, including salt marsh (1) seagrass (4), macroalgae (3), and shellfish (1) habitats.

To determine how best to plan and implement these NBS in a future transformed by climate change, FutureMARES uses three scenarios to show how marine biodiversity might evolve, conceptualising the future world in terms of **global sustainability**, **national enterprise**, and **world markets**.

Project website, deliverables and emails

Website: <https://www.futuremares.eu/>

Main deliverables:

The first periodic report (PR1 or 18th month report) was submitted to the European Commission at the end of April 2022. The most relevant part of the report for the implementation of this lighthouse are the case studies, the so-called Storylines, of the Atlantic region. The Storylines related to the Atlantic region were annexed to the PR1 but are not openly available on the web.

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C.2.1.4 Link to Mission objectives and targets

FutureMARES explores how to best apply marine restoration, in combination with conservation strategies and sustainable harvesting, as a marine NBS to safeguard the biodiversity and climate resilience of our oceans. Specifically, the project researches the potential benefits of introducing habitat-forming species such as reef-building corals and canopy-forming macroalgae into coastal areas. The main concern of the project is using active restoration to facilitate and speed up the recovery process of habitats rendering them healthier and thus more resilient to climate change and safeguarding the services they support.

The project is therefore closely aligned with the Atlantic Lighthouse mission objective by providing a systemic approach to marine ecosystem restoration that leads to societal transformation and positive impact, combined with new forms of governance, collaboration, and citizen involvement.

FutureMARES explores marine restoration through nine “storylines” in European Seas including salt marsh (1) seagrass (4), macroalgae (3), and shellfish (1) habitats. The goal of FutureMARES is to provide science-based advice on the best use of NBS to protect biodiversity and ecosystem services in a future climate.

As an example, in the North Sea FutureMARES examines shellfish and eelgrass restoration; conservation of shellfish, mussels and other benthic communities; and ecosystem-based fisheries and shellfish aquaculture. These are key elements in the search for positive outcomes for the Atlantic Sea Basin under the accelerating impacts of climate change and are therefore directly related to the mission's objectives in this regard.

C.2.2 Main objective of the case study project

In broad terms, FutureMARES seeks to improve our understanding of the inter-relations between climate change impacts and ecosystems' health and to inform on how NBS can increase the adaptation and mitigation potential of marine and transitional ecosystems. The project aims to provide science-based policy advice on how best to use NBS to protect future biodiversity and ecosystem services in a future climate, and will therefore strongly contribute to upcoming national, EU-and global level reports, policies and interventions.

The project aims to achieve its objectives by generating greater understanding of links between ecological functions and ecosystem services and projecting climate change effects on marine biodiversity. Project activities in this regard include projections of spatial ecological impacts (e.g. identifying climate hotspots and refugia), social-ecological climate risk assessments, and (bio-)economic analyses. This work is performed and tested using different scenarios of NBS implementation.

C.2.3 Funding sources and total budget

The FutureMARES project is funded through the Horizon 2020 programme under grant agreement No 869300 (topic SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials").

- Total budget: EUR 8 555 905
- EU contribution: EUR 8 555 905

Cordis fact sheet: <https://cordis.europa.eu/project/id/869300>

C.2.4 Actors

- National labs, Universities, NGOs, Marine Management bodies.
- Lead Partner: University of Hamburg.
- Research Team: 33 partners, from 17 countries.
- Contact: Prof. Myron A. Peck (Project Coordinator - NIOZ Texel / Netherlands) myron.peck@nioz.nl

C.2.4.1 Main actors and their roles

National partners support the implementation of projects at local and regional scales, through incorporating their expertise of the area. Interviews have yet to be conducted for further information on the aspects to be retrieved, individuals have been identified and feedback is pending.

C.2.4.2 Societal/citizen engagement and involvement in the project

Engagement with stakeholders is one of the key elements of FutureMARES. Particularly co-creating research activities with decision- and policymakers is an integral part of FutureMares approach. Stakeholder engagement is already being carried out on an ongoing basis to regionalise the future scenarios by providing details relevant to the project's three NBS (Effective Conservation, Effective Restoration, and Sustainable Harvesting) in specific marine and transitional waters. Perceptions of these scenario-specific differences and contrasts are continuously being collected through a series of stakeholder events including various PESTEL (Political, Environmental, Societal, Technological, Economic and Legal) categories to answer how cultural aspects affect the desire to implement NBS and what emphasis will society place on using NBS. FutureMARES is thus placing significant emphasis on the architecture of value creation of marine NBS interventions (especially resources, partners, network).

Stakeholders play a vital role in a range of steps within FutureMARES projects:

- Defining and/or refining specific NBS activities at different scales (local, regional and international);
- Addressing policy needs and providing policy recommendations (regional, national to international);
- Integrating perspectives of managers and users of marine ecosystem services (local to regional);
- Assessing the adaptive capacity of human communities (local to regional);
- Implementation of NBS 'on the ground' (local to regional).

C.2.4.3 Economic/business aspects

Definitions of NBS highlight the multiple benefits that can be derived by working with nature. Specifically, the European Commission emphasises innovation and economic cost-effectiveness, aiming to 'harness the power and sophistication of nature to turn environmental, social and economic challenges into innovation opportunities' (EC, 2015). Incorporating economic analysis into NBS is not a new approach; being particularly common for urban NBS that add value by replacing "gray" infrastructure with "green-blue" infrastructure (e.g., green roofs and sustainable drainage systems). Applying this approach to NBS with natural systems and ecosystem restoration is still a relatively new area. Recent studies have quantified the impacts of marine NBS for adaptation at regional or global scales using a range of metrics, such as the number of people affected, the monetary value of avoided damage to infrastructure/property (from floods, fires, landslides, etc.), or the market value of utilities such as timber or fish.

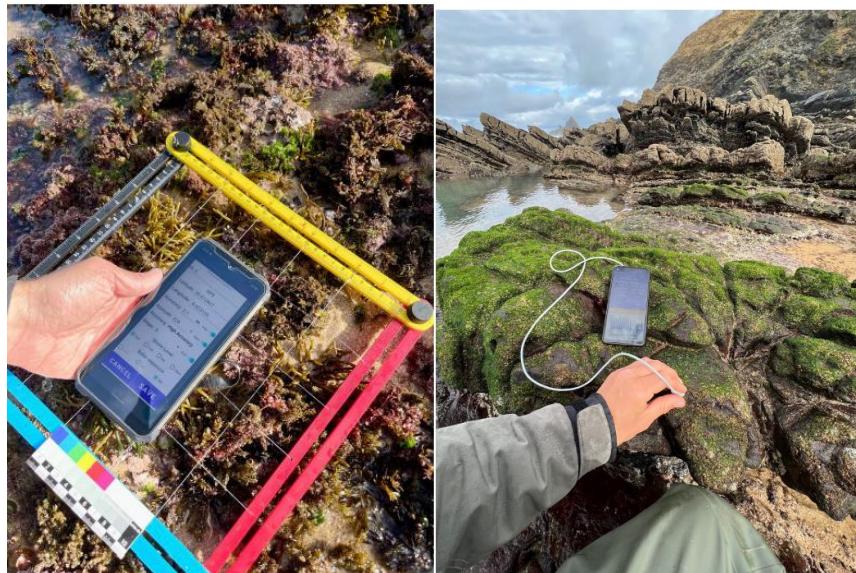
FutureMARES will make considerable efforts in this regard by conducting economic analysis of nature-based solutions in coastal marine ecosystems at regional and local scales to calculate the economic costs and benefits of their implementation on the ground, promising deeper insights into how they help us adapt to climate change and what is needed for their successful implementation. Potential approaches include determining the value-added component of NBS restoration interventions, such as yielding environmental/physiological benefits in addition to the value proposition (e.g. in the form of marketed products).

C.2.5 Main results

C.2.5.1 Innovative methods, activities applied/demonstrated

Socio-ecological vulnerability assessments and economic analysis of Nature-Based Solutions are key innovative methods used by the project. As FutureMARES aims for improved marine nature-based solutions and the mitigation of climate change, climate-sensitive Marine Spatial Planning (MSP) also lies at the heart of its activities across Europe and CELAC countries.

Developing and testing of new technology on the pilot sites for improved data collection and analysis - to help identify biodiversity hotspots and quantify the distribution of thermal refugia in the Atlantic coast of Europe. See for instance the field testing of a new smartphone app developed to aid on the acquisition of photo-quadrat data and metadata, important to contextualise biodiversity measurements in the field; or acquisition of long-term temperature data through deployment of autonomous miniaturised loggers.



Source: FutureMARES project team

C.2.5.2 Implementation challenges (proposed addition)

FutureMARES will develop policy-relevant scenarios based on frameworks commonly used by the IPCC, which will impact on the restoration approaches and be regionalised based on stakeholder perspectives to guide activities such as model simulations in the specific locations of the case studies (referred to here as Storylines). At this stage, these scenarios are not yet completed.

Further implementation challenges arise from the impacts of climate change, which is the very challenge for the restoration projects on which FutureMARES aims to fill the knowledge gap.

C.2.5.3 Project results: achievement of project objectives

Technical results: deliverables

C.2.5.4 Operational results

Ongoing active restoration efforts will result in the creation/enhancement of biophysical structures, for instance in Storyline 10 focusing on oyster reefs in the North-East Atlantic Follow up actions and long-term monitoring

No mention of long-term monitoring plan or replication, but should contribute to upcoming national, EU-and global level reports, policies and interventions.

C.2.6 Implications for Mission activities

Understanding the relationships between climate change, marine biodiversity and ecosystem services is key to reaching the mission objectives and findings from projects such as FutureMARES will be extremely valuable to inform decision making but also guide the research and action in this field over the coming decade.

C.2.6.1 Potential and hindrances for replication and upscaling

At this stage and until interviews are conducted, we can only highlight the expected pros and cons of this project as a lighthouse mission flagship case study.

PROS:

- The project covers a large share of the Atlantic Sea-Basin, and its results will indeed be useful to other initiatives.
- The project focuses on the investigation of nature-based solutions for conservation, restoration and sustainable harvesting to face climate change impact with a strong focus on marine and coastal ecosystem services.
- FutureMARES will perform economic assessments of nature-based solutions and highlight how they can be translated in practices from territories and users' point of view. There is potential for upscaling and increased understanding about environmental and socio-economic impacts.

CONS:

- The project is facing the end of its second year of application. There are very few results yet.
- Too wide a geographical coverage compared to our project.

C.2.6.2 Conclusions and lessons learnt

The FutureMARES project enables more effective restoration of coastal marine ecosystems in Europe. This is done by gaining knowledge of site- and habitat-specific conditions, taking into account the projected impacts of climate change, through monitoring data on key variables but also by applying regionalised scenarios describing future society and economy which inform model simulations in specific storylines. In the Devon UNESCO Biosphere Reserve (Storyline 11), for example, such information enables the selection of areas where the expansion/restoration of kelp beds, seagrasses and salt marshes could be most successful. With the models applied by FutureMARES research, decision making needs are informed, and chances of restoration success are drastically increased which also secures the provision of key ecosystem services these habitats provide (e.g., climate change mitigation through carbon sequestration). Local (changing) environmental conditions are better understood and adapted to (e.g., understanding the natural mix of saltmarsh types that could be achieved through restoration despite sea level rise). In essence, the understanding of climate resilience of restored habitats is greatly improved through the FutureMARES project, allowing for better monitoring of the medium and long-term success of restoration interventions. The impact of restored habitats on economic outcomes is also better understood, e.g., through more knowledge about the impact from restoring coastal habitats on the productivity of fish targeted by local fisheries.

References:

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European Commission. (2015). Towards an EU research and innovation policy agenda for nature-based solutions & re-naturing cities: Final report of the Horizon 2020 expert group on 'Nature-based solutions and re-naturing cities': (full version). Publications Office of the European Union

C.3 Case study 3: LIFE - MarHa: Marine Habitats

This factsheet has been reviewed by the LIFE-MarHa project team in March 2022.

C.3.1 Introduction and context

C.3.1.1 Location

The project is implemented in **France** (Atlantic and Mediterranean)



Figure 113 MarHa project location and partners.

Source: [MarHa project team](#)

C.3.1.2 Year of completion (or extent of completion in 2021)

Started officially in November 2017, but effectively in September 2018, the project should end in December 2025.

C.3.1.3 Brief overview of the case study

Since 1992 and the adoption of the Habitats Directive, the European Union has been committed to the preservation of habitats of community interest and has deployed a network of Natura 2000 sites, first on land and then extended to the sea from 2008. **Life MARHA** is part of this approach and **pursues the objective of restoring and maintaining the good conservation status of natural marine habitats by supporting all the stakeholders involved in the management of the 162 French Marine and coastal Natura 2000 sites**. To implement its 34 actions, the project will combine approaches to (i) evaluate the functioning and implementation of Natura 2000 at sea, (ii) provide knowledge on habitats, their ecosystem services and the pressures they face, (iii) improve the tools available to managers of Natura 2000 sites at sea and (iv) support them in the implementation of concrete actions to preserve habitats.

Project website, deliverables and emails

Website: <https://www.life-marha.fr/>

Main deliverables:

- Complete description of the benthic biocenoses of the Mediterranean available at <https://outil-transferts.ofb.fr/?432f62db14028c8> (600pages; Atlantic to be published in August 2022- 1000pages)
- Technical binders on Mediterranean lagoons available at <https://pole-lagunes.org/etat-de-conservation-des-lagunes-cotieres-dinteret-communautaire-ue-1150-le-classeur-de-fiches-techniques-est-paru/> be published later)
- Technical sheets (on impacts and environmental regulations) for professionals of the shellfish and fish farming sectors available at <https://professionnels.ofb.fr/fr/doc/referentiel-prise-en-compte-activites-cultures-marines-dans-preservation-environnement-marin> (MREs and marine extractions to be published by the end of the year).
- Summary of the audits (governance, finance, communication) conducted in all 162 sites.
 - Final report available at: <https://fr.calameo.com/ofbiodiversite/read/003502948aa28417524b5>
 - Synthesis available at <https://fr.calameo.com/ofbiodiversite/read/003502948279561b20295>

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C.3.1.4 Link to Mission objectives and targets

- Protection (soft and strict)
- Restoration

C.3.2 Main objective of the case study project

The cross-cutting objective of the LIFE IP - MarHa project is to achieve or maintain a favourable conservation status for marine habitats listed in Annex I of the Habitats Directive. To achieve this, while ensuring effective and transparent management of the sites, the integrated project has the following operational objectives:

- Management and governance allowing for a coordinated implementation of the Habitats Directive, MSFD and WFD, while incorporating the connection between land and sea.
- Improved capacities and tools for implementing Natura 2000 policy.
- Integration of marine users and activities.
- Effective, proven and disseminated conservation and pressure mitigation actions.
- Assessment of the conservation status of marine habitats on a biogeographical scale and monitoring devices for adaptive management.
- Recognition by society of the marine Natura 2000 initiative.
- Long-term future of the IP actions ensured through innovative financing mechanisms.
- Reinforced international cooperation.
- Optimised project management and responsibility from an environmental standpoint.

C.3.3 *Funding sources and total budget*

Budget: **EUR 22 295 164** (overall eligible costs)

European Union contribution (LIFE Programme): **EUR 12 897 174**

Beneficiaries' contributions: **EUR 8 597 993**

Of which :

- French National Biodiversity Agency : **EUR 5 000 000**
- French Ministry for Ecological Transition : **EUR 800 000**

In addition to the IP budget itself, the project will facilitate the coordinated use of EUR 48 757 820 of complementary funding from EAFRD, ERDF, and national funds.

C.3.4 *Actors*

C.3.4.1 Main actors and their roles

Main Beneficiary: **French Biodiversity Agency (OFB)**

Associated beneficiary: IFREMER, GIS Posidone, CAPENA, Tour du Valat, National Parks, Regional Natural Parks, Marine reserves Federation, CNRS, Municipalities, public scientific institutes.

C.3.4.2 Societal/citizen engagement and involvement in the project

Inclusion of sea-users' representatives, local authorities, management authorities, NGOs.

Dissemination and citizen involvement (citizen science and marine educational areas).

C.3.4.3 Economic/business aspects

Socio-economic impact studies.

C.3.5 *Main results*

C.3.5.1 Innovative methods, activities applied/demonstrated

- Development and publication of an online evolutive toolkit for managers
- Socio-economic impact studies
- Cumulative impact studies
- Demonstrative restoration actions
- Proposition and implementation a sustainable and coordinated funding strategy
- Identification and maximisation of synergies with sectoral maritime policies
- Strong linkage with five other LIFE projects (MERCES, INTEMARES, AZORES NATURA, BNIP and the last IP-BIODIVERSA in Finland). A Decision Support Tool should be developed in common with these six projects in the coming year.
- Testing innovative approaches to awareness-raising, involving new neurological and cognitive knowledge.

C.3.5.2 Implementation challenges

"Marine management is a new profession, and it requires skills that are only being developed." – Project Team.

C.3.5.3 Project results: achievement of project objectives

The project has already made it possible to carry out a complete diagnosis of the French Natura 2000 sites and to identify the main failures that are responsible for the non-achievement of the good environmental status objectives. The following were analysed:

- Environmental assessment protocols, which vary greatly depending on the site and the associated resources.
 - "We need to secure our thermometer. And we could do both better and cheaper." - Project team.
- Governance practices
- Communication and awareness-raising methods
- Financial resources and management techniques

Three main failures emerge at this stage:

- The non-application of Article 6 of the Habitats Directive on impact assessments, caused by the lack of manpower and competence of the instructing services (DDTM, DREAL, DIRM), the limited association of managers in decision making processes, and the absence of protocols to tackle cumulated effects.
- Too passive and opaque governance. The steering committees often become recording chambers, with decisions being taken elsewhere (sectoral decisions by the prefects).
 - "There is no real democracy in the N2000 areas." - Project team.
- Administrative decisions that systematically favour the economy and social peace and not the environment.
 - "A large part of society has not yet understood the importance of the environment for their well-being." - Project team

Monitoring/surveillance programmes are being developed to improve observation (environment and pressures) and create robust data to confront sectors.

The project has also highlighted that restoration measures have much higher costs than avoiding impacts (about 700 fold).

- "Restoration equals reducing/supressing pressure." - Project team
- "The essential key is the restructuring of impact assessment, even more than funding." - Project team

C.3.5.4 Follow up actions and long-term monitoring

The results expected at the end of project MarHa are an improvement in the conservation status for all French marine habitat types listed in Annex I of the Habitats Directive by 2025, with at least half the habitats with good conservation status and no habitats with an unknown conservation status. All the deliverables will contribute to this objective: best practices in terms of environmental status monitoring, of governance practices, communication and awareness-raising, etc. The result expected for 2040 is a favourable conservation status for all the habitat types. It is expected that the project will contribute significantly to the implementation of the Prioritised Action Framework (PAF) for Natura 2000 in France and, more specifically, to all the marine habitat actions being carried out. Furthermore, it is expected that the Integrated Project contributes to the management of terrestrial Natura 2000 network sites.

The implementation of an "After Life Plan" is planned at the end of the project. Its development has already started. Requests have already been made to duplicate the project in the French Outermost territories.

C.3.6 *Implications for Mission activities*

C.3.6.1 Potential and hindrances for replication and upscaling

Although governance issues highlighted by the project seem to be mostly French-specific, other factors limiting the potential of N2000 in restoring the state of the environment (monitoring protocols, lack of

competencies and tools for managers, etc.) are quite common across Europe. Therefore, all the technical results from the project (guidance, protocols, communication methods, etc.) could benefit the European N2000 network. Some could be translated into English before being disseminated.

C.3.6.2 Conclusions and lessons learnt

The MarHa project initiates an overall assessment of marine Natura 2000 sites in mainland France. The results of this project will make it possible to improve the management of these sites in all their dimensions (governance, environmental monitoring, financing, etc.). Beyond the Natura 2000 sites, to which the project is confined, the methodological issues raised for the evaluation of the ecological status of ecosystems also concern more broadly the descriptors associated with the MSFD, which could be improved by new standards. The international dimension of the project, and the many links it has forged with other LIFE projects in Europe, will greatly facilitate its replication in other countries or basins. By focusing on the land-sea interactions, climate change, ecological continuity, renaturation and pressure reduction, the project is an excellent spearhead for the Mission Objective.

C.4 Case study 4: H2020 REST-COAST - Large scale RESToration of COASTal ecosystems through rivers to sea connectivity

C.4.1 Introduction and context

Coastal areas have the highest population densities in the world and are developing and urbanising faster than inland areas. They are also among the most productive and biodiverse environments, with significant and often underrated carbon storage potential, i.e. coastal blue carbon, captured by coastal ecosystems. However, they are subject to a long history of environmental degradation, which is exacerbated by climate change. For example, rising sea levels cause coastal erosion and loss of soil fertility in coastal areas due to infiltration of salty water in the aquifers. Similarly, dams and barrages upstream in many European rivers have reduced the natural transport of sediments from mountainous areas towards the sea, which leads to the retreat of deltas and the loss of fertile land to the sea. Any restoration and management intervention in the coastal transition areas between land and sea needs to consider the river-coast-sea continuum.

Large-scale coastal restoration of ecosystems such as coastal marshes, seabed meadows and coastal dunes, can provide low-carbon adaptation to climate change (reduce erosion and flooding risk) and at the same enhance biodiversity and coastal blue carbon, which is highly efficient when compared to other terrestrial ecosystems. The restoration of coastal ecosystems is thus an example of a Nature-based Solution, which are solutions that are inspired and supported by nature, are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience and address societal challenges.

A coordinated approach will be used for the various pilot studies in Europe and early warning systems will be developed to improve coastal sustainability and prevent the effects of storms, such as Storm Gloria in 2020 or future storms that could cause a considerably higher sea level than at present.

C.4.1.1 Location

The project has nine pilots in the main EU regional seas (Baltic, Black, North, Atlantic and Mediterranean) and present different biodiversity (BDV) targets, i.e. habitats and species of conservation interest targeted by restoration (e.g. sea grasses, marine seagrasses, birds, wetland birds, water birds, etc.). They are located in different countries all across Europe (Netherlands, Spain, Poland, Italy, Bulgaria, France) and Israel.

In addition, three sites will benefit from large-scale restoration actions (the Ebro Delta on the Spanish Mediterranean coast; the Wadden Sea shared between the Netherlands, Germany and Denmark; and the Venetian Lagoon in the Adriatic). In addition, the project will study a lagoon in the Baltic, a bay in the Black Sea, the Rhone Delta and the Bay of Arcachon on the French Atlantic coast, the low coasts of Sicily and Nahal Dalia on the coast of Israel.

C.4.1.2 Year of completion (or extent of completion in 2021)

1 October 2021 - 31 March 2026 (the kick-off meeting was organised in Barcelona between 2 and 5 November 2021).

C.4.1.3 Brief overview of the case study

The EU-funded REST-COAST project (standing for Large scale RESToration of COASTal ecosystems through rivers to sea connectivity) aims to reduce coastal risks, improve biodiversity and develop coastal blue carbon to mitigate climate change. It will demonstrate the potential of upscaled restoration of coastal ecosystems on the river-delta/estuary-coast continuum, such as marshes, seabed meadows and coastal dunes. REST-COAST will overcome technical, economic, governance and social barriers to the upscaling of restoration and thus reinstate the perturbed river-to-coast connectivity and increase the resilience and delivery of coastal ecosystem services (ESS), such as risk reduction, environmental quality and fish provisioning. These ESS touch urgent coastal problems such as the erosion/flooding during recent storms or the accelerating coastal habitat degradation that seriously affects fisheries and aquaculture.

Building on the nine pilots and combining new techniques, risk assessments, innovative financial/governance arrangements and homogeneous metrics for ESS and biodiversity, the multidisciplinary REST-COAST project will develop a **systemic approach to coastal restoration based** on a scalable **coastal adaptation plan**. The plan will underpin a transformative change in governance and policies, proving the importance of the coastal dimension in the EU Green Deal, facilitating large scale restoration projects, and introducing coastal ESS into national and international policies. Through the work with the pilots and the increase of ecosystem services, REST-COAST will also increase the commitment of citizens, stakeholders and policy makers for a long-term maintenance of coastal restoration efforts.

Project website, deliverables and emails

Website: no project website yet (<https://cordis.europa.eu/project/id/101037097>)

Main deliverables: no deliverables yet

Project manager: Prof. Agustin Sanchez-Arcilla, Maritime Engineering Laboratory (LIM), Universitat Politecnica de Catalunya (Spain)

Email: agustin.arcilla@upc.edu

C.4.1.4 Link to Mission objectives and targets

The REST-COAST project is closely aligned with the mission objective to protect and restore aquatic ecosystems. It contributes specifically to the restoration of coastal ecosystems on the river-delta/estuary-coast continuum and an increase in the delivery of associated ecosystems. The case study in the **Rhone Delta and the Bay of Arcachon** on the French Atlantic coast is particularly relevant for the Atlantic Lighthouse mission objectives.

In addition, the following expected outcomes will be relevant for the mission:

- scalable coastal adaptation plans
- increased understanding on the role of coastal areas for adaptation/mitigation under climate change
- replication of large-scale restoration and introducing coastal ecosystem services into national and international policies.

C.4.2 Main objective of the case study project

The main objective of the REST-COAST project is to demonstrate the **feasibility for systemic, large scale coastal restorations** and increase resilient delivery of coastal ecosystem services. In order to reach this objective, activities are organised in seven work packages:

- WP1 identifies and applies **enablers for upscaling hands-on restoration** of coastal ecosystems in all project pilots;
- WP2 develops **hydro-morpho-eco models with ESS** for risk reduction;
- WP3 designs **policy recommendations and business plans** for restoration;
- WP4 develops **scalable coastal adaptation plans** demonstrated in different pilots and promoted by Restoration Platforms (CORE-PLATs);
- WP5 defines a **roadmap for a shift in governance and policy transformation** based on the pilot's action plans;
- WP6 **disseminates, communicates and exploits** the project results, and designs effective social transformation tools such as a new digital platform and coastal video-game
- WP7 which handles project management and **stimulates cooperation** with other projects.

C.4.3 Funding sources and total budget

The RESTCOAST project is funded through the Horizon 2020 programme under grant agreement No 101037097 (topic H2020-EU.3.5. - SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials).

- Total budget: EUR 18 482 592.50
- EU contribution: EUR 17 823 755.75

Cordis fact sheet: <https://cordis.europa.eu/project/id/101037097>

C.4.4 Actors

C.4.4.1 Main actors and their roles

The REST-COAST project is coordinated by the Universitat Politecnica de Catalunya (Spain) under the lead of Prof. Agustin Sanchez-Arcilla. There are 38 partner organisations representing coastal and marine ecologists, economists and maritime engineers from 11 countries (Germany, Bulgaria, Spain, France, the Netherlands, Italy, Israel, Poland, United Kingdom, Switzerland and Turkey).

Dissemination activities are led by IUCN. Other organisations involved: Fundacio Eurecat, Global Climate Forum e.V., Stichting Deltares, Pensoft Publishers.

Other Spanish partners include Albirem; the Technical University of Madrid; the Ministry of Climate Action, Food and Rural Agenda of the Government of Catalonia and the Catalan Water Partnership (linked to the Ministry); the Spanish Ministry for the Ecological Transition and the Demographic Challenge; and the NGO SEO-Birdlife.

C.4.4.2 Societal/citizen engagement and involvement in the project

The REST-COAST project will work with the nine pilots to increase the commitment of citizens, stakeholders and policy makers for a long-term maintenance of restoration. For example, NGOs, civil society groups and other stakeholders involved in the protection of the Ebro Delta were invited to participate in and provide feedback at the project kick-off meeting that took place in Barcelona between 2 and 5 November 2021.

C.4.4.3 Economic/business aspects

The REST-COAST project will consider the necessary transformation of financial mechanisms to enable the restoration of coastal ecosystems, based on evidence-based results on restoration benefits for the welfare of coastal communities and assets.

The project has a business-driven focus (WP5) and will aim to develop bankable business plans. These will help to design new financial arrangements for upscaling restoration initiatives in the pilots, by public and private parties. Business plans will consider the different enabling conditions (geophysical, political and socio-economic characteristics) of the pilots that would allow the necessary governance transformation. In addition, plans will consider the role of different stakeholders/sectors involved in restoration in the pilots and will consider the transition from local/regional Pilots to worldwide coasts.

Examples of business plans for restoration are a relevant output for future activities in the Atlantic lighthouse mission.

C.4.5 Main results

C.4.5.1 Innovative methods, activities applied/demonstrated

Because the REST-COAST project only started in October 2021, no information about innovation methods and activities is available yet. We are waiting for interviews with the project team to be conducted for this information to be collected, individuals have been identified and feedback is pending.

C.4.5.2 Implementation challenges

Because the REST-COAST project only started in October 2021, no implementation challenges are known yet. Interviews with the project team will be conducted for this information to be collected, individuals have been identified and feedback is pending.

C.4.5.3 Project results: achievement of project objectives

Because the REST-COAST project only started in October 2021, no project results are available yet. Interviews with the project team will be conducted for this information to be collected, individuals have been identified and feedback is pending.

C.4.5.4 Follow up actions and long-term monitoring

No information is available about follow-up actions and long-term monitoring.

C.4.6 *Implications for Mission activities*

C.4.6.1 Potential and hindrances for replication and upscaling

At this stage and until interviews are conducted, we can only highlight the expected pros and cons of this project as a lighthouse mission flagship case study.

PROS:

- The project covers a large share of the Atlantic Sea-Basin, and its results will indeed be useful to future lighthouse initiatives in the Atlantic region.
- The project focus is very relevant and will demonstrate the feasibility for systemic, large-scale restoration on river-delta/estuary-coast continuum and increase the nearshore accommodation space for the resilient delivery of coastal ecosystem services (ESS).
- Different ESS (e.g. risk reduction, environmental quality and fish provisioning) which suffer from coastal problems, such as the erosion/flooding during recent storms or the accelerating coastal habitat degradation and biodiversity losses that seriously affect fisheries and aquaculture.
- Nine exposed Pilots that represent the main EU regional seas (Baltic, Black, North, Atlantic and Mediterranean) making the project results relevant for other lighthouse missions.
- REST-COAST will strengthen transformation of governance and investigation of financial mechanisms, built upon the results from hands-on restoration at the Pilots, and will provide evidence-based results on restoration benefits for the welfare of coastal communities and assets.

CONS:

- The project just started four months ago. There are no results yet and no information about its plans (no project website yet) – complex to align with our calendar.
- Too wide a geographical coverage compared to our project.
- Focus on Climate Change which is out of our scope in the Atlantic.
- Outputs may be relevant, but there is no direct piece of evidence for its contribution to Mission objectives. Although, the list of expected deliverables still needs to be reviewed.

C.4.6.2 Conclusions and lessons learnt

Interviews have yet to be conducted for this information to be retrieved, individuals have been identified and feedback is pending.

References :

<https://cordis.europa.eu/project/id/101037097>

https://twitter.com/RESTCOAST_H2020

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C.5 Case study 5: ECOTIP – Investigating ecological tipping points and cascades in the Arctic seas

C.5.1 *Introduction and context*

C.5.1.1 Location

The ECOTIP project is being implemented in Greenland and in the wider European Arctic region. The four geographic areas of focus are Eastern and Western Greenland, the Barents Sea, and the Fram Strait.

C.5.1.2 Year of completion (or extent of completion in 2021)

Started in June 2020, the ECOTIP project is due to be completed in May 2024.

C.5.1.3 Brief overview of the case study

ECOTIP – “Investigating ecological tipping points and cascades in the Arctic seas” is an interdisciplinary research project that combines different spatiotemporal scales, different approaches, and multiple trophic levels and their interactions focusing on understanding and predicting changes in Arctic marine biodiversity and implications for two vitally important marine ecosystem services: fisheries production, which is the economic lifeblood of many Arctic communities, and carbon sequestration, which has important feedback to the global climate. The project combines state-of-the-art field and laboratory studies, analysis of historical and paleo-oceanographic data and trait-based modelling to predict the potential tipping points of key biological ecosystem functions in Arctic seas in the face of climate change and other pressures. ECOTIP works closely with fishing communities in Greenland and other stakeholders to understand the effects of biodiversity and ecosystem changes on society, and how best to reduce, mitigate and adapt to the changes.

Project website, deliverables and emails

Website: <https://ecotip-arctic.eu/>

Main deliverables: ECOTIP deliverables to date include peer-reviewed scientific journal articles, progress reports, poster presentations, flyers and videos. The deliverables are publicly accessible on either the [dedicated page](#) on the ECOTIP project website or on the open-access repository [Zenodo](#).

Project manager: Dr. Marja Koski, Technical University of Denmark

Email: mak@aqua.dtu.dk

The information included in this case study was collected on the ECOTIP project website and in the 18-month progress report, as well as through a semi-structured interview conducted on 11 March 2022 with Dr. Marja Koski (Project coordinator). The case study was reviewed by Dr. Marja Koski.

C.5.1.4 Link to Mission objectives and targets

Objective 1 of the EU Mission “Restore our Ocean and Waters by 2030” is to “Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030”. For the Atlantic/Arctic lighthouse area, the specific targets under objective 1 are to:

- I. Protect a minimum of 30 % of the EU’s sea area and integrate ecological corridors, as part of a true Trans-European Nature Network.
- II. Strictly protect at least 10 % of the EU’s sea area.
- III. Contribute to relevant upcoming marine nature restoration targets including degraded seabed habitats and coastal ecosystems.

With its overarching objective to map out past and present Arctic biodiversity and its response to external drivers, as well as the effects of expanding commercial activities in the region under expected climate change, the ECOTIP project is particularly relevant to objectives 1 and 2 of the Mission Restore our Ocean and Waters by 2030 – with a geographical focus on the Atlantic/Arctic lighthouse area. Although

the objective of the ECOTIP project is not the implementation of protection and/or restoration actions of marine/coastal biodiversity and ecosystems per se, the mapping of past and present Arctic biodiversity and its response to external drivers, as well as the effects of expanding commercial activities in the region under expected climate change is key to guiding evidence-based protection and restoration actions under the aegis of the Mission Restore our Ocean and Waters by 2030 in order to meet targets (i) “Protect a minimum of 30 % of the EU’s sea area and integrate ecological corridors, as part of a true Trans-European Nature Network”, (ii) “Strictly protect at least 10 % of the EU’s sea area” in line with EU Biodiversity Strategy for 2030.

C.5.2 *Main objective of the case study project*

The overarching objective of the ECOTIP project is to map out past and present Arctic biodiversity and its response to external drivers (with the aim of understanding how functional biodiversity is connected to ecosystem functions and services), as well as the effects of expanding commercial activities in the region under expected climate change. The project is investigating the resistance, resilience, and persistence of key ecosystem components to multiple anthropogenic stressors and estimating their potential tipping dynamics. ECOTIP uses a trait-based approach in process studies, empirical analysis, and numerical models as a novel means of quantifying functional diversity to predict how different anthropogenic forcing scenarios (including climate, invasive species, pollution, exploitation) are changing biodiversity, productivity, and ecosystem services. The project engages with indigenous societies and Arctic European citizens to provide recommendations for optimising the monitoring of Arctic biodiversity and ecosystem services, identify adaptation strategies, promote international collaboration, and support Europe’s endeavours to implement the Paris Agreement and Sustainable Development Goals.

The five specific objectives of the ECOTIP project are to:

- Map the current biodiversity of Arctic marine ecosystems and its past and present interaction with external drivers (multiple stressors), using traits as a measure of functional diversity.
- Investigate the vulnerability of marine communities (with different trait compositions), functions and ecosystem services to multiple climatic and non-climatic stressors, and to determine their potential for ecosystem tipping points.
- Use the analysis of functional (trait) diversity to predict a) changes in the local production and type of fisheries, and b) in carbon sequestration by biological pump under multiple anthropogenic stressors.
- Engage in dialogue and co-creation of alternative governance structures and adaptation strategies for the local and indigenous communities, as well as industries and regulatory authorities.
- Ensure effective exploitation of project results in international scientific assessments of Arctic biodiversity change and by policymakers; ensure dialogue, communication and dissemination to indigenous societies and European citizens; and provide recommendations for optimising the monitoring of Arctic biodiversity and ecosystem services.

C.5.3 *Funding sources and total budget*

The ECOTIP project is funded through the Horizon 2020 programme under grant agreement no. 869383 (topic LC-CLA-07-2019 “The changing cryosphere: uncertainties, risks and opportunities”¹⁶¹).

- Total budget: EUR 6 361 535.75
- EU contribution: EUR 6 361 535.75

Cordis fact sheet: <https://cordis.europa.eu/project/id/869383>

¹⁶¹ Focusing on marine areas, the ECOTIP project is being funded under the same call as the [CHARTER](#) and [FACE-IT](#) projects (the latter being the other case study project included in this baseline study for the Arctic sub-lighthouse area), respectively focusing on terrestrial and coastal fjord areas in the Arctic region. Substantial linkages have been developed between these three research projects from project development to ongoing implementation.

C.5.4 Actors

C.5.4.1 Main actors and their roles

ECOTIP brings together 15 institutions from across Europe and Japan.

- Coordinating institution: Technical University of Denmark, National Institute of Aquatic Resources, DTU Aqua
- Partner institutions:
 - Aalborg University (Denmark);
 - Aarhus University (Denmark);
 - Åbo Akademi University (Finland);
 - Greenland Institute of Natural Resources (Greenland);
 - GRID-Arendal (Norway);
 - Helmholtz-Zentrum Hereon (Germany);
 - Hokkaido University (Japan);
 - Institute of Oceanology – Polish Academy of Sciences (Poland);
 - Marine and Freshwater Research Institute (Iceland);
 - The Arctic University of Norway (Norway);
 - University of Copenhagen (Denmark);
 - University of Stirling (United Kingdom);
 - University of Vienna (Austria);
 - University of Tokyo (Japan);
 - Bedford Institute of Oceanography (Canada);

C.5.4.2 Societal/citizen engagement and involvement in the project

Societal/citizen engagement is an important component of the ECOTIP project. Societal/citizen engagement is in particular central to work package (WP) four of the project, “Socio-economic consequences of biodiversity changes and evaluating adaptation options”. The particular objectives of WP4 are to:

- Establish effects of changing biodiversity and distributions of commercially key important species (e.g., cod, Greenland halibut, mackerel) on coastal and off-shore business and infrastructure, local communities, indigenous life-style, national government and international relations.
- Assess the ability of management structures and regulatory frameworks to adapt to ecosystem changes and provide recommendations for developing adaptation strategies in relation to the changes in the Arctic ecosystems on both the inshore- and the offshore context.
- Investigate how the fishing fleet adapts to changing conditions (including market changes and ecosystem fluctuations) and utilise this knowledge to formulate models on how the activity depends on such factors.

As part of this WP, societal/citizen engagement is being achieved by co-producing knowledge together with local Arctic communities (e.g., Greenlandic fisheries communities), who are being engaged along the project through diverse stakeholder workshops. One of the purposes of these workshops is to elicit stakeholders and communities' local ecological knowledge (LEK) of changes occurring in the marine and coastal environment (e.g., algae bloom, sea currents, salinity, and temperature; glacier meltwater output; plastic pollution; the behaviour and state of fish stocks; etc.) and to better comprehend the adaptive pathways adopted by these

stakeholders and communities in order to pursue their activities and livelihoods. The collection of data through participatory workshops throughout the implementation of the project further enables the development of Bayesian networks. These are being used to establish causal links between changes in ecological processes and in the provision of ecosystem services, and thereby assessing the resulting socio-cultural and economic impacts on relevant stakeholders and communities by testing different scenarios – not only drawing upon scientific data but also on LEK.

Importantly, against the backdrop of local community fatigue to research being conducted in the Disco Bay (Western Greenland), it was also decided by the ECOTIP research team to avoid conducting interviews and field work in that area, as it is currently overexposed to research projects. Instead, the Association of Fishermen and Hunters in Greenland (Kalaallit Nunaanni Aalisartut Piniartullu Kattuffiat – KNAPK) has communicated that people living both North and South are requesting more attention from researchers. This has led ECOTIP researchers to focus their research on 1) Nuuk (mid-Western Greenland); 2) Nanortalik (Southern Greenland) 3) pelagic fisheries in Eastern Greenland; and 4) Uummannaq or Upernivik (Western Greenland). Furthermore, ECOTIP researchers attended several meetings jointly organised with the FACE-IT project (see section 1.3.) with the aim of coordinating the social sciences fieldwork and harness existing synergies between projects in engaging local communities – and to avoid over-soliciting local stakeholders and communities. Interviews with coastal fishers have been conducted in Nuuk in connection with a literature review of LEK, while the offshore industry's (including the pelagic fishery) perceptions of change and adaptation over the past 10 years have been collected in connection with the stakeholder workshop. Two interview rounds in North and South Greenland are to be conducted during 2022, as field work among Greenlandic communities has been delayed due to COVID-19 travel restrictions.

As part of ECOTIP, societal/citizen engagement is also central to WP5 “Data management, communication, dissemination and exploitation”. The particular objectives of WP5 are to:

- Ensure efficient and meaningful communication and engagement with Arctic Indigenous communities and other relevant target groups.
- Ensure optimal dissemination and exploitation of synthesised project outcomes to address knowledge gaps and inform international scientific assessments.
- Provide added-value to decision- and policymakers by disseminating possible adaptation strategies for scenarios of change.
- Provide recommendations for optimal Arctic biodiversity and ecosystem services monitoring efforts.

As part of this WP, societal/citizen engagement to date has been achieved through the organisation of workshops engaging diverse stakeholders and communities in Greenland (e.g., the industrial offshore and local inshore fisheries with the help of the Greenland Institute of Natural Resources – GINR) throughout the project.

One unplanned yet noteworthy communication highlight of ECOTIP has been the presence of Danish high-school teachers onboard the ship R/V Dana. Indeed, during the ECOTIP research cruise to West Greenland (see section 1.5.2. further down for more details on the research cruises), 18 high-school Geography and Biology teachers from Denmark joined the research activities conducted at sea along a transect from Hirtshals (Denmark) to Reykjavik (Iceland), together with three researchers from the Technical University of Denmark (DTU). The activities included investigating ocean food webs and the central role of plankton therein. The research cruise kick-started the UN Decade of Ocean Science for Sustainable Development from ECOTIP's part. By inviting high-school teachers to join the research cruise, it was hoped that the knowledge acquired by the teachers would be further transmitted to high school students – who may one day later decide to pursue their education in oceanography. The teachers who participated indeed submitted a lesson plan on the changing oceans to the Danish high-school teachers union.

C.5.4.3 Economic/business aspects.

The ECOTIP project does not include an economic/business component as such. In the framework of ECOTIP, economic/business aspects are entangled with the societal/citizen engagement of specific commercial stakeholders (e.g., fisheries stakeholders) in the project execution, as emphasised under WP4 (see subsection 1.4.2.). One important task of ECOPTIP in that regard is the mapping and organisation of fishing structures and dynamics. This task is seeking to identify some of the existing problems pertaining to Greenlandic fisheries and to explore potential solutions for improving the economic performance of the fishing fleet. Fish landings and market price statistics have been compiled through a desktop study. One of the identified issues in the Greenlandic fishery is related to the low first-hand price of Greenlandic cod – in

comparison to the Norwegian cod. Fish price fluctuation constitutes an important factor that must be taken into consideration in the formulation and implementation of fisheries' policies.

ECOTIP has been investigating the reasons behind the low market price of cod, including abrupt changes in resource abundance as well as the power monopoly prevalent within the Greenlandic fishery. By producing and analysing models on the dependence of fishing fleets to changing Arctic ecosystem conditions, the ECOTIP project has a direct significance for the commercial stakeholders involved in the project – both in the short- and longer term, as the co-produced knowledge will serve the guidance of adaptation strategies that are integrating the needs of stakeholders and communities that are operating both on- and offshore.

C.5.5 *Main results*

C.5.5.1 Innovative methods, activities applied/demonstrated

The ECOTIP project involves the use of manifold innovative methods and activities including:

- The use of new molecular methods on environmental DNA ("eDNA") for detecting invasive species in the Arctic. eDNA refers to environmental DNA, DNA that can be collected from the environment (e.g., water samples). The usage of eDNA for species monitoring is revolutionary as it saves time, costs, and workload without impairing neither the target organism nor the ecosystem.
- The application of the latest developments in paleo-oceanography by examining sediment cores to peer into the past one thousand years with the aim of providing new insights on the effects of multiple stressors and the speed of recovery in marine biodiversity.
- The application of the traits-based approach to the analysis of changes in Arctic biodiversity and associated ecosystem consequences. This approach helps to overcome the challenge that a large amount of arctic marine species remains unknown. A trait-based approach further allows for the development of realistic scenarios of biodiversity change as a response to multiple anthropogenic stressors, since the likelihood of regime shifts, changes in food web interactions, or the stability of the ecosystem can be studied as a function of trait composition.
- The co-production of knowledge with local communities living in the Arctic. The ECOTIP project is working with fisheries communities and other groups in Greenland and beyond, drawing upon LEK, while bringing in scientific research insights into invasive species and their monitoring, ecosystem service changes, predictions of ecosystem tipping cascades, as well as socio-economic modelling and forecasting. This two-way process is aimed at enhancing the current knowledge on the possible future of Arctic ecosystems and supporting the co-production of climate change adaptation scenarios.
- The development of Bayesian networks – a type of probabilistic graphical model that uses Bayesian inference for generating probability computations. Bayesian networks can be used to predict ecosystem vulnerability through testing of different stressor combinations. As part of the ECOTIP project, Bayesian networks are also being used as a knowledge-driven tool to interact with key actors and target groups, for example by exploring various ecosystem change scenarios.

C.5.5.2 Implementation challenges (proposed addition)

Maintaining a sense of cohesion in a large interdisciplinary research project like ECOTIP can be a tremendous challenge; this is in particular so when project success requires the integration of (i) process studies and time series to understand how multiple anthropogenic stressors influence ecosystem functions; (ii) ecological and socio-economic data to understand how changes in marine ecosystems influence human societies; and (iii) observations and models to predict future exosystemic changes. For another, it may also be challenging to integrate data management and communication for the ongoing research into the project at hand. ECOTIP has approached these challenges by:

- i. Identifying central topics or "storylines" – aimed at improving the focus of the research to maximise the exploitation of the results, to ensure collaboration within the project and integration between the WPs, and to facilitate the connection with relevant stakeholders, as well as communication in general – that encompass the studies being conducted under different WPs. Storylines help both in identifying the key questions from the perspective of different recipient stakeholder groups (including assessment groups, policymakers, etc.) and in clarifying the project concepts with the aim of optimising research being conducted as part of ECOTIP. In addition, storylines help to identify the links between WPs and tasks. During the first 18 months of implementation, the ECOTIP project team has been focusing on six storylines: benthic-pelagic coupling; capelin as trophic link; lipid pump – fate of lipids and implications for upper

- trophic levels; invasive species; socio-economics – above surface vs. below surface; and time series.
- ii. Setting up task forces around central methods being used as part of the project – trait-based and Bayesian modelling (see section 1.5.1. above), and observational activities (both time series and process studies). To ensure optimal communication between the observational work and models, the ECOTIP project team has formed separate task forces to develop Bayesian concepts and to provide insights and verification for trait-based models. These groups have been meeting in workshops in connection with annual project meetings, as well as in several online meetings. The Bayesian groups include, for instance, the development of a conceptual model on the dynamics of sinking aggregates, which will contribute to the understanding of the biological carbon pump, and the development of links between the physical and biological environment and capelin distribution. Trait-based modelling has progressed on two fronts, a mechanistic approach focused on microbial traits and plankton communities, and a statistical approach for fish communities.
- iii. Organising two dedicated research cruises for ECOTIP researchers to come together for investigating key processes such as benthic-pelagic coupling, food web transfer efficiency or sediment-water column exchange of nutrients. The first ECOTIP cruise, conducted in July 2021, focused on the north-south and offshore-onshore transects along the coast of Western Greenland. The first ECOTIP cruise included measurements of hydrography, water chemistry, phytoplankton biomass, microbial diversity and metabolism, biomass and community structure of zooplankton, benthic invertebrates and larval fish, measurements of vertical flux and metabolic rates of zooplankton, and sampling for paleo-oceanography. The research cruise sampled at 25 stations, along five onshore-offshore transects between Nuuk and Qeqertarsuup tunua. The second ECOTIP research has been taking place along the coast of Eastern Greenland during August 2022.

In addition, the project has actively been seeking to establish research collaborations with relevant projects and clusters across the Arctic region with the aim of harnessing synergies as part of the conduction of rights- and stakeholder workshops, educational activities and research activities in general. Such collaborations have been particularly intensive and fruitful with the FACE-IT project. Collaborations between the ECOTIP and FACE-IT projects span diverse activities, from field work to data management to communication with relevant stakeholders, communities and decisionmakers.

The ECOTIP project has, over the past 18 months, also been confronted with more specific practical challenges. These have included the spread of the COVID-19 pandemic from 2020 onwards and associated social distancing measures, which have in particular impacted the social sciences dimension of the research (e.g., stakeholder consultations have as a result initially had to be conducted online – when not postponed); and research fatigue of local Greenlander communities being over-solicited as part of diverse relevant research projects and who often perceived a lack of tangible outcomes for them (see section 1.4.2.).

C.5.5.3 Project results: achievement of project objectives

18 months into the ECOTIP project, important steps have been achieved. To date, the main project results against each of the five specific objectives of ECOTIP are the following:

- 1) Mapping the current biodiversity of Arctic marine ecosystems and its past and present interaction with external drivers (multiple stressors), using traits as a measure of functional diversity.

ECOTIP aims to map trait diversity at all trophic levels, from microbes to fish, including non-indigenous (NIS) species and pre-historical communities from paleo records. To form the basis, microbial, plankton, benthic, fish and paleo-oceanographic communities have either been sampled during field campaigns or assessed based on diverse literature records. To be able to assess trait compositions of the groups of interest, ECOTIP organised a trait-based workshop to discuss the key traits that should be included in the project's trait-based models. The workshop was particularly focused on microbial traits, which have not been assessed before, but which are likely to have an important role in for instance the effectiveness of the biological pump. The traits of NIS have been discussed as part of the invasive species "storyline" group (see section 1.5.2.), and a trait analysis of potentially invasive copepod species in the arctic is in preparation. Trait analyses of benthic communities in the Fram Strait and of fish communities in Greenland have been conducted, based on existing data. The new insights on the trait composition of Arctic communities will feed into the trait-based models analysing the potential changes for the biological pump and fisheries' production.

To investigate the past and present interactions between biodiversity and external drivers, ECOTIP considers both climatic and non-climatic drivers of biodiversity change, focusing on climate change (i.e. changes in temperature; salinity; oxygen; and pH) and pollution by metals. Available data for environmental drivers and composition of marine communities at different time scales have been mapped, collected, and discussed in

a data workshop that was organised in connection to the annual project meeting. Interactions of these drivers with biodiversity – in particular trait diversity – are currently being analysed for several trophic levels and have already resulted in a number of scientific peer-reviewed publications (see open-access repository Zenodo) and submitted manuscripts. The insights that will be obtained from these correlative analyses will be used in model predictions and compared to the results of the experimental work. The correlative analysis has also been complemented by individual-based multiple stressor experiments conducted in the laboratory, where selected copepod species have been exposed to different combinations of temperature, salinity, and contaminants (currently lead, microplastics, and mercury) stress.

- 2) Investigating the vulnerability of marine communities (with different trait compositions), functions and ecosystem services to multiple climatic and non-climatic stressors, and to determine their potential for ecosystem tipping points.

With the aim of advancement from linking stressors and biodiversity towards investigating the vulnerability of ecosystem functions and services, ECOTIP has conducted process studies, combined with different modelling exercises. A large part of this work was conducted during the ECOTIP research cruise (see section 1.5.2. further down for more details). Besides the sampling for stressors and biodiversity at different trophic levels (see point one above), the cruise has in particular been focusing on investigating the pelagic-benthic coupling and the biological pump. This was done by combining the measurements of vertical distribution of pelagic biomass and metabolic rates with the measurements of sedimentation and benthos. The investigations addressed the production of sinking particles (size structure of chlorophyll a; zooplankton faecal pellet production; and vertical distribution of zooplankton carcasses), active carbon transport (vertical distribution of zooplankton and their lipid composition), degradation of sinking particles (microbial degradation and zooplankton feeding on aggregates), quality and quantity of sinking flux (sediment traps) and benthic biomass and community structure under a variety of environmental conditions, represented by onshore-offshore and south-north gradients. Once analysed, these results will allow for a direct linking of the environmental forcing, community structure, benthic-pelagic coupling, and the efficiency of the biological carbon pump. Similarly, the research cruise (see sections 1.4.2. and 1.5.2.) also included intensive sampling of fish larvae, which, combined with the analysis of the phytoplankton and zooplankton size-structure and biomass, will allow the environmental conditions to be linked to trophic efficiency and fish recruitment.

Understanding the link between multiple stressors, biodiversity and ecosystem functions and services has also been developed through Bayesian modelling groups, aiming to conceptualise chains of events that result in, for instance, changed efficiency of the biological pump or different distributions of fish. Discussion on the dynamics around a sinking particle have resulted in a conceptual model investigating the stoichiometry and quantity of sedimentation flux as a function of the processes that produce and degrade the sinking aggregates, which is currently being tested with data from the Barents Sea. A Bayesian approach, together with the trait-based models (see point three below), will in the future be used to test whether changes in functional diversity can result in changes in ecosystem functions and services that could be described as possible ecosystem tipping points.

- 3) Use the analysis of functional (trait) diversity to predict a) changes in the local production and type of fisheries, and b) in carbon sequestration by biological pump under multiple anthropogenic stressors.

The work undertaken during the first 18 months of the project has laid a basis for predicting both changes in the local production and type of fisheries, and in carbon sequestration by biological pump under multiple anthropogenic stressors. Collecting and analysing data series relating biodiversity and trait diversity to multiple stressors and obtaining new insights of the processes contributing to fisheries (e.g., production, trophic transfer efficiency and pelagic-benthic coupling) and to the biological pump (e.g., export flux, its production and degradation) combined with the development of a model will allow for these predictions to be made during the next project period.

- 4) Engage in dialogue and co-creation of alternative governance structures and adaptation strategies for the local and indigenous communities, as well as industries and regulatory authorities.

Socio-economic work conducted as part of ECOTIP has thus far included mapping of 1) the previous studies of the governance systems of Greenland fisheries and their adaptation to climate change; 2) the previous reports on Greenlandic stakeholder perceptions of risks and opportunities in relation to biodiversity, climate change and fisheries; 3) fish landings and market prize statistics; 4) an overview of the current governance structures for Greenlandic fisheries and recent changes in management and regulations, including the ongoing process of formulating recommendations for a new reform for governance of Greenlandic fisheries and; 5) previous studies on the existing LEK in the study area. These desktop studies have formed the basis for the first stakeholder interactions, which culminated in a workshop during the Greenland Science Week organised in Nuuk in November 2021.

The stakeholder workshop and diverse online meetings provided input to the design of the field work and interviews being conducted. For instance, it was suggested during this workshop that south and north Greenlandic communities were understudied, whereas the Qeqertarsup tunua area was suffering from fatigue of being over-solicited by researchers as part of diverse projects (see section 1.4.2.). Also, the communities in the north, as well as the industry, experience more and diverse opportunities. The field work was re-designed to accommodate these changes. Currently, the first interviews with fishers and the fishing industry in Nuuk have been conducted, focusing both on LEK, perception of changing opportunities and governance. The remaining interviews are scheduled for 2022. Therefore, although stakeholder interaction in ECOTIP has been suffering from COVID-19-related delays as the access to the local and indigenous communities has at times been restricted, the dialogue has been initiated and is ongoing.

- 5) Ensure effective exploitation of project results in international scientific assessments of Arctic biodiversity change and by policymakers; ensure dialogue, communication and dissemination to indigenous societies and European citizens; and provide recommendations for optimising the monitoring of Arctic biodiversity and ecosystem services.

The following actions have been implemented as part of ECOTIP in order to reach important target groups for project results:

- To reach international assessment groups and panels such as the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the International Council for the Exploration of the Sea (ICES), or the Arctic Council, ECOTIP has ensured effective and transparent data management and storage, which will facilitate the use of ECOTIP data beyond the project period (2020-2024). ECOTIP has also been directly communicating with the Arctic Council's Working Group on the Protection of the Arctic Marine Environment (PAME) and with the ICES Working Group on Integrated Ecosystem Assessment of the Greenland Sea (WGIEAGS), to inform these groups about the research activities being conducted as part of ECOTIP and to receive input on these groups' data needs. Moreover, ECOTIP contributed to the report of the UNESCO-IOC working group on Integrated Ocean Carbon Research (IOCR), which provides recommendations for addressing knowledge gaps identified by the IPCC.
- To cluster and exchange information with related research projects, ECOTIP has established collaborations with the Horizon 2020 projects CHARTER, COMFORT and FACE-IT, among other projects. In addition, ECOTIP is participating in the different working groups of the EU Polar Cluster and has participated in diverse seminars of different EU projects dealing with Arctic ecology and/or socio-economy. Furthermore, the ECOTIP project team participated in the organisation of a session on biodiversity during the ESA-EU Polar Science Week. These clustering activities have resulted in active research collaborations, and will, particularly towards the end of the ECOTIP project, strengthen the impact of the project on policymakers, indigenous societies and European citizens, as well as guide the development of future research programmes and the orientation thereof.

C.5.5.4 Follow up actions and long-term monitoring

As the ECOTIP project is still under implementation until 2024, no follow up actions nor long-term monitoring have been established at the time of writing. However, as noted in the preceding section, all the data collected as part of ECOTIP could be used by the different assessment and/working groups under ICES and PAME, as well as feed into the IPCC Assessment Reports with the aim to better integrate marine biological processes. Upon completion of the project, follow up actions and monitoring will build upon links and interactions established between ECOTIP and other geographically and thematically relevant projects, such as the CHARTER and FACE-IT projects.

C.5.6 *Implications for Mission activities*

C.5.6.1 Potential and hindrances for replication and upscaling

The diverse methods and activities applied as part of the ECOTIP project hold great potential for being replicated across sites within the Arctic part of the Atlantic/Arctic Lighthouse Area and are of great relevance to the future implementation of the Mission 'Restore our ocean and waters by 2030'. From a social sciences perspective, one method applied as part of ECOTIP that has great potential for replication across locales – as part of social sciences and/or interdisciplinary projects – is the co-production of knowledge by scientists together with local communities and stakeholders, resource-users and other rightsholders. Knowledge co-production and the integration of scientific and local ecological knowledge indeed has the potential to enhance the understanding of social-ecological changes taking place in the Arctic, including the effects of possible ecosystem tipping cascades on marine ecosystem services and dependent livelihoods, and to better inform and guide decision-making pertaining to the protection and/or restoration of the marine and coastal

environment in the region. From a natural sciences perspective, the replication of the diverse methods applied as part of the ECOTIP project (i.e., eDNA, paleo-oceanography, the traits-based approach, and Bayesian networks) will have to be carefully considered based on the needs of and relevance to the activities and objectives of the Mission ‘Restore our ocean and waters by 2030’, including the specific marine and/or coastal ecosystem(s) at stake.

At the same time, the replication (or not) of activities conducted as part of ECOTIP – for instance with the intent of reducing uncertainties about project findings by collecting additional data at other sites, must be guided, and informed by the past and ongoing implementation of other relevant projects, including projects being implemented as part of the EU Polar Cluster. This would indeed help avoiding the costly and unnecessary duplication of past and ongoing research activities where data is already sufficiently available to guide the protection and restoration of the marine and coastal Arctic environment under the future Mission, as well as avoiding research fatigue experienced by over-solicited communities, as encountered by the ECOTIP project team. The scale of the replication of the activities and methods applied as part of ECOTIP will need to be guided by the research objectives of the future project(s) being implemented, and not merely by national and/or European policy objectives. Replication and upscaling of large interdisciplinary research projects such as ECOTIP within a Lighthouse Area represents a tedious and costly effort. In addition, biological observations and data sampling cannot be conducted in all European Arctic marine areas due to their remoteness. It is therefore necessary for scientists and policymakers to rely on extrapolations for the areas that cannot be accessed for data collection processes, thus calling for developing mechanistic approaches for understanding the functioning of ecosystems and changes thereof (e.g., by adopting trait-based instead of taxonomic approaches), as the ECOTIP project is currently developing and implementing.

For another, an important element that must be kept in mind regarding such a large interdisciplinary and international project when seeking to replicate and/or scale it up is the important resources required for the coordination and implementation of its research activities. Hence, while the potential for replication of the ECOTIP project certainly exists, the relevance of this replication process should carefully be assessed. As such, it may be of interest to rather extend the implementation time frame of existing projects such as ECOTIP and the research activities being implemented thereunder, rather than seeking to fully replicate the project at other sites – i.e., scaling up. This would further allow for the development of more extensive time series of social-environmental changes, which should both build upon and feed into ongoing assessments of the state of the Arctic coastal and marine environment that are being conducted by relevant assessment groups under for instance the Arctic Council, the ICES, the OSPAR convention, as well as the IPCC.

C.5.6.2 Conclusions and lessons learnt

This case study of ECOTIP comes early in the project time frame (i.e., 22 months into project implementation) and thus only provides a glimpse of the activities being implemented and of the results already achieved by the project to date. The case study nonetheless laid out the project’s state of play with relevance to the Baseline study for the implementation of lighthouses of the Mission ‘Restore our ocean and waters by 2030’ and the relevant mission objectives and targets. Seeking to map out past and present Arctic biodiversity and its response to external drivers, as well as the effects of expanding commercial activities in the region under expected climate change, ECOTIP constitutes another excellent example of a research project being successfully implemented, which may guide the future implementation of the Mission ‘Restore our ocean and waters by 2030’ in the Arctic part of the Atlantic/Arctic lighthouse area.

Interdisciplinary and international research projects have the advantage of addressing pressing social-environmental issues such as climate change and its impacts on human and non-human nature holistically rather than in closed disciplinary silos. This is evidenced in the five objectives of the ECOTIP project to (i) map the current biodiversity of Arctic marine ecosystems and its past and present interaction with multiple stressors, (ii) investigate the vulnerability of marine communities, functions and ecosystem services to multiple climatic and non-climatic stressors, (iii) predict changes in the local production and type of fisheries, and carbon sequestration by biological pump under multiple anthropogenic stressor; (iv) engage in dialogue and co-creation of alternative governance structures and adaptation strategies for the local and indigenous communities, as well as industries and regulatory authorities; and (v) ensure effective exploitation of project results in international scientific assessments of Arctic biodiversity change and by policymakers, as well as dialogue, communication and dissemination to indigenous societies and European citizens while providing recommendations for optimising the monitoring of Arctic biodiversity and ecosystem services. Such integration of social and ecological dimensions is key to informing the design and implementation of future activities and projects as part of the future Mission Restore our ocean and waters by 2030. As underlined in the preceding subsection, however, the replication and upscaling of research projects such as ECOTIP as part of the implementation of the Mission Restore our ocean and waters by 2030 in the Arctic region must be carefully weighted based on data and knowledge needs.

In this respect, two main lessons can be learnt from the ECOTIP project at the time of writing. First, the need for further enhancing the understanding of ecological processes (e.g. by adopting mechanistic approaches)

rather than seeking to merely replicating data collection campaigns at new sites. Second, the importance for activities and projects to be rolled out as part of the future Mission Restore our ocean and waters by 2030 in the Arctic region to build upon existing and develop novel complementarities and synergies with both past and ongoing research activities and projects of geographic and thematic relevance. In this regard, the unique research collaboration developed and sustained by the CHARTER, FACE-IT, and ECOTIP projects allows for the investigation of social-ecological changes taking place along the entire land-sea continuum in the Arctic region, and to jointly disseminate project results for enhanced policy impact. This would further allow for the best scale and decision-making level through which to implement protection and/or restoration interventions within the Arctic lighthouse area to be identified. Considering this, it is advisable for the European Commission to look for synergies rather than to seek mere replication and scaling up of research activities aimed at further co-producing knowledge about Arctic social-ecological changes and the possible effects of ecosystem tipping cascades on marine ecosystem services and dependent human systems.

C.6 Case study 6: FACE-IT – Arctic Biodiversity & Livelihoods

C.6.1 Introduction and context

C.6.1.1 Location

The FACE-IT project is being implemented at seven Arctic fjord sites in Greenland and Norway (Finnmark and Svalbard) (see Figure 116):

- Qeqertarsuup tunua (QT), Greenland
- Nuup Kangerlua (NK), Greenland
- Young Sound (YS), Greenland
- Inglefieldbukta (IB), Svalbard, Norway
- Isfjorden (IF), Svalbard, Norway
- Kongsfjorden (KF), Svalbard, Norway
- Porsáŋguvuotna/Porsangerfjord (PO)

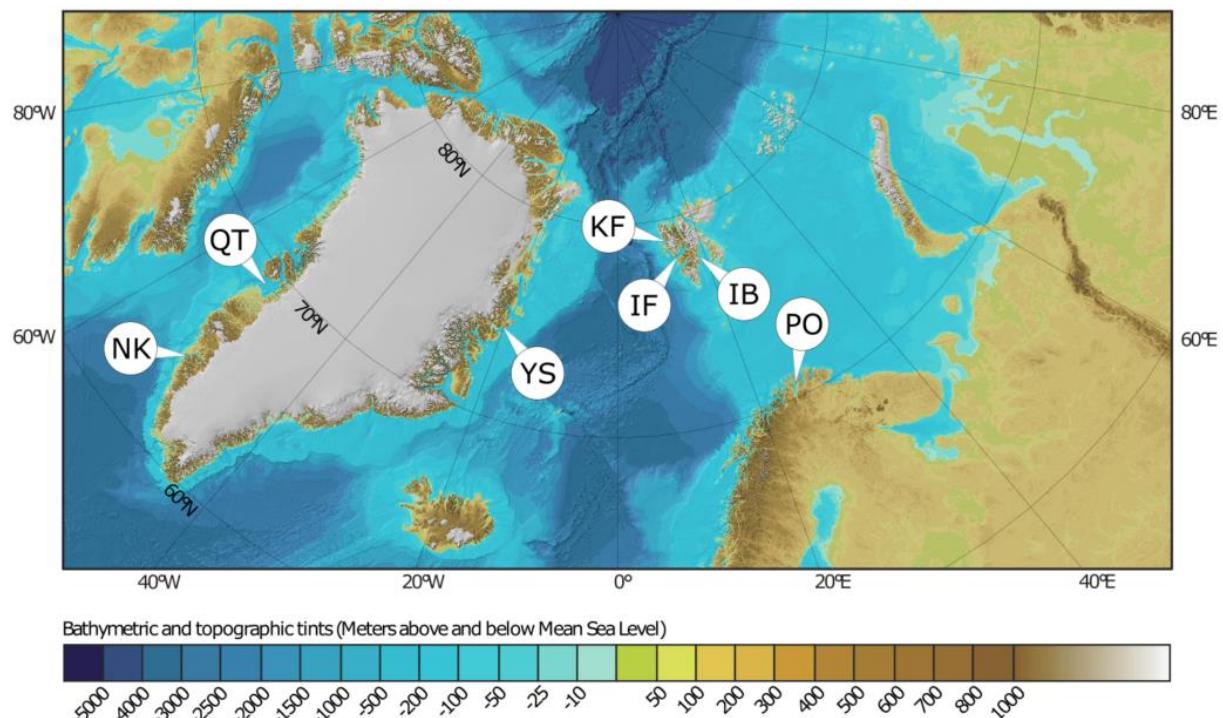


Figure 114 FACE-IT project map

Source: <https://www.face-it-project.eu/index.php/map/>¹⁶²

C.6.1.2 Year of completion (or extent of completion in 2021)

Started in November 2020, the FACE-IT project is due to be completed in October 2024.

C.6.1.3 Brief overview of the case study

Playing a crucial role in regulating earth climate, the Arctic is at the forefront of global environmental changes. Glacier fronts and other sea ice systems in the region are hotspots of biodiversity. Yet, the observed retreat

¹⁶² Based on Jakobsson, M., Mayer, L., Coakley, B., Dowdeswell, J. A., Forbes, S., Fridman, B., Hodnesdal, H., Noormets, R., Pedersen, R., Rebisco, M., Schenke, H. W., Zarayskaya, Y., Accettella, D., Armstrong, A., Anderson, R. M., Bienhoff, P., Camerlenghi, A., Church, I., Edwards, M., Gardner, J. V., Hall, J. K., Hell, B., Hestvik, O., Kristoffersen, Y., Marcussen, C., Mohammad, R., Mosher, D., Nghiem, S. V., Pedrosa, M. T., Travaglini, P. G., & Weatherall, P. (2012). The International Bathymetric Chart of the Arctic Ocean (IBCAO) Version 3.0. *Geophysical Research Letters*, 39(12). <https://doi.org/10.1029/2012GL052219>.

of these systems under the influence of climate change poses great threats to Arctic coastal ecosystem functions and incidentally to local livelihoods that depend on them. Against the backdrop of these changes, the FACE-IT project aims to enable the adaptive co-management of social-ecological fjord systems in the Arctic region. To this end, FACE-IT rests upon a comparison of the aforementioned social-ecological Arctic fjord systems at different stages of cryosphere loss in both Greenland and northern Norway.

Project website, deliverables and emails

Website: <https://www.face-it-project.eu/>

Main deliverables: FACE-IT deliverables to date include peer-reviewed scientific journal articles, data sets and poster presentations. The deliverables are publicly accessible on the open-access repository [Zenodo](#).

Project manager: Dr. Simon Jungblut, University of Bremen (Germany)

Email: jungblut@uni-bremen.de

The information included in this case study was collected on the FACE-IT project website, in official project documents, as well as through a semi-structured interview conducted on 11 March 2022 with Dr. Kai Bischof (Scientific coordinator). The case study was reviewed by Dr. Kai Bischof and Dr. Simon Jungblut.

C.6.1.4 Link to Mission objectives and targets

Objective 1 of the Mission Restore our Ocean and Waters by 2030 is to “Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030”. For the Atlantic/Arctic lighthouse area, the specific targets under objective 1 are to:

- I. Protect a minimum of 30 % of the EU’s sea area and integrate ecological corridors, as part of a true Trans-European Nature Network.
- II. Strictly protect at least 10 % of the EU’s sea area.
- III. Contribute to relevant upcoming marine nature restoration targets including degraded seabed habitats and coastal ecosystems.

With its overarching objective to enable the adaptive co-management of fjord SES in the Arctic in the face of rapid cryosphere and biodiversity changes in a changing climate, the FACE-IT project is particularly relevant to objectives 1 and 2 of the Mission Restore our Ocean and Waters by 2030 – with a geographical focus on the Atlantic/Arctic lighthouse area.

Although the objective of the FACE-IT project is not the implementation of protection and/or restoration actions of marine/coastal biodiversity and ecosystems per se, the identification and quantification of key drivers of biodiversity changes and their past and future trends – the first objective of the project – is key to guiding evidence-based protection and restoration actions under the aegis of the Mission Restore our Ocean and Waters by 2030 in order to meet targets (i) “Protect a minimum of 30 % of the EU’s sea area and integrate ecological corridors, as part of a true Trans-European Nature Network” and (ii) “Strictly protect at least 10 % of the EU’s sea area” in line with EU Biodiversity Strategy for 2030.

Adaptive co-management is deemed crucial for fostering the resilience of social-ecological systems (SES) to multiple stressors, including climate change – as central to the FACE-IT project. The focus of the project on the impacts of climate change on the Arctic cryosphere and on coastal and marine biodiversity with the aim of supporting adaptive co-management at local and national levels – the fourth objective of the project – is thus of great relevance to the Mission Restore our Ocean and Waters by 2030 in light of its attention to addressing the impacts of climate change on marine and coastal ecosystems. Considering this, FACE-IT is deemed a relevant project to objective 1 of the Mission Restore our Ocean and Waters by 2030 for drawing lessons that may guide the formulation of recommendations as regard the type, focus and geographic scope of future activities aimed at protecting and restoring marine and coastal ecosystems in the Arctic part of the Atlantic/Arctic lighthouse area against the backdrop of a rapidly changing climate in the region.

C.6.2 Main objective of the case study project

The overarching objective of the FACE-IT project is to enable adaptive co-management of fjord SES in the Arctic in the face of rapid cryosphere and biodiversity changes. The project will identify ways to manage the impacts of climate change on the cryosphere and marine biodiversity, and the interaction with other drivers

of change. The concept of FACE-IT rests on a comparison of selected Arctic fjord SES at different stage of cryosphere loss in Greenland, Svalbard and Finnmark (Northern Norway). The underlying two-pronged hypothesis of the project is that the biodiversity of Arctic coastal zones is changing in accordance with the rates of cryosphere changes, and that these changes affect local communities, food production, livelihoods and other ecosystem services. FACE-IT brings together a strong interdisciplinary team of internationally recognised experts from both the natural and social sciences. The project further involves the participation of Arctic stakeholders to ensure that Indigenous and local knowledge, perceptions and concerns about ongoing social-environmental changes are being taken into account in defining innovative and adaptive co-management approaches towards a more sustainable future in the region.

The four specific objectives of the FACE-IT project are:

- Identify and quantify key drivers of biodiversity changes and their past and future trends.
- Identify cascading effects of a changing biodiversity associated with ongoing and projected changes in Arctic coastal food webs.
- Assess the interdependencies between environmental changes and Arctic coastal livelihoods.
- Support adaptive co-management at local and national levels.

With the aim of meeting the above objectives, FACE-IT rests upon three overarching research approaches:

- 1) The comparison of fjords and adjacent coastal areas under different degrees of cryosphere loss.
- 2) The integration of existing data through experimental research and modelling.
- 3) An emphasis on coproduction of knowledge to develop and propose adaptive co-management strategies that can safeguard local coastal livelihoods in times of rapid change.

C.6.3 *Funding sources and total budget*

The FACE-IT project is funded through the Horizon 2020 programme under grant agreement no. 869154 (topic LC-CLA-07-2019 “The changing cryosphere: uncertainties, risks and opportunities”).

- Total budget: EUR 6 753 200
- EU contribution: EUR 6 399 272.99

Cordis fact sheet: <https://cordis.europa.eu/project/id/869154>

C.6.4 *Actors*

C.6.4.1 Main actors and their roles

- Coordinating institution: University of Bremen (Germany)
- EU-funded partners:
 - Norwegian Polar Institute (Norway);
 - Sorbonne University, CNRS, (France);
 - Nordland Research Institute (Norway);
 - The University Centre in Svalbard (Norway);
 - Aarhus University (Denmark);
 - Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (Germany);
 - Western Norway Research Institute (Norway);

- Greenland Institute of Natural Resources (Greenland);
- Aalborg University (Denmark);
- Norwegian Institute of Marine Research (Norway)
- Non-EU-funded partners:
 - Canadian Museum of Nature (Canada);
 - University of Alaska Fairbanks (United States);
 - University of Xiamen (China)

C.6.4.2 Societal/citizen engagement and involvement in the project

Societal/citizen engagement is a central component of the FACE-IT project. Societal/citizen engagement is indeed an integral part of four out of the eight interdisciplinary work packages¹⁶³ (WP) of the project: WP 4 “Food provision and livelihoods”; WP 5 “Nature-based tourism”; WP 6 “Transdisciplinary synthesis”; and WP 7 “Policy dialogue and outreach”.

- WP 4 “Food provision and livelihoods” is investigating how Arctic biodiversity changes will affect coastal food provisions and livelihoods, and conversely how human activities near the coasts and ice edges have an impact on biodiversity. The three objectives pursued under this WP are the following:
 - 1) Assess from a local perspective what components and processes in SES are likely to shift in abundance and location in the future, in order to request updated data and analysis from natural scientists, and to provide input on adaptive co-management of natural resources in Arctic SES.
 - 2) Consider the gender and age dimensions of SES management for the sustainability and diversity of livelihood activities through locally grounded narratives of observed and expected changes in societies and ecosystems through interviews and participant observation.
 - 3) Co-produce narrative scenarios of the future development of the SES in the case study regions, with a focus on potential changes in coastal biodiversity and their implications for high Arctic fisheries in the Isfjorden (Svalbard, Norway) and coastal livelihoods in selected communities in Qeqertarsuup tunua (Western Greenland) and in the Porsangerfjord (Norway).

As part of this WP, not only are relevant local stakeholders (e.g., local hunting and fishing communities, and local and regional fisheries stakeholders) being recruited as study informants; they are also essential to co-shaping the case study design at the selected sites of Qeqertarsuup tunua, Porsangerfjord, and Isfjorden. Societal/citizen engagement is furthermore achieved by the conduction of a scenario workshop on “Coping with rapid changes in Arctic fjord systems: uncertainties and opportunities” (in Ilulissat, Greenland and Porsangerfjord, Norway) with the aim of identifying SES dynamics between near-future changes in ecosystems and livelihoods.

- WP 5 “Nature-based tourism” is investigating the interlinkages between increased tourism activities in coastal zones in Svalbard and Greenland and changes in climate, sea ice and biodiversity, and its relationship to local communities. The three objectives pursued under this WP are the following:
 - 1) Develop a framework for assessing local sustainability, including social sustainability and adaptive capacity, of tourism activities under climate change and test the framework at the selected case study sites.
 - 2) Co-produce narrative scenarios of future tourism under climate, cryosphere and biodiversity changes with local tourism actors and management officials.
 - 3) Assess the potential for adaptive co-management of tourism destinations that are likely to pose opportunities for some and risks for others.

¹⁶³ The eight work packages of the FACE-IT project are: Identify key drivers and data management (WP1); Biodiversity changes (WP2); Ecosystem function changes (WP3); Food provision and livelihoods (WP4); Nature-based tourism (WP5); Transdisciplinary synthesis (WP6); Policy dialogue and outreach (WP7); Project management (WP8).

As part of this WP and similarly to WP 4, not only are relevant stakeholders (e.g., tourism stakeholders) being recruited as study informants; they are also essential to co-shaping the case study design at the selected sites of Qeqertarsuup tunua and Isfjorden. Societal/citizen engagement is furthermore achieved by the conduction of the same scenario workshop on “Coping with rapid changes in Arctic fjord systems: uncertainties and opportunities” (in Ilulissat, Greenland and in the Porsangerfjord, Norway) with the aim of providing an analysis of the sustainability of tourism activities under the different future scenario narratives. In addition, WP findings pertaining to new knowledge on SES and livelihoods are first being discussed with local communities and management institutions before being made accessible to the public, thus ensuring sound societal/citizen engagement from study design to study conduction and eventually to dissemination of study findings.

- WP 6 “Transdisciplinary synthesis” is providing a synthesis of how social and ecological drivers interact in Arctic coastal systems based on input from WP 1-5. This synthesis serves as a basis for exploring options for managing change and identifying the requirements for adaptive co-management strategies at the local level, which support the long-term sustainability of food production and tourism in Arctic fjord SES, and the implications for national and international policy development. The two objectives pursued under this WP are the following:

- 1) Provide a transdisciplinary synthesis of results from WPs 1-5.
- 2) Explore the implications of different management options in the case study areas and for policy development at national level.

As part of this WP, societal/citizen engagement is further achieved by the involvement of relevant decision-makers and stakeholders across the local, regional, and national levels, who together with FACE-IT researchers facilitate workshops to explore the implications of different management options locally and nationally.

- WP 7 “Policy dialogue and outreach” supports the dissemination of research-based knowledge created by FACE-IT to local stakeholders in the case study localities and to relevant EU policymakers, as well as in relevant national and international forums. The objective of this WP is to enhance the long-term impact of work carried out in WPs 1-6 by:

- 1) Providing a common framework for dissemination aiming to ensure that up-to-date knowledge about Arctic fjord SES based on research conducted as part of WPs 1-6 becomes available to local, regional, and national decision-makers, advisory bodies, the broader academic community (including scientific knowledge synthesis processes such as the IPCC and Arctic Council assessments), educators at the secondary and tertiary level, Indigenous Peoples organisations, and environmental NGOs.
- 2) Identifying relevant stakeholders and knowledge users based on inputs from researchers involved in different WPs (including initial fieldwork conducted as part of WPs 4 and 5) and on a review of relevant EU and other international policy processes.
- 3) Communicating with society through the project website, media interviews, press releases and contributions to international and relevant national media outlets, production of fact sheets and posters and participation in Open Days at consortium members’ research institutes.
- 4) Ensuring that insights from the transdisciplinary synthesis (WP 6) will inform relevant EU policies processes (including but not limited to an integrated EU Arctic policy) by organising an outreach event in Brussels and by using personal contacts within the consortium to reach relevant national and international policy processes that are important for the successful adaptive co-management of Arctic fjord SES (e.g. under the Arctic Council and the United Nations Framework Convention on Climate Change – UNFCCC, as well as sector specific organizations).
- 5) Informing the scientific community about the major outcomes of FACE-IT through scientific publications, opinion papers, conference presentations, and organisation of interdisciplinary workshops and symposia.
- 6) Training and educating students (BSc, MSc, PhD) in research approaches, theories, and methods through local lectures, research theses work, courses, and field excursions.

- 7) Engaging in public outreach and societal debates about the impacts and consequences of cryosphere changes and about Arctic fjord SES by media visibility, presentations at relevant events, and production of outreach material.

Finally, WP 1 “Identify key drivers and data management” seeks to identify and analyse the major drivers of changing coastal marine biodiversity in the Arctic, while also considering indirect drivers (tourism, fishing and hunting) of biodiversity changes and their interaction with direct drivers. This WP thus rests upon the compilation of data on anthropological drivers as imported from the aforementioned WPs 4,5,6.

C.6.4.3 Economic/business aspects

The FACE-IT project does not include an economic/business component as such, and neither are economists part of the interdisciplinary research team. In the framework of FACE-IT, economic/business aspects are entangled with the societal/citizen engagement of specific commercial stakeholders in the execution of the project, as emphasised under WPs 4 and 5 (see subsection 1.4.2.). The active participation of commercial stakeholders from the fisheries and tourism sectors operating at the selected Arctic fjord sites ensures that both the societal importance and the environmental impact(s) of local livelihoods and commercial activities are being duly addressed in the process of developing an adaptive co-management framework that is intended to sustainably manage Arctic fjord SES in the context of changing complex processes against the backdrop of uncertainty.

For instance, Norway’s ambition to ensure the protection of Svalbard’s marine and terrestrial ecosystems has led the Norwegian state to demarcate large areas as either national parks or nature reserves with strict regulations for traffic and travel. While such regulations are crucial for protecting marine and terrestrial biodiversity, these also impact nature-based tourism, which constitutes an important economic manna in the area (conflicts are for instance being observed between small-scale “expedition tourism” and large-scale tourism in the context of the growth of both activities). In this context, Greenland and Norway may need to adopt similar ambitions to ensure that increases in tourism activity due to more favourable regional climate conditions (i.e., sea-ice retreat) do not negatively impact biodiversity, other livelihood activities and the local communities depending upon them. Assessing the local sustainability of the main commercial activities at the selected sites is thus key for guiding the adaptive co-management of Arctic fjord SES – including by developing alternative livelihood strategies such as, for instance, seaweed cultivation, which will in turn ensure the short- and long-term commercial interests of stakeholders involved are not being jeopardised by ongoing and anticipated rapid cryosphere and biodiversity changes.

C.6.5 Main results

C.6.5.1 Innovative methods, activities applied/demonstrated

The FACE-IT project involves the use of multiple methods across the natural and social sciences. The project rests upon comparison between seven Arctic fjord SES at different stages of cryosphere loss. From a natural sciences perspective, this comparison allows a space-for-time substitution to be adopted to analyse changes in Arctic coastal and marine ecosystems. Widely used in environmental modelling to infer past or future trajectories of ecological process and systems from contemporary spatial patterns, space-for-time substitution is a method that involves analyses in which contemporary spatial phenomena are being used to understand and model temporal processes that are otherwise hardly observable, most notably past and/or future events including climate changes. As part of FACE-IT, the space-for-time substitution is being achieved through comparison of seven Arctic fjords SES being used as a reference for representing different stages of “Atlantification” and “borealisation” of the Arctic region under Anthropogenic climate change.

From a social sciences perspective, the main innovative method applied as part of the FACE-IT project is the co-production of knowledge by scientists together with local communities (fishers and hunters) and commercial stakeholders from the fisheries and tourism sectors with the aim of enabling the adaptive co-management of Arctic fjord SES. Although a linear model of science–policy arrangements often has remained prevailing in the production of environmental knowledge, the co-production of knowledge is crucial for broadening the scope of knowledge, perspectives and values that are being represented in sustainability research with the aim of informing decision-making, not least for fostering adaptive co-management arrangements and processes. In conjunction with natural sciences approaches including the comparison of fjords and adjacent coastal areas under different degrees of cryosphere loss, as well as the integration of existing data through experimental research and modelling, the co-production of knowledge on social-ecological changes by scientists with Indigenous and local coastal communities ensures their perceptions and concerns about ongoing changes in the Arctic are duly being taken into account when designing and implementing innovative and adaptive co-management approaches for fjord SES in the region.

C.6.5.2 Implementation challenges

As part of its implementation, the FACE-IT project has been and still is facing a diverse set of challenges. Similar to many research projects being implemented since 2020, FACE-IT and the activities conducted as part of it have been impacted by the spread of the COVID-19 pandemic and the related travel restrictions. As a result of these travel restrictions, no single meeting bringing together the entire project consortium could be organised at the time of writing. Another practical challenge faced by the FACE-IT project has been the increasing costs of conducting research (e.g., research station rental costs, boat use for data collection campaigns, etc.) – an increase insufficiently addressed by funding bodies. Furthermore, one challenge pertaining directly to the scale of the FACE-IT project and its comparative approach to the study of Arctic fjord SES at different stages of cryosphere loss is the complexity of investigating the seven study sites with the same depth, due in particular to access constraints conditioned by the remoteness of the sites as well as by social factors (e.g. in Norway access for field research in the selected fjord sites is contingent on the assent and availability of the country's coastguard).

C.6.5.3 Project results: achievement of project objectives

Nearly 18 months into the FACE-IT project, all planned milestones have been achieved (see table 54 for a detailed overview). A list of detailed results for the project is, however, not available yet, as the 18-month report is currently being developed and to be made publicly available later during the year. However, the first field work season was completed during 2021 and the project team is currently processing the natural and social sciences data that has been collected to date. The second field work season was set to start in June 2022. Selected FACE-IT deliverables – including datasets, peer-reviewed scientific publications, and posters are being made publicly accessible on the open-access repository [Zenodo](#) on a rolling basis.

Work Package	Milestones
WP 1 – Identify key drivers and data management	Report on key drivers of changes
WP 2 – Biodiversity changes	Implementation of experimental systems Data on seabird and sea mammal abundance provided to WP5
WP 3 – Ecosystem function changes	Data on pelagic primary production delivered to WP1 Data on production parameters and glacier influence available to WP1
WP 4 – Food provision and livelihoods	Overview of societal, demographic, economic, and ecological conditions Metadata of the social science data sent to WP1 Case study design established
WP 5 – Nature-based tourism	Analytical framework and case study design established Data compiled by all tasks sent to WP1
WP 6 – Transdisciplinary synthesis	Compilation of relevant literature for analysis Input to draft framework of adaptive co-management for assessment in WP 4 and 5

Table 54 List of milestones achieved 18 months into the project under each Work Package*

*No milestones were set within the first 18-month period for WPs 7 and 8.

C.6.5.4 Follow up actions and long-term monitoring

As the FACE-IT project is still under implementation until 2024, no follow-up actions nor long-term monitoring have been established at the time of writing. However, multiple natural sciences data collection activities conducted as part of the project are embedded within the ongoing monitoring of the marine and coastal Arctic environment and the changes therein (e.g. monitoring of seaweed and phytoplankton in Greenland – Young Sound and Nuuk Fjord; seaweed, seabirds and marine mammals in Kongsfjorden) conducted by relevant assessment groups – such as specific working groups under the Arctic Council – and will thus carry on beyond the 2020-2024 project implementation period, though under the aegis of other science-policy processes. More located in time and space, the social sciences research activities are planned to also be followed up by the research team, in particular to follow up on the implementation of project recommendations.

C.6 Implications for Mission activities

C.6.6.1 Potential and hindrances for replication and upscaling

In the face of a need for better understanding the impacts of a changing climate in the Arctic region, the research objectives and activities of the FACE-IT project may, although limited in geographical scope – i.e., Arctic fjord SES, potentially be replicated across sites in the region in order to further enable the adaptive co-management of fjord SES other than those investigated as part of the project. Indeed, no specific hindrances exist for replicating the activities undertaken as part of FACE-IT. In this regard, the co-production of knowledge by scientists together with local communities, resource-users and other rightsholders as part of

the project holds great potential for being replicated across sites within the Arctic part of the Atlantic/Arctic Lighthouse Area. At the same time, the replication (or not) of activities conducted as part of FACE-IT – for instance with the intent of reducing uncertainties about project findings by collecting additional data at other sites, must be guided, and informed by the past and ongoing implementation of other relevant projects, including projects being implemented as part of the EU Polar Cluster. This would indeed help to avoid the costly and unnecessary duplication of past and ongoing research activities where data is already sufficiently available to guide the protection and restoration of the marine and coastal Arctic environment.

Beyond replication, scaling up the FACE-IT project and activities conducted thereunder should be guided by research objectives of the potential new project(s) to be implemented, and indirectly by European policy objectives for the Arctic region. The FACE-IT project was itself initially developed with the intent to scale up research being conducted at the Kongsfjorden (Svalbard, Norway), a fjord that has extensively been studied and for which substantial data are thus already available. The idea of scaling up the knowledge available on cryosphere changes in the Kongsfjorden – considered a harbinger of cryosphere changes in the Arctic – in a pan-Arctic perspective was the underlying rationale for developing FACE-IT and is as part of the project being achieved through the comparison of the seven fjord sites at different stages of cryosphere loss. Importantly, however, the pan-Arctic approach remains yet to be fulfilled, as indeed the Russian Arctic, as well as the Canadian and Alaskan Arctic are not part of the geographic focus of the project – and indeed neither of the future Mission Restore our ocean and waters by 2030. Underlying the objectives of the project, the scientific challenge that FACE-IT has set itself is to expand research and improve existing knowledge on social-ecological changes in the Arctic region, specifically by scaling up ongoing research activities initially conducted at one site.

For another, an important element that must be kept in mind regarding such a large interdisciplinary and international project when seeking to replicate and/or scale it up is the significant resources required for the coordination and implementation of its research activities. Hence, while the potential for replication of the FACE-IT project certainly exists, the relevance of this replication process should carefully be assessed. As such, it may be of interest to rather extend the implementation time frame of existing projects such as FACE-IT and the research activities being implemented thereunder, rather than seeking to fully replicate the project at other sites – i.e., scaling up. This would further allow for the development of more extensive time series of social-environmental changes, which should both build upon and feed into ongoing assessments of the state of the Arctic coastal and marine environment that are being conducted by relevant assessment groups under for instance the Arctic Council, the International Council for the Exploration of the Sea (ICES), the OSPAR convention, as well as the IPCC. Beyond ecological data, extending the collection of social data in time would further ensure the adaptive co-management of the Arctic fjord SES in the mid- and longer term, while also better guiding the co-management of other marine and coastal SES across the Arctic region.

C.6.6.2 Conclusions and lessons learnt

This case study of FACE-IT comes early in the project time frame (i.e., less than 18 months into project implementation) and thus only provides a glimpse of the activities being implemented and of the results already achieved by the project to date. The case study nonetheless laid out the project's state of play with relevance to the Baseline study for the implementation of lighthouses of Mission 'Restore our ocean and waters by 2030' and the relevant mission objectives and targets. Seeking to enable the adaptive co-management of fjord SES in the Arctic region through interdisciplinary research, FACE-IT constitutes an excellent example of a research project being successfully implemented, which may guide the future implementation of the Mission Restore our ocean and waters by 2030 in the Arctic part of the Atlantic/Arctic lighthouse area.

Interdisciplinary and international research projects such as FACE-IT have the advantage of addressing pressing social-environmental issues such as climate change and its impacts on human and non-human nature holistically rather than in closed disciplinary silos. From a social sciences perspective, the level of societal/citizen engagement and involvement central to and already achieved as part of four out of the eight interdisciplinary WPs of the project, ranging from local coastal communities to national policymakers and eventually to larger EU decision-making processes, has the potential to guide the design and implementation of policies targeted at the protection and restoration of the marine and coastal environment across decision-making levels within the Arctic region. On the other hand, the space-for-time substitution in analysing changes in Arctic coastal and marine ecosystems combined with other research activities conducted as part of the project has the potential to significantly enhance researchers' understanding of current and possible future climate changes and impacts thereof in the region, and thereby to inform the design and implementation of future activities and projects as part of the future Mission Restore our ocean and waters by 2030.

As underlined in the preceding subsection, however, the replication and upscaling of research projects such as FACE-IT as part of the implementation of the Mission Restore our ocean and waters by 2030 in the Arctic region must be carefully weighted based on data and knowledge needs, as well as based on the funds available for research, in an economic context where conducting empirical research in remote environments

is becoming increasingly costly. While the short- to long-term social-ecological impacts of FACE-IT remain to be carefully assessed beyond the project implementation time frame, the key lesson learnt from the project at the time of writing is thus the importance for activities and projects to be rolled out as part of the future Mission Restore our ocean and waters by 2030 in the Arctic region to build upon existing, and develop novel complementarities and synergies with both past and ongoing research activities and projects of geographic and thematic relevance. In this regard, the unique research collaboration developed and sustained by the three CHARTER, FACE-IT, and ECOTIP projects allows for investigating social-ecological changes taking place along the entire land-sea continuum in the Arctic region, and to jointly disseminate project results for enhanced policy impact.

Considering this, it is advisable for the European Commission to look for synergies rather than to seek mere replication and scaling up of research activities aimed at further co-producing knowledge about social-ecological changes taking place in the Arctic region. However, based on the results of and analyses drawn from research projects such as FACE-IT, which should guide the design and implementation of ecologically sustainable and socially just policies and regulations pertaining to the protection and restoration of the marine and coastal Arctic environment, selected relevant activities such as the development and further application of innovative research and social-ecological management methods should be replicated where possible and needed as part of future projects.

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Appendix D Maps for the Danube chapter

This Annex contains the maps of the Danube chapter, provided by ICPDR.

Interruptions of River Continuity for Fish Migration - Current Situation 2021

DRBMP Update 2021 - MAP 14



* The barriers are related to different water uses. More detailed information is available in the chapter 2 of the DRBMP Update 2021.
This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, MD, ME, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRN World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DIREB of AL, IT, ME and PL.

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Interruptions of River Continuity for Fish Migration - Expected Restoration Measures by 2027

DRBMP Update 2021 - MAP 36



In case of overlapping continuity interruption symbols, they are drawn on top of each other in this order (top to bottom): Not implemented by 2027, Not yet determined, Implemented by 2027, Already implemented by 2021, Not necessary for GESGP, Not applicable.

This CPDR product was based on national information provided by the Contracting Parties to the ICPOD (AL, BA, BI, CZ, DE, HR, HU, ME, ML, RO, RS, SK, SI, UA) and GM. EuroGeographics data was used for all national borders except for BA, ME where the data from the ESRU World Countries was used. Shuttle Radar Topography Mission (SRTM) from USGS, Seamless Data Distribution System was used as elevation data layer, from the European Commission Joint Research Center it was used for the outer border of the DRBDs of AL, ME and PL.

Manna November 2021



This map illustrates morphological conditions of full water bodies which are affected by morphological alterations. The exact locations of individual water body alterations are not visualized.

On transboundary river water bodies, values of morphological classes are reported separately for each country and may differ from each other. In case of overlapping symbols of morphological classes, they are drawn on top of each other in this order (top to bottom): 4-5, 2-6, 3, 1-2, 1.

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, MD, ME, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

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Hydrological Alterations - Impoundments - Expected Restoration Measures by 2027

DRBMP Update 2021 - MAP 33



* On transboundary river water bodies, values are reported separately for each country and may differ from each other.

In case of overlapping symbols of transboundary impoundments, they are drawn on top of each other in this order top to bottom): Not implemented by 2027, Implemented by 2027, Already implemented by 2021, Not necessary for GES/GEP, No data available.

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, MD, ME, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

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Hydrological Alterations - Water Abstractions - Expected Restoration Measures by 2027

DRBMP Update 2021 - MAP 34



* On transboundary river water bodies, values are reported separately for each country and may differ from each other.

This ICOPDR product is based on national information provided by the Contracting Parties to the ICOPDR (A, BA, BE, BG, CZ, DE, HR, HU, MD, NL, RO, RS, SI, SK, UA) and China. EuroGlobalMap data was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) data from USGS Seamless Digital Elevation Data Distribution System was used for the outer border of the DRBD of AL, BA, ME where the data from the European Commission (Joint Research Center) was used.

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* On transboundary river water bodies, restoration measures are reported separately for each country and may differ from each other.

In case of overlapping symbols of restoration measures, they are drawn on top of each other in this order (top to bottom): Not yet implemented, Partly Implemented by 2021, Fully implemented by 2021, Not necessary - GES/GEP achieved, No data available.

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BG, CZ, DE, HR, HU, MD, ME, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

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Exemptions According to WFD Article 4(4), 4(5) and 4(7) - Concerning Ecological Status of SWBs

DRBMP Update 2021 - MAP 27a



Please note that the EIA study in relation to the Fast Danube Project (including the Impact Assessment on Water Bodies) is an ongoing process, and only its completion will conclude or not on WB deterioration. Data reported for RS is not based on an official WFD Article 4(7) application as there is no transposition of WFD requirements in national water law yet. In case of river/river water bodies, exemptions for surface water bodies are reported separately for each country and may differ from each other. In case of groundwater symbols, they are shown on top of each other in this order (top to bottom): Exemption (c), Exemption (d), Exemption (d), Not indicated, All (not listed) already assessed in 2024, Not applicable.

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR at BA, BE, BG, DE, DK, HR, HU, MD, ME, RO, RS, SI, SK, UM and CY. EuroGeographics data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ICPDR WebGIS Repository was used. Georeferencing provided by the ICPDR at BA, BE, BG, DE, DK, HR, HU, MD, ME, RO, RS, SI, SK, UM and CY.

This NORPAC product is based on national information provided by the Contracting Parties to the NORPAC II, BA, BG, DE, HR, HU, MD, ME, RO, RS, SI, SK, UA and the EurodeborderMap data from Eurogeographics was used for all national borders except for AL, BA, ME where the data from the ESRG World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Geospatial Data Distribution System was used as elevation data; data from the European Commission (Joint Research Center) was used for the outer border of the DBRB of AL, IT, ME and PL.

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The ecological prioritisation approach (Part A) is not meant to substitute the similar national approaches, but to outline the basin-wide perspective. Low restoration priority indicated on the basin-wide level does not imply that no measures should be undertaken on the national level, as all fish species need open river continuity. On the other hand, ecological prioritisation is only one of the many aspects in deciding which measures to adopt and implement. Final decision will be taken at the national level.

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, MD, ME, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

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Appendix E Case Studies of Danube lighthouse area

E.1 Case study 1: Living space in the estuary stretch of the river Traisen – LIFE+ Traisen

E.1.1 Introduction and context

The Traisen is one of the largest tributaries of the Danube in Lower Austria. In the 1970s, the construction of a power plant in Altenwörth saw the river extended by 7.6 km and its mouth relocated and diverted into the tailwater of the power plant. As a result, the Traisen ran as a straight channel through the Natura 2000 site Tullnerfelder Donau-Auen¹⁶⁴. The regulated river did not have the aquatic and terrestrial habitats usually found on floodplains and was cut off from the surrounding riparian forest. High waters seldom reached the surrounding habitats¹⁶⁵.



Figure 115 Newly created riverscape at the mouth of the Traisen
© VERBUND Hydro Power GmbH, photo credits: Gerhard Pock.

E.1.1.1 Location

The project is in Lower Austria, at the mouth of the Traisen into the Danube, where the Natura 2000 site Tullnerfelder Donau-Auen is located.

E.1.1.2 Year of completion (or extent of completion in 2021)

The LIFE+ Traisen project was completed in 2019. It ran from 2009-2019, with the main construction phase taking place between 2013-2016.

E.1.1.3 Brief overview of the case study

The LIFE+ Traisen project aimed to re-establish a natural river with alluvial forest that creates new habitats for animals and plants and increases biodiversity. A new, dynamic riverbed was created between 2013 and 2016 that has transformed the lower reaches of the Traisen river into a diverse floodplain. The redesign of the Traisen has improved not only the condition of the Traisen River, but also the Danube itself¹⁶⁶.

¹⁶⁴ VERBUND Hydro Power GmbH, *LIFE+ Traisen - New Life in the Floodplain*, Layman report, 2020, https://www.life-traisen.at/-/media/life-traisen/final-report-2020/verbund-life-traisen_project-summary-layman-report.ashx

¹⁶⁵ European Commission, LIFE Public Database, n.d., <https://webgate.ec.europa.eu/life/publicWebsite/project/details/2854#>

¹⁶⁶ VERBUND Hydro Power GmbH, *LIFE+ Traisen - New Life in the Floodplain*, Layman report, 2020, https://www.life-traisen.at/-/media/life-traisen/final-report-2020/verbund-life-traisen_project-summary-layman-report.ashx

Project website, deliverables and emails

Website: <https://www.life-traisen.at/en-at>,

Main deliverables¹⁶⁷:

- Creation of a new, 10 km-long meandering Traisen river, with dynamic banks and intensive interplay of water. It should continue to develop dynamically and naturally;
- Active creation of flood zones covering an area of 60 hectares (ha) to maintain the alluvial forest priority habitat type (silver willow wetland);
- Creation of bodies of standing water along the new river and in the adjacent wetland area;
- Creation of a fish-passable network.

For more details, see: <https://www.life-traisen.at/en-at/biodiversity>

Project manager: Helmut Wimmer and Roland Schmalfuß, VERBUND Hydro Power GmbH.

Email: Roland.Schmalfuss@verbund.com

E.1.1.4 Link to Mission objectives and targets

LIFE+ Traisen is one of the most comprehensive restoration projects in Central Europe. The newly created nearly natural riverscape improves the longitudinal and lateral connectivity of the river and habitat conditions, contributing to the upcoming nature restoration targets (*as soon as these targets are published, we will add an additional sentence on the precise contribution*).

The restoration project helps to reach ‘Good Ecological Status’ for the Traisen river (one of the main implementation targets of the WFD). In addition, the project reconnected the Natura 2000 site Tullnerfelder Donau-Auen to the riverbed, which contributes to the improvement and preservation of this protected area.

E.1.2 Main objective of the case study project

The specific objectives of the LIFE+ Traisen project were to^{168,169}:

- Create a new, dynamic riverbed with intensive exchange with the surrounding floodplain;
- Restore large-scale flooding zones to restore and maintain the alluvial forest, with a focus on the priority habitat type of white willow woods;
- Link numerous floodplain waters to the new river course;
- Create a free passage for fish and other water species;
- Improve the conservation status of the dry meadow landscapes.

E.1.3 Funding sources and total budget

The overall project costs amounted to EUR 30 million, financed through different sources: EUR 15 million was financed by the VERBUND Hydro Power GmbH (project leader¹⁷⁰), about EUR 5.3 million was covered by the EU LIFE+ Nature and Biodiversity Fund¹⁷¹, and the remaining financing came from:

- Lower Austrian Provincial Government;

¹⁶⁷ VERBUND Hydro Power GmbH, *LIFE Traisen*, n.d., <https://www.life-traisen.at/en-at>

¹⁶⁸ European Commission, LIFE Public Database, n.d., <https://webgate.ec.europa.eu/life/publicWebsite/project/details/2854#>

¹⁶⁹ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁷⁰ VERBUND Hydro Power GmbH, *LIFE+ Traisen - New Life in the Floodplain*, Layman report, 2020, https://www.life-traisen.at/-/media/life-traisen/final-report-2020/verbund-life-traisen_project-summary-layman-report.ashx

¹⁷¹ European Commission, LIFE Public Database, n.d., <https://webgate.ec.europa.eu/life/publicWebsite/project/details/2854#>

- Federal Ministry of Agriculture, Regions and Tourism;
- Lower Austria Landscape Fund;
- Lower Austrian Provincial Fishing Association;
- viadonau GmbH (subsidiary of the Austrian Ministry for Transport, Innovation and Technology tasked with the preservation and development of the Danube waterway).

E.1.4 Actors

E.1.4.1 Main actors and their roles

The VERBUND Hydro Power GmbH, the viadonau GmbH¹⁷² and the Federal Waterways Engineering Administration of Lower Austria (*Bundeswasserbauverwaltung Niederösterreich*) were the direct beneficiaries of the LIFE+ Traisen project. VERBUND Hydro Power GmbH took on the project management and established good cooperation with the other two beneficiaries. Coordination and discussions were scheduled according to the project phase and requirements¹⁷³.

The project management team at VERBUND Hydro Power GmbH was supported by an external consultant experienced in the implementation of LIFE+ funded projects. This team managed and controlled the entire project process and was also charged with¹⁷⁴:

- Environmental Impact Statement (EIS) coordination group;
- Landowner meetings and negotiations, contracts;
- Community meetings;
- Planning group meetings;
- Meetings with authorities;
- Construction supervision.

viadonau GmbH is responsible for the administration of the public water property in the Traisen estuary on the Danube and supported the project in this respect. Similarly, the Federal Waterways Engineering Administration of Lower Austria supported the project, as the administrator of the public water property along the old Traisen river. The public water property is owned by the Republic of Austria and managed by one of the two organisations depending on the location. If the land is used or touched, consent must always be obtained. Both institutions provided practical support to the LIFE+ Traisen project, providing documents, plans and legal clarifications, as well as assisting with project negotiations¹⁷⁵.

The wider project team included external planning offices, biologists and scientists, who provided various sub-services during implementation of the project. The construction work was put out to tender and carried out by external construction companies¹⁷⁶.

E.1.4.2 Societal/citizen engagement and involvement

Citizen engagement in the renaturation project of the Traisen was already initiated before the start of the LIFE+ Traisen project. A feasibility study for the project was prepared in 2005, where the potential new location of the Traisen was discussed with all relevant authorities and interested parties¹⁷⁷.

After the start of the LIFE+ Traisen project, a series of activities were initiated to engage and inform citizens about project progress. A homepage was created, together with the publication of numerous press articles and television reports. Residents of local communities were invited to information events. Between 2010 and

¹⁷² viadonau is the international waterway operator in the Danube region.

¹⁷³ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁷⁴ Ibid.

¹⁷⁵ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁷⁶ Ibid.

¹⁷⁷ Kaufmann, T., Frik, G., Schmalfuß, R., Haidvogl, G., Eberstaller, J., Wimmer, H. and Jungwirth, M., ,LIFE+ Traisen: Der Lange Weg Zum Neuen Fluss', *Österreichische Wasser- Und Abfallwirtschaft*, Vol. 70, No 5–6, 2018, pp. 264-71, <https://doi.org/10.1007/s00506-018-0481-9>

2011, a total of seven large information meetings were organised in the neighbouring communities of Traismauer, Zwentendorf, Kirchberg am Wagram and Altenwörth. Three public information sessions were held in May 2021 within the scope of the environmental impact assessment (EIA) procedure (Zwentendorf, Traismauer, Altenwörth). Additional question and answer sessions were held in the communities of Zwentendorf and Traismauer in June 2011 for invitees¹⁷⁸. Objections raised by several stakeholders in July 2011 saw the Danube cycle path adjusted to a different route than originally planned¹⁷⁹.

The neighbouring communities continued to be kept informed until the end of the project and, at their request or on the invitation of the project team, six guided tours of the construction site were organised¹⁸⁰.

E.1.4.3 Economic/business aspects

The financing of the project proved challenging. The original budget was EUR 12.8 million, but the construction tender in 2012 resulted in much higher prices than originally planned and the project was almost cancelled. The project leader VERBUND Hydro Power GmbH finally committed to taking over a multiple of the originally planned financing in order to continue and complete the project¹⁸¹.

An interesting economic aspect arose from the fact that large quantities of gravel had to be excavated to create the new riverbed. The sale and reuse of this gravel was included in the project budget to help to finance the project¹⁸². From the total material extracted, a large part (about 680 000 m³) was loaded onto ships via a gravel loading station on the banks of the Danube and transported away on the waterway. The material was used in equal parts for bed load addition in the tailwater of the Freudeneau Danube power plant and for recycling in the regional construction industry, via the port of Krems. The other part of the extracted gravel (about 720 000 m³) was transported to nearby gravel pits, where it was temporarily stored, processed and reused in the construction industry. Although revenues were lower than originally expected, the recycling of the gravel contributed about EUR 4.2 million to the project budget¹⁸³.

E.1.5 Main results

E.1.5.1 Innovative methods, activities applied/demonstrated

LIFE+ Trasien was not a classic river restoration project because no river course was restored; rather, a new river course was created in the floodplain. Large quantities of excavated material were necessary for the ecologically functional shaping of the riverbed. The project received the Neptune Water Award¹⁸⁴ 2011 as the best water project in Austria. In granting the award, the jury recognised the exemplary solution to the challenge of reconciling the protection of water bodies and the safeguarding of near-natural habitats with the requirements of flood protection and hydropower utilisation¹⁸⁵.

E.1.5.2 Implementation challenges

Although the construction of the new Traisen was carried out in only three years, the design, planning, financing and approval took over 15 years. The renaturation of the Traisen was initially proposed in the 1990s, but there was no adequate legal framework or funding opportunities for such a project. The implementation of the WFD into national law in 2003 created the basic legal framework for the project to go ahead. The redesign of the lower reaches of the Traisen was seen as a significant opportunity to improve the ecological conditions in the immediate project area¹⁸⁶. Once the legal framework was in place, funding for the project proved difficult. However, once the LIFE+ Nature and Biodiversity Fund became available, the project was accepted in the second round of funding. During the planning of the construction works, the project required twice the initial budget allocated and was almost cancelled.

¹⁷⁸ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁷⁹ Kaufmann, T., Frik, G., Schmalfuß, R., Haidvogl, G., Eberstaller, J., Wimmer, H. and Jungwirth, M., 'LIFE+ Traisen: Der Lange Weg Zum Neuen Fluss', *Österreichische Wasser- Und Abfallwirtschaft*, Vol. 70, No 5–6, 2018, pp. 264–71, <https://doi.org/10.1007/s00506-018-0481-9>

¹⁸⁰ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁸¹ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁸² Kaufmann, T., Frik, G., Schmalfuß, R., Haidvogl, G., Eberstaller, J., Wimmer, H. and Jungwirth, M., 'LIFE+ Traisen: Der Lange Weg Zum Neuen Fluss', *Österreichische Wasser- Und Abfallwirtschaft*, Vol. 70, No 5–6, 2018, pp. 264–71, <https://doi.org/10.1007/s00506-018-0481-9>

¹⁸³ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁸⁴ The Neptune Water Award is an initiative of the Federal Ministry of Agriculture, Forestry, Environment and Water Management, in cooperation with the Federal Ministry of Science, Research and Economy, the Austrian Association for Gas and Water (*Österreichische Vereinigung für das Gas- und Wasserfach*) and the Austrian Water and Waste Management Association (*Österreichischer Wasser- und Abfallwirtschaftsverband*).

¹⁸⁵ Kaufmann, T., Frik, G., Schmalfuß, R., Haidvogl, G., Eberstaller, J., Wimmer, H. and Jungwirth, M., 'LIFE+ Traisen: Der Lange Weg Zum Neuen Fluss', *Österreichische Wasser- Und Abfallwirtschaft*, Vol. 70, No 5–6, 2018, pp. 264–71, <https://doi.org/10.1007/s00506-018-0481-9>

¹⁸⁶ Kaufmann, T., Frik, G., Schmalfuß, R., Haidvogl, G., Eberstaller, J., Wimmer, H. and Jungwirth, M., 'LIFE+ Traisen: Der Lange Weg Zum Neuen Fluss', *Österreichische Wasser- Und Abfallwirtschaft*, Vol. 70, No 5–6, 2018, pp. 264–71, <https://doi.org/10.1007/s00506-018-0481-9>

E.1.5.3 Project results: achievement of objectives

The newly created river landscape covers an area of 150 ha, which is continuously connected to its floodplains. The new Traisen is now the fish passage connection to the Danube. The new riverbed is obstacle-free and naturally designed. It flows into a new side arm of the Danube, which at low water acts as an extension of the river and at high water provides a large bay as a retreat for Danube fish¹⁸⁷. Except for a few local spots, the banks are without fortifications and thus completely natural. This guarantees dynamic development and typical habitats in the water-land transition zone¹⁸⁸.

The winding course of the new river is characterised by diverse flow patterns, flood zones, shallow and deep areas, gravel banks and dead wood, offering a wide range of structures and resulting in a mosaic of existing and new habitats that provide space for many animal and plant species. Fish stocks have increased and endangered species such as the Danube salmon are back. The river provides a migratory route for Danube fish, which are now able to reach their spawning grounds upstream¹⁸⁹.

About 60 ha of frequently flooded zones were created and are suitable as a site for the priority habitat type riparian forest (silver willow wetland). This habitat type was established as an initial measure and is now left to independent colonisation through natural growth. In the surrounding floodplain, the project has ecologically improved 30 ha of the dry and degraded meadow communities through maintenance measures, contributing to biodiversity, especially for insects and plants. Measures were also taken to improve riparian habitats, such as structuring with tree trunks, eliminating neophytes in the meadows, and protecting old oaks. In the floodplain forest, floodplain ponds were created to increase the diversity of still waters¹⁹⁰.

The LIFE+ Traisen project achieved maximum protection and improvement of the habitat situation through very precise planning of the new river course and detailed analysis of the environmental impacts during the EIA procedure.



Figure 116 Near-natural riverscape as a result of the LIFE+ Traisen project

© VERBUND Hydro Power GmbH.

E.1.5.4 Follow-up actions and long-term monitoring

A detailed monitoring concept was developed during the EIA that included monitoring during the construction phase and several years after completion of the project. The first monitoring phase started immediately on completion of the construction works and flooding of the constructed sections¹⁹¹. Various reports are

¹⁸⁷ VERBUND Hydro Power GmbH, LIFE+ Traisen - New Life in the Floodplain', Layman report, 2020, https://www.life-traisen.at/-/media/life-traisen/final-report-2020/verbund-life-traisen_project-summary-layman-report.ashx

¹⁸⁸ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁸⁹ VERBUND Hydro Power GmbH, LIFE+ Traisen - New Life in the Floodplain', Layman report, 2020, https://www.life-traisen.at/-/media/life-traisen/final-report-2020/verbund-life-traisen_project-summary-layman-report.ashx

¹⁹⁰ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁹¹ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

available on the development of fish stocks, aquatic plants, vegetation, dry meadows and bats¹⁹², etc. A second monitoring phase is now being implemented.

The benefits of the new Traisen are secured for the future and will have a sustainable effect. Commitments and legal safeguards are contained in the 'After LIFE Plan' developed at the end of the project¹⁹³.

In 2020 (one year after the end of the LIFE project), three additional floodplain ponds were established, financed outside the LIFE+ funding scheme¹⁹⁴.

E.1.6 *Implications for Mission activities*

E.1.6.1 Potential and barriers to replication and upscaling

This project created a new dynamic riverbed from an artificial channel. Such projects have considerable potential to improve the ecological situation of a river by creating new habitats, reconnecting old habitats to the river, and contributing to the new nature restoration targets. An interesting question is whether a newly created but near-natural riverbed also contributes to the Mission target of 'free-flowing rivers'. As the project clearly removed barriers and restored fish passage, it could be considered to contribute to this goal.

The project had a very long lead time, with many actors involved. That lengthy period allowed very precise planning and coordination, which contributed to project success. The relevant ministries at federal and regional level were involved and supported the project from the early stages. Another success factor was the fact that there were few landowners in the project area and they were positively disposed towards the project.

The biggest obstacle was the high final project costs. The original idea of financing the project mainly through the sale of excavated gravel soon proved unrealistic. Once funding was secured, the project budget doubled in size, which almost led to the cancellation of the project. The project was finally carried out when VERBUND Hydro Power GmbH used its substantial financial resources to cover the unexpected costs. Project partners perceived the significant additional time and financial burden associated with an EIA as a barrier¹⁹⁵.

E.1.6.2 Conclusions and lessons

The ecological benefits of the LIFE+ Traisen project were substantial due to the creation of new habitats that were quickly colonised by animal and plant species (including important habitats directive target species). Many of these species apparently existed in residual populations in the surrounding floodplain or in the adjacent water bodies and not only settled in the newly created habitats, but also reproduced or established new populations. The LIFE+ Traisen project made a significant contribution to the better provision of habitats in the area¹⁹⁶.

The new river section is an exemplary example of renaturation under the WFD. Habitats and functions were created that resulted in immediate ecological effects. Fish ecological monitoring and the applied evaluation method show that the new Traisen already has a 'good' fish ecological condition only three-four years after construction was completed. This is a target value for renaturation that is difficult to achieve in many cases¹⁹⁷.

The project can be considered a successful ecological project, particularly for a large corporation that previously paid little attention to ecology in large-scale measures. The project has already spawned follow-up projects. The LIFE project 'Network Danube'¹⁹⁸ and 'Network Danube+'¹⁹⁹ of VERBUND Hydro Power GmbH are working on further improvements to the Danube ecosystem and the adjacent riparian landscapes in Austria.

¹⁹² VERBUND Hydro Power GmbH, *LIFE Traisen*, n.d., <https://www.life-traisen.at/en-at>

¹⁹³ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁹⁴ Ibid.

¹⁹⁵ Kaufmann, T., Frik, G., Schmalfuß, R., Haidvogl, G., Eberstaller, J., Wimmer, H. and Jungwirth, M., 'LIFE+ Traisen: Der Lange Weg Zum Neuen Fluss', *Österreichische Wasser- Und Abfallwirtschaft*, Vol. 70, No 5–6, 2018, pp. 264–71, <https://doi.org/10.1007/s00506-018-0481-9>

¹⁹⁶ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁹⁷ VERBUND Hydro Power GmbH, *Lebensraum im Mündungsabschnitt des Flusses Traisen*, LIFE Project Number LIFE07 NAT/A/000012: FINAL Report, 2020.

¹⁹⁸ VERBUND Hydro Power GmbH, *LIFE Netzwerk Donau*, n.d., <https://www.life-netzwerk-donau.at/en-at>

¹⁹⁹ VERBUND Hydro Power GmbH, *LIFE Network Danube Plus*, n.d., <https://www.life-network-danube-plus.at/en-at>

E.2 Case study 2: Sediment Danube Project: DanubeSediment

E.2.1 *Introduction and context*

Sediments are a natural part of aquatic systems. In recent centuries, humans have significantly altered the Danube River. Riverbed straightening, hydropower dams and dykes have all led to substantial changes in the sediment load, with the resulting imbalance contributing to flood risk and reducing navigation possibilities and hydropower production. It also led to the loss of biodiversity within the Danube basin.

As a first step, the project team collected sediment transport data in the Danube River and its main tributaries. These data provided the foundation for a Danube-wide sediment balance analysis that examined the sinks, sources and redistribution of sediment within the Danube. In addition, the different monitoring instruments and methods used to collect sediment data by the Danube States were compared. The project recommends establishing a harmonised quantity monitoring network, setting-up new monitoring stations, and creating centralised data storage. In order to understand the impacts and risks of sediment deficit and erosion, the project partners analysed the key drivers and pressures altering the sediment balance²⁰⁰.

E.2.1.1 Location

The DanubeSediment project involves partners in Croatia, Germany, Austria, Slovenia, Slovakia, Hungary, Bulgaria and Romania, and maps the entire Danube basin.

E.2.1.2 Year of completion

The DanubeSediment project ran from 2017-2019.

E.2.1.3 Brief overview of the case study

More than a decade ago, the ICPDR identified the changed sediment regime in the Danube. As the Danube flows through 10 countries from the Black Forest to the Black Sea, a transnational project on sediment management was needed to obtain a full picture. The aim was to improve sediment and water management, as well as the morphology of the Danube. To tackle these challenges, 14 project partners and 14 strategic partners came together in the three-year DanubeSediment project²⁰¹.

Project website, deliverables and emails

Website: <https://www.interreg-danube.eu/approved-projects/danubesediment>

Main deliverables:

- Handbook on good practices in sediment monitoring methods;
- Danube Sediment Balance;
- Danube Sediment Management Guidance with a proposal of measures;
- Sediment Manual: how to implement the proposed measures;
- International stakeholder workshop to train 100 experts from all the Danube countries.

[Link to list of deliverables](#)

Project manager: Dr Sándor Baranya, Barbara Kéri.

Email: baranya.sandor@emk.bme.hu, keri.barbara@emk.bme.hu

²⁰⁰ DanubeSediment, 2020, <https://www.interreg-danube.eu/approved-projects/danubesediment>

²⁰¹ Danubesediment, 2020, <https://www.interreg-danube.eu/approved-projects/danubesediment>

E.2.1.4 Link to Mission objectives and targets

Strengthening governance: One main project output is the Danube Sediment Management Guidance (DSMG). It contains recommendations on reducing the impact of a disturbed sediment balance, e.g. on ecological status and flood risk along the river. By feeding into the Danube River Management Plan (DRBMP) and the Danube Flood Risk Management Plan (DFRMP) issued by the ICPDR, the project directly contributes to transnational water management and flood risk prevention²⁰².

E.2.2 Main objective of the case study project

Development of a [Danube Sediment Management Guidance \(DSMG\)](#). The document provides background information and concrete examples for implementing good practice measures in each field²⁰³.

E.2.3 Funding sources and total budget

The project was funded by Danube Transnational Programme (2014-2020). The total investment was EUR 3 558 581.62, with an ERDF contribution of EUR 2 827 421.16 and an Instrument for Pre-Accession Assistance (IPA) contribution of EUR 197 373.19, the remaining sum of funding was taken from the Hungarian National Budget. The investment falls under the priority ‘Environment and culture responsible Danube region’ with the specific objective to ‘Strengthen transnational water management and flood risk prevention’.

Options for obtaining better sediment data were considered, along with ways of using investment ‘individually’ by national agencies/administrations (e.g. for purchasing equipment). Where agencies/administrations or ministries saw the possibility to develop sediment-related networks, they gave additional funding, but there is no evidence of any other municipalities or philanthropic organisations providing funding²⁰⁴.

The project managers noted that, at the end of the project, no appropriate possibilities were identified to continue. However, they plan to apply for future funding (from the Danube Region Programme 2021-2027). The lifetime of that project will depend on the eventual funding programme and project objectives.

E.2.4 Actors

Lead partner: Budapest University of Technology and Economics (Hungary).

ERDF partners:

- University of Natural Resources and Life Sciences, Vienna (Austria);
- National Institute of Meteorology and Hydrology (Bulgaria);
- Executive Agency ‘Exploration and Maintenance of the Danube River’ (Bulgaria);
- Institute for Water of the Republic of Slovenia (Slovenia);
- Water Research Institute (Slovakia);
- Technical University of Munich Chair of Hydraulic Research and Water Resources Management (Germany);
- National Administration ‘Romanian Waters’ (Romania);
- Croatian Waters – legal entity for water management (Croatia);
- Bavarian Environment Agency (Germany);
- General Directorate of Water Management (Hungary);
- National Institute of Hydrology and Water Management (Romania).

²⁰² DanubeSediment, Summary document for second national stakeholder workshop, Hungary, 2020.

²⁰³ Habersack H., Baranya S., Holubova K., Vartolomei F., Skiba H., Schwarz U., Krapesch M., Gmeiner Ph. and Haimann M., *Sediment manual for stakeholders*, Output 6.2 of the Interreg Danube Transnational Project DanubeSediment co-funded by the European Commission, Vienna, 2019.

²⁰⁴ Email correspondence between FT and Project Managers Mrs Kéri and Mr Baranya (1-8 March 2022).

IPA partners

- Jaroslav Černi Institute for the Development of Water Resources (Serbia);
- Republic of Serbia, Ministry of Construction, Transport and Infrastructure Directorate for Inland Waterways (Serbia).

Associated partners

- Federal Waterways Engineering and Research Institute (Germany);
- International Sava River Basin Commission (Croatia);
- Danube Commission (Hungary);
- WWF Hungary (Hungary);
- Water management construction, State enterprise (Slovakia);
- Ministry of Water and Forest (Romania);
- VERBUND Hydro Power GmbH (Austria);
- Ministry of Foreign Affairs and Trade (Hungary);
- Slovenian Water Agency (Slovenia);
- Slovak Water Management Enterprise, s.e. (Slovakia);
- Hidroelectrica SA (Romania);
- ICPDR (Austria);
- Federal Ministry of Agriculture, Forestry, Environment and Water Management (Austria);
- Global Water Partnership Central and Eastern Europe (Slovakia).

E.2.4.1 Main actors and their roles

The lead partner is Budapest University of Technology and Economics (Hungary), which was tasked with managing the consortium. Other members contributed varying roles to different work packages²⁰⁵.

E.2.4.2 Societal/citizen engagement and involvement

*First national stakeholder workshop*²⁰⁶

The first national stakeholder workshop was held in Zagreb on 30 November 2017 at Croatian Waters' head office. The workshop was attended by around 100 experts from different Croatian institutions and staff from Croatian Waters. The main objective of the project was to improve the management of water and sediment, as well as the morphology of the Danube River, as well as to:

- Establish a sediment balance for the Danube River, also considering the input of the most important tributaries;
- Identify stretches with sediment surplus and deficit, riverbed degradation, sediment related;
- Identify problems in flood risk management, hydropower generation, navigation, and ecology;
- Gain knowledge and better understanding of sediment transport and morphodynamic processes in the Danube.

²⁰⁵ Email correspondence between FT and Project Managers Mrs Kéri and Mr Baranya (1-8 March 2022).

²⁰⁶ Danubesediment, *First national stakeholder workshop summary*, 2017.

Second national stakeholder workshop, Hungary²⁰⁷

The aim of the event was to summarise the results of the projects, introduce the measures identified, and facilitate a discussion among participants. Thirty-three participants registered (22 attended) from universities, research institutes, ministries, regional water management authorities and NGOs.



Figure 117 Presentation for the plenary during the second stakeholder workshop in Hungary²⁰⁸

The workshop concluded that more data are needed that reflect the standards agreed by the partners. They also agreed on the need for innovative measures to improve the sediment balance, e.g. chevrons were introduced, and the Hungarian partners were encouraged by NGO representatives.

Two international stakeholder events were also organised, but were primarily attended by consortium members. Small group discussions were aided by translators, to maximise participation. The international stakeholder workshops supported the transfer of knowledge to key target groups throughout the Danube River Basin, for example hydropower, navigation, flood risk management and river basin management, which includes ecology. These target groups were also involved in developing the project results, for example in the framework of national events²⁰⁹.

E.2.4.3 Economic/business aspects

According to the Project Manager, Barbara Kéri:

'Economic or business aspects weren't really been considered during the project. In parts of the recommendations about best practices the consortium made qualitative assessments about whether a solution is cheap or expensive, but I think we didn't go any further into the economic issues'²¹⁰.

E.2.5 Main results

The issue of sediment changes and the state of balance was researched thoroughly and discussed across Member States in-depth for the first time. A [sediment manual for stakeholders](#) was prepared, which was designed to:

- Explain the background and context, as well as all relevant information on the legal background, boundary conditions, problems and needs;
- Share good practice examples and potential measures for sediment management, including checklists for planned projects;
- Compile measures against sedimentation in reservoirs and other impoundments;
- Present sediment monitoring and data approaches.

[Various documents](#) were published to present the results of the project.

²⁰⁷ DanubeSediment, *Summary document second national stakeholder workshop*, Hungary, 2020.

²⁰⁸ Ibid.

²⁰⁹ DanubeSediment, 2020, <https://www.interreg-danube.eu/approved-projects/danubesediment>

²¹⁰ Email correspondence between FT and Project Managers, Mrs Kéri and Mr Baranya (1-8 March 2022).

According to the Project Managers, the discussions and collaboration in the consortium strengthened future cooperation and the network of actors engaged with Danube sediment.

E.2.5.1 Innovative methods, activities applied/demonstrated

The project is the first detailed study on sediment transport in the Danube. The consortium succeeded in bringing together experts from different countries to discuss this specialist topic for the benefit of the Danube.

E.2.5.2 Implementation challenges

The project had no specific implementation challenges. For the workshops, it was observed that most participants were more comfortable engaging with specific (technical) details in their mother tongue, thus translators were used to ensure that all details were captured²¹¹.

Data are gathered (monitoring) in the same way as before the project, except where some countries have developed their monitoring measures. Lack of funding meant that there was no specific development of monitoring in the participating countries²¹².

E.2.5.3 Project results: achievement of objectives

All promised deliverables were submitted:

- 1) Handbook on good practice of sediment monitoring methods;
- 2) Danube Sediment Balance;
- 3) Danube Sediment Management Guidance with a proposal of measures;
- 4) Sediment manual for stakeholders with instructions on how to implement the proposed measures;
- 5) International Stakeholder Workshop to train 100 experts from all Danube countries, forming a target group of users of the project results and establishing efficient interaction with them.

DanubeSediment solely addressed sediment quantity, rather than quality²¹³.

E.2.5.4 Follow-up actions and long-term monitoring

Some follow-up measures are in place to maintain monitoring, but there are no other follow-up actions planned, given the lack of funding. The Project Manager noted that the consortium plans to apply for future funding from the Danube Region Programme 2021-2027, with duration and objectives depending on the funding parameters.

E.2.6 *Implications for Mission activities*

E.2.6.1 Potential and barriers to replication and upscaling

There are no distinct barriers to replicating the project. However, it takes considerable transboundary coordination to analyse the key drivers and pressures causing an alteration of the sediment balance and to draw conclusions to adapt the management approach. More significant is the need to continue this project itself - as sediment regimes are constantly changing, constant review and research are needed to reveal and evaluate development in the sediment balance.

E.2.6.2 Conclusions and lessons

An increasing discrepancy between surplus and lack of sediment is evident in the Danube basin. This increases in flood risk, reduces navigation possibilities and hydropower production, deteriorates ecological conditions, and lowers the groundwater level. Sediment management is therefore an urgent issue that can only be treated in a basin-wide transnational approach. The lack of sediment management was recognised by the ICPDR in the Danube RBMPs of 2009 and 2015.

The uncertainty of funding and the linking of funding to project objectives may neglect some other activities that feel appropriate to strengthen the project²¹⁴.

²¹¹ Ibid.

²¹² Ibid.

²¹³ DanubeSediment, *Overview of all deliverables*, 2020, <https://www.interreg-danube.eu/approved-projects/danubesediment/outputs>

²¹⁴ Email correspondance between FT and Project Managers, Mrs Kéri and Mr Baranya (1-8 March 2022).

E.3 Case study 3: Ottensheim Fishpath

E.3.1 Introduction and context

This project is the construction of the longest Danube fish bypass at the Ottensheim-Wilhering power plant. The bypass channel has a length of 14.2 km.

The bypass channel itself is not in a Natura 2000 area, but it represents an important connection between the Natura 2000 areas on the Danube and its tributaries. There are important stepping stone biotopes alongside, which provide considerable support for exchanges between the populations in the conservation areas²¹⁵.

The operators of the hydropower plant in Ottensheim partnered with researchers from different universities on the project and received support from LIFE+. The project goes beyond the requirements of the WFD.

E.3.1.1 Location

The case study area is in Ottensheim-Wilhering, Upper Austria²¹⁶.

E.3.1.2 Year of completion

The work was carried out between 2011-2020²¹⁷.

(Construction commenced in 2015 and was completed in 2016, more quickly than expected).

E.3.1.3 Brief overview of the case study

Project website, deliverables and emails

Website: <https://www.life-netzwerk-donau.at/de-at/massnahmen/umgehungsarm-ottensheim-wilhering>

Main deliverables:

- Restoration of Danube continuity for all relevant fish species;
- Creation of habitats in the form of gravel structures and lateral networking with tributaries;
- Networking of Natura 2000 areas (stepping stone biotopes between protected areas);
- Strengthening fish populations in surrounding areas;
- Closing the gap between completed LIFE projects in Lower Austria;
- Valuing previous investments;
- Implementation of the WFD.

Project Managers: Walter Reckendorfer, Florian Seidl, David Oberlechner

Email: walter.reckendorfer@verbund.com, florian.seidl@verbund.com, david.oberlechner@verbund.com,

E.3.1.4 Link to Mission objectives and targets

This project is linked to the target of free-flowing rivers and aims to strengthen biodiversity. Given its scope and long-term approach, it will be an important enabler of fish migration. However, this project is a solution rather than addressing the root of the problem, suggesting that the construction of fish ladders is most suited to areas where barriers cannot be removed.

²¹⁵ VERBUND, *LIFE+ Netzwerk Donau: VERBUND Baut Europas Längste Fischwanderhilfe In Ottensheim*, 2020, https://www.youtube.com/watch?v=PitArPv2c3M&ab_channel=VERBUND

²¹⁶ Europas Längste Fischwanderhilfe, 2020, <https://www.life-netzwerk-donau.at/de-at/massnahmen/umgehungsarm-ottensheim-wilhering>

²¹⁷ Europas Längste Fischwanderhilfe, 2020, <https://www.life-netzwerk-donau.at/de-at/massnahmen/umgehungsarm-ottensheim-wilhering>

E.3.2 Main objective of the case study project

Enabling power plant activity while fulfilling high ecological and technical requirements for passability for fish and creating new deep areas (pools), fords and inlets for additional habitat areas²¹⁸.

E.3.3 Funding sources and total budget

- EUR 280 million to 2025 from the EU (Life+ programme), Federal Ministry for Forestry, Water and Environment, communal fishing associations of Austria;
- VERBUND applied to the LIFE+ programme for funding.

E.3.4 Actors

E.3.4.1 Main actors and their roles

- VERBUND: company running the hydropower plant that initiated the project and is responsible for all implementation steps;
- LIFE+ programme: granted funding to this project;
- Natura 2000: the fish ladder is adjacent to a Natura 2000 area, with the hope that overall re-naturalisation in the area will have positive effects for the Natura 2000 area nearby;
- Life Netzwerk Donau: partner and coordinator for re-naturalisation efforts of VERBUND and other project implementers along the Danube. Participation in the network is particularly important to VERBUND in the longer term, both for the Danube and other rivers.

E.3.4.2 Societal/citizen engagement and involvement

- Early in the project, regional governments and Upper Austria were approached to join the project and also contributed to the financing;
- National and international excursions are being used to raise the project profile.

E.3.4.3 Economic/business aspects

This project was efficient in building the fish bypasses, due to past experience - the VERBUND Hydro Power GmbH has already built more than 90 fish bypasses with similar scopes.

E.3.5 Main results

E.3.5.1 Innovative methods, activities applied/demonstrated

The project lead highlighted four main innovative aspects:

- 1) High precision for close-to-nature implementation of creating the water channel (use of GPS data points automated for construction machines)²¹⁹;
- 2) Monitoring of fish migration (paid and running project) with injecting chips, and monitoring how fish move and migrate;
- 3) Tracking aquatic ecosystem activity;
- 4) Meets both technical and ecological standards.

E.3.5.2 Implementation challenges

The project had very few implementation challenges and was concluded substantially ahead of schedule.

²¹⁸ Europas Längste Fischwanderhilfe, 2020, <https://www.life-netzwerk-donau.at/de-at/massnahmen/umgehungsarm-ottensheim-wilhering>

²¹⁹ VERBUND, *LIFE+ Netzwerk Donau: VERBUND Baut Europas Längste Fischwanderhilfe In Ottensheim*, 2020, https://www.youtube.com/watch?v=PitArPv2c3M&ab_channel=VERBUND

E.3.5.3 Project results: achievement of project objectives

The construction of the side channel is an important contribution to this part of the Danube and surrounding areas. It was purposefully integrated as a link to other ecological areas to enable fish migration, in line with the WFD and the Habitats Directive. Figure 120 shows how the fish-ladder was constructed.



Figure 118 Fish ladder construction²²⁰

E.3.5.4 Follow-up actions and long-term monitoring

The VERBUND project team monitors the quantity and health of fish using the ladder, as an indicator of ecosystem health. Since monitoring began, the team has identified 53 species of fish using the ladder. The number of fish per day varies substantially, depending on when the monitoring takes place. The team also checks the data from the chips in some of the fish in order to analyse the routes they take.

E.3.6 Implications for Mission activities

The project is relevant to Mission activities due to its thorough approach, consistency in monitoring, and local connections. This project runs a state-of-the art fish ladder that fulfils the purpose of fish passage and ecosystem development, while running a hydropower plant. It thus contributes to the Mission target of free-flowing rivers, although it does not fulfil all four dimensions (lateral, longitudinal, temporal, vertical) of connectivity²²¹.

E.3.6.1 Potential and barriers to replication and upscaling

The potential for replication exists. The planners and all parties involved developed a well-planned project from planning to implementation, thus there are sufficient data and detail available on specific steps or measures that could be applied to other projects.

One possible obstacle may be the high level of financial support and interest in fish ladders, which may not be found in other locations. VERBUND was incentivised to start this project because Austria encourages and expects companies to contribute to the goals of the WFD.

²²⁰ <https://www.verbund.com/de-at/ueber-verbund/kraftwerke/fischwanderhilfen>

²²¹ VERBUND, *Fischmonitoring Bei Ottensheim: Ein Zwischenstand*, 2018, <https://vround.verbund.at/de-at/artikel/2019/03/12/fischmonitoring-fischwanderhilfe-ottensheim>

E.3.6.2 Conclusions and lessons

Where a barrier remains (e.g. an active hydropower plant), a river is not free-flowing and fish migration is disrupted. The construction of a fish ladder offers fish an alternative pathway to get to the river section past the dam. This project proves that this can be a successful and important measure for fish migration and biodiversity. Project success depended on the efforts and willingness of the region to support the project, both financially and in strengthening social acceptance.

The Life Netzwerk Donau is an important enabler and coordinator for this and other projects and could be a key point to effectively coordinate funding.

E.4 Case study 4: Drava LIFE

E.4.1 *Introduction and context*

Project organisers point to the uniqueness of this project's wide-ranging scale: it follows the goal of river restoration in five different countries along the Drava River, in an integrated manner, over the course of nine years. With a strong emphasis on coordination, the project team has met the requirements for national permits, carried out nature impact assessments, and prepared implementation work.

The DRAVA LIFE project area covers a length of 310 km and includes four Natura 2000 sites in an area of 67 800 hectares, from Dubrava Križovljanska 322.8 km of the river) to Osijek (15 km). Except for the part from Osijek to the confluence with the Danube (Kopački Rit Nature Park), the whole length of the Croatian Drava is included in the project.

All of the areas covered by the project are Natura 2000 sites. However, there are several layers and categories that the project has to consider:

- ‘We have proclaimed in Croatia Natura 2000 as a part of the European network, then within the Natura 2000 you have protected areas like the regional park that covers river Mura and Drava. And on top of this they have the Mura-Drava biosphere reserve amongst the five countries, which covers parts of the Mura Drava in parts of Austria, Slovenia, Croatia, Hungary and Serbia’²²².

The LIFE project acts within a UNESCO Biosphere Reserve, the first across the five countries. In 2011, the Ministers for Environment and Nature Protection of Austria, Croatia, Hungary, Slovenia and Serbia agreed on the establishment of the Transboundary UNESCO Biosphere Reserve ‘Mura-Drava-Danube’. In 2022, the UNESCO Man and the biosphere committee in Paris officially approved the Croatian-Hungarian part of the Biosphere Reserve. These 630 000 ha cover some 60 % of the future five-country area. The Reserve is not an official nature protection category in Croatia, but ‘is more like a brand or creating visibility but does not have the important status like a strictly protected area’²²³.

The Drava River is the central part of one of Europe’s largest and best-preserved riverine ecosystems. The five-country Transboundary UNESCO Mura-Drava-Danube Biosphere Reserve connects the free-flowing stretches of the Drava and Mura with the extensive river and floodplains areas of the Danube. Together, the rivers form a 1 300 km² river system, including approx. 700 km of free-flowing rivers, that stretches across five countries: Austria, Croatia, Hungary, Slovenia and Serbia. This river system is the focus of one the largest river conservation initiatives in Europe, as it consists of four zones: Natura 2000 area, a buffer zone and transition zones. Most of the Biosphere Reserve is located in Croatia.

The permit was granted after the impact assessment was completed. This allows time to prepare all of the technical details and design, hire contractors, verify access and obtain additional land permits. Restoration measures are expected to start at the end of 2022²²⁴.

E.4.1.1 Location

Croatia (focus), Austria, Hungary, Slovenia and Serbia.

E.4.1.2 Year of completion (or extent of completion in 2021)

- 2015-2024
- Started: December 2015
- Originally scheduled to finish in December 2020, but prolonged (twice) to November 2024, due to additional EIA activities in the Natura 2000 areas. The EIA process took three years.

²²² Zoom interview with Branka Spanicek (WWF Adria) and Igor Tošić (Croatian Waters) on 10 March 2022 (35-minute recording).

²²³ Ibid.

²²⁴ Ibid.

E.4.1.3 Brief overview of the case study

Project website, deliverables and emails

Website: <https://www.drava-life.hr/en/home/>

Main deliverables:

- 41 ha of land acquired for river restoration;
- 1000 metres of dynamic river banks restored and preserved;
- 13 ha of new dynamic river zones with gravel, sand and muddy banks created;
- 14.5 km of side-arms restored or newly created;
- Quality improvement to more than 300 ha of floodplain forests;
- Breeding population of endangered birds increased (e.g. little tern (*Sterna albifrons*));
- Human disturbance of river birds during breeding season reduced (through information for visitors, placing of panels on breeding sites);
- Knowledge of Natura 2000 sites increased and awareness raising instruments established (e.g. information centre, information points, nature educational corners, monitoring towers, communication and educational material and workshops);
- Cross-border cooperation fostered (e.g. International Drava Symposium) and new inter-sectoral river management approach strengthened.

Project Managers: Igor Tošić, Tanja Nikowitz, Maja Mlinarić Bajšić, Branka Spanicek.

Email: igor.totic@voda.hr, maja.mlinaric.bajsic@voda.hr, tanja.nikowitz@wwf.at,
bspanicek@wwfadria.org

E.4.1.4 Link to Mission objectives and targets

The creation of the Mura-Drava-Danube Transboundary UNESCO Biosphere Reserve is a central part of Europe's largest river protection initiative. The Drava LIFE project focuses on the restoration of side arms and channels. It supports flood control within the existing floodplains. These measures positively influence the lowering of high water levels locally and divert the water away from settlements, bridges, roads and dykes.

The biosphere status is relevant for the Mission because it is a starting and meeting point for different projects in the area. The members of the Drava LIFE project network with other projects and have, for example, created the Water School in Croatia, which links its work and contents to the transboundary biosphere status.

The project actively contributes to Target 1 for the Mission lighthouse area and to two indicators of Target 2:

- Flood control supporting ecosystems;
- Support of habitats and species within the Natura 2000 sites.

E.4.2 Main objective of the case study project

- Increase pristine, dynamic river habitats – dynamic river habitats (gravel, sand and steep banks) are extremely rare along the Drava, but are key for many habitat types and species;
- Preserve and create new floodplain waters and improve water level dynamics – floodplain waters are the most threatened parts of the Drava River ecosystem due to riverbed deepening and disconnection from the main river by bank revetments and groynes. Actions will focus on the 're-dynamisation' of the side arms to benefit habitats and species;
- Reduce human disturbance of birds – visitor guidance on how to avoid negative impacts of uncontrolled human activities is key for the preservation of typical riverine bird species;

- Increase awareness of Natura 2000 sites that have just been established along the Drava and in Croatia. The project addresses the current lack of awareness and seeks local support;
- Introduce intersectoral river management cooperation in Croatia;
- Increase cross-border cooperation along the Drava.

E.4.3 Funding sources and total budget

- Total budget: EUR 4 592 898;
- EU contribution: EUR 2 755 739 (60%) (LIFE+ Programme);
- The contribution of partners: 1,837.159 € (40%), which applied for project specific funding from the Austrian Federal Ministry for climate action, environment, energy, mobility, innovation and technology, as well as the Coca-Cola Foundation. The exact budget of each supporter (share of the 40%) is not specified.

Supported by the Austrian Federal Ministry for Sustainability and Tourism and the Coca-Cola Foundation

- Initially the project was set up with a model that targeted 60 % of funding from LIFE+ and 40 % from the partners (self-secured or through additional partners). For instance, WWF Adria received one part of its funding from the [Federal Ministry for Sustainability and Tourism \(BMNT\)](#) and the other from the [Coca-Cola Foundation](#). Croatian Waters covered its share through the state budget, as the legal authority for water management;
- The Coca-Cola Foundation ran the Living Danube Partnership (2013-2020), with Drava LIFE one of the projects supported²²⁵.

E.4.4 Actors

E.4.4.1 Main actors and their roles

- River restoration activities were carried out in cooperation with water management and nature protection authorities, as well as NGOs.

Beneficiaries:

- Coordinating beneficiary: Croatian Waters (legal entity for water management) is in charge of planning and oversight during implementation;
- WWF Austria (*Umweltverband WWF Österreich*);
- Public institution for management of protected natural values in Varaždin County (*Javna ustanova za upravljanje zaštićenim prirodnim vrijednostima na području Varaždinske županije - JU ZDP VŽ*) (Croatia);
- Public institution for the management of protected natural values in the Koprivnica-Križevci County (*Javna ustanova za upravljanje zaštićenim prirodnim vrijednostima na području Koprivničko-križevačke županije - JUZPVKKZ*) (Croatia);
- Public Institution for the Management of Protected Areas of Nature and the Ecological Network of Virovitica-Podravina County (*Javna ustanova za upravljanje zaštićenim dijelovima prirode i ekološkom mrežom Virovitičko-podravske županije - JU VPŽ*) (Croatia);
- Association for nature and environment protection Green Osijek (*Udruga za zaštitu prirode i okoliša Zeleni Osijek - Zeleni Os*) (Croatia).

E.4.4.2 Societal/citizen engagement and involvement

During project implementation, the partners set up educational centres and educational paths along the Drava River and put in place visitor guidance actions. Several exhibitions and extensive awareness-raising activities will be organised in cooperation with local citizens and schools. Completed and ongoing activities include:

²²⁵ Zoom interview with Branka Spanicek (WWF Adria) and Igor Tošić (Croatian Waters) on 10 March 2022 (35-minute recording).

- Generation of short videos;
- 'River experience days', with guided tours to the project areas;
- Excursions with students;
- Croatian Waters was responsible for constructing a water centre. Due to open at the end of 2022, it will be the first water school of this size and type to teach the public about water restoration projects. Some contracts have already been signed with interested schools and associations;
- The project has 47 activities: implementation of action plans, strategies, habitat management, education, awareness-raising, and preparing a book²²⁶.

E.4.4.3 Economic/business aspects

A socioeconomic analysis (stakeholder survey) was carried out, with another due to take place at the end of the project. Those data will be used to draw conclusions about the added value of the project for the region.

E.4.5 Main results

E.4.5.1 Innovative methods, activities applied/demonstrated

The LIFE project is the first intersectoral cooperative and integrated management initiative focusing on Croatian rivers. It aims to implement EU directives (including the WFD, Floods Directive, and Birds and Habitats Directives) to solve river ecosystem problems. Restoration activities will benefit endangered habitats and species within the Natura 2000 sites, contribute to better flood protection of inhabited areas along the Drava River, and increase the recreational value of the area for local people.

River restoration measures will be integrated into basin-wide and long-term planning of the regional ecosystem, by combining ecosystem conservation and flood protection.

E.4.5.2 Implementation challenges

- 1) Challenging to get all parties on board for the impact assessment study, with project leaders noting difficulties 'mentally, financially and administratively';
- 2) The budget should have been set higher initially to allow for rising costs over the lifetime of such a project, such as:
 - i. Actual cost per unit (especially for technical implementation) increasing due to inflation;
 - ii. Difficulties in securing funding extensions (i.e. due to the impact assessment)²²⁷.

E.4.5.3 Project results: achievement of project objectives

All project deliverables and objectives (see list in info box) will be completed, albeit with some delays.

E.4.5.4 Follow-up actions and long-term monitoring

Monitoring was carried out before the project and will be carried out again afterwards to evaluate its impacts. The Croatian Water Services were responsible for the pre-restoration monitoring, with WWF Adria taking on the post-project monitoring. This approach was set as a permit condition by the Ministry of Agriculture, Forestry and Water Management. The permit was accompanied by an 80-page document of measures to be implemented during the project, including observations and monitoring activities from other projects in the same area, such as bird observations and fish monitoring.

E.4.6 Implications for Mission activities

E.4.6.1 Conclusions and lessons

- 1) Budgeting: there is a need for more careful budgeting, as funding was needed for unforeseen extensions. Project amendments and small technical details that change during the project then require new justifications for funding. Some of these costs were covered by the partners (especially Croatian Waters for the technical implementation) because decisions from financing sources take too much work and time.

²²⁶ Zoom interview with Branka Spanicek (WWF Adria) and Igor Tošić (Croatian Waters) on 10 March 2022 (35-minute recording).

²²⁷ Zoom interview with Branka Spanicek (WWF Adria) and Igor Tošić (Croatian Waters) on 10 March 2022 (35-minute recording).

- 2) Endurance: it can be challenging to keep a project of this length (nine years) on track²²⁸. The permits needed for river restoration projects consume a lot of time and energy in terms of administration and conditions. Gaining buy-in from the ministries and agencies took several field trips and considerable justifications about the exact plans and international comparisons.
- 3) Participation and coordination: active involvement of all parties from the beginning is central to building trust and smoothing communication, but it takes time. Open discussion and collaboration is also crucial to finding joint solutions and making compromises as needed.

E.4.6.2 Potential and barriers to replication and upscaling

The fact that LIFE provides 60 % of funding aids replication. A higher share would have reduced stress for the project partners, who had to seek out other options (in Croatia, a fund for the environment and an office for associations now exist) and donors and compete with other projects and topics²²⁹. It takes work to fund projects: there may not be sufficient financing and time to reach the Mission goal of 25 000 km of free-flowing rivers.

It was difficult to convince donors of the reasons for prolonging certain steps. Project leaders recommend focusing more on the initial budget, including building in overruns from the outset.

Much depends on the type of partner. For instance, WWF is not financed by the State and does not have the same rigidity in yearly budgeting as for instance Croatian Waters and some of the research organisation partners²³⁰.

E.4.6.3 Conclusions and lessons

- Strong link between overall river basin management and the initiative;
- Actions are in line with the EU Biodiversity Strategy and the target of 25 000 km of free-flowing rivers by 2030;
- Target 2 000 types, species and Natura 2000 sites all specified for this project;
- Coordination among various donors and implementing organisations;
- Various awareness-raising projects for different audiences.

²²⁸ Ibid.

²²⁹ Zoom interview with Branka Spanicek (WWF Adria) and Igor Tošić (Croatian Waters) on 10 March 2022 (35-minute recording).

²³⁰ Ibid.

E.5 Case study 5: Mahmudia wetland restoration project

E.5.1 Introduction and context

The Danube Delta is the largest European wetland and also constitutes Europe's largest water purification system. It is characterised by diverse ecological conditions and consists of a river zone with sandy levees and densely vegetated lakes, a transition zone of larger lakes, reed marshes, forested levees, dune-dominated coastline, and marine area.

The Delta supports rich flora and provides habitats for feeding, breeding and wintering of 312 important bird species and about 90 fish species, including populations of species of high conservation value worldwide (e.g. Danube sturgeon). The Delta is one of the last refuges of a range of endangered mammal species, such as the European mink (*Mustela lutreola*), the wildcat (*Felis silvestris*), the freshwater otter (*Lutra lutra*), and the globally threatened monk seal (*Monachus monachus*).

The Danube Delta designated a Biosphere Reserve on the territory of Romania and Ukraine in 1998, and it is also inscribed on UNESCO's World Heritage List. Since 1991, the Delta has been recognised as a wetland of international importance, according to the RAMSAR Convention (Ramsar site no. 521).

The development of Romania's national agricultural policy in the 1980s saw much of the Delta drained to gain agricultural land, creating a huge challenge for the survival of this significant area for biodiversity conservation in Europe.

The RECO Mahmudia wetland restoration project was the first initiative implemented for ecological restoration of the natural characteristics of the Danube Delta. It was implemented by the local community in partnership with WWF Romania and the Danube Delta Biosphere Reserve Administration. The project lasted four years.

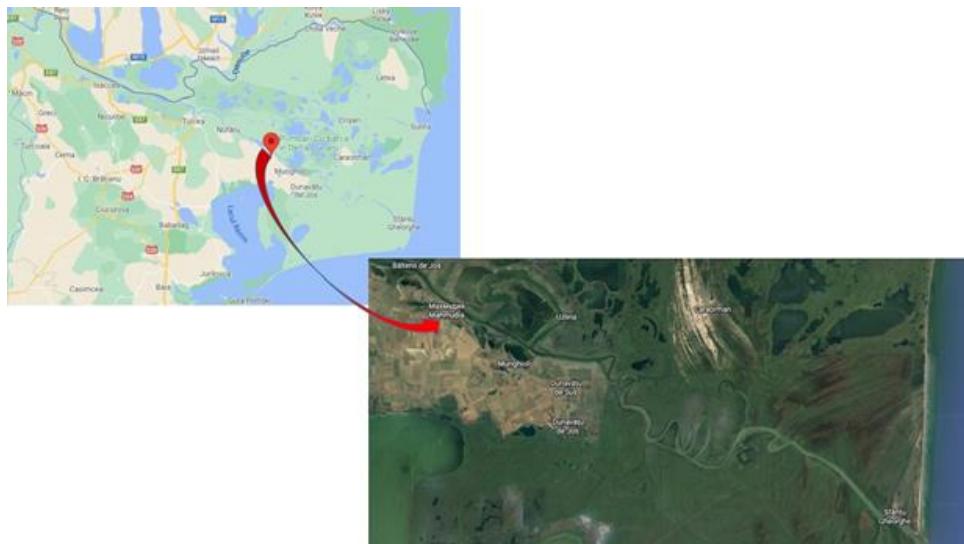


Figure 119 Mahmudia community at the Danube Delta

Source: Google Earth, 2022.

E.5.1.1 Location

The project was located in Mahmudia, a village in Tulcea County, Romania, situated along the southernmost canal of the Danube Delta, at about 60 km before the confluence with the Black Sea. The village was built between two different landscapes on either side of the Sfântu Gheorghe Channel - the delta wetlands to the north and the arid Balkan hilly steppe to the south.

E.5.1.2 Year of completion

The Mahmudia wetland restoration project ran from 2012-2016.

E.5.1.3 Brief overview of the case study

In the 1980s, the Danube Delta area became a subject of intense development to transform nature for economic ends, as it was considered the most fertile terrain in the country.

A large-scale project to drain the majority of the Delta began in 1983²³¹. Large areas were drained and transformed into agricultural fields, destroying their biodiversity. Large areas of the Delta were left totally barren, populated only by certain species of plants. Given their uniformity, those areas are easily identified through remote sensing methods. Almost 40 % of the Delta area was drained for agricultural use, severely affecting the livelihoods of the local population who used the Delta's rich natural resources in the past.

An information campaign promoting the opportunities provided by Romania's Operational Programme Environment 2007-2013 brought together local society and environmental organisations and revived hopes for restoring the natural characteristics of the wetland and improving the quality of life.

Project website, deliverables and emails

Website: No explicit project website - general information is published in the Mahmudia Information Bulletin issued periodically by the municipality:

http://d2ouvy59p0dg6k.cloudfront.net/downloads/foaie_mahmudia_final.pdf

Main deliverables:

- Reconnected 924 ha to the natural flow of the Delta by restoring the hydrological system;
- Restored 18 habitat types;
- Planted 10 ha with white willows (*Salix alba*), silver poplars (*Populus alba*) and European ash (*Fraxinus excelsior*).
- For more details, see: https://wwf.panda.org/wwf_news/?257990/Proiectul-de-renaturare-a-zonei-Carasuhat-din-Mahmudia-la-final

Project Manager: Gheorghe Demidov, Local Council of Mahmudia; WWF Local Project Coordinator: Cristian Mititelu.

Email: demidovgeorgiana@yahoo.com; cmititelu@wwf.ro

E.5.1.4 Link to Mission objectives and targets

RECO Mahmudia worked to restore the natural characteristics of about 2 % of one of the most important wetlands worldwide through the application of active solutions for freshwater ecosystem restoration. The implementation of the project contributed to the achievement of the objective of 'Good Ecological Status' under the GES and the achievement of 'Favourable Conservation Status' (FCS) of species of high conservation value worldwide under the Birds and Habitats Directives, and thus to the goals of the EU Biodiversity Strategy 2030.

The project also contributes to the achievement of MSFD environmental targets by retaining and reducing nutrient loads and other pollutants flowing from the Danube River into the Black Sea, as well as reducing flood risk and sediment loss.

The project therefore contributes to both Mission objectives: to protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030; and to prevent and eliminate pollution of our ocean, seas and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil.

E.5.2 Main objective of the case study project

The main project objective was to restore natural wetlands on the territory owned by the Mahmudia community, contributing to solving two major problems faced in both the project area and in the entire delta: the use of 35 % of the area for agriculture and pisciculture; and the lack of measures to protect the species and habitats on 52.8 % of the territory of the reserve.

²³¹ Ganea, I-V. and Sabin, B.A., 'How a Romanian village resurrected the Danube Delta after the fall of the Iron Curtain', *The Conversation*, 2021, <https://theconversation.com/how-a-romanian-village-resurrected-the-danube-delta-after-the-fall-of-the-iron-curtain-169180>

The project aimed to:

- Reach FCS of priority habitats in the Danube Delta Natura 2000 site - Carasuhat pilot area, directly contributing to the objectives of Priority Axis 4 of the Operational Programme Environment 2007-2013;
- Increase the welfare of the local community through the sustainable use of natural resources and by diversifying opportunities for traditional economic activities, especially tourism.

E.5.3 Funding sources and total budget

The project 'Ecological reconstruction of land belonging to the public domain of the Mahmudia Local Council, within the Carasuhat precinct of the Danube Delta' was co-financed by the ERDF and carried out under the Operational Programme Environment 2007-2013, based on financing contract no. 128266/01.03.2012 signed between the Ministry of Environment and Climate Change as the Managing Authority of SOP Environment and the Local Council of Mahmudia Commune, as beneficiary²³².

The overall project budget was EUR 4 million, of which 90% was EU funding (ERDF) and 10 % national co-funding (Romanian State Budget).

E.5.4 Actors

E.5.4.1 Main actors and their roles

The Local Council of Mahmudia implemented the project in partnership with WWF Romania and the Danube Delta Biosphere Reserve Administration.

E.5.4.2 Societal/citizen engagement and involvement

The inhabitants of the many scattered villages in and around the case study area are closely linked to the Delta ecosystem. Human activities include fishing, forestry, small-scale agriculture, and tourism. The project sought to increase the well-being of this local community. As a purely community-driven initiative, it had significant public acceptance²³³.

During project implementation, a survey (questionnaires) sought to understand how local inhabitants perceive the Natura 2000 sites and their restoration. Information campaigns were also carried out to overcome unfounded doubts about the opportunities and constraints for activities in Natura 2000 sites²³⁴.

E.5.4.3 Economic/business aspects

The Delta's freshwater ecosystems provide essential environmental services, such as drinking water, wood, fish and other food sources, flood protection, tourism and recreation opportunities.

The Mahmudia community and its 2 900 inhabitants were deprived of direct access to the Delta after 924 ha of agricultural land were drained. Before the restoration activities, almost all economic activities were disappearing and the project was seen as the chance for revival, including for fishing and tourism. The change especially affected local fishers, whose numbers had dropped from approximately 300 to 20. Regional tourism had also dwindled, as the closest access to the Danube Delta at Gorgova Lake was pushed back to 26 km distance.

On completion of the project, that distance from Mahmudia to Gorgova Lake was reduced to just 6 km. That shortened distance was seen as important to fishers and to tourism. Presently, for much of the year, Mahmudia is full of Romanian and foreign tourists, who are attracted by the incredible diversity of aquatic birds, landscapes, and traditional local dishes made from a large variety of fish species. This brings in a significant income, ensuring a decent standard of living for those living in the village.

E.5.5 Main results

E.5.5.1 Innovative methods, activities applied/demonstrated

The RECO Mahmudia wetland restoration project was the first community-driven initiative to restore the natural characteristics of the Danube Delta. Six years after the completion of restoration works, the results

²³² WWF Romania, 'Proiectul de renaturare a zonei Carasuhat din Mahmudia la final', 2015, https://wwf.panda.org/wwf_news/?257990/Proiectul-de-renaturare-a-zonei-Carasuhat-din-Mahmudia-la-final

²³³ Local Council Mahmudia, 'The RACO Mahmudia project was concluded', *Mahmudia Information Bulletin*, No 6, 2015, http://d2ouvy59p0dg6k.cloudfront.net/downloads/foaie_mahmudia_final.pdf

²³⁴ Local Council Mahmudia, 'Natura 2000 – spreading the myth', *Mahmudia Information Bulletin*, No. 6, 2015, http://d2ouvy59p0dg6k.cloudfront.net/downloads/foaie_mahmudia_final.pdf

are visible in the natural environment and the improved quality of life and development in the area. It is an example of successful rehabilitation and sustainable use of natural resources provided by the Delta.

E.5.5.2 Implementation challenges

Despite high public support, Mahmudia was unable to restore its whole territory. Large portions are the property of individuals and industrial or agricultural companies, where the municipality could not legally intervene. This poses further challenges in completing the Danube Delta's overall restoration and reaching a better balance of economic development, the use of ecosystem services, and conservation of the biodiversity of this unique natural system.

E.5.5.3 Project results: achievement of project objectives

The project reconnected more than 900 ha of agricultural lands previously separated from the area's inner lakes and wetlands by restoring the natural hydrological system. This created good conditions for the life of all species of plants, birds, and fish that are characteristic of the Delta and led to the rapid restoration of biodiversity and the natural shape and functions of the Delta. When RECO Mahmudia was finished, 18 natural Danube Delta habitats and 10 ha of forest were restored, the equivalent of 2.3 % of the Delta's natural surface.

Economic development and the well-being of the residents increased. The available guesthouse capacity cannot cover tourism demand²³⁵.

On completion of the project, the distance from Mahmudia to Gorgova Lake was shortened from 25 km to 6 km.

In autumn 2021, a new survey was carried out by WWF Romania. Local inhabitants filled out questionnaires on their perceptions of the restoration more than five years after its completion. The survey found that increasing numbers of people are taking advantage of the resources provided by the restored local nature, while eco-tourism is developing progressively.



Figure 120 Restored wetlands of Mahmudia community

Source: Video image 'WWF-Romania Living Danube Mahmudia Wetland Restoration', Interreg Danube Transnational Programme²³⁶.

E.5.5.4 Follow-up actions and long-term monitoring

Recommendations were formulated for activities after the restoration, including monitoring procedures and activities to ensure the role of stakeholders. At present, however, no permanent long-term monitoring of the restored wetland is underway. The Danube Delta Biosphere Reserve Administration is responsible for monitoring the Delta, but due to a lack of funds, this body has not been able to carry out monitoring.

However, the area is, however, of growing interest to scientists and environmental organisations. With the help of external funding, WWF Romania has already conducted some studies on biodiversity (notably birds and vegetation) to understand the effects of the restoration, as well as the socioeconomic results. A scientific study of the restored area with high-resolution inventory and mapping of the local ecosystems and species of high conservation value was carried out in 2021. At the same time, information materials were developed to

²³⁵ Interreg Danube Transnational Programme, WWF Romania Living Danube Mahmudia Wetland Restoration, commissioned by WWF Romania and produced by Virtual Media Production, 2019, <https://www.youtube.com/watch?v=RJ86HogXwE>

²³⁶ Ibid.

raise public awareness about the possibilities offered by local ecotourism²³⁷. The study found that the variety and numbers of birds in the restored area were much greater than before the restoration, with more than 30 species of aquatic birds identified in the restored area. While birds and fish species quickly repopulated the area, plant communities such as the *Nymphaea alba* species of white water lily are coming back at a much slower rate. This also shows the value of appropriate monitoring activities to better assess the value and ecosystem services provided by this dynamic system.



Figure 121 View of Mahmudia wetlands

Source: Photo credit – WWF Romania²³⁸.

E.5.6 *Implications for Mission activities*

E.5.6.1 Potential and hindrances for replication and upscaling

Nature is the basis for economic development in the Delta and for local livelihoods. The local community intends to continue the work, with a view that this is just a stepping stone to returning the Delta's nature to its initial condition in the 1980s. The successful implementation of the project and the already tangible results creates a sound basis for expanding the scope of activities to restore the natural characteristics of the Delta.

Some difficulties were also encountered. One of the difficulties in maintaining the restored wetland is the protection of the trees planted to strengthen dykes. The presence of grazing animals during low waters has led to the loss of newly planted trees, requiring additional preventive measures. The need to find appropriate solutions for private property in the Delta area remains.

One of the major policy-level barriers to upscaling the restoration activities in the Danube Delta stems from the fact that agriculture in Danube Delta receives subsidies, thereby favouring agricultural development in the region. There is a substantial difference in the financial support for agriculture and that for fisheries and aquaculture. Over the last five years, about 5 000 ha have been transformed from fish farms into agricultural farms. Even now, agriculture in the Delta continues to grow.

²³⁷ Ganea, I-V. and Sabin, B.A., 'How a Romanian village resurrected the Danube Delta after the fall of the Iron Curtain', *The Conversation*, 2021, <https://theconversation.com/how-a-romanian-village-resurrected-the-danube-delta-after-the-fall-of-the-iron-curtain-169180>

²³⁸ Leemans, S., Le Merle, H. and Shanahan, E., *Nature restoration helping people, biodiversity and climate*, WWF Romania, 2021, https://wwf.eu.awsassets.panda.org/downloads/nature_restoration_helping_people_biodiversity_and_climate_wwf.pdf

Wetland restoration directly contributes to achieving the objectives of EU environmental directives (WFD, MSFD, Birds and Habitats Directives) and should be considered a priority in developing management plans and measures.

The Mahmudia case is a good transferrable example for other areas with little public support, or where river restoration is not a priority on the political agenda. The project achievements are considered a starting point in the development of a model of sustainable use of natural resources provided by the Delta, taking into account both the need for nature conservation and the needs of the local community for development through nature-friendly economic activities.

E.5.6.2 Conclusions and lessons

The story of Mahmudia's wetland restoration shows the value of rescuing ecosystems from agricultural overdevelopment and achieving human welfare and well-being by implementing nature-friendly economic activities.

One of the main success factors was the efficient and effective collaboration of the different partner organisations, including the local administration, State authority, and an NGO. Collaboration was essential to implementation activities and an appropriate form of ongoing cooperation will need to be found to continue activities after the restoration.

The case of Mahmudia shows how communities can be transformed by restoring degraded ecosystems. The restored wetland has led to biodiversity recovery, reduced pollution and flood risk, contributed to carbon sequestration, and serves as sediment traps for runoff. Meanwhile, local people have benefited from ecotourism and the local economy has prospered.

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Appendix G Proposed Indicators: Common Indicators and Lighthouse Area Indicators

G.1 Introduction

The overall objective of Mission ‘Restore our ocean and waters by 2030’ is to provide a systemic approach for the restoration of our oceans, seas and waters by 2030. Within this overall objective, the Mission aims at three specific interlinked and mutually supporting objectives:

- 1) Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030;
- 2) Prevent and eliminate pollution of our oceans, seas and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil;
- 3) Make the sustainable blue economy carbon-neutral and circular, in line with the European Climate Law and the holistic vision supported by the Sustainable Blue Economy Strategy.

As part of this baseline study covering the Atlantic and Arctic Sea basin, the Danube River basin and Mediterranean Sea basin, a proposed set of indicators has been identified. These indicators can monitor the progress of the Mission’s implementation and the achievement of its objectives.

The indicators are intended to cover Mission projects funded and co-funded by the EU as well as actions submitted by partners via the Mission Charter pledging system (for some indicators, the term ‘Mission projects’ is used to refer to both EU-funded projects and partner actions).

Based on the Mission Implementation Plan, as well as the EC’s Better Regulation Guidelines, the proposed indicators are classified in three categories:

- Outputs: the immediate tangible and countable products/services produced as a consequence of the initiative. Output indicators will measure the progress of Mission implementation for key Mission activities.
- Outcomes: the immediate direct effects of the initiative (on the environment). Outcome indicators will measure the degree of achievement of the three Mission objectives (i.e., nature restoration and protection, pollution reduction, and carbon neutral and circular blue economy) throughout the EU.
- Impacts: the long-term, wider effects (on the environment). Impact indicators will measure the actual real-time progress of ocean and water restoration based on Green Deal, biodiversity restoration targets and on the upcoming EU Nature restoration targets.

The indicators are presented on the following pages. They are divided into:

- Common indicators for all lighthouse areas
- Indicators specific to each lighthouse area

Most of the common indicators are output indicators, though a few common outcome and impact indicators are proposed. The common indicators are based on a review of key policy and planning documents for Horizon Europe and for the Mission.

The indicators for each lighthouse area also cover outputs, outcomes and impact indicators. In addition, these lighthouse area indicators identify KPIs that are closely linked to the Mission’s objectives. The proposed KPIs are in **bold**.

G.2 Common indicators for all three lighthouse areas

I Output indicators

Indicator	Unit	Comments
Number of projects implemented within the Mission	Number	Aggregated by Mission area and target, MS/third country, type of project lead organisation, type of project.
Financial resources allocated for projects implemented within the Mission	Euros	Aggregated by Mission area and target, MS/third country and source of financial resources: EU Horizon funding, other EU funding sources, national public funding, private sources. Sources also include in-kind contributions by project partners.
Number of citizens and stakeholder groups actively involved in projects implemented within the Mission	Number	Grouped by Mission area and target, MS/third country, type of stakeholder group. Number of participants at project workshops, training sessions and other events.
Number of citizens reached through public awareness/information /education activities in Mission projects and actions.	Number	Number of visitors of project websites. Grouped by Mission area and target, MS/third country. <i>To be gathered by project partners.</i>
Scientific contribution (number of papers)	Number	Number of academic papers published, by Mission area and target, MS/third country

II Outcome indicators

Outcome indicator	Unit	Comments
Number of monitoring systems implemented or improved	Number	Number of monitoring systems implemented or catalysed by the Mission. Grouped by Mission area and target, MS/third country.
Number of projects catalysed by the Mission	Number	Actions pledged by partners under the Mission Charter. Grouped by Mission area and target, MS/third country.
Number of innovative solutions and tools developed in Mission projects and scaled up	Number	Number of solutions and tools brought to market Mission projects. Grouped by Mission area, MS/third country.
Development of provisions that ensure long-term and sustained effects of the restoration measures	Number	Can include EU or national legal provisions and financial provisions, as well as the creation of specific institutions. For provisions supported by Mission projects and actions. An indication of the contribution of the Mission to policy development. Aggregated by Mission area, by MS/third country and (where appropriate), at regional level.

III Impact indicators

Impact indicator	Unit	Comments
Increase of public awareness	Number	Public awareness of EU policy objectives related to Mission targets. Would require public opinion surveys. <i>To be developed – this might be a Mission-wide indicator.</i>
Progress towards Mission objectives	Index	Composite indicator aggregating lighthouse area KPIs – to be developed.

I Output indicators

Indicator	Unit	Comments
Marine/coastal area covered by Mission projects	km ² % of MPA and restoration objectives	Aggregated by sea basin (ATL/ARC), MS/third country, protection level (protected/strictly protected/non-protected area), and coastal and marine habitat types listed in Annex I and II of the Proposal for a Regulation on nature restoration. <i>Relevant for all three lighthouse area targets.</i>
Number and area coverage of habitat sites mapped and analysed by the Mission	Number km ² % of restoration objectives	Aggregated by sea basin (ATL/ARC), MS/third country, per protection level (protected/strictly protected/non-protected area), and coastal and marine habitat types listed in Annex I and II of the Proposal for a Regulation on nature restoration. <i>Relevant for target 3: Contribute to relevant upcoming marine nature restoration targets.</i>
Number and area coverage of sites mapped and analysed by the mission to identify new marine protected areas.	Number km ²	Aggregated by sea basin (ATL/ARC), MS/third country. <i>Relevant for target 1: Protect a minimum of 30 % of the EU's sea area and integrate ecological corridors</i>
Number and area coverage of sites mapped and analysed by the mission to identify ecological corridors.	Number km ² % of target 1 objective	Aggregated by sea basin (ATL/ARC), MS/third country. <i>Relevant for target 1: Protect a minimum of 30 % of the EU's sea area and integrate ecological corridors</i>
Restoration measures implemented in the projects within the framework of the Mission	Number km ²	Can be aggregated by sea basin (ATL/ARC), MS/ third country and habitat type <i>Referring to target 3: Contribute to relevant upcoming marine nature restoration targets.</i>
Number of nature-based solutions implemented in Mission projects	Number km ²	Especially for coastal projects. Can be aggregated by sea basin (ATL/ARC), MS/ third country and habitat type <i>Referring to target 3: Contribute to relevant upcoming marine nature restoration targets.</i>
Number of innovative solutions and tools to reduce human pressures on marine ecosystems developed in Mission projects	Number	Can be aggregated per MS/ third country and habitat type (where relevant). <i>Relevant all three ATL/ARC targets.</i>

II Outcome indicators

Outcome indicator	Unit	Comments
Designation of new or expanded Marine Protected Areas (MPAs)	Number km ² %*	For MPAs directly supported or catalysed by the Mission. Aggregated by sea basin (ATL/ARC), MS/third country. *% of area under jurisdiction (EEZ, TS and IW) covered by MPAs), of national marine waters, of EU targets, and of IUCN categories. Separately, areas in the high seas. In addition, % of target 1 objective. <i>Relevant for target 1: Protect a minimum of 30 % of the EU's Sea area and integrate ecological corridors.</i>
Designation of new Strict Marine Protected Areas (MPAs)	Number km ² %*	For MPAs directly supported or catalysed by the Mission. Aggregated by sea basin (ATL/ARC), MS/third country. *% of area under jurisdiction (EEZ, TS and IW) covered by MPAs), of national marine waters, of EU targets, and of IUCN categories. Separately, areas in the high seas. In addition, % of target 2 objective. <i>Relevant for target 2: Strictly protect at least 10 % of the EU's Sea area.</i>
Development of management plans for new and existing MPAs	Number MPA area: % of targets 1 and 2	Number of MPAs with new or revised management plans whose preparation is supported or catalysed by the Mission. Aggregated by sea basin (ATL/ARC), MS/third country. <i>Relevant for targets 1 and 2.</i>

Outcome indicator	Unit	Comments
Designation of new and/or expanded coastal protected areas	Number km ² % of target 3	For coastal habitat types listed in Annex I and II of the Proposal for a Regulation on nature restoration. For sites supported or catalysed by the Mission. Aggregated by sea basin (ATL/ARC), MS/third country. <i>Referring to target 3: Contribute to relevant upcoming marine nature restoration targets.</i>
Designation of ecological corridors in maritime spatial plans	Number km ²	For ecological corridors identified by Mission projects (or whose identification is catalysed by the Mission). Aggregated by sea basin (ATL/ARC), MS/third country. <i>Relevant for target 1: Protect a minimum of 30 % of the EU's Sea area and integrate ecological corridors.</i>

III Impact indicators

Impact indicator	Unit	Comments
Improvement in achievement of GES (under MSFD)	Number of marine areas reaching GES	Focusing on the following descriptors: Descriptor 1 (Biodiversity) Descriptor 2 (non-indigenous species) Descriptor 3 (commercially exploited fish) Descriptor 5 (eutrophication) Descriptor 6 (sea floor integrity) Descriptor 7 (hydrographical conditions) – especially Descriptor 7C2 on benthic habitats <i>Based on WISE-Marine data for ATL; to be checked for ARC based on OSPAR cooperation</i>
Improvement in status of marine and coastal habitats	Number km ²	Aggregated by habitat type. <i>Based on EEA (EUNIS) data for ATL; possibly for ARC (to be checked – should be data for NO and ISL)</i>
Enhanced connectivity of habitats	Number km ²	<i>Indicator and information base to be developed</i>
Reduction in pressures and combined effects of human activities on marine ecosystems	Number %	<i>Based on EEA data; update of indicator to be checked, as well as coverage</i>

G.4 Danube River basin lighthouse

I Output indicators

Indicator	Unit	Comments
Length of rivers covered by Mission projects	km	Aggregated by MS/third country and RBD. <i>Referring to both targets for the Danube.</i>
Number of artificial barriers on rivers identified, mapped and analysed by the Mission	Number	Aggregated by MS/third country and RBD. <i>Referring to Danube target 1: free-flowing rivers</i>
Number of habitat sites mapped and analysed by the Mission	Number	Aggregated by MS/third country and RBD; and by freshwater habitat types listed in Annex I of the Proposal for a Regulation on nature restoration.
Number of innovative solutions and tools for river/habitat restoration developed in Mission projects	Number	Innovative solutions can include technical, social and financial solutions. Aggregated by Mission area and target, MS/third country RBD.
Number of artificial barriers to river connectivity removed by Mission projects.	Number km	Artificial structures affecting the free-flowing character of water, sediment, nutrients, matter and organisms along river systems. Aggregated by MS/third country and RBD. Can be aggregated per dimension as in barriers to longitudinal, lateral, vertical, and or temporal connectivity; per partial and fully removed barrier; and per obsolete and non-obsolete barrier. <i>Referring to Danube target 1: free-flowing rivers</i>
Restoration measures taken by Mission projects to improve the condition of habitats to good status	Number km ²	Aggregated per MS/third country, RBD, and freshwater habitat types listed in Annex I of the Proposal for a Regulation on nature restoration. <i>Referring to Danube target 2: nature restoration</i>

II Outcome indicators

Outcome indicator	Unit	Comments
Number of measures and length of restored river stretches	Number km	<p>Implementation of the following types of expected restoration measures (by 2027) identified by ICPDR:</p> <ul style="list-style-type: none"> Measures addressing hydrological alterations Measures addressing alterations of river morphology Measures addressing interruptions of river continuity for fish migration Measures to reconnect wetlands/floodplains <p>Number of measures and length of restored river stretches. Measures implemented by Mission projects and partner actions.</p> <p><i>Data sources: ICPDR; mission projects Referring to target 1: free-flowing rivers</i></p>
Designation of new or enlarged protected areas to maintain or improve freshwater and coastal habitat conditions	Number km ²	<p>Can be aggregated per MS/third country and freshwater habitat types listed in Annex I of the Proposal for a regulation on nature restoration</p> <p>Designations linked to measures implemented by Mission projects and partner actions.</p> <p><i>Data sources: mission projects Referring to target 2: nature restoration</i></p>
Increase in free-flowing river sections	km	<p>Increase due to Mission projects and partner actions.</p> <p>Will need to be developed based on an agreed definition of a free-flowing river (potentially drawing on CIS guidance document and other sources).</p> <p>Aggregated per MS/third country, RBD.</p> <p><i>Data sources: ICPDR; mission projects. Referring to target 1: free-flowing rivers</i></p>
Improvements in land-use within 25m of river banktop and improvements in river bankface vegetation	Bankface: m ² banktop: km ²	<p>Measuring horizontal river connectivity.</p> <p>Improvements linked to measures implemented by Mission projects and partner actions.</p> <p>Check of land-use at the banktop of the river. Check of vegetation type at river bankface and classification into bare, uniform, simple, complex, depending on species diversity</p>

I Impact indicators

Impact indicator	Unit	Comments
Improvement in freshwater and coastal habitat condition	Number km ²	<p>Aggregated per MS/third country and habitat types listed in Annex I of the Proposal for a regulation on nature restoration.</p> <p><i>Based on Natura 2000 / EUNIS data Referring to target 2: nature restoration</i></p>
Water bodies restored to good ecological status under the WFD	Number km ²	<p>Aggregated per MS/third country and RBD.</p> <p><i>Based on WFD / WISE-Marine data Referring to target 2: nature restoration</i></p>
Reduction in interruptions of river continuity for fish migration	Number	<p>Change in number of interruptions</p> <p><i>Data source: ICPDR Referring to target 1: free-flowing rivers</i></p>
Improvements in connectivity of habitats, including longitudinal, lateral, vertical and temporal river connectivity	km	<p>Aggregated per country, RBD; and habitat types listed in Annex I of the Proposal for a regulation on nature restoration.</p> <p><i>Indicator needs to be developed – a common definition needed. Referring to target 1: free-flowing rivers</i></p>

I Output indicators

Indicator	Unit	Comments
Area covered by projects implemented within the Mission	km ²	Aggregated by MS/third country <i>Referring to all three Mediterranean targets</i>
Number of hotspots covered by projects implemented within the Mission	Number	Refers to hotspots identified in the baseline study. Aggregated by MS/third country and type of hotspot (referring to hotspots identified in the baseline study). <i>Referring to all three Mediterranean targets</i>
Number of innovative solutions and tools for plastic litter and microplastics developed in Mission projects	Number	Innovative solutions can include technical, social and financial solutions to prevent, minimise, remediate and monitor plastic litter and microplastics in coastal and marine waters. Aggregated by MS/third country, region (NUTS2). <i>Referring to Mediterranean targets 1 (plastic litter at sea) and 2 (microplastics)</i>
Number of innovative solutions and tools for urban, nutrient, chemical and pesticide runoff developed in Mission projects	Number	Definition of innovative solutions can include technical, social and financial solutions to prevent, minimise, remediate and monitor nutrients and pesticides in coastal and marine waters. Aggregated by MS/third country, region (NUTS2). <i>Referring to Mediterranean target 3 (nutrients and pesticides)</i>
Number of innovative solutions and tools for pollution incidents developed in Mission projects	Number	Definition of innovative solutions can include technical, social and financial solutions to prevent, minimise, remediate and monitor pollution incidents in coastal and marine waters. Aggregated by MS/third country, region (NUTS2). <i>Referring to all three Mediterranean targets</i>
Number of innovative solutions and tools for ship/port waste developed in Mission projects	Number	Definition of innovative solutions can include technical, social and financial solutions to prevent, minimise, remediate and monitor ship waste in coastal and marine waters. Aggregated by MS/third country, region (NUTS2). <i>Referring to all three Mediterranean targets</i>

III Outcome indicators

Outcome indicator	Unit	Comments
Reduction in plastic litter in hotspots	% change in concentration kg/m ³ (water column) kg/m ² (seabed)	Focusing on hotspots identified in the baseline study where Mission projects and partner actions address plastic litter and/or microplastics. Common methodology needed. <i>To be gathered by projects</i> <i>Refers to Mediterranean target 1 (plastic litter)</i>
Reduction in microplastics in hotspots	% change in concentration kg/m ³ or number of particular / m ³	Focusing on hotspots identified in the baseline study where Mission projects and partner actions address plastic litter and/or microplastics. Common methodology needed. <i>To be gathered by projects</i> <i>Refers to Mediterranean target 2 (microplastics)</i>
Reduction in nutrients, chemicals and pesticides in hotspots	% change in concentrations	Focusing on hotspots identified in the baseline study where Mission projects partner actions address nutrients and/or pesticides. <i>To be gathered by projects</i> <i>Refers to Mediterranean target 3 (nutrients, pesticides)</i>
Increase in preparedness for pollution incidents	<i>To be defined</i>	<i>Increase in MS/third country preparedness for marine pollution incidents.</i>
Decrease in waste gap for ship waste	%	Refers to gap between estimated ship waste and ship waste collected by Mediterranean ports. Focusing on ports working with Mission projects and partner actions. Based on EMSA methods.

III Impact indicators

Impact indicator	Unit	Comments
Improvement in achievement of GES (under MSFD)	Number of marine areas reaching GES	<p>Focusing on the following descriptors:</p> <p>Descriptor 5 (eutrophication) Descriptor 8 (contaminants) Descriptor 10 (marine litter) Descriptor 11 (underwater noise)</p> <p><i>Based on WISE Marine data. Refers to all three Mediterranean targets</i></p>
Reduction in the number of hotspots not meeting GES	Number	<p>Number of hotspots identified in the baseline study that meet GES at the end of the Mission and decrease in the number of descriptors not met across all hotspots.</p> <p>Focusing on hotspots addressed by Mission projects and partner actions.</p> <p><i>Refers to all three Mediterranean targets.</i></p>

TASK 3 – GOVERNANCE STRUCTURES AND STAKEHOLDER INVOLVEMENT – ATLANTIC, ARCTIC, DANUBE AND MEDITERRANEAN LIGHTHOUSE AREAS

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1. INTRODUCTION

We are pleased to present the draft version of the Final Report for Task 3 – Governance Structures and Stakeholder Involvement – Atlantic, Arctic, Danube and Mediterranean Lighthouse areas related to the Framework Contract N° FRA/C.2/ENV/2020/OP/0032 “Baseline study for the implementation of lighthouses of Mission ‘Restore our ocean and waters by 2030’”.

1.1. Objective of the Baseline study

As a reminder, the objective of the assignment is to set up a comprehensive baseline for Mission lighthouses in the Atlantic and Arctic Sea basins, Danube River basin and Mediterranean Sea basin. The expected baseline will be made up of five complementary and interlinked building blocks or modules:

- A general overview of lighthouse areas (Task 1);
- The lighthouse-specific baselines (Task 2);
- A mapping of lighthouse area governance structures and stakeholder involvement (Task 3);
- A mapping of Smart Specialisation Strategies (RIS3) (Task 4);
- A mapping of citizen engagement and ocean and water literacy (Task 5).

1.2. Objective of this report

As per the Terms of Reference of the Baseline study, the present Final Report should provide to the Contracting authority results and findings for Task 3 of the study, specifically for deliverables 4 and 5:

- An analysis of the lighthouse area governance structures and stakeholder involvement for each of the three lighthouse areas, as described under Task 3 (Deliverable 4);
- A comprehensive and searchable database for each of the three lighthouse areas containing the information required under Task 3 (Deliverable 5).

The objective of Task 3 is “to map and describe existing international, national, regional or local governance structures relevant for each lighthouse area/implemented objective”, as well as “other actors, stakeholders and/or stakeholder networks in the lighthouse area relevant to the implemented Mission objective”. Moreover, the aim of this task is to highlight key stakeholders with which future cooperation, partnerships, and synergies for the implementation of the Mission in the different lighthouse areas will possibly be developed.

1.3. Structure of the interim report

This Interim Report is structured as follows:

- The background and refined methodological framework for Task 3 is outlined in Section 2.
- Section 3 presents an overview of the lighthouse areas and relevant organisations acting at the global scale.
- Section 4 develops the analysis of governance structures and stakeholder involvement for the Atlantic Lighthouse area.
- Section 5 develops the analysis of governance structures and stakeholder involvement for the Arctic Lighthouse area.
- Section 6 develops the analysis of governance structures and stakeholder involvement for the Danube Lighthouse area.
- Section 7 develops the analysis of governance structures and stakeholder involvement for the Mediterranean Lighthouse area.

Additionally, chapters 4 to 7 follow an overall similar structure presenting i) an introduction to the lighthouse area, ii) relevant governance structures according to a categorization presented below in section 2.2, iii) recommendations and potential partners for collaboration.

2. BACKGROUND AND METHODOLOGY

2.1. Background

2.1.1. The need for basin-wide cooperation mechanisms and dynamic investment ecosystem

According to its Implementation Plan²³⁹, the EU Mission Restore our Ocean, seas and waters by 2030 will be implemented in two phases:

- The first 'development and piloting' phase (2022-2025) will be dedicated to the laying out of foundations for the implementation of the three Mission objectives and enabling actions. To that end, research and innovation activities will be supported, transformative, innovative solutions will be tested and citizens participation and engagement will be encouraged. The Mission "lighthouses" have been launched, as sites to pilot, demonstrate and deploy the Mission solutions across EU sea and river basins as well as to mobilise potential partners, Member States, regions, multilateral organisations and other relevant actors, to address common challenges collectively.
- In the second 'deployment and upscaling' phase (2026-2030), the solutions identified and developed in the first phase to deliver on the Mission objectives will be further deployed, replicated, and scaled up.

The high level of expectation for the Mission's results and impacts requires strong and effective governance to steer cooperation between different actors eager to contribute to Mission's objectives. Thereby, **one of the key mandates of the Mission will be to promote basin-wide cooperation, commitment and deployment of solutions addressing the Mission's objectives.**

The Mission's aim is to build in the first place on existing commitments and initiatives, and create synergies with basin level governance structures already in place. Therefore, particular attention will be paid to the coordination and coherence of the Mission lighthouse portfolios and other local, regional and national efforts at the basin scale, with the view to ensuring maximum cohesion and synergies in the achievement of the Mission objectives at basin scale.

In addition to this, due to the transboundary nature of fresh waters and seas, basin-scale coordination of implementation and regional cooperation is required for solutions to be effective for resolving shared problems and support of all riparian states is needed to achieve Mission objectives. Hence also the need to connect and structure existing activities, disseminate and upscale solutions and mobilise relevant actors.

With this imperative in mind, the Mission will stimulate synergies and alignment with the national, regional, cross-regional, sea and water basin and strategies, plans and activities by exploring existing common topics and actions. It will seek to coordinate and cooperate with important institutions, partners, platforms, and international networks active in the ocean and water sectors.

2.1.2. The funding strategy

In the same way, **delivering a dynamic investment ecosystem will be both a key need and a strategic deliverable of the Mission.** To financially support its activities, the Mission will aim to exploit a wide array of funding sources (public, public-private, and private) and financial and non-financial instruments will be put in place at European, national, regional and local level. The mix of funding will follow the Mission's systemic approach and support its cross-cutting character, with innovative and fit-for-purpose financial mechanisms.

Different funding sources will need to be mobilised for the different phases of the Mission. For the first phase, due to the focus on research and innovation activities will be primarily funded with seed money and in-kind contributions from Horizon Europe and other sectoral EU programmes as well with Member State funds. For the upscaling and replication of the second phase, additional national, regional and private funding will have to be secured.

²³⁹https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/ocean_and_waters_implementation_plan_for_publication.pdf

The Mission will upscale, build and fund a pipeline of projects from research to demonstration of solutions to their market roll-out. To develop its pipeline of projects and support the deployment and upscaling of solutions, the Mission will draw on a range of sources of funding, starting with Horizon Europe and other EU financing opportunities (such as LIFE, EMFAF, ERDF, ESF+, JTF, InvestEU, Copernicus Programme, the Neighbourhood Policy, among others), but not limited to this. It will also put in place processes to build a community of interested impact investors and philanthropic donors.

Here again, the Mission will rely on existing mechanisms and channels, and arrangements to interlink different programmes will be sought, such as project twinning. It will seek to align, as appropriate, with relevant EU programmes and Member States investment. The Mission will also seek synergies with Member States especially with relevant projects funded under the Recovery and Resilience Plans and national programmes²⁴⁰, or more specific initiatives such as the Joint Programming Initiative for the Oceans (JPI Oceans)²⁴¹ which has demonstrated a keen interest in providing co-funding.

In addition, cooperation with third countries will be invigorated through existing structures and initiatives such as International River Commissions (e.g., ICPRD) and Sea Basin Conventions (e.g., OSPAR, UNEP/MAP), other multilateral agreements (e.g., Arctic Council) as well as through the UN system, which will importantly support the Mission and provide further opportunities (e.g., UNCLOS, the UN Ocean Decades of Ocean Science for Sustainable Development 2021-2030, among others).

Finally, public-private funding will be sought from several sources with private and commercial investors and the Mission will work at multiple levels to unlock private capital and to attract private investors, including philanthropic funding.

2.1.3. A multi-level partnership

Partners will play varied roles in the implementation of the Mission ranging from information dissemination, stakeholder engagement, harnessing synergies and complementarities, coordination of activities, direct implication in the Mission implementation and governance, as well as providing financial support. They will also be directly involved in the Mission implementation and governance by undertaking research and innovation activities within the Mission, scaling up innovations, developing innovative products and services, new business models and many other activities needed to achieve the Mission strategic objective.

Member States and Regions will play a central role by ensuring coordination at national level through dedicated national structures they have put in place to support the active participation of regions, macroregions, associations of regions and communities as well as other stakeholders in the Mission. Synergies with the regional Smart Specialisation Strategy and other regional strategies will be pursued, and Member States as well as regions are also expected to provide financial and other resources.

The lighthouses governance will be established through an implementation charter concluded among the Member States, regions and the European Commission, and, where relevant, multilateral organizations, third countries and other stakeholders. The main purpose of the charter is to provide political commitment to cooperating, aligning and mobilizing resources to achieve the three Mission specific objective the Mission objectives, building on existing structures and bringing the various partners needed for the Mission implementation together. The charter will also involve stakeholders and citizens in the basin using an inclusive, bottom-up and participatory process.

This comprehensive cooperative framework will allow for a more effective and integrated governance and an overall and integrated approach to the hydrosphere management.

²⁴⁰ https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

²⁴¹ <https://www.jpi-oceans.eu/en/about>

Stakeholder category	Examples of stakeholders	Mission implementation	Finance & Investments	Synergies/ Cooperation potential	Dissemination & engagement	International governance
Member States & regions	National level					
	Macro-regions					
	Regions & communities					
International fora	U.N. system bodies					
	River Commissions					
	Sea Basin Conventions bodies					
	Multilateral Research Alliances					
EU institutions and bodies	Committee of Regions					
	EIB					
EU networks	EFIR					
	ET-KIC					
	Networks of research performing organisations					
	ERRIN					
	NGOs /civil society					
	Literacy entities					
	Business networks					
	Finance networks					
	Philanthropy					

Table 55 Non-exhaustive overview of the main categories of partners and stakeholders with possible roles supportive of the Mission

Source: European Commission²⁴²

2.2. Scope and Methodology

The objective of Task 3 is to map governance structures and their flagship activities, as well as to identify institutions that are most relevant for the Mission's objectives. As a reminder, the later are:

- 1) Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030.
- 2) Prevent and eliminate pollution of our oceans, seas and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil.
- 3) Make the sustainable blue economy carbon-neutral and circular, in line with the European Climate Law and the holistic vision supported by the Sustainable Blue Economy Strategy.

The mapping exercise of the governance structures was conducted per Lighthouse area, focusing on the organizations that relate to the specific Mission objective in each of the lighthouse areas. For instance, the identification of organizations in the Atlantic, Arctic and Danube basins focused on achieving the objective of protecting and restoring marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030. In addition, the mapping for the Mediterranean Sea basin governance targeted organizations that aim to prevent and eliminate pollution in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil.

The following categories of governance bodies and stakeholder clusters operating in the lighthouse areas were mapped:

- **Governmental institutions:** decision-making bodies, operating at the international, regional, national and sub-national levels as well as other entities relevant to the Mission objectives and active in the lighthouse areas covered by the project, including bodies involved in the implementation of the MSFD and WFD. Local institutions were not considered unless they were of an outstanding interest for the Mission and generating considerable impacts or including a best practice with significant upscaling potential. These entities are in charge of setting the policy, strategic and regulatory framework for the protection and preservation of freshwater and seas, in addition to designing and implementing the mechanisms to monitor, evaluate and control their implementation.
- **R&D and innovation entities** and higher education institutions, research networks, public-private partnerships, consortia implementing relevant research/innovation projects irrespective of the funding source, whether public, private or mixed. Those entities are key for both the development of knowledge and innovation, be it technological, societal or organisational. They also contribute to the improvement of the regulatory framework and stakeholder practices. Priority was given to regional or trans-national R&D and innovation cooperation network and initiatives.

²⁴² European Missions – Restore our oceans and waters by 2030. Implementation Plan, 2021 p.48.

- **Industry and business grouping and networks:** this category relates to relevant professional organisations or federations within economic sectors that are key to the development of the lighthouse areas and/or generate significant impact on freshwater and seas: agriculture, tourism, transport and transport infrastructures (ports), industry, energy, waste management, water cleaning facilities, etc.
- **NGOs and civil society organizations:** these organisations play a significant role in knowledge and information dissemination, citizen awareness raising, advocacy and lobbying with decision-making bodies and other entities, in addition to technical experimentation and social innovations and implementation of relevant projects.
- **Philanthropic organisations:** similarly to the above category, these organizations are key in reinforcing or supporting the role of other type of organizations, as they provide funding alternatives for project implementation.
- **Financial institutions:** public and private entities providing finance or implementing funding programmes (international, EU, national, regional, local programmes and their management structures). Since no development and innovation can take place without funding support, the latter have a key role to play. It will be critical to differentiate between the origin of the funds (private, public, mixed) to inform the Mission about the origin of the resources flowing into each lighthouse area and the dependence on public funds. Moreover, it will also allow to understand the type of new financial mechanisms and instruments for nature conservation and protection funded from private sources, hence not depending solely on public resources.

The present report provides a description of the short-listed organizations selected by the Project team with potential to find synergies for financing in each region as well as to understand decision making process in each region. A more complete list of organizations mapped is presented as a separate deliverable to this report in an Excel format. It is not however the purpose of this report (and database) to provide an exhaustive or comprehensive list of stakeholders present in the different lighthouse areas. The entities that are analysed below were selected based on the following criteria:

- 1) High political importance to cooperate with the European Commission/Mission secretariat on the implementation of the Mission.
- 2) The entity addresses topics aligned with the Mission objectives implemented in each lighthouse area.
- 3) Efficiency, effectiveness, and potential scalability of the organizations and the potential of their involvement in Mission implementation.

Additionally, each lighthouse area chapter of this report presents the section “Opportunities for collaboration” which provides a list with some of the most relevant organizations deemed important for collaboration with the Mission Implementation. This list contains at least one organization from each of the categories mentioned above, portraying the broad scope of the Mission’s objectives and the necessity to involve all relevant stakeholder. Moreover, each of the selected organizations with a high potential of collaboration were arranged into five categories to provide systematic interactions with the European Commission. A selected organization could be placed in more than one category. The categories are as follows:

- **Political partner:** organizations with political influence that are key for the European Commission to be able to achieve results in the lighthouse areas. This could include supra-national and macro-regional organizations with whom the European Commission will be required to cooperate to in order to increase the impact and outreach of the Mission.
- **Decision makers:** organizations/authorities with the power to decide on policy issues and on approving small and large-scale projects (national and regional institutions).
- **Financing/programming partner:** organizations that could partner with the European Commission to provide financing for the development of projects and activities to reach the Mission’s objectives; this includes the development/design of funding programmes and frameworks.
- **Science partner:** focused on science, research, development, innovation.
- **Potential project leader:** organizations that are already working “on the ground” in the area (are leading specific projects) that could potentially serve as partners to realize concrete projects for the European Commission. Such organizations are especially needed by the Mission in areas where the European Commission has no/minimum reach (non-EU countries for example).

3. THE LIGHTHOUSE AREAS

3.1. Overview

The study covers four regions with very different biogeographical, socio-economic and political conditions with a geographical scope totalling 42 countries (and 16 EU Member States), very different governance structures, and varying degrees of political integration. In the following sections, relevant examples of stakeholders will be presented for each region covered by the study.

In the EU Mission to Restore Our Oceans and Waters, the Atlantic and Arctic areas are conceptualised as one lighthouse area titled the “Atlantic and Arctic coast”. In this report, the two areas are treated separately.

Lighthouse areas	Countries
Danube	14 countries: Germany, Austria, Hungary, Romania, Slovakia, Croatia, Bulgaria, Serbia, Slovenia, Bosnia and Herzegovina, Montenegro, Slovakia, Moldova, Ukraine
Atlantic	4 countries: Portugal, Spain, France, Ireland
Arctic	3 countries: Norway, Iceland, Denmark (Greenland, Faroe Islands)
Mediterranean	21 countries: Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, the European Community, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia, Turkey

Table 56 Overview of the Lighthouse areas

The governance structures are specific to each of the lighthouse areas; however, certain organizations act at a global scale and are thus relevant for all basins. The following sections provide an overview of some of the key global structures which will be further complemented in each lighthouse area with specific activities and projects.

3.2. Global organisations

The **World Bank Group** (WB) is one of the world's largest sources of funding and knowledge for developing countries. Its five institutions share a commitment to reducing poverty, increasing shared prosperity, and promoting sustainable development. WB provides financing, policy advice, and technical assistance to governments of developing countries. IDA focuses on the world's poorest countries, while IBRD assists middle-income and creditworthy poorer countries. IFC, MIGA, and ICSID focus on strengthening the private sector in developing countries. Through these institutions, the World Bank Group provides financing, technical assistance, political risk insurance, and settlement of disputes to private enterprises, including financial institutions. The WB is an important source of funding on the national level, as well as for the private sector. The exact scope and objectives of the WB's engagement is outlined in individual Country Partnership Frameworks.

The **Global Environment Facility** (GEF) is the largest multilateral trust fund focused on enabling developing countries to invest in nature, and supports the implementation of major international environmental conventions including on biodiversity, climate change, chemicals, and desertification. GEF funds are available to developing countries and countries with economies in transition seeking to meet the objectives of international environmental conventions and agreements. Support is provided to government agencies, civil society organizations, private sector companies, research institutions, among other partners, to implement projects and programs related to environmental conservation, protection, and renewal. In most cases, the GEF provides funding to support government projects and programs. Governments decide on the executing agency (governmental institutions, civil society organizations, private sector companies, research institutions). The GEF has several “Focal Areas” of importance for the Mission:

- The International Water Focal Area has a unique mandate: support transboundary cooperation in shared marine and freshwater ecosystems.
- The Biodiversity Focal Area provides financial resources to implement the CBD. The goal of the GEF's biodiversity strategy is to maintain globally significant biodiversity in landscapes and seascapes. To achieve this goal, GEF investments focus on a) mainstreaming biodiversity across sectors as well as landscapes and seascapes, b) addressing direct drivers to protect habitats and species, and c) further develop biodiversity policy and institutional frameworks.

- The Protected Areas Focal Area aims to create sustainable protected area systems by providing support to countries to effectively establish and protect ecologically viable and climate-resilient representative samples of a country's terrestrial and marine ecosystems and provide adequate coverage of threatened species at a sufficient scale to ensure their long-term persistence, ensure that sufficient and predictable financial resources are available to support protected area management costs and build individual and institutional capacity to manage protected areas such that they achieve their conservation objectives.

The GEF Small Grants Programme (SGP) is a corporate program that provides financial and technical support to local civil society and community-based organizations to develop and implement innovative local actions that address global environmental issues, while also improving livelihoods and reducing poverty.

The **International Union for Conservation of Nature** (IUCN) is a membership union composed of both government and civil society organisations. It harnesses the experience, resources and reach of its more than 1500 Member organisations and the input of more than 18000 experts. This diversity and vast expertise make IUCN the global authority on the status of the natural world and the measures needed to safeguard it. IUCN is a democratic union that brings together the world's most influential organisations and top experts in a combined effort to conserve nature and accelerate the transition to sustainable development.

The **World Wild Fund (WWF)**²⁴³ is the world's leading conservation organization with presence in over 100 countries, to tackle issues on related to nature, people, and climate. WWF focuses its work on area relevant to the Mission, which include:

- Oceans by achieving resilient and productive oceans that support biodiversity, food security, and sustainable livelihoods.
- Freshwater to protect resources and landscapes to support biodiversity and human livelihoods.

Moreover, it works internationally providing support for local communities on identifying the most suitable and critical places to establish Marine Protected Area, support on the participation in MPAs co-management and develop alternative sources of income for livelihoods around MPAs.

The **Global Ocean Observing System (GOOS)**²⁴⁴ is a programme led by the Intergovernmental Oceanographic Commission (IOC), which is part of UNESCO. Since its creation in 1991, it develops a global ocean observing system to deliver information related to sustainable development, wellbeing and prosperity. As of 2011, the implementation of the Framework for Ocean Observing began to guide stakeholders in topics related to ocean health, among others.

3.3. EU institutions

The **European Investment Bank Group**, composed of the European Investment Bank (EIB) and the European Investment Fund (EIF), is investing in the sustainable blue economy and supporting initiatives aimed at reducing pollution and preserving the oceans. In 2021, around 43% of the total financing was committed to green financing, in particular to climate action and environmental sustainability projects²⁴⁵. It is notably financing operations aimed at reducing discharge of chemical pollutants, nutrients, plastic waste and micro-plastics to the ocean. It supports improved waste, wastewater and storm water management while bringing significant expertise in project preparation, implementation, and financing.

Under its new Blue Sustainable Ocean Strategy (Blue SOS)²⁴⁶, the EIB committed to double its lending to sustainable ocean projects to €2.5 billion over the period 2019-2023 and expects to mobilise at least €5 billion of investments that will contribute to improve the health of the oceans and their resources. This will be done through projects in 1) Sustainable coastal development, 2) Sustainable seafood production, 3) Green shipping and 4) Biotechnology. Regarding the first strand of action (Sustainable coastal development), the EIB will support projects that protect coasts from flooding and erosion, rehabilitate degraded coasts, restore coral reefs and improve water quality.

The European Investment Bank Group has agreed to cooperate with the Commission to increase its ambition and develop additional funding mechanisms in a core area of the Mission, reducing pollution in European seas²⁴⁷, especially in affected areas such as the Mediterranean Sea. They also announced increased cooperation to implement the new EU Sustainable Blue Economy policy²⁴⁸. Both institutions will work jointly

²⁴³ <https://www.worldwildlife.org>

²⁴⁴ https://www.goosocean.org/index.php?option=com_content&view=article&id=274&Itemid=412

²⁴⁵ <https://www.eib.org/en/index.htm>

²⁴⁶ <https://www.eib.org/en/publications/blue-sustainable-ocean-strategy>

²⁴⁷ <https://www.eib.org/en/press/all/2021-161-the-european-commission-and-european-investment-bank-group-join-forces-to-protect-the-oceans-and-boost-investment-in-the-sustainable-blue-economy>

²⁴⁸ https://ec.europa.eu/commission/presscorner/detail/en/ip_21_2341

with the EU Member States to meet existing financing needs to reduce pollution in European seas and support investment for blue innovation and blue bioeconomy²⁴⁹. The European Investment Bank's Vice-President Ricardo Mourinho Félix said: "The EIB is eager to join efforts with the European Commission to foster access to financing for projects that will improve the quality of our oceans and biodiversity, in particular by reducing pollution, by recycling and re-using plastics, so that we can ensure a better future for all. It is key that our green strategies have more blue in it. The EIB and the European Commission are together in building it forward not only green but also bluer."²⁵⁰ Both institutions will carry out a comprehensive market study and identify investable projects for pollution avoidance and reduction, such as, biodegradability, recycling and reuse along the entire plastic value chain. They will offer solutions to increase access to financing, including through risk reduction facilities, provision of equity or loans, grants, all aimed at incentivizing private and public financiers to provide additional liquidity to such projects.

In the same vein, the EIB and the Commission will enhance their successful collaboration through the **BlueInvest fund**²⁵¹, which combined with additional private capital will help to drive Europe's Blue Economy agenda. BlueInvest is a European Commission and EIF initiative that aims to improve access to finance and investment readiness for start-ups, early-stage businesses and SMEs active in the Blue Economy. Its features include an online community, investment readiness assistance for companies, investor engagement, events, an academy and a projects pipeline. The EIF, backed by the European Strategic Investment Fund (ESIF), has earmarked finance for enterprises with innovative products and services' that can help the blue economy deliver the EU's Green Deal priorities. The EIF is managing the BlueInvest Fund²⁵² and is financing businesses in the blue economy sector via equity funds. In 2020 the BlueInvest fund successfully deployed €75 million EFSI contribution plus €15 million from InnovFin Equity to a number of Venture Capital Funds, who will use these guarantees to invest up €300 million in the blue economy in the next 5 years, most of it in the EU.

The EIB also collaborates with European partners - the German development bank²⁵³, the Agence Française de Développement (AFD)²⁵⁴, Cassa Depositi e Prestiti (CDP)²⁵⁵, the Spanish promotional bank ICO²⁵⁶ and the European Bank for Reconstruction and Development (EBRD)²⁵⁷ - within the **Clean Oceans Initiative**, which will provide €2 billion in investment by 2023 to support public and private sector in implementing sustainable projects that reduce or avoid plastics and other waste and clean up waste and wastewater before it reaches the ocean. The Clean Oceans Initiative, as of February 2022, has already provided €1.6 billion financing.

Other sources of funding from the EIB which can be mobilized for the protection and restoration of the seas are the Natural Capital Financing Facility (NCFF²⁵⁸) and the InvestEU programme.²⁵⁹



Figure 122 EIB financing for the blue economy: highlights
 * EIB financing in the European Union and the United Kingdom from 2016 to 2021
 Source: EIB²⁶⁰

²⁴⁹ <https://www.eib.org/en/about/governance-and-structure/statutory-bodies/management-committee/members/ricardo-mourinho-felix>
²⁵⁰ <https://www.circular-solutions.eu/news/the-european-commission-and-eib-group-join-forces-to-protect-the-oceans-and-boost-investment-in-the-sustainable-blue-economy/>
²⁵¹ <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1451>
²⁵² https://www.eif.org/what_we_do/equity/news/2021/first-blueinvest-fund-agreements-secure-eur-45-million-blue-economy.htm
²⁵³ <https://www.kfw.de/stories/environment/nature-conservation/infographic-clean-oceans/>
²⁵⁴ <https://www.afd.fr/en/war-against-plastic-sea-afd-taking-action>
²⁵⁵ https://www.cdp.it/sitointernet/page/en/the_clean_oceans_initiative_reaches_two_thirds_of_its_5year_financing_target_and_expands_with_cdp_and_ico_as_new_members
²⁵⁶ https://www.ico.es/web/ico_en/press-release/-/blogs/the-clean-oceans-initiative-reaches-two-thirds-of-its-5-year-financing-target-and-expands-with-cdp-and-ico-as-new-members
²⁵⁷ <https://www.ebrd.com/home>
²⁵⁸ <https://www.eib.org/en/products/mandates-partnerships/ncff/index.htm>
²⁵⁹ https://investeu.europa.eu/contribution-green-deal-and-just-transition-scheme_en
²⁶⁰ https://www.eib.org/attachments/publications/clean_oceans_and_the_blue_economy_overview_2022_en.pdf

The European Union contributes to research and innovation at different levels through different programs and with different partners. In order to achieve the target of transforming Europe in a climate-neutral continent by 2050, research and innovation investments will allow to accelerate the transitions, deploy new solutions and engage citizens, as well as developing evidence-based policies. In consequence, different programs have been deployed to support R&D activities in the Mediterranean Sea basin. **Horizon 2020** was the EU's research and innovation programme from 2014 until 2020 with a budget allocation of €80 billion²⁶¹. It was succeeded by **Horizon Europe** with a budget of €95.5 billion available over the period 2021 to 2027²⁶² (refer to Task 2 deliverables for an overview of projects funded under these programmes related to the Mission's objectives).

The **Joint Research Centre (JRC)** is the European Commission's science and knowledge service that provides independent and scientific advice to the EU policymaking process. The main responsibilities are to develop innovative tools for policy-makers, anticipate emerging issues to be addressed by the EU, and contribute to scientific knowledge sharing. JRC's activities are clustered in ten science areas, among which i) environment, resource scarcity, climate change & sustainability; ii) Innovation systems & processes; iii) People, governance in multicultural and networked societies could potentially be relevant to the Mission's objectives²⁶³. Moreover, the **Institute for Prospective Technological Studies (IPTS)** of the Joint Research Centre (JRC) conducts research policy and technological development in the Southern Mediterranean²⁶⁴. Moreover, the **Knowledge Centre for Biodiversity (KCBD)** was launched under the leadership of the JRC in 2020 for knowledge management for policy-making on biodiversity²⁶⁵.

The **European Environmental Agency (EEA)**²⁶⁶ is an agency of the European Union providing independent information on the environment. It aims to monitor EU policies implementation and support sustainable development to improve the environment through relevant and reliable information for policymakers in diverse topics such as biodiversity and ecosystems, climate change adaptation and mitigation, environment and health, resource efficiency and waste, and water and marine environment, among many others. The latter topic is of particular interest to the Mission, since both subtopics included relate to the different lighthouse areas: Europe's seas and coasts, and European freshwater.

²⁶¹ https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-2020_en

²⁶² https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

²⁶³ https://joint-research-centre.ec.europa.eu/science-areas_en

²⁶⁴ <https://cordis.europa.eu/article/id/10718-research-policy-and-technological-development-in-the-southern-mediterranean>

²⁶⁵ https://knowledge4policy.ec.europa.eu/biodiversity_en

²⁶⁶ <https://www.eea.europa.eu>

4. ATLANTIC LIGHTHOUSE AREA

4.1. Introduction

The Atlantic Ocean is the second largest ocean covering approximately one-fifth of Earth's surface and separating the continents of Europe and Africa to the east from those of North and South America to the west.

For the purposes of this project, the focus is on Europe's Atlantic Sea basin, which is situated at the western edge of the European continent. To the North, it is bordered by the Arctic Sea basin and to the South and West by the Wider Atlantic. The basin itself hosts four EU Member States: Ireland, Spain, Portugal, and France. The UK is also on its shores which includes Wales, West-England, West- Scotland and Northern Ireland. It contains the Celtic Seas, the Bay of Biscay, and the Iberian Coast. The Atlantic basin lighthouse area comprises 293 999 km² of land and 44 028 km of coastline.

According to the 2020 Blue Economy Report²⁶⁷, the Atlantic basin is the most important sea basin in the EU in terms of GVA (Gross Value Added), representing 36% of the EU blue economy GVA. In 2017, the Blue Economy in the Atlantic Ocean generated €73.4 billion of GVA and employed 1.29 million people. The GVA is generated mainly by Coastal tourism (€27 billion), followed by Non-living resources (€16 billion), Port activities (€12 billion) and Living resources (€7 billion). In terms of employment, coastal tourism employs more than all the other sectors combined (0.76 million people). Port activities (0.18 million people) and Living resources (0.17 million people) are also sectors offering significant employment opportunities (Blue Economy Report, 2020).

For the Atlantic and Arctic Sea basin lighthouse, the following specific targets are set under Mission objective 1, "Restore marine and freshwater ecosystems and biodiversity".

Target	Name
Target 1	Protect a minimum of 30 % of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network.
Target 2	Strictly protect at least 10 % of the EU's sea area.
Target 3	Contribute to relevant upcoming marine nature restoration targets including degraded seabed habitats and coastal ecosystems. [overall target is 20% of degraded habitats]

Table 57 The 3 specific targets under Mission Objective 1 "Restore marine and freshwater ecosystems and biodiversity"

In the EU Mission to Restore Our Oceans and Waters, the Atlantic and Arctic areas are conceptualised as one lighthouse area titled the "Atlantic and Arctic coast". In this report, the two areas are treated separately. However, some of the organisations identified here for the Atlantic are also relevant for the Arctic lighthouse area, which overlaps with the Atlantic Sea basin.

4.2. Governance structures and stakeholder involvement

4.2.1. Governmental institutions and international cooperation

4.2.1.1. International institutions and initiatives

OSPAR

The OSPAR Commission is the only formal basis for inter-governmental collaborative management of the marine environment which applies to all countries in the North Sea and Celtic Seas basins covering at the same time North Atlantic and Arctic (see the page below for the list of OSPAR countries; see Chapter 5 for additional information on the Arctic governance landscape).

The OSPAR strategy for 2030 is a clean healthy and biologically diverse North-East Atlantic Ocean (NEAO) which is productive, used sustainably and resilient to climate change and ocean acidification. It is guided by the ecosystem approach. This is the comprehensive integrated management of human activities based on the best available scientific knowledge of the ecosystem and its dynamics, in order to identify and act on drivers, activities and pressures that adversely affect the health of marine ecosystems. The ecosystem approach thereby achieves the sustainable use of ecosystem goods and services and the maintenance of ecosystem integrity.

²⁶⁷ European Commission (2020). Blue Economy Report: Blue sectors contribute to the recovery and pave way for EU Green Deal.

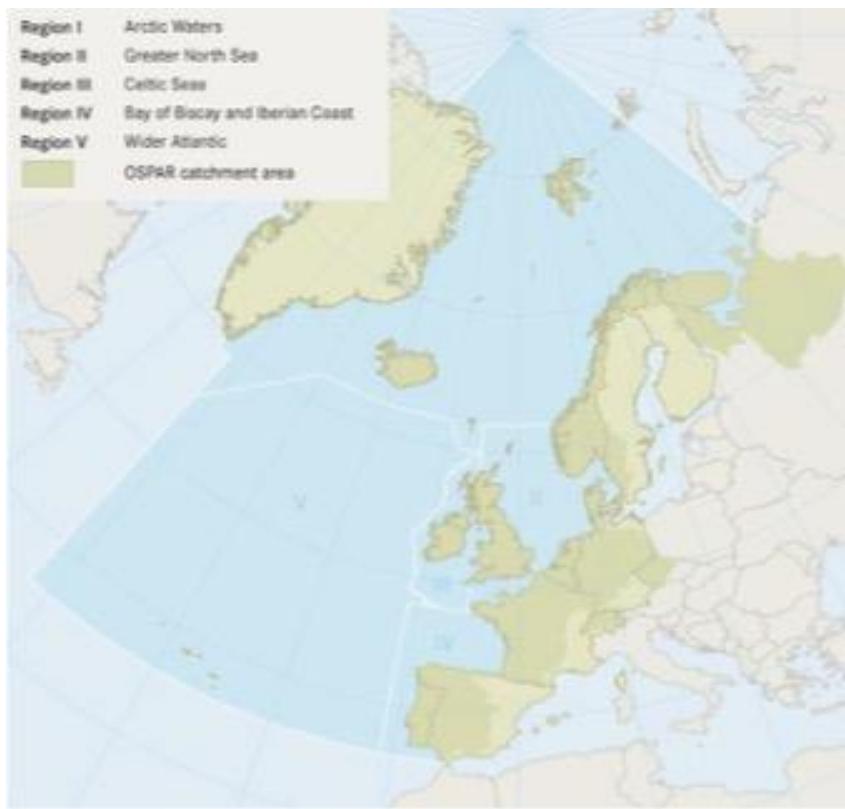


Figure 123 The North-East Atlantic

Source: OSPAR

To implement the vision 2030, the North-East Atlantic Environment Strategy (NEAES) 2030²⁶⁸ was adopted on 1 October 2030. To put the Strategy into effect, an implementation action plan²⁶⁹ was set. This plan is a living document, setting out specific actions and tasks to achieve the NEAES objectives and will be used by OSPAR to record and assess progress with implementation of the Strategy.

NEAES 2030 includes twelve strategic objectives to lead contracted parties towards achieving good environmental status²⁷⁰ in the marine environment including:

- environmental/biodiversity restoration, protection
- eutrophication tackling
- reduction of disturbances/impacts to the marine environment (e.g., underwater noise), in particular under:
 - 1) Strategic objective 5
 - a) Protect and conserve marine biodiversity, ecosystems and their services to achieve good status of species and habitats, and thereby maintain and strengthen ecosystem resilience.
 - 2) Strategic objective 6
 - a) Restore degraded habitats in the North-East Atlantic when practicable to safeguard their ecosystem function and resilience to climate change and ocean acidification.
 - 3) Strategic objective 7
 - a) Ensure that uses of the marine environment are sustainable, through the integrated management of current and emerging human activities, including addressing their cumulative impacts.

²⁶⁸ <https://www.ospar.org/documents?v=46337>

²⁶⁹ <https://www.ospar.org/convention/strategy/implementation-plan>

²⁷⁰ OSPAR Contracting Parties that are EU Member States have agreed that the OSPAR Commission should be the main platform through which they coordinate their work to implement the EU Marine Strategy Framework Directive (MSFD) in the North-East Atlantic. As a consequence, the definition of the GES and its associated indicators are the same than the MSFD ones.

To support the implementation of the NEAES 2030, the Quality Status Report (QSR) 2023 is in being drafted, with the objective to assess the environmental status of the North East Atlantic against the objectives of the North East Atlantic Environmental Strategy 2010-2020 (NEAES 2020), evaluate any updated or additional objectives from NEAES 2020-2030, and identify the priority elements for actions to achieve OSPAR's vision for a clean, healthy, biologically diverse sea, used sustainably. In addition, QSR 2023 may be used by Contracting Parties that are also EU Member States to support their reporting obligations under the Marine Strategy Framework Directive.

The OSPAR Contracting Parties are Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom, together with the European Union. Finland is not on the western coasts of Europe, but some of its rivers flow to the Barents Sea and historically it was involved in the efforts to control the dumping of hazardous waste in the Atlantic and the North Sea. Luxembourg and Switzerland are Contracting Parties due to their location within the catchments of the River Rhine. The OSPAR Commission elects a Chair and two Vice-Chairs by the unanimous vote of the Contracting Parties present at annual Commission meetings. Currently the Chair of the OSPAR Commission is Richard Cronin²⁷¹ (Ireland). The current Vice-Chairs are Ane-Marie Løvendahl Eskildsen (Denmark) and Jorge Ureta Maeso (Spain).

There are also OSPAR observers²⁷² such as intergovernmental organisations working in similar fields, and international non-governmental organisations. The non-governmental observer organisations are environmental protection and nature conservation organisations, industry and trade organisations and organisations of regional and local authorities. While the primary responsibility of implementing the OSPAR Convention lies with the Contracting Parties, the observer community plays an essential role in the promotion of protecting and conserving the North-East Atlantic and its resources. The observers not only take part in the various meetings of the OSPAR Commission but also contribute actively to its work and to shaping policy development. In this way non-governmental organisations are essential partners in the implementation of the Convention and translating its principles into practical action at local, national and regional level.

The OSPAR Commission Secretariat facilitates the work of the Contracting Parties by supporting and organising an annual cycle of meetings together with intersessional work programmes.

4.2.1.2. EU initiatives:

Atlantic Action Plan 2.0

More geographically focused on the North Atlantic Sea basin is the **Atlantic Action Plan 2.0**. The revised Atlantic Action Plan 2.0²⁷³ was communicated by the European Commission on 23 July 2020. Its main objective is to unlock the potential of blue economy in the Atlantic area while preserving marine ecosystems and contributing to climate change adaptation and mitigation. Its aims are in line with the global commitments for sustainable development and are fully integrated in the European Commission's political priorities for 2019 – 2024, notably a European Green Deal, an Economy that works for people and a stronger Europe in the world.

This plan is a revised version of its predecessor the Atlantic Action Plan for 2013-2020 which was endorsed after the adoption of an Atlantic Maritime Strategy²⁷⁴ by the European Commission in 2011. This strategy was to response to repeated calls from stakeholders for a more ambitious, open and effective cooperation in the Atlantic Ocean Area. The strategy, consistent with the EU 2020 agenda and its flagship initiatives, grouped the identified challenges and opportunities facing the Atlantic region under five main thematic headings. The EU's 2013-2020 Atlantic Action Plan²⁷⁵ sets out practical steps to be taken in the 4 Member States with Atlantic coasts (Ireland, France, Portugal, Spain) and their outermost regions in order to boost the Atlantic Ocean Area's sustainable blue economy by 2020.

The action plan 2.0²⁷⁶ objectives are to promote innovation, contribute to the protection and improvement of the Atlantic's marine and coastal environment, improve connectivity, and create synergies for a socially inclusive and sustainable model of regional development. While contributing to offset the adverse socio-economic impact of the Covid-19 crisis, the updated Atlantic action plan addresses some of the 'great challenges' structured around blue economy in 4 thematic pillars:

²⁷¹ Also part of the task force of pillar IV of AAP2.0

²⁷² <https://www.ospar.org/organisation/observers>

²⁷³ https://atlanticstrategy.eu/sites/default/files/sites/default/files/aap_v2.0_en.pdf

²⁷⁴ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52011DC0782>

²⁷⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1395674057421&uri=CELEX:52013DC0279>

²⁷⁶ Atlantic action plan 2.0: A revamped maritime strategy to foster a sustainable blue economy and the EU Green Deal

- Atlantic ports as gateways and hubs for the blue economy
- Marine renewable energy
- Blue skills of the future and ocean literacy
- Healthy ocean and resilient coasts.

The Political coordination of the Atlantic Action plan is primarily conducted by the Ministers responsible for maritime affairs of the participating countries (Ireland, France, Portugal, Spain). Member States define the broad political guidelines and guide the implementation of AAP 2.0, as well as also decide, in consultation with the European Commission, to expand membership of the Atlantic strategy to other interested States.

Operational coordination of the AAP2.0 is ensured through the **Atlantic Strategy Committee** (ASC) that acts as a decision-making (executive) body and ensures the involvement of representatives from different coastal regions. The ASC is comprised of representatives from the four EU Member States (France, Ireland, Portugal and Spain) bordering the Atlantic Ocean as well as representatives from the European Commission, the Committee of the Regions, the Economic and Social Committee and representatives from coastal regions, cities and other relevant economy and social stakeholders.

The **Atlantic Strategy Committee** is also the governing body of the AAP 2.0 and aims to ensure the political and operational coordination of the plan and to provide the framework for its implementation. To that effect, each year the ASC Chair undertakes the organisation of the main Atlantic event, the Atlantic Stakeholder Platform Conference, on one of its coastal regions, seeking to bring together stakeholders to discuss the AAP 2.0 implementation and share new ideas and new innovations to promote the blue economy in the Atlantic sea-basin.

Representatives of relevant funding and financing institutions²⁷⁷, as well as other relevant parties, can be invited as observers on a case-by-case basis. Additionally, the **Atlantic Assistance Mechanism**, an EU funded project, aims at providing stakeholders with updated information on the revised AAP 2.0, its research and investment priorities, news, events and networking opportunities. The Assistance Mechanism team consists of a **National Hubs network**, operating in France, Ireland, Portugal and Spain, coordinated by a central team²⁷⁸.

In each country, the national hub provides national stakeholders with support on project development supporting the AAP2.0, raises awareness on AAP2.0 as a frame for cooperation at national level and at the sea basin level but also on funding opportunities which could be mobilized for the AAP2.0 implementation.

The national hub supports its national coordinator which stands at the ASC and also the pillar coordinator which has been assigned to one of the four countries. Environment issues are mainly carried under the Pillar IV of AAP 2.0. It is under the responsibility of France.

The existing Atlantic Assistance Mechanism should be merged in S2 2022 into a unique assistance mechanism supporting three sea basins (i.e., Atlantic, Western Mediterranean and Black Sea). The new assistance mechanism shall provide the necessary technical assistance for the implementation of the three sea basin strategies, upscaling the impact and visibility of the EU support. It will continue to support the AAP2.0 implementation considering its specificities thanks to its network of National hubs. In a synergetic approach, it will upscale best practices and lessons learned from the past and ongoing assistance mechanisms.

There is also a strong international dimension as the action plan focusses on research and innovation under the Atlantic Ocean Research Alliance which includes USA, Canada, Brazil and South Africa.

Other bodies in the Atlantic basin include:

- The Atlantic Arc Commission (AAC)

²⁷⁷ In particular public ones (i.e. EU funding management authorities).

²⁷⁸ National hubs are individuals and not organisations. Their position is financed by the EC under the frame of a DG Mare funded project. Therefore, they cannot be added in the database.

- AAC is one of the six Geographical Commission of the Conference of Peripheral Maritime Regions (CPMR) and membership is linked to membership of the CPMR. Its recent political declaration in 2021²⁷⁹ reaffirmed its pledge to work towards a more socially responsible future for the Atlantic Area inside and outside the EU and calls for greater attention from the EU institutions and national governments to the sustainable development of the Atlantic Arc Area, using an integrated approach and a multi-level dialogue²⁸⁰ on key policies and programmes relevant to the Atlantic Arc Regions. AAC has been promoting since several years the creation of a macroregion in the Atlantic.

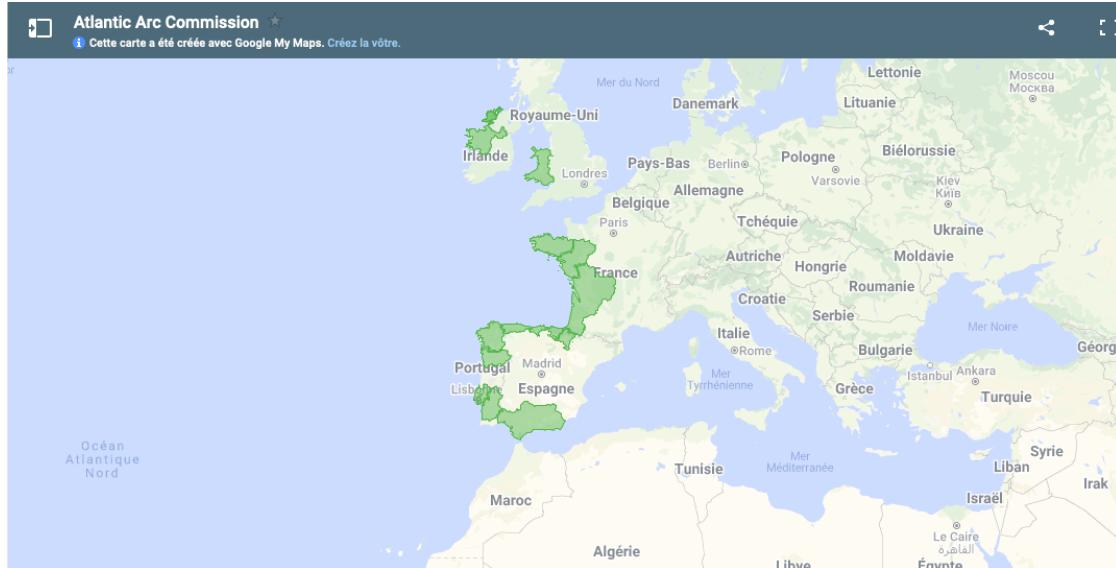


Figure 124 Atlantic Arc Commission

The following table compiles the list of regions engaged in AAC. These regions are key policy makers to be considered for the sea basin in addition with the national authorities.

Country	Region	Regional authority
Republic of Ireland	Northern And Western Region	Northern And Western Regional Assembly
France	Bretagne Pays De Loire Nouvelle Aquitaine	Conseil régional de Bretagne Conseil régional de Pays De Loire Conseil régional de Nouvelle Aquitaine
Spain	Comunidad foral de Navarra Pais Vasco Cantabria Principado De Asturias Comunidad Autónoma de Galicia Comunidad Autonoma de Andalucia	Gobierno De Navarra Gobierno Vasco Gobierno De Cantabria Gobierno Regional del Principado De Asturias Xunta De Galicia Junta De Andalucía
Portugal	CCDR Do Norte CCDR Do Lisboa E Vale Do Tejo CCDR Do Alentejo	
United Kingdom	Wales	Welsh Government

Table 58 National authorities of relevance to the Mission in the Atlantic

The Atlantic Transnational Network (ATN-RTA)

The Atlantic Transnational Network which is a platform for cooperation of civil society in the Atlantic area.

The Atlantic Transnational Network (ATN-RTA) brings together representatives of civil society from different socio-professional organisations – Spanish, French economic, social and environmental councils (CES and CESER) and Forum Oceano in Portugal. They are seeking to develop partnerships and joint initiatives within the Atlantic area.

²⁷⁹ <https://cpmr-atlantic.org/download/political-declaration-of-the-atlantic-arc-commission/?wpdmid=12280&refresh=625ea2330d9311650369075&ind=1630937921393>

²⁸⁰ From the Sea Basin to local one where public authorities (States and collectivities) can collaborate in accordance with their respective competences.

Its Presidency represents the ATN-RTA, chairs its bodies, implements the decisions of the Orientations Committee and the Executive Committee and takes all necessary action for the proper functioning and preservation of the network. The ATN-RTA Presidency is held alternately by the countries represented in the network, for a two-year mandate.

The Presidency of the ATN-RTA is CESER Brittany (FR), presidence.ceser@ceser.bretagne.bzh. The Presidency of the ATN-RTA Working Group is CESER Nouvelle-Aquitaine (FR).

The Atlantic Cities

Atlantic Cities is an association, composed of 20 local authorities that represent almost 400 municipalities. It was formerly known as the Conference of Atlantic Arc Cities (CAAC) which was created on July 7, 2000 in Rennes, by M. Edmond Hervé (then Mayor of the city). The Atlantic Cities Association is a Non-Profit Organization under the French "1901" law. It is governed by its statutes, its internal regulations and by the Rennes Declaration of 2000²⁸¹ and the Charters of San Sebastian of 2008²⁸² and 2018²⁸³.

The association's goal was to create a network with and for the cities placed at the edge of the Atlantic Ocean. Therefore, the platform wishes to develop a collaborative relationship between its members and to enable them to be heard by the European institutions.

The Atlantic Cities Association is a platform for the EU strategy of its member cities:

- Exchanges and cooperation: ACA supports cooperation between its members and beyond through the exchange of good practices, peer to peer learning as well as the transfer of knowledge and innovations.
- Advocacy of Atlantic public interest: ACA enhances the political stance of its members as local governments providing technical, theoretical and political support and referring to its large network of European contacts, notably in the quest for the recognition of the Atlantic macro-region.
- Fundraising: the association ensures a continuous strategic follow-up materialized through monthly newsletters of funding opportunities. Moreover, thanks to its 20 years of unique experience in proposal writing and European project management, ACA offers its support and advice in European projects
- Promotion and visibility: Atlantic Cities help its members attract tourism, investment and talent by proposing initiatives that increase their visibility such as Stella Atlantis.

The Atlantic Cities network is at the service of its members, defending the interests of citizens and the sustainable development of the Atlantic Arc region, in accordance with the European Union and its values. They foster transnational cooperation through European projects and informal exchanges

As a center of expertise for writing proposals and managing European projects (Up to 4 million €), its Secretariat offers its services to its member cities as a way to foster cooperation across the Atlantic Arc.

One of its current themes is Ocean and Blue Growth. The associated commission has been chaired since 2021 by Brest Metropole. The presidency is a three-year rotating one.

JPI Oceans is a pan-European intergovernmental platform aiming to increase efficiency and impact of research and innovation for sustainably healthy and productive seas and oceans. The partnership is partially funded through Horizon Europe. Developed with JPI Oceans members and co-created with stakeholders, the Strategy Framework 2021-2025 provides a coherent and impactful pan-European research and innovation setting, in support of healthy and productive seas and ocean which is relevant for consideration for lighthouse mission objectives in a synergetic approach such as the activities related to the sea level rise. Furthermore, and in liaison with JPI climate, the partnership aims to develop a knowledge hub on regional to local sea level changes in Europe. The ambition is to provide easy access to usable knowledge on regional-local sea level change in Europe, regularly updated as a series of periodic assessment reports.

Governance performance at the regional level can be assessed through **institutional capacity**, which is defined as the capability of a region to set and achieve social and economic goals, through knowledge, skills, systems, and institutions.²⁸⁴ The average institutional capacity scores 58 in the basin, however, the scores

²⁸¹ <https://atlanticcities.eu/prueba1/wp-content/uploads/2015/06/rennesen.pdf>

²⁸² <https://atlanticcities.eu/prueba1/wp-content/uploads/2015/06/ssen.pdf>

²⁸³ <https://atlanticcities.eu/prueba1/wp-content/uploads/2018/06/Carta-donostia-EN-Junio.pdf>

²⁸⁴ DG REGIO, 2019: Regional Competitiveness Index, <https://cohesiondata.ec.europa.eu/Other-RCI/European-Regional-Competitiveness-Index-2019-index/if3f-yweu>

have a wide range. Andalucia scores the lowest (35.32) while South-West England displays the best performance (73.43). At the country level, the UK also has the best average institutional capacity (70.7) and Spain the lowest (44.31)²⁸⁵.

Country	Administrative Tiers
France	4
Republic of Ireland	3
Portugal	3
Spain	4

Table 59 Number of administrative tiers and state structure in the Atlantic

Regarding the distribution of competences between government levels, for most sectors and countries, legislative function is concentrated at the central level. For regulation and funding the picture is more mixed, with public utilities, education, police, social policy, taxes, and environmental protection being commonly also under the responsibility of regional or local governments. Provision is largely shared among the different levels of government and local governments participate in the provision of services mostly in the areas of public utilities, social policy, environmental protection, education, health and police. The specific constellation of how these competencies are allocated to the different government tiers for different policy fields however varies substantially between the different countries. See table 57 that points to the complexity of the system at the national level.

However, ‘centralist models’ do not preclude from decentralised implementation of policies in accordance with the share of competences in particular between the State and the Regions. In addition, some countries with ‘administrative integrated models’ such as France are characterised by a rather centralised implementation of policies.

Country	General implementation of policies
France	Centralised
Republic of Ireland	Centralised
Spain	Centralised (for MSFD), decentralised for WFD
Portugal	Centralised/Decentralised in Azores and Madeira Islands (MSFD)

Table 60 Implementation of policies in the Atlantic

4.2.1.3. National governmental institutions

France:

The definition of the national policies in matter of environmental protection and its alignment with international and EU regulations is under the responsibility of the Ministry of the Environment and is implemented by the “Direction de l'Eau et de la Biodiversité”. As the topic is related to the sea, the minister in charge of the sea can be also associated.

For their implementation, several state agencies are responsible:

- **Office français pour la biodiversité (OFB)** charged to protect and restore biodiversity in Metropolitan France and its Overseas Territories. Its dedicated roles are fully in line with the Mission:
 - Sharing knowledge, research and expertise about species, habitats and their uses
 - Environmental and wildlife health policing
 - Supporting the implementation of public policies
 - Assisting and Supporting protected natural area managers
 - Supporting stakeholders and mobilising civil society

²⁸⁵ ibid

- **Conservatoire du littoral et des rivages lacustres** which is dedicated for the preservation of the coastline:
 - the conservation of spaces whose heritage value;
 - the preservation of a natural and historical capital that is fundamental for the attractiveness of coastal territory;
 - the social well-being of all through the equitable and shared reception of populations;
 - the protection of goods and people against extreme climatic phenomena by allowing a buffer space between the ocean and human issues

Both organizations are leader partners of several Life projects ²⁸⁶that would be supporting the lighthouse objectives, in particular on protection and restoration of marine and coastal areas.

The Republic of France is divided in metropolitan Thirteen “Régions” (5 are located on the North Atlantic), in which are included “Départements” and where local communities are located.

For marine issues, the competences are at the State level even if some competences are shared at infra-national levels. For instance, Régions are in charge of the economic development. Coastal management is ensured by communities and sea management by the State.

Ireland:

The environment is under the overall responsibility of the national Department of the Environment, Climate and Communications. The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment. It is committed to protecting people and the environment from the harmful effects of radiation and pollution. It plays key roles in environmental regulation, provision of knowledge and advocacy for the environment.

The EPA provides environmental data, assessments and evidence to inform decision making and implements effective regulation and environmental compliance systems – while working with national stakeholders and decision makers to advocate for a clean, healthy and well protected environment and sustainable environmental behaviour.

The EPA has a wide remit and is responsible for a range of tasks relating to the authorisation of activities that could have an impact on the environment or on human health. The EPA regulates and assesses major industrial, waste and wastewater operations in Ireland to ensure that they comply with environmental law and don't endanger human health or harm the environment.

EPA delivers essential scientific support for environmental policy development, implementation and broader decision making such as (I) Addressing climate change evidence needs or (ii) Protecting and restoring the natural environment .As part of its wide range of functions the EPA manages an environmental research programme : **EPA Research 2030**²⁸⁷, a ten-year high-level framework for the EPA's research programming (2021-2030).

EPA Research 2030 has been designed to generate evidence crucial in assisting Ireland in meeting its commitments and requirements under the various global, EU and national policies and strategies. It is a Government of Ireland initiative which is funded by the Department of the Environment, Climate & Communications.

The Republic of Ireland is divided into 30 administrative regions, mostly tied to the 26 constituent counties (county Tipperary is divided in two and county Dublin in four). Each region has a directly elected Council which is responsible for local government. County councils and county borough corporations are responsible for physical planning, roads, sewerage and water supplies, housing, public libraries, fire services, and courthouses. Local government authorities in the republic have no functions in relation to police or education. Marine poliicies definition and implementation is centralized.

²⁸⁶ Life MARHA – Life Adapto

²⁸⁷ https://www.epa.ie/publications/research/epa-research-2030/EPA-Research-2030-Framework_Final.pdf

Spain:

In terms of the implementation of EU law relevant for the Atlantic lighthouse, the MSFD competent authority in Spain is the Dirección General de Sostenibilidad de la Costa y del Mar (**DGSCM**) and the Subdirección General para la Protección del Mar (**SGPM**) has specific competence in MSFD, both are included under the structure of the Ministry for ecological transition (**MITECO**). **SGPM** is one of the three Subdirectorates integrated in the **General Directorate for the Sustainability of the Coast and the Sea (DGSCM)**. It is the competent authority for MSFD implementation, marine biodiversity protection and Marine Protected Areas designation and management. It is also the main actor for representation of Spain in OSPAR.

The commitment to the recovery of degraded ecosystems is included as one of the priority objectives of the Marine part of the Recovery, Transformation and Resilience Plan (PRTR). To this end, ecological restoration is being reinforced, guaranteeing the sustainable use of natural resources and the preservation and improvement of its ecosystem services. The marine part of the PRTR has a total budget of 26 million Euro²⁸⁸ to support restoration projects from 2023 to 2026. Funds are allocated from the Next Generation EU funding programme and it seems will support cofinancing aspects of future LIFE projects.

In Spain, there are seventeen Autonomous Communities and two Autonomous Cities of Ceuta and Melilla. Each Autonomous Community has its Statute of Regional Autonomy, approved by framework law. The system of government of the Autonomous Communities is parliamentary in nature. Its basic institutions being Parliament, the president of the Autonomous Community and the regional government. Autonomous Communities have considerable freedom in terms of economic and financial management. They can approve their own annual budgets and determine their own resources through taxes, rates and surcharges. The general funding system of Autonomous Communities, which also includes taxes assigned by the State and participation in national taxes, is set multilaterally by the State and Autonomous Communities.

There are a total of 10 Autonomous Coastal Communities and Cities with powers in the management of the marine Natura 2000 Network in Spain. These are Galicia, Asturias, Cantabria, Cataluña, Illes Balears, Comunitat Valenciana, Región de Murcia, Andalucía, las islas Canarias y Melilla²⁸⁹. They support the Ministry of Environment in the design of joint actions for the protection of marine biodiversity.

Portugal:

The management of marine protected areas in Portuguese sea waters is the responsibility of the **Directorate General for Natural Resources, Safety and Maritime Services (DGRM)** Direção Geral dos Recursos Naturais, Segurança e Serviços Marítimos), in liaison with ICNF. DGRM's mission is to develop maritime safety and services, including the maritime-port sector, the implementation of policies on fisheries, aquaculture, the processing industry and related activities, the preservation and knowledge of marine resources, as well as to ensure the regulation and control of activities in these areas.

DGRM is part of *Ministério do Mar (Ministry for the Sea*, re-established in 2015) and it is the competent authority for MSFD implementation. In Portugal (unlike Spain and France), the competent authority for MSFD implementation falls under a dedicated Ministry for the sea and not the environment ministry.

Further, the **Directorate-General for Maritime Policy – Portugal** (acronym **DGPM**) is a public administration body of the Ministry of the Sea. It was created to develop, evaluate and update the National Ocean Strategy, design and propose the national maritime policy, develop the maritime spatial planning strategy and management, monitor and participate in the development of the Integrated Maritime Policy of the European Union and promote national and international cooperation on maritime affairs. Currently with 29 staff members, DGPM has around 10 staff members engaged in a variety of scientific marine and maritime research topics (including socio-economy sciences related to the Ocean, monitoring of the Blue Economy, and monitoring of the Portuguese contribution to the UN SDG 14 Goal), but also in Ocean Literacy and translational aspects between academia and industrial sectors. DGPM is involved in a variety of expert groups and activities at national and regional level, but also at international level (both EU and cross continental). DGPM is a key player in the Blue Economy and Ocean Literacy strategic and political arenas.

The **Institute for Nature Conservation and Forests (ICNF Instituto da Conservação da Natureza e das Florestas)** is the national authority for Nature Conservation and Biodiversity in Portugal, and is responsible for ensuring the management of the National Network of Protected Areas as well as implementing the EU Natura 2000 Network.

²⁸⁸ <https://www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/transicion-ecologica/Paginas/2022/170322-habitatsmarinos.aspx>

²⁸⁹ <https://www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/transicion-ecologica/Paginas/2020/300920-ccaa.aspx>

In Portugal, the autonomous regions (Madeira and Azores archipelagos) have administrative and legislative autonomy, with its own representatives and executive and administrative powers. Regional authorities are responsible for the designation and management of MPAs. The creation of protected areas becomes effective through Regional Legislative Decrees. As an example, the Regional Directorate for Sea Affairs in the Azores (DRAM) was established within the new structure of the X Regional Government by the Regional Implementing Decree no.17/2010/A of September 21. DRAM's mission is to enhance the Azores Sea by increasing its usefulness, maintaining its splendour and ensuring its environmental quality. They lead activities related to the protection of the marine environment, including the implementation or reinforcement of marine protected areas, and their biodiversity.

4.2.2. R&D and innovation entities

France:

Pôle Mer Bretagne Atlantique (PMBA) is a competitiveness cluster created in France in 2005.

The policy of competitiveness clusters is one of the pillars of the national innovation policy, in particular for the benefit of SMEs. Competitiveness clusters brings together small and large companies, research laboratories and training establishments in a clearly identified area and on a targeted theme. The national and regional public authorities are closely involved in its dynamic. There are many forces at work in a competitiveness cluster. All are necessary for the development of dynamic ecosystems that create wealth. The purpose of a competitiveness cluster is to support innovation. It encourages the development of particularly innovative collaborative research and development (R&D) projects. It also supports the development and growth of its member companies, particularly through the development and marketing of new products, services or processes resulting from research projects. By enabling the companies involved to take a leading position in their markets in France, Europe and internationally, the competitiveness clusters are engines of growth and employment. It is based on a strong territorial anchoring while relying on existing structures (industrial fabric, campus, collective infrastructures, etc.). PMBA is one of the fiftyfour competitiveness clusters in France²⁹⁰. They are funded by private and public sectors as they are partners but also by national or European projects where they are engaged or they lead.

As a new way of responding to the increasing pressures of globalised competition for maritime sectors, PMBA primary mission is to advance an alternative industrial policy to enhance the capacity of companies to innovate and are intended to stimulate growth and employment in promising markets. It is an essential lever to facilitate the emergence of collaborative research and development projects and support the growth of their member companies, particularly by bringing to market new products, services and processes resulting from research. Pôle Mer Bretagne Atlantique is a classic example of such a cluster in practice. It is able to bring together large and small companies, research centres and laboratories and training and education establishments within a specific region and around a common theme. It works in close liaison with Pole Mer Méditerranée (PMM) which is located In Toulon (Région Sud).

The dynamism of PMBA relies principally on its network of players – major companies, SMEs, universities and research centres. The main missions of the Mer Bretagne Atlantique cluster are to contribute to projects' success, assist with creating technology platforms, promote exchanges between all maritime sector stakeholders and help concrete initiatives emerge. There is a strong commitment on the part of PMBA to working closely with French overseas territories. This is demonstrated in partnerships established with Qualitropic, an economic development cluster based on the Island of Reunion on several topics such as aquaculture, marine ecology or algae²⁹¹, and with Tahiti Fa'ahotu, the leading Polynesian cluster promoting innovation. PMBA also engages in regular exchanges with the Antilles²⁹², Guyana²⁹³ and Saint-Pierre and Miquelon.

For the Mission, one of its strategic area is "Environment and coastal development". For this area, PMBA work is to guide its members and encourage collaborative innovation to increase support for activities relating to the maritime and littoral environment. Such activities comprise protecting water habitats, developing tools for managing and mitigating climate risks, and expanding environmental and coastal development services. The work in this area will contribute to the French Climate Plan and to making coastal zones more resilient. As a result of human pressures and regulatory concerns, a significant component of maritime activities now involves issues relating to coastal and environmental attractiveness and sustainability. Four fields fall within the scope of this strategic area:

²⁹⁰ <https://www.entreprises.gouv.fr/fr/innovation/poles-de-competitivite/presentation-des-poles-de-competitivite>

²⁹¹ http://www.qualitropic.fr/fichiers/Livret_mission_Mer.pdf

²⁹² Prototype of a 20-metre pelagic fishing boat for Martinique: <https://pole-mer-bretagne-atlantique.com/en/component/projects/project/2645>

²⁹³ Global change, dynamics of exploited marine biodiversity and sustainability of fisheries: <https://pole-mer-bretagne-atlantique.com/fr/component/projects/project/2271>

- Preserving the coastal and deep-sea environment in a healthy ecological state and safeguarding aquatic biodiversity;
- Dealing with new environmental risks linked to human pollution and its impact on the environment;
- Enhancing resilience to coastal risks and managing the coastline and associated developments;
- Increasing the added value of the littoral heritage and developing economic sectors linked to recreational and cultural use.

As an integrated marine science research institute, **Ifremer** contributes to the national research and innovation system, as well as to the European research area, by producing (i) fundamental knowledge via a systemic approach that enables a better understanding of the processes that govern ecosystems and the changes that affect them and (ii) more finalised results in response to questions posed by society, based on its observation, monitoring and expertise capacities.

Ifremer is thus involved in research of excellence based on various disciplines and themes and, to do this, relies on partnerships with universities and research organisations. It is also a driving force at the international and European levels for concerted programming initiatives, whether for research or infrastructure (fleet, observatories, databases).

Ireland:

The Marine Institute was set up under the Marine Institute Act 1991: “to undertake, to coordinate, to promote and to assist in marine research and development and to provide such services related to research and development, that in the opinion of the Institute, will promote economic development and create employment and protect the marine environment.”

It implements the Ireland’s National Marine Research & Innovation Strategy 2017-2021 (MRIS) which was launched by the Minister for Agriculture, Food and the Marine in June 2017. As part of the preparation of the MRIS, a detailed review of national and European policies and strategies in relation to the marine was undertaken. This process identified the 15 major themes that are considered under the Strategy²⁹⁴. This approach was taken to ensure that the Strategy focused on applied and demand-led research, while recognising the importance of a fully functional marine research system that extends from basic research, through applied research, to translational utilisation of research outputs.

Marine institute is a State agency responsible for marine research, technology development and innovation in Ireland therefore funded by Irish State. It provides scientific and technical advice to Government to help inform policy and to support the sustainable development of Ireland’s marine resource. Marine Institute is implementing three schemes: Marine Biodiversity, Blue Growth & Marine Spatial Planning and Data Collection. The Marine Institute provides funding for marine related projects under the Marine Research Programme. Funding is provided under a number of programmes including the Cullen Fellowship Programme, Shiptime Programme, Post-Doctoral Fellowships, Project-Based Awards and the National Infrastructure Programme (NIAP). Full details of the awards funded by the Marine Institute under the various programmes are available on the dedicated marine research portal²⁹⁵.

Spain:

Fundación Biodiversidad is a public sector foundation that belongs to the **MITECO**. It was created in 1998 and its role is to contribute to the protection and conservation of the Spanish natural heritage and biodiversity. The Biodiversity Foundation commissions conservation projects (e.g. EU projects), in collaboration with NGOs and other entities such as universities.

The Pleamar Programme of the Biodiversity Foundation, runs from January 2017 to December 31, 2023 and it is articulated through the publication of calls for grants, which, in a competition, will enable the selection and co-financing of around 300 Projects. It has a total budget for the initiative of 20.5 M Euro for the duration of the full programme. The maximum duration of projects is 12 months, for projects of up to €400,000, and 24 months, for projects of up to €800,000.

²⁹⁴ For more information, refer to: <https://www.marine.ie/Home/site-area/research-funding/national-marine-research-innovation-major-themes>

²⁹⁵ https://marine.smartsimple.ie/ex/ex_viewreport.jsp?key=&token=@GgONTxkeFIRRhpeSRxRS1xQZVdzE3Nq

In addition, the Foundation coordinated the following projects dealing with the management and regulation of MPAs:

- LIFE INTEMARES (2016 2024)²⁹⁶: “Integrated, innovative and participatory management of Natura 2000 network in Spanish marine environment”. The main objective of this project is to achieve a consolidated network of N2000, managed on an effective way with participation of all sectors.
- LIFE INDEMARES (2009 2014)²⁹⁷: “Inventory and designation of marine Natura 2000 areas in Spanish seas”, this project, worked the scientific basis for the enlargement of the Natura 2000 network in the marine environment in Spain, by the identification of the spaces of high ecological value. The main result of this project was the declaration of 39 marine SPAs, and 10 SCIs. This surface included the protection of more than 8% of the marine surface of Spain.

The Spanish Institute of Oceanography (IEO) is a public institution that depends on the **Ministry of Science, Innovation and Universities**. The IEO is a body dedicated to the investigation of all aspects related with marine sciences It specifically has a department/unit dealing with marine conservation.

The main topics explored by the IEO are sustainable fisheries and marine environment. The IEO represents Spain in most of the international scientific and technological fora related to the sea and its resources, in coordination with the **Ministries of Foreign Affairs, European Union and Cooperation** (and also **MITECO**).

The IEO is in charge of designating fisheries protection zones, marine protected areas and other spaces on the maritime domain of Spain, by dealing with scientific studies to justify the declaration of important areas as MPAs (e.g. on the identification of habitats and species of community importance).

AZTI Technological Expert Center on marine and food innovation

AZTI is a specialized technology centre that conducts strategic applied research to generate knowledge, focused on the Basque Country economic and social development. It is funded by the Basque Government.

The center also does applied research on the marine environment, providing knowledge on the functioning of coastal systems. AZTI is also involved in the investigation of sustainable fishing practices, to achieve sustainable fishing activities at the same time as maintaining an economic and competitive fleet.

The main areas of specialisation in marine research are:

- Marine Ecosystem Functioning
- Sustainable fisheries management
- Marine and coastal environmental management
- Efficient use of resources: aquaculture and maritime technologies.

Portugal:

The **Institute for Nature Conservation and Forests (ICNF)** is a public institute, integrated into the indirect administration of the State, with administrative and financial autonomy. ICNF is the national authority for the nature conservation and biodiversity. Among its functions are the proposition, monitoring and implementation of nature conservation policies. In collaboration with the **Portuguese Agency of Environment (APA Agência Portuguesa do Ambiente)**, the ICNF secures the conservation and sustainable management of species and habitats. It is the responsible authority for the elaboration and implementation of plans, programs and actions dedicated to management and monitoring of the protected areas.

Concerning MPAs, the ICNF is responsible for the management of national MPAs, in cooperation with the **DGRM** and the **Portuguese Institute for the Sea and Atmosphere (IPMA)**. The ICNF also promotes the revision of spatial plans for MPAs, developing instruments of management for the N2000 Network, assuring the connectivity referent to migration, geographical distribution and genetic exchange of species.

²⁹⁶ <http://intemares.es/>

²⁹⁷ <https://www.indemares.es/en>

The ICNF can propose the creation of MPAs, securing the management of areas of national interest, in cooperation with the DGRM and IPMA. The ICNF can follow activities of research in areas of marine conservation and propose orientation for funding, in cooperation with services or State organisms with similar duties.

Portuguese Institute for Sea and Atmosphere I.P. (IPMA, IP) is a public institution part of the indirect administration of the State, under the **Ministry of the Sea**. The IPMA has the responsibilities at the national level in the fields of the sea and the atmosphere, concentrating its efforts on research projects that revert to direct applications with use in the operational activity. The IPMA also supports strategic plans in terms of analysis and surveys, research and monitoring.

4.2.3. Industry and business grouping and networks

France:

Pôle Mer Bretagne Atlantique (PMBA): Based on its role on research and innovation, Pôle Mer is also an economic development cluster created in France in 2005 as a new way of responding to the increasing pressures of globalised competition, its primary mission is to advance an alternative industrial policy to enhance the capacity of companies to innovate and are intended to stimulate growth and employment in promising markets. It encourages the development of collaborative research and development projects and support the growth of their member companies, particularly through the marketing of new products, services or processes resulting from research work.

Cluster Maritime Français (CMF): Created in 2006, CMF brings together all the players in the maritime ecosystem, from industry to all types of maritime services and activities. It is currently made up of more than 430 entities: companies of all sizes, competitiveness clusters, federations and associations, laboratories and research centres, schools and training organisations, local authorities and economic players, as well as the French Navy.

The CMF supports its members in the sustainable and responsible development of their activities and projects, in France and abroad, through various actions.

It stands more a lobby organization than an actor for project definition and implementation. PMBA is part of CMF as the National agencies mentioned above.

Portugal: Forum Oceano

Fórum Oceano - Associação da Economia do Mar is a collective entity of public utility (private law, non-profit), which aims to promote the development of the economy of the Sea. Its mission is to reinforce the dynamics of strategic cooperation between players - companies, RTD centres, higher education institutions, Public Administration bodies - and to promote the competitiveness of the main value chains that use the Sea and the marine resources as central elements of their activity in order to contribute, sustainably, to economic growth, exports and employment and to increase the relative importance of the economy of the Sea in the national economy. The association has more than 100 associates, linked to the most diverse sectors of the Sea economy activity.

Spain: Seastainable Ventures

Seastainable Ventures is a company based in Barcelona (Spain) that develops, accelerates and manages new and innovative projects to help society to transition towards the Blue Economy. It combines science and technology with the natural capital of the oceans, generating investment opportunities that value restoration and protection.

Seastainable Ventures aims to become the leading Venture Builder platform specialising in the Blue Economy in Europe and the Mediterranean, under an Impact Investment approach (economic and environmental), helping society to transition towards a sustainable development model while protecting the oceans and preserving biodiversity for future generations.

They received funding in the form of loans (for example from the European Investment Bank) to develop projects. One of such projects is an investment fund for businesses that support restoring or enhancing marine and coastal ecosystems in the European Union, adopting innovative models to capture revenue streams from sustainable recreational activities as well as other ecosystem services. Investments include re-establishment of marine vegetation and hard structures, such as artificial reefs. A total loan of 11.05 million dollars was awarded by the EIB to Seastainable Ventures S.L to develop the Venture Builder platform for blue economy projects.

4.2.4. NGOs and civil society organizations

France:

Tara Ocean Foundation's objective is to make high level scientific expertise available to clarify environmental policies. In the various international bodies and negotiations, it emphasises the importance of understanding marine ecosystems for their preservation, sustainable management and climate regulation. Since 2015, thanks to its status as Special UN Observer, the foundation has been supporting the important decisions to be taken in favour of the ocean in the eyes of leaders and encouraging them to maintain ambitious objectives. For the mission, TARA Ocean foundation can be a relevant player to advocate for the clarification of environmental policies but also to promote the solutions in the various international bodies and negotiations and also to make understanding marine ecosystems for their preservation, sustainable management and climate regulation.

Réserves Naturelles de France (RNF) is an association under the French law of 1901 created in 1982 which runs the French network of nature reserves. Initially created under the name of Conférence permanente des réserves naturelles (CPRN), it became Réserves naturelles de France in 1994. Its aim is to represent the network of nature reserves in various bodies, to centralise information on nature reserves, to exchange conservation experiences, to distribute legal information to managers, etc. RNF has nearly 700 members who work in more than 340 nature reserves. It pools the skills and expertise of its members²⁹⁸. RNF is funded by public authorities mainly collectivities thanks to taxation but also^{299 300}.

Ocean & Climate Platform (OCP) now gathers more than 90 members – research institutes, NGOs, aquariums, private sector, French institutions and international agencies, local authorities – working together in order to spread the following message: “a healthy ocean for a protected climate”. Through its role of interface between science and policy, the Ocean & Climate Platform fosters reflection and exchanges between the scientific community, civil society and policy-makers. Its ambition is to mobilize the largest number of actors for better consideration of the scientific message on the interactions between the ocean, climate and biodiversity by policy-makers and the general public. The OCP is committed to making the voice of civil society heard and participates in the mobilization of ocean stakeholders on ocean, climate and biodiversity issues. It coordinates a strong network of more than 90 members from various sectors. Thanks to their expertise and involvement, the OCP carries out various awareness-raising actions with the general public: organisation of conferences and thematic meetings, communication campaigns and production of informational tools such as learning sheets entitled “Ocean and Climate: new challenges”. After advocating the integration of the ocean into the preamble of the Paris Agreement at COP21, the OCP has continued to raise ocean – climate – biodiversity issues in different bodies – UNFCCC, CBD – and published in 2019 its Policy Recommendations for policymakers. The “Sea’ties Declaration” was launched at the Sea’ties Forum “Cities and their Territories Tackling Sea Level Rise” hosted during the One Ocean Summit (February 9-11, 2022). Signed by more than 30 mayors and governors of coastal cities across the world, the Declaration calls for an acceleration in the transformation of cities and their territories, highlighting four priority actions: (1) the mobilisation of science and observation systems, (2) the integration of societal issues within adaptation plans, (3) the fostering of adaptive and hybrid solutions, and (4) the increase of public funding and private investments for adaptation to sea level rise.

Spain:

World Wild Fund (WWF) Spain

The WWF NGO works directly on the management and proposal of designation of MPAs in Spain, participating on projects with the Spanish administrations, such as the case of INTEMARES and INDEMARES (see Fundación Biodiversidad).

WWF Spain is an entity actively involved in protection and conservation of seas, by supporting on the effective participation of society on conservation, especially targeting communication with users of the marine space.

SEO Birdlife

SEO Birdlife is a Society founded in 1954 that aim to conserve nature and biodiversity in Spain. The NGO focus on protecting the wild birds present in the Spanish territory, contributing to the worldwide biodiversity.

²⁹⁸ The association brings together the managers of French nature reserves and the classification authorities. There are active members (natural or legal persons) and associate members. Members may be (i) organisations managing nature reserves, (ii) professionals and volunteers responsible for the protection and management of these areas, (iii) experts and organisations involved in nature protection; (iv) authorities responsible for classifying nature reserves (State and regions).

²⁹⁹ Such as Lile MARHA or ADAPTO

The NGO also provide scientific studies to increase the knowledge about birds and habitats. The SEO Birdlife also acts on topics related to water contamination, exploitation of resources and nature conservation including marine birds.

Pong Pesca (Portugal)

The platform Pong Pesca is a network of the main NGOs that work on the marine and coastal environment in Portugal. Its aim is to promote the sustainable exploration of the fishing resources, including social, economic and ecological aspects. The main objective is to create a Forum of dialogue and work between the NGOs that develop the work on the coastal and marine environment in Portugal. The Pong Pesca is also reference on the discussion and reflection about fisheries, representing the link between the fisheries sector and the other stakeholders.

Other topics are also under the interest of the network, such as:

- Environment state of oceans and coast,
- Aquaculture,
- Management of marine environment and the coast.

4.2.5. Philanthropic organisations

France:

TotalEnergies Foundation aims to contribute to development in the territories where Total Energies is conducting activity to sponsor activities with a special focus on young people, and priority areas of action: road safety, climate, coastal areas and oceans, youth inclusion and education, and cultural dialogue and heritage.

More details on sponsored actions can be found hereafter³⁰¹. To illustrate, TotalEnergies' French corporate foundation, as part of the TotalEnergies Foundation program, signed an agreement in 2019 with the BOREA aquatic biology laboratory of France's National Natural History Museum. Under the deal, the foundation supports research on mangroves as well as the production of a documentary to raise awareness among young people of the essential environmental role played by these forests between land and sea.³⁰²

4.2.6. Financial institutions

France:

The Fondation de France ("Foundation of France") is an independent administrative agency which was established by the French government in an effort to stimulate and foster the growth of private philanthropy and private foundations in France. The aim for all of the supported projects is to develop cooperation among all stakeholders: non-profits, companies and local authorities and citizens especially, whose contribution is a proof of effectiveness.

The **French National Research Agency (ANR)** is a public administrative institution under the authority of the French Ministry of Higher Education, Research and Innovation. The agency funds project-based research carried out by public operators cooperating with each other or with private companies. The ANR was founded in 2005 to promote French project-based research and to stimulate innovation by promoting the emergence of collaborative multidisciplinary projects and encouraging collaboration between the public and private sectors. It also aims to strengthen the position of French research at European level and worldwide. Alongside institutional research stakeholders, the ANR plays a major role in the European and international planning of research funding, representing France and its interests on several bodies.

- Within **European Joint Programming Initiatives (JPI)** relating to major social challenges (climate, water resources, sustainable cities etc.), it presents the vision of national stakeholders and contributes to the construction of European strategic agendas. The ANR is a member of the 10 existing JPIs, chairing JPI Water³⁰³ and co-chairing Facce³⁰⁴.

³⁰¹ <https://foundation.totalenergies.com/en/our-actions/climate-coastal-areas-and-oceans>

³⁰² <https://foundation.totalenergies.com/en/increasing-awareness-mangroves-and-how-they-can-help-fight-climate-change>

³⁰³ <http://www.waterjpi.eu/>

³⁰⁴ <https://www.faccejpi.com/>

- Within the **Belmont Forum**, an association of research funding agencies in the field of global environmental change, the Agency plays an active part in defining funding instruments and strategic priorities at global level.

4.3. Conclusions and opportunities for collaboration

The Atlantic Strategy Committee (ASC) – through the Atlantic Action Plan 2.0 is an established platform between EC and Member States. If the target is to effectively promote the mission objectives among the involved Member States in the Northeast Atlantic (ES, PT, IE and FR), we conclude it is an appropriate platform for engagement.

In terms of specific links to the mission objectives, the AAP2.0 as the cooperation framework to develop a sustainable blue economy in the Atlantic Sea basin includes a pillar IV which is mainly focused on two goals: Goal 6 “Stronger coastal resilience” and Goal 7, “The fight against marine pollution”.

If the governance structure is fully in line with the lighthouse mission area, the priorities “protection & restoration” are not the key priorities of the AAP 2.0. It could be recommended to add an additional key priority related to the restoration and the protection of marine and coastal zones under the Pillar IV of the AAP 2.0.

It should not be a major issue as all contracting parties are committed with EU legislation (fi. MSFD, N2000, WFD, MSPD).

As a consequence and before engagement, it is important to consider first of all, the AAP rotating presidency and its steering committee as a **political partner**. The role of the AAP Assistance Mechanism (AM) is to be considered to promote the lighthouse and to develop synergies with the AAP implementation. The AAP AM can support the stakeholders in the mission's call thanks to its national hubs which are located in the Four countries.

The involvement of the marine regions (i.e., Atlantic Arc commission of the CPMR and Atlantic Cities) is also to be considered if the objective is to engage with local authorities about their engagement with mission objectives and promote project participation and development. Subsequently, national agencies in charge of protecting the marine environment can lead project implementation as reported in task 2. See below.

The OSPAR convention's geographical scope is wider in scope than the mission objectives and is to be considered for a joint approach between the Atlantic and the Arctic objectives. OSPAR provides the contracting parties with the QSR which is a relevant tool to be considered in addition with EAA database in particular to include non-EU MS.

The key players which are listed in the above sections should be considered for the involvement in the lighthouse, keeping in mind that most of the actions related to protection and restoration in particular in marine spaces fall within national competences at central level.

The first key players are the **decision makers** which are the ministries and agencies in charge of protecting the marine environment.

For activities related to protection and restoration, the involvement of national agencies is critical for any potential success towards implementing projects to meet the mission objectives related with increasing MPA's coverage (targets 1 and 2) and specific actions to restore and protect marine ecosystems (target 3). Specifically, agencies managing protected areas are pivotal as they have a legitimate role for the protection but also thanks to their experience in LIFE projects have the ability to coordinate and increase the chances of success with projects implementation.

The **national agencies** in particular the ones which have already engaged in related Life projects as identified in Task 2 are to be considered as **potential project leader**:

- France: Office français pour la biodiversité (OFB) and Conservatoire du littoral et des rivages lacustres
- Irish Environmental Protection Agency (EPA)
- Spain: General Directorate for the Sustainability of the Coast and the Sea (DGSCM), Fundación Biodiversidad (FD) and The Spanish Institute of Oceanography (IEO)
- Portugal: Institute for Nature Conservation and Forests (ICNF), Directorate General for Natural Resources, Safety and Maritime Services (DGRM) and Directorate-General for Maritime Policy

Beyond the strict objectives of the lighthouse, there is already a strong ecosystem of **research and innovation in the Atlantic area** which is engaged in the development of a sustainable blue economy. All of the listed ones can be **science partners**. In priority partnerships could be sought with Ifremer in France, Irish Marine Industry, AZTI in Spain, Portuguese Institute for Sea and Atmosphere. Their involvement could be further strengthened through dedicated existing EU initiatives such as JPI Oceans that could be seen as an EU wide umbrella for research.

Collaboration in projects could be considered with the **engagement of active NGOs** such as Tara Ocean Foundation Réserves naturelles de France (RNF), Ocean & Climate Platform (OCP) in France, SEO Birdlife Spain Pong Pesca (Portugal) or World Wild Fund (WWF) in Spain. All of them have already demonstrated capacities to be partner or leaders in projects. Their participation in a consortium is to be considered by the national agencies.

The **engagement of the private sector** is to be considered via the national clusters which can be a good catalyser for innovative project ideas contributing the next EC related calls: Pôle Mer–Bretagne Atlantique (PMBA) - France; Forum Oceano – Portugal; Seastainable Ventures – Spain.

In addition to the EU and governmental fundings, some synergies could be considered with **private or philanthropic organisations** such as TotalEnergies Foundation or The Fondation de France which can fund or launch calls for projects related to the mission objectives.

5. ARCTIC LIGHTHOUSE AREA

5.1. Introduction

The Arctic Sea basin is located in the Arctic Ocean, which is the smallest and shallowest of the world's oceans. It is surrounded by five Arctic coastal states, which have maritime zones extending into the Arctic Ocean: Canada, Denmark (via Greenland), Norway, Russia, and the United States. Besides these maritime zones of Arctic Ocean coastal states, the Arctic Ocean comprises high seas areas. Besides the Arctic Ocean coastal states, Finland, Iceland and Sweden have territory within the Arctic. In total, there are **eight Arctic States**, three of which are Member States of the European Union: Finland, Sweden, and Denmark (via Greenland).

The Arctic basin lighthouse area spans **the marine waters of Iceland and Norway** (in the European Economic Area, EEA), as well as those of **the Faroe Islands and (Eastern) Greenland** (neither in the EU nor the EEA). Greenland and the Faroe Islands are legally part of the Kingdom of Denmark, but have substantial autonomy and are not part of EU territory. Both Greenland and the Faroe Islands are eligible for the Horizon Europe programme, and thus also covered by the EU Mission to 'Restore our Ocean and Waters by 2030'. Greenland is eligible for the Horizon Europe programme due to its Overseas Countries and Territories (OTC) status. The Faroe Islands negotiated an agreement on the participation of the Faroe Islands to Union programmes, with a specific protocol on its association to Horizon Europe, which was signed and entered into application on 24 May 2022.³⁰⁵

The Arctic basin lighthouse area does **not include the marine waters of any EU Member States**. It is a continuation of the Northeast Atlantic. In the EU Mission to Restore Our Oceans and Waters, the Atlantic and Arctic areas are conceptualised as one lighthouse areas titled the "Atlantic and Arctic coast". In this report, the two areas are treated separately. However, some of the organisations identified for the Atlantic are also relevant for the Arctic lighthouse area (see section 4). Areas Beyond National Jurisdiction (ABNJ), that is the (Arctic) High Seas, especially in the Central Arctic Ocean, are not included in this study. Consequently, this section also does not elaborate on some developments with potential relevance for cooperation in the High Seas, for example the International Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, which entered into force in 2021.³⁰⁶ The EU is a signatory to this agreement, which presents a significant opportunity to achieve the Mission objectives in the Arctic but falls outside of the lighthouse area.

The (Atlantic and) Arctic lighthouse area should specifically address the Mission Objective 1: Protect and restore marine and freshwater ecosystems and biodiversity. The relevant targets under this objective are to:

- Protect a minimum of 30% of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network.

³⁰⁵ https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/europe-world/international-cooperation/faroe-islands_en
³⁰⁶ https://ec.europa.eu/oceans-and-fisheries/news/arctic-agreement-prevent-unregulated-fishing-enters-force-2021-06-25_en

- Strictly protect at least 10% of the EU's sea area.
- Contribute to relevant upcoming marine nature restoration targets including degraded seabed habitats and coastal ecosystems.

Even though the Arctic lighthouse area lies outside of the EU's sea area and isn't directly considered by the minimum protection targets, protection and restoration of Arctic ecosystems are urgent. In addition, also the Mission objectives to reduce pollution and make the blue economy carbon-neutral and circular are relevant to the Arctic lighthouse area, and some of the actors listed below are active in these domains.

The following overview is focused on elements with a direct link to Arctic lighthouse area. The focus lies on transnational actors and initiatives. These are examples that offer the most potential for collaboration to implement the Mission objectives, considering that the lighthouse area does not cover the marine waters of any EU Members States, and that the conditions in the region (remoteness, limited accessibility, high costs of operations) have required transnational cooperation in the past to create a more effective governance framework in several sectors. The transnational actors and initiatives can also serve as entry-points to establish contact with relevant actors and initiatives at the national and sub-national level.

The Russian Federation's aggression against Ukraine has severely **disrupted ongoing and planned cooperation in the Arctic**. Meetings and activities of intergovernmental institutions, such as the Arctic Council or the Barents Euro-Arctic Council, have been suspended. Also, other venues for cooperation have been closed, including among scientific institutions, which have distanced themselves from the Russian Federation. At the time of this report, it is too early to give specific predictions about the duration of the disruption but – where possible – potential pathways for short- and mid-term cooperation (without the Russian Federation) have been indicated.

5.2. Governance structures and stakeholder involvement

Due to the several national jurisdictions, regional cooperation and international waters, the Arctic marine governance landscape is complex and includes a range of laws, policies and actors on several levels.

5.2.1. Governmental institutions

5.2.1.1. International governmental institutions

The following will briefly describe the work of the main international actors and policies shaping Arctic governance, namely:

- the **Arctic Council** (inter-governmental) with the membership of Canada, Denmark, Norway, Russian Federation, United States, Finland, Iceland and Sweden,
- the **Barents-Euro Arctic Council** (inter-governmental) and **Barents Regional Council** (inter-regional) in the Barents Region,
- **Nordic Council of Ministers** (inter-governmental) and **Nordic Council** (inter-parliamentary) with membership of Denmark, Finland, Iceland, Norway and Sweden,
- the **Northern Dimension Policy** between the European Union, the Russian Federation, Norway and Iceland, as well as Belarus as an observer.

The **Arctic Council** was established in 1996 and consists of the eight Arctic states Canada, Denmark (via Greenland), Norway, Russia, United States, Finland, Iceland and Sweden. It is an "intergovernmental forum promoting cooperation, coordination and interaction among the Arctic States, Arctic Indigenous peoples and other Arctic inhabitants on common Arctic issues, in particular on issues of sustainable development and environmental protection in the Arctic."³⁰⁷ In addition to the Arctic States, the Arctic Council includes six Indigenous Peoples' organizations as Permanent Participants (see 3.2.4), 13 observer states (including the EU Member States Germany, Spain, France, Netherlands, Poland, Italy), as well as observers from intergovernmental organisations and NGOs.

³⁰⁷ <https://www.arctic-council.org/about/>

The EU Member States Ireland³⁰⁸ and Czech Republic³⁰⁹ have applied for observer status and are currently awaiting a decision; Latvia has announced that it will apply in 2022.³¹⁰ Estonia's bid for observer status was rejected in 2021, but it has announced that it will re-apply.³¹¹ The European Union's application for observer status has been pending since 2013, but it participates regularly as an ad-hoc observer in Arctic Council meetings.³¹² Every two years, ministerial meetings take place - usually between the Foreign Ministries of the eight Arctic states. Accompanying meetings of the Environmental Ministers and regular meetings by "Senior Arctic Officials" (usually twice a year) to take the substance of work forward are also part of the Council's schedule.

The Council's six Working Groups are involved in data collection and monitoring of the Arctic, which are the basis for the publication of assessments and recommendations. The six Working Groups are: Arctic Contaminants Action Program (ACAP), Arctic Monitoring and Assessment Programme (AMAP), Conservation of Arctic Flora and Fauna (CAFF), Emergency Prevention, Preparedness and Response (EPPR), Protection of the Arctic Marine Environment (PAME), Sustainable Development Working Group (SDWG). Under the working groups, specific projects are usually coordinated by two Arctic states and implemented with expert support that can also include observer organisations. In its Strategic Plan 2021-2030,³¹³ the Arctic Council sets out strategic priorities for the current decade, which will guide the Working Groups and the Arctic Council overall. Four of these strategic priorities are especially relevant to the Mission objectives:

- Strategic focus 1: Arctic climate
- Strategic focus 2: Arctic ecosystems
- Strategic focus 3: Sustainable use and conservation of marine environment
- Strategic focus 5: Sustainable economic development

On 3 March 2022, it was announced that all official meetings of the Arctic Council have been suspended until further notice due to the war in Ukraine. The Russian Federation has the chairmanship of the Council until spring 2023, when it rotates to Norway for the next two years. It is unlikely at this point that a ministerial meeting of the Council would take place during the Russian chairmanship. On 8 June 2022, the governments of Canada, the Kingdom of Denmark, Finland, Iceland, Norway, Sweden, and the United States have issued a statement announcing that they "intend to implement a limited resumption of our work in the Arctic Council, in projects that do not involve the participation of the Russian Federation" and that they "continue to examine additional modalities to allow us to further continue the Council's important work."³¹⁴ The current situation might open opportunities for the European Union, in coordination with its Arctic member states, to contribute more closely to Arctic Council activities.

The **Barents-Euro Arctic Council (BEAC)** supports and promotes intergovernmental co-operation and development in the Barents Region. Its members include Denmark, Finland, Iceland, Norway, Russian Federation, Sweden and the European Commission. The BEAC operates through a range of working groups, including the Working Group on the Environment (WGE). The **Barents Regional Council** also promotes cooperation and development in the Barents Region through fostering interregional cooperation, setting of common priorities, and implementing cross-border projects. It consists of 13 member counties and a representative of the indigenous peoples in the northernmost parts of Finland, Norway and Sweden and North-West Russia. One of its priority areas for 2019-2023 is climate and the environment.³¹⁵

The BEAC has also suspended activities involving Russia in the Barents Euro-Arctic cooperation in March 2022 and the comments by the Russian Foreign Ministry representative do not let expect a return to the previous relations in the foreseeable future.³¹⁶ The European Union's involvement in the cooperation could similarly to the Arctic Council involvement be continued with the remaining partners.

³⁰⁸ <https://assets.gov.ie/125514/c51224dc-2006-410c-af2e-c39c712be909.pdf>

³⁰⁹ https://www.mzv.cz/jnp/en/foreign_relations/candidacy_arctic_council/index.html

³¹⁰ https://www.mfa.gov.lv/en/article/minister-foreign-affairs-2022-latvia-preparing-apply-role-observer-arctic-council?utm_source=https%3A%2F%2Fwww.google.com%2F

³¹¹ <https://news.err.ee/1608254889/estonia-s-bid-for-arctic-council-observer-status-unsuccessful>

³¹² <https://www.arctic-council.org/about/observers/intergov-interparl/>

³¹³ https://oaarchive.arctic-council.org/bitstream/handle/11374/2601/MMIS12_2021_REYKJAVIK_Strategic-Plan_2021-2030.pdf?sequence=1&isAllowed=y

³¹⁴ <https://www.state.gov/joint-statement-on-limited-resumption-of-arctic-council-cooperation/>

³¹⁵ https://www.barents-council.org/files/Barents-Programme/Barents_program_2019-2023_adopted_24_May_2018.pdf

³¹⁶ <https://barents-council.org/news/joint-statement-of-finland-denmark-iceland-norway-sweden-and-the-european-union-regarding-barents-euro-arctic-cooperation>

The **Nordic Council of Ministers** is the official body for inter-governmental co-operation in Denmark, Finland, Iceland, Norway and Sweden. It was founded in 1971. The Nordic Council of Ministers consists of 11 individual councils of ministers. Arctic co-operation is part of the Nordic Council of Ministers' international co-operation. Its work is guided by the Nordic Council of Ministers' Arctic Co-operation Programme 2022–2024.³¹⁷ The **Nordic Council** is the official body for formal inter-parliamentary co-operation in Denmark, Finland, Iceland, Norway and Sweden. It consists of 87 elected members of national parliaments, which conduct their work through committees and party groups. A Committee for a Sustainable Nordic Region works on issues and cases involving the protection of the environment and nature and on questions of natural resources.

The **Northern Dimension Policy** is a partnership between the European Union, the Russian Federation, Norway and Iceland, as well as Belarus as an observer. It is aimed at fostering stability, well-being and sustainable development in the region. Practical cooperation is organized in thematic partnerships on the environment, transport and logistics, culture, and public health and social well-being. In addition to these partnerships, the ND policy comprises the international university network Northern Dimension Institute (NDI), the ND Business Council as a forum for dialogue between the business and government, and the Northern Dimension Parliamentary Forum.

*The European External Action Service has published a statement on 8 March 2022, condemning “in the strongest possible terms Russia’s unprecedented military aggression against Ukraine” and announcing that the European Union, Iceland and Norway suspend until further notice all activities of the Northern Dimension policy involving Russia and Belarus.*³¹⁸

5.2.1.2. National governmental institutions

This section gives an overview of the national ministries relevant to the EU Mission in the Arctic lighthouse area, as well as an overview of Arctic sub-national regions within a country, where applicable. Cooperation with national and sub-national governmental institutions can aid the implementation of the Mission objectives. It is especially relevant due to the ongoing uncertainties on how the Arctic Council, BEAC and the Barents Regional Council, as well as the Northern Dimension Policy will continue operating after the Russian invasion of Ukraine in February 2022.

³¹⁷ <https://www.norden.org/en/publication/sustainable-arctic-nordic-council-ministers-arctic-co-operation-programme-2022-2024>.

³¹⁸ https://www.eeas.europa.eu/eeas/northern-dimension-policy-joint-statement-european-union-iceland-and-norway-suspending_en

Country	Relevant ministries	Arctic regions
Denmark	Foreign Affairs Climate, Energy and Utilities Environment and Food Higher Education and Science Industry, Business and Financial Affairs	Greenland, Faroe Islands (see below)
Faroe Islands	Ministry of Foreign Affairs and Culture Ministry of Environment, Industry and Trade Ministry of Fisheries	All of Faroe Islands
Greenland	Foreign Affairs, Business and Trade Fisheries and Hunting Education, Culture, Sports and Church Ministry for Agriculture, Self-sufficiency, Energy and Environment	All of Greenland
Iceland	Foreign Affairs Culture and Business Affairs Food, Agriculture and Fisheries Higher Education, Science and Innovation Environment, Energy and Climate	All of Iceland
Norway	Foreign Affairs Local Government and Regional Development Trade, Industry and Fisheries Climate and Environment Ministry of Education and Research	Nordland, Troms and Finnmark, Svalbard, Jan Mayen

Table 61 National authorities of relevance to the Mission in the Arctic

Denmark is the largest constituent of the Kingdom of Denmark, alongside **Greenland** and the **Faroe Islands**. Greenland and Faroe Islands are self-governing and have their own governments, which hold competence in all areas except for foreign and security policy, monetary systems, police and justice, and constitutional matters. Due to this division of foreign competences, the Kingdom of Denmark is a member of the Arctic Council because of Greenland. The potentially relevant Danish ministries for the implementation of the Mission objectives are the Ministry of Foreign Affairs; Ministry of Climate, Energy and Utilities; Ministry of Environment and Food; Ministry of Higher Education and Science; and Ministry of Industry, Business and Financial Affairs.

The Faroe Islands consist of six regions and 29 municipalities. The government holds executive power in local government affairs. The potentially relevant Faroese ministries for the Mission are the Ministry of Foreign Affairs and Culture; Ministry of Environment, Industry and Trade; and Ministry of Fisheries. Greenland is divided into four municipalities, as well as the unincorporated Northeast Greenland National Park. Relevant ministries for the Mission are the Ministry for Foreign Affairs, Business and Trade; Ministry for Fisheries and Hunting; Ministry for Education, Culture, Sports and Church; and the Ministry for Agriculture, Self-sufficiency, Energy and Environment. The Government, the Government of the Faroes and the Government of Greenland are currently working on a new strategy for the Arctic for the period 2021-2030,³¹⁹ after the strategy for 2011-2020 has expired.³²⁰

Iceland is a unitary state consisting of 64 municipalities. There is no regional government. Almost all of Iceland lies below the Arctic Circle, which only passes through its northernmost community called Grimsey Island, but Iceland considers that all its territory is part of the Arctic.³²¹ The potentially relevant ministries for the implementation of the Mission objectives are the Ministry of Foreign Affairs; Ministry of Culture and Business Affairs; Ministry of Food, Agriculture and Fisheries; Ministry of Higher Education, Science and Innovation; and Ministry of Environment, Energy and Climate.

The Kingdom of **Norway** is a unitary state consisting of 11 counties and 356 municipalities. The two counties Nordland, as well as Troms and Finnmark are located in the Arctic. In addition, the islands Svalbard and Jan Mayen are located in the Arctic, but they are not allocated to a particular county. In 2020, Norway adopted its new Arctic policy,³²² covering foreign and security policy; climate and environment; social development; value creation and competence development; infrastructure, transport and communications; and civil protection. The Arctic policy was developed with the involvement of the Ministry of Foreign Affairs; the Ministry of Local Government and Regional Development; and the Ministry of Trade, Industry and Fisheries. Other ministries potentially relevant for the implementation of the Mission objectives are the Ministry of Climate and Environment and the Ministry of Education and Research.

³¹⁹ <https://um.dk/en/foreign-policy/the-arctic>

³²⁰ <https://um.dk/en/-/media/websites/umen/foreign-policy/the-artic/arctic-strategy.ashx>

³²¹ <https://www.arctic-council.org/about/states/iceland/>

³²² https://www.regjeringen.no/en/dokumenter/arctic_policy/id2830120/

5.2.2. R&D and innovation entities

Over 4 million people live in the Arctic, especially along the coastlines, including many local communities and indigenous rights holders. Their (scientific and traditional) knowledge and understanding offer key contributions to addressing and solving regional and global issues. Building scientific cooperation on their needs and supporting their involvement are key aspects to conduct research in the area. There are several networks and organisations that aim to bring together actors from science and business working on Arctic issues, including:

- the **Arctic Frontiers** network of policy, business and science, and the annual **Arctic Frontiers Conference**;
- the **Arctic Circle network** of corporations, organisations, research institutions, governmental bodies, and the **annual Arctic Circle Assembly**;
- the **University of the Arctic (UArctic)**, a network of educational institutions;
- the **International Arctic Science Committee (IASC)**, which facilitates scientific cooperation across Arctic and non-Arctic countries and organises the **International Conference on Arctic Research Planning (ICARP)**, and the **Arctic Science Summit Week (ASSW)**;
- **EU Polar Net**, which coordinates the polar research of all European Member States and Associated Countries.

Arctic Frontiers is a network of Arctic stakeholders linking policy, business and science to foster knowledge-based growth and development in the Arctic. Arctic Frontiers has more than 20 partners.³²³ Year round, the Arctic Frontiers secretariat organises seminars, open debates, workshops, projects and network meetings both in Norway and abroad centred on five pillars: Policy, Business, Science, Arena and Young. Since 2006, every year the **Arctic Frontiers Conference** has been organised. It is a scientific conference on economically, socially and environmentally sustainable growth in the north.

The **Arctic Circle** is a network for international dialogue and cooperation on the future of the Arctic. It has more than 100 members from foundations, organizations, universities, corporations, research institutions, governmental bodies and public associations.³²⁴ It hosts various other platforms for exchange and information, such as the Arctic Circle Forums and Arctic Circle Mission Councils to deepen engagement on particular themes, the online media platform Arctic Circle VIRTUAL, the Arctic Circle Journal, and publishes podcasts and webcasts. Every year in October, the Arctic Circle organises the **Arctic Circle Assembly** with more than 2000 participants from over 60 countries (politicians, scientists, indigenous representatives, business leaders).

The **University of the Arctic (UArctic)**, which was established following the Arctic Council's 1998 Iqaluit Declaration, is a network of universities, colleges, research institutes, and other organizations concerned with Arctic education and research. Since the official launch in 2001, UArctic has grown to over 200 members, comprising higher education institutions and other organizations from both Arctic and non-Arctic countries.³²⁵ UArctic also includes Indigenous educational institutions, such as the Sámi University of Applied Sciences, the International Sámi Film Institute or the Sámi High School and Reindeer Husbandry School, all located in Norway.³²⁶ UArctic develops knowledge to address local and global challenges of relevance to Arctic peoples and societies by providing educational, research, and innovation opportunities. It is a decentralized organization, with offices, programs and other functions hosted at member institutions. Its activities include among others Thematic Networks, UArctic Institutes, UArctic Study Catalogue of Arctic relevant courses and programs, the north2north mobility program, UArctic Research Infrastructure Catalogue.

The **International Arctic Science Committee (IASC)** is a non-governmental scientific organization established to encourage and facilitate international consultation and cooperation for scientific research concerned with the Arctic. It consists of the eight Arctic countries, as well as 15 non-Arctic countries (including EU Member States Austria, the Czech Republic, Germany, Italy, the Netherlands, Poland, Portugal and Spain). The IASC fosters greater scientific understanding of the Arctic region through six thematic working groups on the atmosphere, the cryosphere, as well as marine, social & human, terrestrial, and cross-cutting issues. Every year since 1999, the IASC has been organising the **Arctic Science Summit Week (ASSW)**³²⁷

³²³ <https://www.arcticfrontiers.com/partners/>

³²⁴ <https://www.arcticcircle.org/partners>

³²⁵ <https://www.uarctic.org/about-uarctic/members-list/>

³²⁶ <https://old.uarctic.org/member-profiles/norway/>

³²⁷ <https://iasc.info/>

to provide opportunities for coordination, cooperation and collaboration between the various scientific organizations involved in Arctic research. The next conference will take place from 17-23 February 2023 in Vienna, Austria and is co-organised by the Austrian Polar Research Institute. Periodically, the IASC hosts the **International Conference on Arctic Research Planning (ICARP)**, which identifies key scientific questions and issues. The next ICARP (4th edition) will be held in Boulder, CO (USA) in 2025, the planning process started in 2022.

The EU and its member states are very active and contributes substantially to research in the Arctic. In addition to the international initiatives and networks mentioned above, several EU Member States are involved in national, European and international research projects. The **EU PolarNet** is a Cooperation and Support Action (CSA) funded under the Horizon 2020 programme for the period 2020-2024, which coordinates the polar research of all European Member States and Associated Countries (incl. Iceland, Norway, Greenland), including their contributions to Horizon Europe. Their Catalogue of national Polar programmes and other large-scale programmes,³²⁸ as well as their Directory of European Polar Research funding programmes³²⁹ (both published in March 2022) provide a useful overview of ongoing scientific efforts.

5.2.3. Industry and business grouping and networks

Both governments and the business community are increasingly interested in the economic development of the Arctic region, including its blue economy. Relevant initiatives include:

- the **Arctic Economic Council (AEC)**,
- the **Association of Arctic Expedition Cruise Operators (AECO)**

The **Arctic Economic Council (AEC)** was created by the Arctic Council during the 2013-2015 Canadian chairmanship and is open to corporations, partnerships and indigenous groups that have an economic interest in the Arctic. It aims to facilitate business activities and responsible resource development through sharing and advocating for best practices, technological solutions, and standards; supporting market accessibility; and providing advice and a business perspective to the work of the Arctic Council. The Arctic Economic Council has five working groups on Maritime Transportation, Infrastructure, Responsible Resource Development, Connectivity, and Blue Economy. In addition, since 2017, the AEC is responsible for and further develops the Arctic Investment Protocol (AIP), which was originally published in 2015 by the World Economic Forum's (WEF) Global Agenda Council on the Arctic.

The AEC has published a statement on 1 March 2022 stating that it “condemns the invasion of Ukraine by Russia.” The Arctic Economic Council (AEC) is under the Russian business community’s chairmanship from 2021 to 2023. Four out of five members of the Executive Committee voted in favour of the condemnation. As a reaction to the invasion, the hybrid annual general meeting was moved from St Petersburg, Russia to an online meeting.³³⁰ The statement does not contain any information on whether or how activities involving Russia will be continued.

The **Association of Arctic Expedition Cruise Operators (AECO)** has more than 60 members from the cruise tourism industry,³³¹ which have dedicated themselves to managing responsible, environmentally friendly, and safe tourism in the Arctic and strive to set the highest possible operating standards. AECO has published guidelines on a range of topics (e.g., Clean Seas, Vegetation, Wildlife), which its members commit to upholding. AECO also organises an annual Arctic cruise conference and workshops, and is involved in research projects and citizen science. AECO has also launched the **Clean Seas Project**, which aims to combat marine plastic pollution through cutting back single-use plastics on Arctic expedition cruise vessels, beach clean-ups, providing information and education (in cooperation with the UN Environment Programme's Clean Seas campaign), and publishing best practices on reducing plastics consumption on expedition cruise ships.

5.2.4. NGOs and civil society organizations

The Arctic is home to Arctic Indigenous Peoples from over 40 ethnic groups, which are organised and participate in a wide variety of NGOs and civil society organisations. The population of Greenland is 88.9% Greenlandic Inuit (out of a total population of ca. 56,000), the majority of which refers to themselves as Kalaallit. They consist of three major groups: the Kalaallit, who speak Kalaallisut; the Inuit, who speak Inuktitut; and the Inughuit/Avanersuarmiut, who speak Inuktun. Kalaallisut is the official language of Greenland

³²⁸ <https://eu-polar.net.eu/catalogue-of-national-polar-programmes-and-other-large-scale-programmes/>

³²⁹ <https://eu-polar.net.eu/directory-of-european-polar-research-funding-programmes/>

³³⁰ <https://arcticeconomiccouncil.com/news/arctic-economic-council-statement/>

³³¹ <https://www.aeco.no/members/>

and spoken by the majority of the population. The Norwegian Arctic is part of Sápmi, the traditional territory of the Sámi people, which stretches across territories in Sweden, Norway, Finland and Russia. Norway is home to around 50-65,000 Sámi, which is between 1.06% and 1.38% of the total population. Iceland and the Faroe Islands do not have Indigenous Peoples.³³²

In addition to Arctic Indigenous Peoples organisations, international environmental organisations are active in the Arctic. The following provides more information about:

- the Arctic Indigenous Peoples organisations which are **Permanent Participants** to the Arctic Council, especially the **Inuit Circumpolar Council (ICC)** and the **Saami Council**;
- The **Sámi Parliament of Norway**;
- The **WWF Arctic Programme**;
- **Greenpeace**;
- the **Bellona Foundation**;
- the **Clean Arctic Alliance**.

Six Arctic Indigenous Peoples organisations are **Permanent Participants** to the Arctic Council, namely the Aleut International Association (AIA), Arctic Ath'baskan Council (AAC), Gwich'in Council International (GCI), Inuit Circumpolar Council (ICC), Russian Association of Indigenous Peoples of the North (RAIPON), Saami Council. They are supported by the Secretariat for Indigenous Peoples' Secretariat.

The Greenlandic Inuit are represented by the **Inuit Circumpolar Council (ICC)**, which also represented the Inuit living in Canada, Alaska and Russia. The Sámi living in Norway are represented by the **Saami Council**, alongside the Sámi in Finland, Russia, and Sweden. The Saami Council has a specific Arctic and Environmental Unit. Both ICC and Sámi Council contribute to the assessments of the Arctic Council Working Groups, especially Indigenous knowledge; represent Inuit and Sámi in international environmental fora (e.g., CBD, UNFCCC, GEF); and raise awareness of Arctic environmental issues.

*The Russian section of the Saami Council has issued a statement regarding the current situation in Russia on 27 March 2022, calling for international support to continue cooperation between the Sami of the four countries.*³³³

*The Inuit Circumpolar Council (ICC) has issued a statement regarding the suspension of all Arctic Council meetings on 7 March 2022. It states that the ICC “worked hard to ensure that our sisters and brothers from Chukotka [in Russia] were able to join us in 1992” and that “Inuit are committed to the Arctic remaining a zone of peace”.*³³⁴

The **Sámi Parliament of Norway** was opened in 1989. Its 39 representatives are elected by the Sámi living in Norway and deal with all matters concerning the Sámi people. The parliament aims to improve the Sámi's political position and promote their interests. It also has administrative responsibility in some policy areas, such as in matters concerning culture, language and education.³³⁵ In Sweden and Finland, the Sámi are also represented by Sámi parliaments. In 2000, the three Sámi parliaments established a joint council of representatives called the Sámi Parliamentary Council. The Sámi in Russia are represented by NGOs.³³⁶

The **World Wide Fund for Nature's (WWF) Arctic Programme** is run by the organisation's offices in Arctic countries (including Norway and Greenland, as well as Finland, Russia, Sweden, and the United States), as well as by national offices in non-Arctic countries. The WWF Arctic Programme works on a range of topics relevant to the region, e.g., wildlife, climate change, ocean, communities, oil and gas, shipping or governance. Its work includes research and analysis, advocacy for Arctic protection, policy recommendations, and information and education campaigns. The WWF's Arctic Programme is the only circumpolar environmental NGO with Observer status at the Arctic Council. Recent projects include working on a network of Arctic priority areas for conservation (ArcNet),³³⁷ which was also presented at the Senior Arctic Officials (SAO) Meeting

³³² Mamo, Dwayne (2022). *The Indigenous World 2022*. The International Work Group for Indigenous Affairs (IWGIA). <https://iwgia.org/en/resources/indigenous-world.html>.

³³³ <https://www.saamicouncil.net/news-archive/statement-by-the-russian-side-of-the-saami-council-regarding-the-current-situation-in-russiaaa>

³³⁴ <https://www.inuitcircumpolar.com/news/statement-from-the-inuit-circumpolar-council-concerning-the-arctic-council/>

³³⁵ <https://sametinget.no/about-the-sami-parliament/>

³³⁶ Mamo, Dwayne (2022). *The Indigenous World 2022*. The International Work Group for Indigenous Affairs (IWGIA). <https://iwgia.org/en/resources/indigenous-world.html>.

³³⁷ <https://arcticwwf.org/work/ocean/arctnet/>

under the Arctic Council in December 2021. In April 2022, WWF published a report titled 'Review of Perceived Gaps and Challenges in the Implementation of the Polar Code' adopted by the International Maritime Organization (IMO) in 2014.³³⁸ Greenpeace is part of the Clean Arctic Alliance (see below).

*The WWF Russia office seemingly continues its work but has issued a statement on its website that its mission to conserve diversity of life can only be achieved through peaceful means.*³³⁹

Greenpeace is an independent global campaigning network, which comprises 26 independent national/regional organisations (including in Norway and Denmark), as well as a co-ordinating body, Greenpeace International. Several of Greenpeace's national/regional organisations, as well as Greenpeace International, engage in activities related to the Arctic. In 2012, Greenpeace started the "Save the Arctic" campaign to protect the Arctic from a possible oil spill. This has developed into the "People vs. Oil" campaign, which started in 2018 and has included international protests, litigation, and public communication against the oil industry worldwide.³⁴⁰ Greenpeace International has also made a proposal for an Arctic Sanctuary in the Arctic high seas in 2014.³⁴¹ Greenpeace is part of the Clean Arctic Alliance (see below).

The **Bellona Foundation** is an independent non-profit organisation that works on a range of topics connected to climate change and pollution worldwide. Founded in 1987, the Foundation currently has 57 employees working in the main office in Oslo (Norway) and international offices in Brussels (Belgium / EU), Berlin (Germany) Murmansk (Russia) and St. Petersburg (Russia) with different funders for the respective offices. The Bellona Foundation also runs a partnership program with the private sector. In the Arctic, the Foundation monitors the environmental situation (e.g., oil spills, radiation hazards, permafrost melt), advocates for Arctic environmental protection in international fora like the Arctic Council or EU, and publishes reports.³⁴² One of their current focus areas is Arctic transport and shipping and it is part of the Clean Arctic Alliance (see below).

*The Bellona Foundation has halted all their external activities in their Russian offices in Murmansk and St. Petersburg for the foreseeable future, as announced in a statement published on 2 March 2022.*³⁴³

The **Clean Arctic Alliance** was founded in 2020 and today unites 21 NGOs, which are campaigning for a reduction of carbon dioxide, black carbon, effluents from scrubbers, and underwater noise from Arctic shipping. **WWF**, **Greenpeace** and the **Bellona Foundation** are part of the Alliance.³⁴⁴

5.2.5. Philanthropic organisations

Philanthropic organisations are active in environmental and climate protection in the Arctic, including:

- **Prince Albert II of Monaco Foundation (FPA2)**, which recently launched its **four-year Polar Initiative**.

The **Prince Albert II of Monaco Foundation (FPA2)** is active across the world in limiting the effects of climate change and promoting renewable energies, preserving biodiversity, managing water resources, and combating desertification. Among its focus regions are the Arctic and Antarctic. In 2022, the Foundation launched the **Polar Initiative**,³⁴⁵ a four-year programmatic effort spanning science, policy, capacity building and conservation action. Under this Initiative, the FPA2 will organise scientific symposia in 2022 and 2024 (the first one took place in February 2022), lead campaigns for policy change, build capacities through fellowships with the IASC (International Arctic Science Committee) and SCAR (Scientific Committee on Antarctic Research), and deliver conservation actions through FPA2 regular calls for projects.

5.2.6. Financial institutions

Several international financial institutions are lending to and investing in Arctic projects and companies, such as:

- the **Nordic Investment Bank (NIB)** focused on the Nordic-Baltic region, which launched an **Arctic Lending Facility** in 2015,

³³⁸ <https://www.arcticwwf.org/newsroom/reports/review-of-perceived-gaps-and-challenges-in-the-implementation-of-the-polar-code/>

³³⁹ <https://wwf.ru/en/>

³⁴⁰ <https://www.greenpeace.org/international/campaign/people-vs-oil/>

³⁴¹ <https://www.greenpeace.org/static/planet4/international-stateless/2014/06/190fb9b9-arctic-sanctuary.pdf>

³⁴² E.g. <https://bellona.org/publication/sustainable-use-of-resources-in-the-arctic>

³⁴³ <https://bellona.org/news/climate-change/2022-03-war-is-what-happens-when-language-fails>

³⁴⁴ <https://cleanarctic.org/campaigns/>

³⁴⁵ <https://www.thepolarinitiative.org/en>

- the **Nordic Environment Finance Corporation (NEFCO)** owned by Denmark, Finland, Iceland, Norway and Sweden.

The **Nordic Investment Bank's (NIB) Arctic Lending Facility** was launched in 2015 to lend to sustainable development projects in the Arctic. The NIB was established in 1975 by Norway, Sweden, Finland, Denmark and Iceland. In 2005, Latvia, Lithuania and Estonia joined. As of today, EUR 907 million in loans have been disbursed through the Arctic Lending Facility, spread over 16 projects ranging between EUR 12 million and EUR 150 million. The projects that received loans include ports, airports, mining, healthcare, culture, biofuels, loans to SMEs and environmental projects.³⁴⁶

NIB's authorised capital amounts to approximately EUR 8,369 million.³⁴⁷ Normally, total project costs are above EUR 20 million, but smaller projects and investments into SMEs and small midcaps can be financed through special loan facilities opened in cooperation with local intermediary banks. A NIB loan or guarantee for a project generally does not exceed 50% of the total cost of the project. In a loan to a midcap, NIB's financing may cover up to 75% of the costs. NIB thus typically co-finances with other financial institutions and public- and private-sector lenders. NIB has also allocated EUR 500 million to be invested in green bonds, social bonds, sustainability bonds and sustainability-linked bonds used to finance environmentally sustainable projects in the Nordic-Baltic region. As of 6 April 2022, EUR 387 million have been invested.³⁴⁸

The **Nordic Environment Finance Corporation (NEFCO)** was founded in 1990 by Denmark, Finland, Iceland, Norway and Sweden to finance the initial scale-up of Nordic green solutions on international markets. NEFCO supports Nordic companies in their internationalisation, but also works with green initiatives beyond the founding countries, including in the Arctic. Its portfolio includes projects from chemical, mineral and metals, food and engineering, agriculture, water treatment, power utilities, municipal services, waste management, nuclear remediation, environmental management and environmental equipment manufacturing. They finance both private and public projects and also provide loans to financial institutions, which then on-lend to their clients for environmentally beneficial projects. NEFCO also manages the Arctic Council Project Support Instrument (PSI).

*NEFCO has announced on 9 March 2022 that they stop all ongoing project and financing activities and withdraw from all existing trust fund engagements and assignments in Russia and Belarus.*³⁴⁹

5.3. Conclusion

The Arctic is severely impacted by climate change and ecosystem degradation, underlining the important of the Mission objective to protect and restore ecosystems and biodiversity. There are many actors and initiatives in the Arctic lighthouse area which are active on restoration and protection, providing ample opportunities for collaboration. The organizations deemed most important for collaboration to achieve the Mission's objectives in the Arctic region are presented below. Additional cooperative opportunities in the Northeast Atlantic, such as the OSPAR Commission or the Atlantic Ocean Research Alliance (AORA), which also cover Arctic waters are outlined in the chapter on the Atlantic Lighthouse Area (see section 3).

The Russian invasion of Ukraine has had a severe impact on transnational cooperation in the Arctic. While Russia is not part of the lighthouse area, all main cooperative fora including the Russian Federation have suspended their operation and it is uncertain how (and when) they will continue. This uncertainty will likely also influence the implementation of the EU Mission in the Arctic. In some cases, the EU could step up in its responsibility and support with additional resources in coordination with the other Arctic states - but research and cooperation will likely not include the Russian Arctic in the near future.

5.4. Opportunities for Collaboration

The **Arctic Council** is the most important forum for intergovernmental cooperation in the Arctic, as they take a circumpolar approach, and also directly includes key stakeholders such as Indigenous Peoples Organisations and (some) NGOs. The current Strategic Plan 2021-2030's focus on climate, ecosystem conservation and sustainable economic development align with the EU Mission objectives. There is potential to collaborate with the Arctic Council on research and innovation, spreading awareness and information, as well as engaging stakeholders.

³⁴⁶ <https://www.nib.int/what-we-offer/agreed-loans?tags=arcticFacility&years=&countries=>

³⁴⁷ <https://www.nib.int/who-we-are/about/member-countries-governing-bodies-and-capital/>

³⁴⁸ <https://www.nib.int/what-we-offer/investments-in-labelled-bonds>

³⁴⁹ <https://www.nefco.int/news/statement-of-nefco-regarding-russian-invasion-of-ukraine/>

- Potential role as partner to the Mission: Decision maker, science partner, potential project leader, financing/ programming partner

The **Barents-Euro Arctic Council (BEAC)** supports and promotes intergovernmental co-operation and development in the Barents Region. Especially its Working Group on the Environment (WGE) is relevant to achieving Mission objectives and there is potential for collaboration between the EU Mission and BAEC to align priorities and coordinate activities.

- Potential role as partner to the Mission: **Political partner**

The **University of the Arctic (UArctic)** is a network of universities, colleges, research institutes, and other organizations. Many of the universities in EU member states are already part of EU research projects and consortia. Cooperating with UArctic as a focal point could allow a distribution channel to the whole network. In the wider context of **EU PolarNet**, the research priorities and educational activities of the EU could continue to grow via UArctic to fulfil the Mission objectives, as well as provide the opportunity to expand access to a wide-ranging and well-established network of stakeholders in the Arctic region, also beyond the EU member states.

- Potential role as partner to the Mission: **Science partner**

The **Arctic Circle** is a large network for international dialogue and cooperation with members from foundations, organizations, universities, corporations, research institutions, governmental bodies and public associations. Increased collaboration with the Arctic Circle offers the opportunity to raise awareness of the Mission objectives and connect with a diverse group of stakeholders active in the Arctic. This includes a potential participation in the annual Arctic Circle Assembly, and in additional regional fora (e.g., planned for Japan and Germany) which could allow for a more region-specific focus and exchange.

- Potential role as partner to the Mission: **Science partner, potential project leader**

The **Inuit Circumpolar Council (ICC)** and the **Saami Council** represent Indigenous Peoples of the Arctic and are also among the six Permanent Participants to the Arctic Council. Sámi The ICC and Saami Council already have direct contacts and exchanges with the EU's Arctic units (in DG Mare, and the EU's External Action Service), as can be seen by the EU Arctic Forum and Indigenous Peoples' Dialogue.³⁵⁰ Continuing and deepening this cooperation could support building further trust with additional Indigenous institutions and initiatives, which is integral to ensure participation in Arctic protection activities in the future.

- Potential role as partner to the Mission: Political partner, potential project leader

³⁵⁰ See https://ec.europa.eu/info/events/eu-arctic-forum-and-indigenous-peoples-dialogue-2021-nov-10_en.

6. DANUBE LIGHTHOUSE AREA

6.1. Introduction

The Danube is the second largest river basin in Europe, with a total area of 801,463 km². It comprises various countries from Central to Eastern Europe, EU and non-EU countries: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, Ukraine. Its major river is the Danube which flows through 9 countries from the Black Forest to the Black Sea, making the river as the most international river of the world. Having a length of 2,857km, the river flows through varied landscapes, from high mountainous areas to lowlands and before entering the Black Sea, forming one of the greatest marshlands of Europe, the Danube Delta. The Danube River Basin can be divided into three sub-regions: the upper basin, the middle basin, and the lower basin (including the Danube Delta). The Upper Basin extends from the source of the Danube in Germany to Bratislava in Slovakia. The main tributaries in the Upper Basin are the Inn and the Morava rivers. The Middle Basin is the largest of the three sub-regions, extending from Bratislava to the dams of the Iron Gate Gorge on the border between Serbia and Romania. In this stretch, the Danube is joined by the waters of three major tributaries - the Drava, the Tisza and the Sava - which nearly triples its flow. The lowlands, plateaus and mountains of Romania and Bulgaria form the Lower Basin of the River Danube. The tributaries that enter the main river along this section, including the Iskar, the Olt, the Yantra, the Siret and the Prut are comparatively small and only account for a modest increase in the total flow rate. Finally, the river divides into three main branches, forming the Danube Delta, which covers an area of about 6,750 km².

For the Danube Lighthouse Area the following specific targets of the Mission objective 1 “Restore marine and freshwater ecosystems and biodiversity” are relevant:

Target 1: Restore at least 25 000 km of free-flowing rivers in Europe

Most European rivers, including the Danube, are interrupted due to human interventions, such as dams or other structures. Barriers alter a river's natural flow, lead to shifts in sediment transportation, limit fish and other species' ability to migrate both up- and downstream. Barriers also lead to habitats being fragmented. As a result, the living environment of aquatic species and the ecosystem as a whole is compromised. The European Commission published a Guidance document on barrier removal for river restoration in late 2021 stating that: the concept of free-flowing rivers is mainly to be achieved through barrier removal and the restoration of floodplains and wetlands. The guidance names various reasons for the close interlinkage of the Water Framework Directive (WFD), as well as the Birds and Habitats Directives. For instance, in Biodiversity Strategy (BDS)' work river function units are based on the WFD work and existing legislation through the Birds and Habitats Directive is acknowledged. These laws are the cornerstones of EU nature protection policy and have brought about the creation of Natura 2000, the world's biggest network of protected areas. This matters, because the proper fulfilment of river restauration measures is seen as a key step towards reaching the biodiversity targets, according to the European Environment Bureau. According to the European Commission mitigation measures, such as fish ladders can be effective, but often the removal of barriers is necessary to enable fish mitigation and especially the unfolding of the entire aquatic ecosystem.

In the past 30 years there has been a mix of small to large scale barrier removal and renaturation activities in the Danube. The projects differ from the planning phase and the funding schemes, as well as the operational implementation. For a description of the current situation in the Danube regarding target 1, see the Task 2 report.

Target 2: Contribute to relevant upcoming nature restoration targets, including degraded seabed habitats and coastal ecosystems.

This target is closely linked and based on the EU restoration law, which was planned to be published by the end of 2021 (Commission proposal for a regulation). The publication has been postponed, and it has been reported that it will likely only be published in summer 2022. Hence, the exact specifics of target 2 are not yet clear. For a description of the current situation in the Danube regarding target 2, see the Task 2 report.

Several regional, i.e., basin-wide organizations are active in the Danube River Basin.

As the Danube region is composed of countries organized in diverse political systems, the local and regional governance capacities vary. According to the European Regional Competitiveness Index³⁵¹, the best performing regional institutions are in Germany and Austria (average 69 and 68 points respectively) while the

³⁵¹ European Regional Competitiveness Index - Regional Policy - European Commission (europa.eu)(2020).

lowest average scores are in Bulgaria and Romania (6.6 and 14.6 respectively). Common challenges across the region are climate change (changing precipitation patterns, increasing risks of drought), ageing populations and the impact of the COVID pandemic, but certain challenges vary depending on geography and socio-economics: the type of region (rural-urban), the position of a country (upstream/downstream), on the GDP level, status of EU membership, structure of the state (centralised-decentralised). The basin contains EU and non-EU, high- and low-income countries, with different socio-economic backgrounds. This is illustrated by the cohesion policy status of the Danube region, with only 17 (approximately 40%) of the NUTS2 regions considered as "more developed" while the large majority is "less developed" and only 3 are "in transition".

Regarding the GDP per capita, the median of the Danube region is 14,800 EUR, while the average is 22,782 EUR. The difference between both statistics shows the existence of disparities, with a few high GDP per capita regions pulling the average up. Among the regions where data is available, Serbian regions have the lowest GDP per capita (regions of Južne and Šumadije) with 4,200 EUR and 4,400 EUR respectively. The highest income regions are in Germany (region of Oberbayern) with 59,700 EUR and Austria (region of Salzburg) with 53,600 EUR. From Central and Eastern European countries, only Slovakia has a region in the 20% of GDP per capita, which is the capital region of Bratislava with 39,700 EUR.

6.2. Governance structures and stakeholder involvement

Being the most international river basin in the world, a multitude of organisations is present in the Danube RB. In the following, an overview is provided on governmental organisations, followed by R&D and innovation entities, industry and business grouping and networks, NGOs and civil society organizations, philanthropic organisations and financing institutions. While governmental institutions are described also in general terms – e.g., an overview of administrative arrangements is provided – the other sections focus on organisations/institutions of importance for the Mission's objectives in the Danube RB. It is neither the purpose of this section to describe every organisation present in the Danube RB, nor the structure and functioning of each and every governmental institution in all Danube countries.

6.2.1. Governmental institutions

6.2.1.1. International governmental institutions

'The Danube Basin Area is covered by an EU 'Macroregional strategy', the **EU Strategy for the Danube Region** (EUSDR), which was the result of a consultation process with stakeholders from different background and levels: the EU (European Commission), partner countries' representatives and experts. A 'Macroregional strategy' is an integrated framework endorsed by the European Council, which may be supported by the European Structural and Investment Funds among others, to address common challenges faced by a defined geographical area relating to member States and third countries located in the same geographical area which thereby benefit from strengthened cooperation contributing to achievement of economic, social and territorial cohesion. The Strategy seeks to create synergies and coordination between existing policies and initiatives taking place across the Danube Region. The EUSDR's 'Priority Area 06 "To preserve biodiversity, landscapes and the quality of air and soils" has the following targets, of which most are relevant for the Mission:

- Improve management of Natura 2000 sites and other protected areas through transnational cooperation and capacity building.
- Strengthen the efforts to halt the deterioration in the status of species and habitats occurring in the Danube Region and covered by EU nature legislation and in particular to continue the ongoing work and efforts to securing viable populations of Danube sturgeon species.
- Reduce the introductions and spread of Invasive Alien Species (IAS) in the Danube Region.
- Maintain and restore Green and Blue Infrastructure elements through integrated spatial development and conservation planning.
- To improve and/or maintain the soil quality in the Danube Region.
- To decrease air pollution in the Danube Region.

Since 2018, the Danube Strategy Point provides the secretariat to the strategy implementation and dialogue³⁵². In each Danube EU country, a “National Coordinator” (NC) serves as the focal point for EUSDR implementation on the national level; the NCs form the decision-making body of the Strategy.

Another transnational body active in the Danube region is the **International Commission for the Protection of the Danube River** (ICPDR). An intergovernmental organization, it was established to implement the Danube River Protection Convention. It has 14 countries as signatories, plus the European Union³⁵³. The ICPDR is a transnational body, which has been established to implement the Danube River Protection Convention (DRPC). The DRPC³⁵⁴, signed in 1994, provides the legal framework for cooperation on water issues within the Danube Basin. All Danube countries with territories > 2,000 km² in the Danube River Basin are Contracting Parties to the DRPC: Austria (AT), Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), the Czech Republic (CZ), Germany (DE), Hungary (HU), Republic of Moldova (MD), Montenegro (ME), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI) and Ukraine (UA). In addition, the European Union (EU) is also a Contracting Party to the DRPC. Each ICPDR contracting party has its own Head of Delegation, and decisions are sought through consensus between representatives at two annual meetings chaired by the ICPDR President: the ‘Ordinary Meeting’, held in Vienna in December, while another meeting is held in June in the country that currently holds the Presidency. The ICPDR Presidency is passed on from one country to another in an alphabetical order every year; it is in 2022 being held by Romania, to be followed by Slovakia in 2023. The overall objective of ensuring the sustainable and equitable use of waters in the Danube River Basin includes:

- The implementation of all transboundary aspects of the EU Water Framework Directive;
- The coordination of the implementation of the EU Floods Directive within the Danube River Basin;
- The promotion of policy agreements and the setting of joint priorities and strategies for improving the state of the Danube and its tributaries; and
- The improvement of tools used to manage environmental issues in the Danube basin, such as the Accident Emergency Warning System, the Trans-National Monitoring Network for water quality, and the Information System for the Danube (Danubis).

In certain larger tributaries to the Danube, smaller river basin commissions are established and active, such as the Sava River Basin Commission.

The complement to the ICPDR in the Black Sea is the **Commission on the Protection of the Black Sea Against Pollution** (BSC). The BSC - via its Permanent Secretariat - is the inter-governmental body established in implementation of the Convention on the Protection of the Black Sea Against Pollution. The Convention on the Protection of the Black Sea Against Pollution was signed in Bucharest in April 1992, and ratified by all six legislative assemblies of the Black Sea countries in the beginning of 1994. Also referred to as "Bucharest Convention", it consists of the basic framework agreement and three specific Protocols, which are: the control of land-based sources of pollution; dumping of waste; and joint action in the case of accidents (such as oil spills). The main functions of the Black Commission's functions are defined in Article 18 of the Convention:

- Promote the implementation of this Convention and inform the Contracting Parties of its work.
- Make recommendations on measures necessary for achieving the aims of this Convention.
- Consider questions relating to the implementation of this Convention and recommend such amendments to the Convention and to the Protocols as may be required, including amendments to Annexes of this Convention and the Protocols.
- Elaborate criteria pertaining to the prevention, reduction and control of pollution of the marine environment of the Black Sea and to the elimination of the effects of pollution, as well as recommendations on measures to this effect.

³⁵² <https://danube-region.eu/about/governance/> (2020).

³⁵³ <https://www.icpdr.org/main/icpdr/about-us> (2004).

³⁵⁴ Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Sofia, 1994).

- Promote the adoption by the Contracting Parties of additional measures needed to protect the marine environment of the Black Sea, and to that end receive, process and disseminate to the Contracting Parties relevant scientific, technical and statistical information and promote scientific and technical research.
- Cooperate with competent international organizations, especially with a view to developing appropriate programs or obtaining assistance in order to achieve the purposes of this Convention.
- Consider any questions raised by the Contracting Parties.
- Perform other functions as foreseen in other provisions of this Convention or assigned unanimously to the Commission by the Contracting Parties.

The BSC is very active in monitoring, information/research, awareness raising and policy formulation/promotion of conservation efforts in the Black Sea. There are seven BSC Advisory Groups which provide their expertise and information support to the Commission and Secretariat on following sectors: (a) pollution monitoring and assessment (PMA); (b) control of pollution from land based sources (LBS); (c) development of common methodologies for integrated coastal zone management (ICZM); (d) environmental safety aspects of shipping (ESAS); (e) conservation of biological diversity (CBD); (f) environmental aspects of the management of fisheries and other marine living resources (FOMLR); and (g) information and data exchange (IDE). BSC possesses co-operation links and options for consultative conversation with other intergovernmental organizations involved in marine pollution affairs at the global and regional level, including the United Nations Environment Program (UNEP), International Maritime Organization (IMO), Global Environmental Facility (GEF), International Commission for the Protection of the Danube River (ICPDR), Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS), Organization of the Black Sea Economic Cooperation (BSEC), European Environment Agency (EEA), different institutions of the European Union (EU) and some other organizations.

Another international legal framework in place in the Danube RB is the **Lower Danube Green Corridor Agreement** between Bulgaria, Moldova, Romania, and Ukraine. In 2000, with the support of the WWF, the governments of the four countries pledged to work together to establish a green corridor along the entire length of the Lower Danube River. The Lower Danube Green Corridor Declaration, recognized the need and responsibility of the four governments to protect and manage in a sustainable way one of the most outstanding biodiversity regions in the world. The Lower Danube Green Corridor was created along the river's final 1,000 km, covering an area of 11,574 km². The agreement commits Bulgaria, Romania, Moldova and Ukraine to preserve a total of 935,000 ha, including enhanced protection for 775,000 ha of existing protected areas, and new protection for another 160,000 ha, and to restore 224,000 ha of former wetland areas. The four countries also pledged to promote sustainable development along the Lower Danube. The Lower Danube Green Corridor was and still is the most ambitious wetland protection and restoration initiative in Europe. To achieve the objectives, each country prepared an action plan in which additional areas of floodplain were designated for protection and restoration. For implementation and financing, the four countries collaborated with a range of national and international actors (national governments, NGO, EU, GEF, IUCN, Ramsar Convention etc.). These action plans described for each designated area what specific measures were needed and what steps had to be taken to carry out these measures. Many activities are already finalized. As of today, some restoration projects are still ongoing, such as the Gârla Mare and Vrata ones that will have an impact on an area of 2,000 ha. Currently, this initiative requires new impetus³⁵⁵, because most objectives are fulfilled (e.g., in 2010, the targets of the initial agreement have been expanded).

6.2.1.2. EU institutions and legal frameworks

In October 2000 the **EU Water Framework Directive**³⁵⁶ (WFD) was adopted and came into force in December 2000. The purpose of the Directive is to establish a framework for the protection and enhancement of the status of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater, and to ensure a sustainable use of water resources. It aims to ensure that all waters meet 'good status' and to avoid their deterioration, which are the central objectives of the WFD. EU Member States (EU MS) should aim to achieve "good status/potential" in all bodies of surface water and groundwater initially by 2015. Currently not all Danube countries are EU MS and are therefore not legally obliged to fulfil the WFD requirements. Five countries (BA, MD, ME, RS and UA) are not-EU Member States. Out of these, two countries (ME and RS) have the status of candidate countries; the status of Ukraine as a candidate country is currently under discussion. However, when the WFD was adopted in 2000, all countries cooperating under the DRPC decided to make all efforts to implement the Directive throughout the whole basin. The WFD

³⁵⁵ E.g., through an Interreg project, as proposed from a Moldovan institution, the Ecological Counseling Center Cahul (see <https://www.interreg-danube.eu/calls/project-ideas/project-idea-deatils/535#!>).

³⁵⁶ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

establishes several integrative principles for water management, including public participation in planning and the integration of economic approaches, as well as aiming to integrate water management into other policy areas. It envisages a cyclical process where river basin management plans are prepared, implemented and reviewed every six years. There are four distinct elements to the river basin planning cycle: characterization and assessment of impacts on river basin districts; water status monitoring; the setting of environmental objectives; and the design and implementation of the program of measures needed to achieve the objectives. These tasks were accomplished for the Danube River Basin in 2009 for the first time in the international Danube River Basin Management Plan (WFD cycle 2009-2015), and were in 2021 updated according to the WFD cyclical approach (WFD cycle 2021-2027), thus providing the framework for adaptive river basin management.

Besides the WFD, other EU Directives are of relevance for the Mission's objectives. Directive 2007/60/EC on the assessment and management of flood risks ("Floods Directive") entered into force on 26 November 2007. This Directive requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. With this Directive also reinforces the rights of the public to access this information and to have a say in the planning process. As "Nature-Based Solutions" (e.g., the reconnection of riparian wetlands) as a form of flood defence become more and more established in flood risk management, there are potentially enormous synergy effects between the objectives of the Floods Directive and the Mission's objectives.

Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ("Habitats Directive") aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive (Directive 2009/147/EC) and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments. Both Directives are directly linked to the Mission's objectives, especially to the conservation aspects³⁵⁷.

6.2.1.3. National governmental institutions

The **national governance structures** vary naturally, according to the great number of countries present in the Danube RB. Decentralization reforms have been a key thrust of public administration reform in many EU Member States and non-EU countries with a redistribution of competences and resources between government tiers (Kuhlmann/Wollmann 2014). Most decentralization reforms were adopted in the 80s-90s, but some of the EU countries have created or strengthened their regional level later (for example 2004 in Romania). Such reforms are mostly presented as a way to rationalize public expenditure and to clarify and strengthen responsibilities and competences between administrative tier. The large majority of Danube countries now has two or three administrative tiers, while some have four administrative tiers. The presence of more than three administrative tiers is generally observed in large countries with Austria and Bosnia and Herzegovina as exceptions. Most Danube countries have a unitary state structure. De facto unitary states can have either a centralized or a decentralized exercise of authority. Among the federal states, only Germany appears as a fully-fledged federation, while other countries only have a quasi-federal structure. Austria has been described as a "centralized federal state" (Pelinka, 2009), the principle of subsidiarity is not well anchored and the distribution of competences between government tiers appears complex. Bosnia and Herzegovina has elements of a federal as well as a confederal state.

³⁵⁷ https://ec.europa.eu/environment/nature/natura2000/index_en.htm (n.d)

Country	Administrative Tiers	State structure
Austria	4	Federal
Bosnia and Herzegovina	4	Federal/confederal
Bulgaria	3	Unitary
Croatia	3	Unitary
Czech Republic	3	Unitary
Germany	4	Federal
Hungary	3	Unitary
Republic of Moldova	3	Unitary
Montenegro	2	Unitary
Romania	3	Unitary
Serbia	3	Unitary
Slovakia	3	Unitary
Slovenia	2	Unitary
Ukraine	3	Unitary

Table 62 Number of administrative tiers and state structure in the Danube RB

Note: Due to only small proportions in the Danube RB, some countries are excluded from this analysis (these countries are also not CPs to the DRBC): Switzerland (0.2% of the basin), Italy (<0.15% of the basin), Poland (<0.1% of the basin), North Macedonia (<0.1% of the basin) and Albania (<0.1% of the basin).

Regarding the **distribution of competences** between government levels, for most sectors and countries, legislative function is concentrated at the central level. For regulation and funding the picture is more mixed, with public utilities, education, police, social policy, taxes, and environmental protection being commonly also under the responsibility of regional or local governments in many countries (in several countries in form of a shared responsibility). Provision is largely shared among the different levels of government and local governments participate in the provision of services mostly in the areas of public utilities, social policy, environmental protection, education, health and police. The specific constellation of how these competences are allocated to the different government tiers for different policy fields however varies substantially between the different countries. The table below shows that most Danube countries follow a centralized implementation of policies.

Country	General implementation of policies
Austria	Decentralized
Bosnia and Herzegovina	Decentralized
Bulgaria	Centralized
Croatia	Centralized
Czech Republic	Centralized/decentralized (mix)
Germany	Decentralized
Hungary	Centralized
Republic of Moldova	Centralized
Montenegro	Centralized
Romania	Centralized
Serbia	Centralized
Slovakia	Centralized
Slovenia	Centralized
Ukraine	Centralized/decentralized (mix)

Table 63 Implementation of policies in the Danube RB

Note: Due to only small proportions in the Danube RB, some countries are excluded from this analysis (these countries are also not CPs to the DRBC): Switzerland (0.2% of the basin), Italy (<0.15% of the basin), Poland (<0.1% of the basin), North Macedonia (<0.1% of the basin) and Albania (<0.1% of the basin).

In the following, the national authorities/institutions with the highest relevance for the Mission in a given country are briefly presented. The Excel Database accompanying this Deliverable contains additional information (e.g., contact details).

In **Austria**, the Federal Ministry for Agriculture, Regions and Tourism is the main interlocutor on the federal level with regard to WFD and Floods Directive implementation (competent authority, preparation of the RBMP and FRMP), as well as EUSDR coordination (shared with the Federal Ministry for Europe, Integration and Foreign Affairs) and policy making (responsible for the federal level Water Law). The Ministry also represents the administrative authority for the implementation of obligations from the Convention on Biodiversity (CBD)

and the Convention on Wetlands (Ramsar Convention). Furthermore, the Ministry is the administrative authority for the coordination of funding programmes such as rural development, LIFE Plus and LEADER and is partner in many INTERREG projects. Nine regions (specifically the Landeshauptmann, or Governor, of each region) also have important responsibilities with regard to WFD and FD implementation, focussed on implementation and planning of measures, and function as secondary interlocutors for concrete planning/implementation of restoration/conservation projects.

In **Bosnia-Herzegovina**, the Mission needs interlocutors at the two separate federal entities, the Federation of Bosnia and Herzegovina and the Republika Srpska. In the Federation, the Federal Ministry of Physical Planning and Environment BH serves as the main contact point for the Mission, with the main activities related to physical planning, land use, long-term resource planning and protection of national monuments and areas of major importance. The Federation of Bosnia and Herzegovina has 10 autonomous cantons, which are important for the concrete implementation of measures/actions. In the Republika Srpska, the Ministry for Urbanism, Construction, Communal Issues and Ecology is responsible for spatial planning and ecology, and serves as the main interlocutor here. The NC for EUSDR is the Mission of Bosnia and Herzegovina to the EU.

In **Bulgaria**, a large number of competent authorities for WFD implementation are reported: on the national level, the Ministry of Environment and Water is responsible for freshwater and marine policies. The Ministry is also responsible for the national policy on nature protection targets, control and conservation of biodiversity and protected areas. It is assisted by the Directorate National Office for Protection of Nature. The Ministry develops and implements the overall national policy on protection of biodiversity, endangered species and protected areas, preparing regulatory and planning documents, conducting procedures for assessment of compatibility of investment proposals and plans, programs and projects with the object and purpose of protected areas. It is assisted at a basin level by 4 Basin Directorates, whose main roles are the monitoring and assessment of groundwater and surface water, co-ordination of implementation, economic analysis, enforcement of regulations, implementation of measures, preparation of the RBMPs and Programme of Measures, public participation, and reporting to the European Commission. The national Ministry clearly serves as main interlocutor and entry point for the Mission; the Basin Directorates are hierarchically organized and will be contacted by the Ministry when necessary. With regard to EUSDR issues, the Ministry of Regional Development and Public Works serves as NC.

The water sector in **Croatia** is managed at the national level. Croatian Waters (Hrvatske Vode) is the national water management agency, which grants and controls water extraction and discharge rights, collects corresponding fees, and reinvests the proceeds into sector investments. It is also charged with flood protection policy. Strategic objectives for Croatian Waters are defined by their Water Management Strategy (2008-2038) and the River Basin Management Plan (RBMP). The Ministry of Environmental Protection and Energy, through its Directorate for Water Management, is the body responsible for the implementation of water policies in Croatia, including those related to water supply and sanitation services, as well as for the administrative supervision of Croatian Waters. Both the Ministry as well as Croatian Waters are reported as competent authorities for WFD implementation. The Ministry should be the first interlocutor for the Mission, with Croatian Waters serving as partner when cooperation and projects get more concrete and specific (implementation). Another ministry, the Ministry of Regional Development and EU Funds in Zagreb, and its Service for Transnational and Interregional Cooperation, serves as the EUSDR NC.

In the **Czech Republic**, two national ministries serve as competent authority for WFD implementation: the Ministry of Agriculture and the Ministry of Environment (both responsible for status assessments and monitoring, preparation of Programme of Measures and RBMPs, pressure and impact analysis, public participation and reporting to the European Commission). 14 regional authorities are responsible for the implementation of measures, the preparation of WFD Programme of Measures and the preparation of the RBMP. The Office of the Government of the Czech Republic serves as NC for the EUSDR.

In **Germany**, the federal level (i.e., the Federal Ministry for the Environment) is mainly responsible for general policy making, with the main implementation power for nature protection and many aspects of water policy situated at the Länder level. The most important interlocutors for the Mission in the Danube LA are therefore the respective Länder ministries, the Ministry of the Environment, Climate Protection and the Energy Sector Baden-Württemberg and the Bavarian State Ministry of the Environment and Consumer Protection. Both are responsible for WFD and FD implementation, as well as general freshwater/nature protection policy in the Baden-Württemberg and Bavarian parts of the Danube. The NCs for EUSDR are also located at the Länder level, in Baden Württemberg the State Ministry and in Bavaria the State Chancellery.

In **Hungary**, a multitude of agencies is responsible for water management and WFD implementation (many competent authorities are reported). The main agency at the national level – the only ministry reported as WFD competent authority – is the Ministry of the Interior, which has the main coordination role in preparing the RBMP and PoMs, supported by the General Directorate of Water Management. The Ministry of Agriculture is responsible for environmental protection, and serves as LIFE contact point. These two Ministries should

serve as “entry points” and main interlocutors for the Mission. 12 sub-national water directorates have competencies in the implementation of measures. The Ministry of Foreign Affairs and Trade serves as NC for the EUSDR.

In the **Republic of Moldova**, the main interlocutor for the Mission with regard to restoration and conservation objectives is the Ministry of Ecology, Construction and Territorial Development, which is responsible for general freshwater and nature conservation policy in Moldova. The Ministry of Agriculture, Regional Development and Environment serves as NC for the EUSDR.

In **Montenegro**, the main interlocutor for the Mission with regard to restoration and conservation objectives is the Ministry of Ecology, Spatial Planning and Urbanism, responsible for natural resources, biodiversity and spatial planning in Montenegro. The European Integration Office serves as NC for the EUSDR.

In **Romania**, two agencies at the national level are reported as competent authorities for WFD implementation: the National Administration "Romanian Waters" has a multitude of responsibilities, including strategy and policy in qualitative and quantitative water resource management and monitoring the compliance of water regulations. The second is the Ministry of the Environment, Waters and Forests, responsible for the coordination of implementation and the enforcement of regulations. The Ministry also serves as LIFE national contact point. The Ministry of Foreign Affairs serves as NC for the EUSDR.

In **Serbia**, the main interlocutors for the Mission with regard to restoration and conservation objectives are two ministries, the Ministry of Agriculture, Forestry and Water Management and the Ministry of Environmental Protection³⁵⁸. The Ministry of European Integration serves as NC for the EUSDR.

In **Slovakia**, the main interlocutor for the Mission is the national Ministry of Environment, the competent authority for WFD implementation. The Ministry of the Environment is the central state administrative authority and supreme inspection authority in environmental affairs, including nature and landscape protection, protection of water resources and the quality of groundwater and surface water, fisheries and forestry in national parks, and national environmental policy. The Ministry of Investments, Regional Development and Informatization serves as NC for the EUSDR.

In **Slovenia**, the main interlocutor for the Mission is the national Ministry of the Environment and Spatial Planning, which is the competent authority for WFD implementation and the national contact point for LIFE. The Ministry of Foreign Affairs serves as NC for the EUSDR.

In **Ukraine**, normally the main interlocutor for the Mission with regard to restoration and conservation objectives is the Ministry of Ecology and Natural Resources of Ukraine, responsible for general freshwater and nature protection policy in Ukraine. The Ministry for Communities and Territories Development serves as NC for the EUSDR. Due to the current political situation, priorities will be of course different than in peaceful times.

6.2.2. R&D and innovation entities

Many research institutions – university departments, public research institutes – are working in the Danube RB, collectively holding a vast amount of knowledge and expertise relevant for the Mission’s objectives. Also, a number of LIFE, INTERREG and Horizon2020 projects are of relevance for the Mission, which are highlighted in the database accompanying this document (as no permanent governance structures have been created by these).

The **International Association for Danube Research** (IAD) is the longest existing international scientific network in the Danube Region. The IAD is an association with the goal of promoting and coordinating activities in the fields of limnology, water management, water protection and sustainable development in the Danube River basin. The association is active in promoting ideas exchange and mobility between scientists to foster cooperation and knowledge transfer. In terms of scientific issues, since the 1950s major water management and environmental issues have been key priorities on the agenda of IAD, and science-based solutions are discussed and proposed. Based on the Danube river basin management plan provided by the ICPDR, IAD established to be a strong science based partner in different critical issues at river basin scale, such as sustainable development of navigation, future development of hydropower and functional fish passes to ensure the river continuum, flood protection and floodplain ecology, species conservation and biodiversity and its potential threats by invasive species and various forms of water pollution (e.g. nutrients, organic and toxic substances), and new model approaches for sustainable management solutions in multiple used aquatic environments. IAD delegates participate in various ICPDR Expert Groups and develop tools and measures to protect the Danube River and to reach a sustainable river basin management as ultimate goal of the Water Framework Directive (EU-WFD).

³⁵⁸ <http://www.ekologija.gov.rs/>

The **Danube Delta National Institute for Research and Development** (DDNI) in Romania is a national research institute specialized in wetlands. The DDNI's main objective is conducting fundamental and applied research for scientific support of the management of the Danube Delta Biosphere Reserve (DDBR) and other wetland areas of national and international interest, with particular focus on biodiversity conservation and sustainable use. The research activities of the DDNI are oriented towards achieving the management objectives of the largest protected area in Romania and Europe. The main activities with relevance for the Mission's objectives are:

- Assessment of the ecological status of natural heritage and the elaboration of biodiversity conservation measures;
- monitoring of the DDBR biodiversity and environmental factors;
- elaboration of hydrological scenarios in support of ecological restoration measures for improvement of the water circulation regime on the existing channels network;
- measures for the recovery of endangered species populations – fish, birds, reptiles, mammals;
- elaboration of technical solutions for the restoration of abandoned agricultural polders and fish ponds in order to increase the area of natural habitats of fish and bird species;
- supporting studies for the harmonization of socio-economic interests with the concept of conservation of natural capital.

The **University of natural resources and life sciences** in Vienna (BOKU) is one of the most active universities for sustainability in Europe and conducted many research and applied science projects in the Danube RB. Research and teaching are focussed on:

- Conservation and development of protection for habitats and the economic market, as well as standards of living.
- Management of natural resources and the environment.
- Protecting food and health.

Several departments - notably the Department of Water, Atmosphere and Environment (WAU) with the Institute of Hydrobiology and Aquatic Ecosystem Management (IHG), the Department of Integrative Biology and Biodiversity Research (DIB), the Department of Civil Engineering and Natural Hazards and the Department of Landscape, Spatial and Infrastructure Sciences - have expertise important for restoration and conservation of freshwater ecosystems.

Beside DDNI and BOKU, other research institutions are the **Jaroslav Černi Water Institute**, the leading research organization in Serbia's water sector, the **Institute for Water of the Republic of Slovenia** (IzVRS), a specialized organization for water resources management and freshwater and maritime engineering and the **Chair of Hydraulic and Water Resources Engineering of the University Munich** (TU Munich), which has expertise in hydrological research with a focus on sustainable hydropower.

6.2.3. Industry and business grouping and networks

In the Danube RB, there are not many industry and business grouping/networks active that have relevance for the Mission's objectives.

Viadonau is the leading private international waterway operator in the Danube region. By utilising the knowledge of experts in infrastructure management, shipping and logistics, along with electronic information and navigational systems, flood control and environmental hydraulic engineering, Viadonau provides services for the public sector, businesses, holidaymakers and local residents along the Danube. In Austria, Viadonau is charged with the task of ensuring the smooth operation of the Danube waterway. Viadonau is continually striving to achieve the harmonised development of the Danube waterway and enhance the integration of the Danube Region into the policies of the European Union. To achieve this, the company maintains close contact with the other waterway authorities, decision-makers and interest groups in the Danube riparian states. Improvement and maintenance of this network is carried out in accordance with the guidelines of the relevant judicial transport policies, either as part of common initiatives, projects and events, or through bilateral administrative and cooperation agreements. At a European level, Viadonau supports the European Commission with, amongst other things, the implementation of the European Action Programme for Inland Waterway Transport (NAIADES and NAIADES II) and the development of the Rhine-Danube Corridor as part of the trans-European transport network (TEN-T).

The **Marine Cluster Bulgaria** acts towards the creation of favourable conditions for development and enhancement of the competitiveness of the blue economy by introducing new organizational, product, market and technological solutions, training, implementation of best practices, as well as for its promotion at national and international level. The main objectives of the cluster are:

- Unification of the efforts of enterprises, education, scientific and business organizations of the sectors of Bulgaria maritime economy and local authorities to achieve sustainable economic growth.
- Improving the quality of human and innovation potential, optimizing resource efficiency for competitive Bulgarian maritime economy.
- Promotion and integration of Bulgarian maritime industry in International Maritime Economic Area.

6.2.4. NGOs and civil society organizations

Being of such great value for European biodiversity, a great number of NGOs and civil society organizations with relevance for the Mission's objectives are active in the Danube RB.

The **International Union for Conservation of Nature** (IUCN) has the mission to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. IUCN co-leads NetworkNature, a partnership to promote Nature-based Solutions (NBS) in the Danube. Nature-based solutions are building blocks of sustainable landscapes, with the new platform NetworkNature as the cornerstone. The partnership, launched in 2020, gathers NBS communities, resources, projects, best practices and tools under one roof. IUCN also creates "Conservation Outlook Assessment", which provides detailed information on values, threats. Protection and management of high value conservation areas³⁵⁹.

The **World Wildlife Fund for Nature** (WWF) with its Central and Eastern European branch (WWF CEE) is very present in many restoration and conservation projects in the Danube RB. WWF Central and Eastern Europe and the national offices/branches are active in the protection of freshwater ecosystems across the Danube RBD. Foci in freshwater ecosystems are the protection of the sturgeon, also through restoration projects, and the Danube delta region. In 2010, WWF conducted an "Assessment of the restoration potential along the Danube and main tributaries", with recommendations for the Danube countries to set realistic restoration targets, develop inventories, and give precise recommendations on strategic planning. WWF is also part of projects in the so-called "Amazon of Europe", the lower courses of the Drava and Mura Rivers and related sections of the Danube spanning Austria, Croatia, Hungary, Serbia and Slovenia, which are among Europe's most ecologically important riverine areas. The rivers form a 700 km long "green belt" connecting almost 1 mio. hectares of highly valuable natural and cultural landscapes from all five countries and have therefore become a symbol of unity by becoming world's first five country Transboundary UNESCO Biosphere Reserve "Mura-Drava-Danube" (TBR MDD). In the TBR MDD alone, there are 700km of pristine rivers under threat that need protection, and 1100km that could be restored. The WWF's work on the Amazon of Europe is focused on ensuring good cross-border cooperation by linking the relevant institutions in all five countries. Main examples are two completed Interreg projects, LifelineMDD and CoopMDD³⁶⁰, in which the WWF and the Protected Area Administrations responsible for the management of protected areas as well as a multitude of other stakeholders from all five countries work together in one project team and prepare for future coordinated nature management.

³⁵⁹ Overview available at <https://worldheritageoutlook.iucn.org/>; included are, for example, the Danube Delta and the Plitvice Lakes National Park in Croatia.

³⁶⁰ See <http://www.amazon-of-europe.com/en/coopmdd/>.

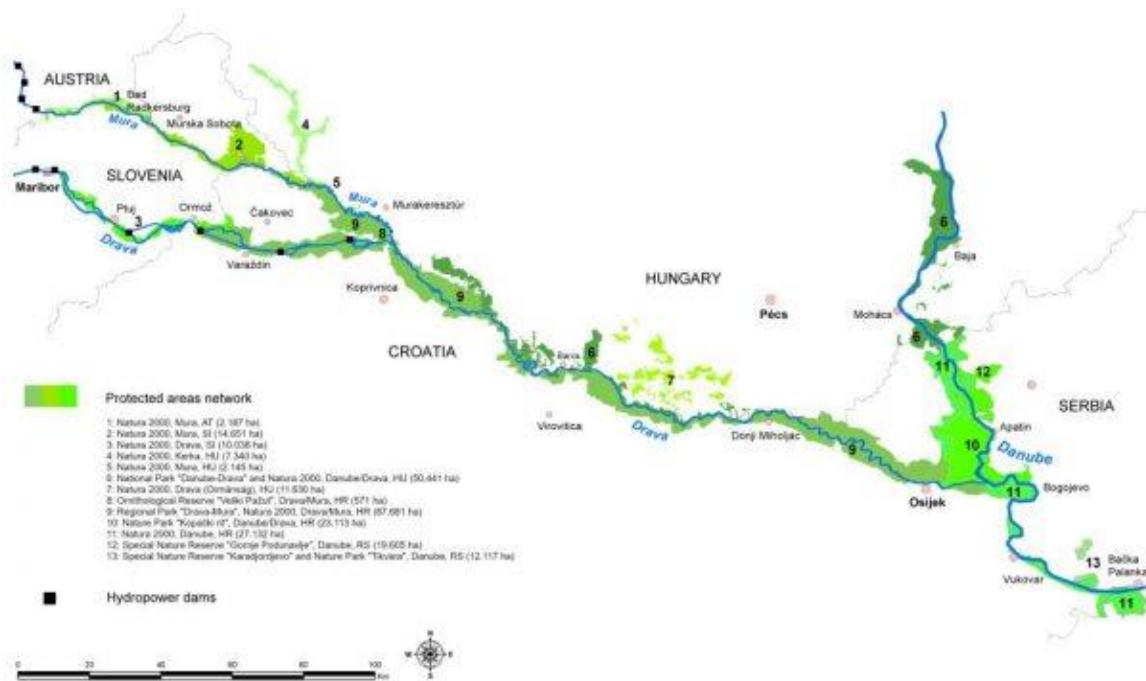


Figure 125 Protected Areas Network in the TBR MDD

Source: WWF 2022

Birdlife International is also present in the region, through its different national partner organisations. Birdlife's mission is to conserve birds, their habitats and global biodiversity, working with people toward sustainability in the use of natural resources.

The **Nature Conservancy** (TNC), through its Southeast Europe program, supports the protection of free-flowing rivers in the Balkans, e.g., the Krupa river in Croatia.

Rewilding Europe is an environmental NGO based in the Netherlands that conducts several "rewilding projects" in 9 "pioneering landscapes". The objectives of Rewilding Europe are:

- Rewilding is being practiced at scale across Europe.
- The application of rewilding principles, models and tools is delivering measurable, demonstrable, and sustained benefits for nature and people.
- Create a Europe that is richer in nature and more resilient to climate change.

"Rewilding" is a progressive approach to conservation. It is about letting nature take care of itself, enabling natural processes to shape land and sea, repair damaged ecosystems and restore degraded landscapes. One of the 9 rewilding areas is the Danube Delta, where the Rewilding Europe team is working with partners to improve the ecological integrity and natural functioning of 40,000 hectares of wetland and terrestrial delta habitat, using rewilding principles at a landscape scale. The Danube Delta is also one of the case study areas of the three-year GrazeLIFE project (finalized December 2021)³⁶¹. The project evaluates the benefits of various land management models involving domesticated and wild/semi-wild herbivores. Also, Rewilding Europe is working to create new opportunities for delta communities by supporting the development of nature-based business.

6.2.5. Philanthropic organisations

The **Coca-Cola Foundation** is the Coca-Cola company's primary international philanthropic arm, and already invested in the Danube RBD. The Coca-Cola Foundation funds restoration and nature protection projects in the Danube RB, as strategic partner to the ICPDR via the Living Danube Partnership (WWF is also involved)³⁶².

³⁶¹ <https://grazelife.com/>

³⁶² <https://wwfcee.org/partnerships/partnership-for-freshwater> and <https://www.coca-cola.eu/news/supporting-environment/danube-day-2020>

6.2.6. Financial institutions

Several European or global financing institutions are actively involved in the Danube RB, and could serve as sources of funding.

The **European Investment Bank** (EIB) is the European Union's long-term lending institution and is owned by its 28 Member States. While the large majority of projects financed by the EIB are in the EU, the EIB has been active outside the EU for more than 50 years and is firmly committed to supporting EU development policies in non-EU countries. EIB can provide funding for climate and environmental sustainability (e.g., through instruments such as the - just expired - Natural Capital Financing Facility (NCFF)).

The **Global Environment Facility** (GEF) was and is heavily invested in the Danube RB since the early 1990s, when the Danube Regional Project was launched together with UNDP, running until 2007. The Danube Regional Project aimed at reinforcing regional cooperation of the Danube countries and supported the development of national policies and legislation and the definition of priority actions for pollution control in order to ensure common approach to protection of international waters, sustainable management of natural resources and biodiversity. Present activities of the GEF in the Danube focus on Albania, Bosnia-Herzegovina, Serbia, Ukraine and Moldova, and thematically on nutrient reduction³⁶³.

As the United Nations lead agency on international development, **UNDP** works in 170 countries and territories to eradicate poverty and reduce inequality. UNDP's work is concentrated in three focus areas: sustainable development, democratic governance and peace building, and climate and disaster resilience. UNDP has six so-called "Signature Solutions", of which "Nature-based Solutions" is of special interest to the Mission. Through nature-based solutions, such as the sustainable management and protection of land, rivers and oceans, UNDP helps to ensure that countries have adequate food and water, are resilient to climate change and disasters, shift to green economic pathways, and can sustain work for billions of people through forestry, agriculture, fisheries and tourism. Currently, there are no major UNDP activities in the Danube RB (see GEF above for the Danube Regional Project).

The **World Bank Group** (WB) is active in the Danube region, through many national projects and the Danube Water Program; momentarily, however, the activities are mainly focussed on infrastructure and development (service supply and delivery)³⁶⁴.

6.3. Conclusion

The Danube and many of its tributaries are intensively used for hydropower generation and navigational purposes, and hence are highly modified and structured in many parts. Similarly, the Black Sea coast is also densely used economically for shipping, tourism, and fishing. The Danube's flow itself is interrupted by major barriers for migrational species, such as the Iron Gates hydropower installation. Figure X shows that most of the barriers of river continuity for fish migration are located in the upper parts of the river basin.

³⁶³ GEF Project Database: <https://www.thegef.org/projects-operations/database>

³⁶⁴ Project Database: <https://projects.worldbank.org/en/projects-operations/projects-list?os=0>



Figure 126 Interruptions of river continuity for fish migration – current situation

Source: ICPDR 2021

At the same time, the Danube and its tributaries still boast large river stretches with pristine and highly valuable ecosystems and habitats, and many river stretches that are still free-flowing. Also, a multitude of actors from many sectors are active in the Danube RB, aiming at the conservation of these pristine areas: major regional and global actors (WB, GEF, ICPDR, BSC), major NGO (WWF, Birdlife International, IUCN), and many high-profile scientific institutions. Due to WFD implementation and international initiatives and agreements, restoration measures and barrier removal initiatives are being planned and implemented (see figure 127). Such initiatives, however, face serious economic constraints, and are not yet being implemented on the scale necessary to achieve the Mission's objectives.



Figure 127 Expected restoration measures of impoundments by 2027

Source: ICPDR 2021

For achieving the Mission's objectives, we make the following recommendations and suggest the following priority partners.

- The restoration of free-flowing rivers is important, but the conservation of existing pristine highly valuable areas needs to be treated at the same priority. This includes the prevention of new hydropower developments, to not make the same mistakes as have been done in the past (e.g., in the Mura-Drava area, the "Amazon of Europe", where the Croatian Electric Company plans to build the Molve I+II hydropower plant, and other areas in the Western Balkans).
- We emphasize the recommendation issued in Task 2 to focus on the lower parts of the Danube (e.g., the Danube Delta region) for restoration and conservation projects, but expand the recommendation to include highly valuable areas in Danube tributaries, especially in the Balkans (e.g., Mura-Drava, the "Amazon of Europe" should be in the focus, as well as other pristine areas in the Western Balkans)

6.4. Opportunities for collaboration

In the following, the 11 organizations deemed most important for collaboration on Mission implementation with regard to achieving the Mission's objectives in the Danube Lighthouse area are presented. The list contains at least one organization from each category – governmental institutions and international intergovernmental organizations, research institutions, NGO, finance institutions and philanthropic organizations – to acknowledge the broad scope of the Mission's objectives and the necessity to involve all relevant stakeholder groups. The order of the organizations is not to be understood as a prioritization. Instead, the list contains examples of actors crucial to talk to in order to go forward with the Mission's objectives.

Competent Authorities for WFD implementation

The Competent Authorities in charge of WFD implementation in the EU Member States are the main contact points for the Mission with regard to any issues touching on the WFD's central objectives, i.e., to ensure that all waters meet "good status/potential" and to avoid their deterioration. Currently not all Danube countries are EU MS and therefore not legally obliged to fulfil the WFD requirements. Five countries (BA, MD, ME, RS and UA) are not EU Member States (non-EU MS). Out of these, two countries (ME and RS) carry the status of candidate countries; the status of Ukraine as a candidate country is currently being discussed. However, when the WFD was adopted in the year 2000, all countries cooperating under the DRPC decided to make all efforts to implement the Directive throughout the whole basin.

Potential role as partners to the Mission: decision makers.

EUSDR National Coordinators (NCs)

The NCs are the focal point for EUSDR implementation on the national level and they form the decision-making body of the Strategy. They are the core strategic decision-makers within the governance structure of the EUSDR, and hence of fundamental importance for implementing the biodiversity elements of the Strategy (PA 06) and the Mission's objectives. They also have a strategic coordination function of the EUSDR within their country. As the participating states are governing the EUSDR and they are the sole owners of the Strategy, the key role of NCs, with support of the Danube Strategy Point (DSP) upon request, is to coordinate, guide and monitor the participation of their state in the implementation of the EUSDR, and to liaise with their national line ministries and other relevant organizations to motivate them to consider and implement the EUSDR in their policy field. NCs encourage the mutual exchange with relevant programmes (in particular their managing authorities)/financial instruments, aiming at better alignment of policies, resources and funding a national and macro-regional level. This also comprises keeping close contact with the political level in order to secure feedback and adjustment, for instance with relevant ministries.

Potential role as partner to the Mission: political partners, often double-function as decision makers.

International Commission for the Protection of the Danube River (ICPDR) and the Black Sea Commission (BSC)

Both regional Commissions – for the Danube River and the Black Sea – were established to implement an international agreement to protect and develop sustainably the respective water bodies. Both Commissions have permanent secretariats, and are involved in a high number of project-based and supporting activities. Regarding transboundary restoration and conservation schemes and projects, there is "no way around" these organisations, as they hold crucial knowledge and are vital networking hubs, connecting national state actors, NGO and the scientific community. Both Commissions are also involved in implementation of the WFD (ICPDR) and MSFD (BSC) legislation. This is especially true for the ICPDR which publishes the international Danube River Basin Management Plan according to the six-year cycle of the WFD. ICPDR and BSC work on

a limited budget, limiting their reach and capabilities; it should be a strategic objective to gain more financial support for both, in order to fully equip them with the staff needed to assist in implementing the Mission's objectives.

Potential role as partners to the Mission: political partners.

Lower Danube Green Corridor Agreement

If the Mission follows the recommendation to focus on the Lower Danube, the Lower Danube Green Corridor Agreement between Bulgaria, Moldova, Romania, and Ukraine could be renewed and given new impetus. The Lower Danube Green Corridor was created along the river's final 1,000 km. It includes very concrete preservation objectives – it commits Bulgaria, Romania, Moldova and Ukraine to preserve a total of 935,000 ha, including enhanced protection for 775,000 ha of existing protected areas, and new protection for another 160,000 ha, and to restore 224,000 ha of former wetland areas – and is as such the most ambitious wetland protection and restoration initiative in Europe. To achieve the objectives, each country prepared an action plan in which additional areas of floodplain were designated for protection and restoration. These action plans described for each designated area what specific measures were needed and what steps had to be taken to carry out these measures, many of which are by now finalized. However, with sufficient political and financial backing, new objectives and Action Plans could possibly be realized.

Potential role as partner to the Mission: partners would be the environment ministries of the four countries (decision makers), or the WWF (funding partner and potential project leader).

International Association for Danube Research (IAD)

The International Association for Danube Research (IAD) is the longest existing international scientific network in the Danube Region, with the goal of promoting and coordinating activities in the fields of limnology, water management, water protection and sustainable development in the Danube River basin. Based on the Danube river basin management plan provided by the ICPDR, IAD established to be a strong science-based partner in different critical issues at river basin scale. IAD delegates participate in various ICPDR Expert Groups and develop tools and measures to protect the Danube River and to reach a sustainable river basin management as ultimate goal of the Water Framework Directive (EU-WFD). It is recommended to approach IAD as science partner for the overall Mission, and to consult with the association on specific knowledge needed per concrete project on a case-by-case basis.

Potential role as partner to the Mission: science partner.

World Wildlife Fund for Nature (WWF)

The WWF with its Central and Eastern European branch (WWF CEE) is very present in many restoration and conservation projects in the Danube RB. It is considered by us to be the most effective and impactful environmental NGO in the area. WWF Central and Eastern Europe and the national offices/branches are active in the protection of freshwater ecosystems across the Danube RB. Foci in freshwater ecosystems are the protection of the sturgeon, also through restoration projects, and the Danube delta region. WWF is also part of projects in the so-called "Amazon of Europe", the lower courses of the Drava and Mura Rivers and related sections of the Danube spanning Austria, Croatia, Hungary, Serbia and Slovenia, which are among Europe's most ecologically important riverine areas. In this region, there are 700km of pristine rivers under threat that need protection, and 1100km that could be restored. WWF could serve as project partner, or in a more strategic cooperation as a "vehicle" to mobilize volunteers and private funds.

Potential role as partner to the Mission: funding partner, potential project leader.

Rewilding Europe

Rewilding Europe is an environmental NGO promoting "rewilding" as a progressive approach to conservation. "Rewilding" is about letting nature take care of itself, enabling natural processes to shape land and sea, repair damaged ecosystems and restore degraded landscapes. One of the 9 rewilding areas of the organization is the Danube Delta. Rewilding as a concept for river restoration is very cost-effective. Rewilding Europe has the experience and partners/network to act as implementing agency or main partner in restoration projects, also in other areas where the concept is applicable.

Potential role as partner to the Mission: potential project leader.

European Investment Bank (EIB)

The EIB is the European Union's long-term lending institution. The EIB is financially autonomous and raises money by issuing bonds on the capital markets. While the large majority of projects financed by the EIB are in the EU, the EIB has been active outside the EU for more than 50 years and is firmly committed to supporting EU development policies in non-EU countries. EIB can provide funding for climate and environmental sustainability, e.g., through instruments such as the - just expired - Natural Capital Financing Facility (NCFF), which could be restarted.

Potential role as partner to the Mission: financing/programming partner.

Global Environment Facility (GEF)

The GEF is the largest multilateral trust fund focused on enabling developing countries to invest in nature, and supports the implementation of major international environmental conventions including on biodiversity, climate change, chemicals, and desertification. GEF funds are available to developing countries and countries with economies in transition seeking to meet the objectives of international environmental conventions and agreements. Support is provided to government agencies, civil society organizations, private sector companies, research institutions, among other partners, to implement projects and programs related to environmental conservation, protection, and renewal. In most cases, the GEF provides funding to support government projects and programs. Governments decide on the executing agency (governmental institutions, civil society organizations, private sector companies, research institutions). The GEF can serve as a source of funding for the Mission, and as a "cornerstone" of cooperation which it has been in the GEF "Strategic Partnership on the Black Sea and Danube Basin", an initiative aimed to address the root causes of environmental degradation in this region and promote investments and capacity building to return the Black Sea/Danube Basin environment to its 1960s condition. The GEF funded Partnership has been established with the cooperation of the World Bank, UNDP, UNEP and other multilateral and bilateral financiers and basin countries. As it was finalized in 2006, a similar partnership could be initiated by the Mission, covering restoration and conservation objectives instead of nutrient pollution.

Potential role as partner to the Mission: financing/programming partner.

World Bank (WB)

The WB is one of the world's largest sources of funding and knowledge for developing countries. WB provides financing, policy advice, and technical assistance to governments of developing countries. The WB is an important source of funding on the national level, as well as for the private sector. For the Mission, the WB can act as an important source of funding – via individual Country Partnership Frameworks, coordinated with the EUSDR – in a partnership with e.g., the GEF and other international donors. The World Bank has been and is also an important sponsor of hydropower projects and advocate for agricultural intensification, developments which both can run detrimental to the Mission's objectives. For these reasons alone, the World Bank should be involved in the Mission, to avoid contrasting policies to affect the region's rich biodiversity and the Mission's objectives.

Potential role as partner to the Mission: financing/programming partner.

Coca-Cola Foundation

The Coca-Cola Foundation is the Coca-Cola company's primary international philanthropic arm, and already invested in the Danube RB. The Coca-Cola Foundation funds nature protection projects in the Danube RB, as strategic partner to the ICPDR. For the Mission, the considerable funds of the Foundation could be harnessed to facilitate high profile restoration and conservation efforts.

Potential role as partner to the Mission: financing partner.

7. MEDITERRANEAN LIGHTHOUSE AREA

7.1. Introduction

The Mediterranean Sea covers an area of approximately 2.600.000 km², with an average depth of 1.460 m. It stretches from the Atlantic Ocean on the west, southwestern Asia to the east, Europe to the north, and the Maghreb region of northern Africa to the south, making it the largest enclosed sea on the planet³⁶⁵, even though it only represents 0,82% of the surface area of the world's oceans³⁶⁶. Approximately one third of the Mediterranean population lives in the coastal area and more than 70% in cities³⁶⁷.

The biogeographical region enclosing the Mediterranean Sea includes coastlines of 21 both EU and non-EU states, which are Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia, and Turkey. This results in a complex region in terms of both ecological and socio-political features. Although the region is composed of a wide array of actors from different groups of countries (i.e., Member States, Candidate Countries, Potential Candidates, third countries), the analysis exposed in the present chapter will provide a particular focus on EU Member States. However, governance structures of non-EU countries were included to the greatest possible extent.

On one hand, the Mediterranean is considered a biodiversity hotspot. It has particular regional characteristics with a climate of hot dry summers and humid, cool winters, and a hilly landscape. It is characterized by rich biodiversity with around 9% of all the world's marine creatures live in the Mediterranean³⁶⁸, and hosting many endemic species, reaching between 20% to 30% of the total marine species found in the basin. However, climate change, habitat loss, overexploitation of resources and coastal urbanisation are directly threatening the marine biodiversity, and as a result the Sea features the highest proportion of threatened marine habitats in Europe (32% species from 15 habitats)³⁶⁹. In addition, the Mediterranean countries have strong commonalities related to heritage, lifestyle, and values.

On the other hand, the Mediterranean region has been impacted by intense human pressures for several centuries. From agricultural practices and livestock grazing of early settlers, to being the number one tourism destination³⁷⁰ in the world and a conveyor belt for trade nowadays, resulting in high urbanization levels on the coastlines as well as risks of water shortages and forest fires³⁷¹. Moreover, the diversity of countries surrounding the sea provides for a layer of political complexity in the region. There is a persistent gap between northern Mediterranean countries and, southern and eastern Mediterranean countries in human development, demographic dynamics, economic growth, environmental protection, political stability and social conflict management. The former are characterized by low fertility rate, an aging population, and a low share of active population. On the contrary, the latter are currently experiencing a phase of demographic transition, with high population growth, and a high share of active population. The gaps between northern and, eastern and southern countries have reduced in the last decade, but are nonetheless still significant. Hence, leading to considerable inequalities in their adaptive capacity to deal with environmental change³⁷².

The Mediterranean is a relatively small and enclosed sea with limited exchange with ocean basins, amplifying the human-induced effects of pollution. More particular, nutrients, heavy metals, Persistent Organic Pollutants (POPs), pesticides, hydrocarbons, and marine litter are the main pollutants of the Mediterranean Sea according to UNEP/MAP and Plan Bleu (2020). First, fertilizers and pesticides used for agriculture in Mediterranean countries are above global average³⁷³, creating environmental impacts into the sea such as nutrient and agro-chemical pollutants run-offs. Second, noise pollution has also a relevant impact over the basin. Around 4% of both global gas and oil reserves are located off the coasts of Algeria, Egypt, Greece, Italy, Libya, and Turkey³⁷⁴, creating pressures as resource depletion, offshore exploitation, underwater noise, and discharges of oil and other substances. Third, according to Galewski et al. (2021), the Mediterranean basin hosts around 30% of the world's international tourists (amounting 360 million persons per year³⁷⁵), as well as being the second largest destination for cruise ships worldwide. Consequently, there is an increasing depletion of natural resources (i.e., water, soil, biodiversity, food and energy) but also pollution of marine and

³⁶⁵ <https://www.medqsr.org/mediterranean-marine-and-coastal-environment>

³⁶⁶ <https://www.intechopen.com/chapters/55867>

³⁶⁷ UNEP/MAP and Plan Bleu (2020). State of the Environment and Development in the Mediterranean. Nairobi.

³⁶⁸ https://ec.europa.eu/environment/natura2000/biogeog_regions/mediterranean/index_en.htm

³⁶⁹ <https://www.intechopen.com/chapters/55867>

³⁷⁰ <https://www.medqsr.org/tourism>

³⁷¹ https://ec.europa.eu/environment/natura2000/biogeog_regions/mediterranean/index_en.htm

³⁷² UNEP/MAP and Plan Bleu (2020). State of the Environment and Development in the Mediterranean. Nairobi.

³⁷³ UNEP/MAP and Plan Bleu (2020). State of the Environment and Development in the Mediterranean. Nairobi, p. 121.

³⁷⁴ UNEP/MAP and Plan Bleu (2020). Summary for Decision Makers - State of the Environment and Development in the Mediterranean. Nairobi, p. 15.

³⁷⁵ Galewski et al. Living Mediterranean Report – Monitoring species trends to secure one of the major biodiversity hotspots. Tour du Valat, 2021. France.

land environments. As a result, the Mediterranean is one of the most littered marine areas in the world with around 730 tonnes of plastic entering the sea daily³⁷⁶. According to UNEP/MAP and Plan Bleu (2020) plastic accounts for up to 95% to 100% of total floating marine litter and 50% of seabed litter³⁷⁷. Also, beach recreational activities generate marine litter on beaches which is composed of around 60% of single-use plastics³⁷⁸. The main sources of marine litter are tourism, shipping, fisheries, as well as untreated wastewater through which litter enters the sea. However, less than one third of the plastic produced per year in the Mediterranean countries is recycled³⁷⁹.

As a result, the governance of the sea basin requires national and transnational environmental agreements and regulations supported at the supranational and multilateral level to ensure management of the coastal and marine environments. According to Galewski et al. (2021), the Mediterranean Sea basin faces different governance challenges. First, the disparities in levels of development and living standards between countries are impacting the capacity to invest in more sustainable practices. Second, the differences in environmental regulations and institutions, especially between EU and non-EU countries, are producing uneven frameworks to apply sustainability at different paces. Third, the absence of inclusive governance, including different types of stakeholders (e.g., civil society), is excluding actors within the decision-making process. Finally, the lack of an effective science and policy interface and knowledge exchange processes to take into account the diversity of the region is hampering the possibility to go beyond a one-size-fits-it-all approach to boost innovation and development in the region³⁸⁰.

The specific Objective 2 of the Mission “Prevent and eliminate pollution of our ocean, seas and waters” is relevant for the Mediterranean lighthouse area. More specifically, the following Mission targets are considered:

- Reduce by at least 50 % plastic litter at sea.
- Reduce by at least 30 % microplastics released into the environment.
- Reduce by at least 50 % nutrient losses, the use and risk of chemical pesticides.
- Less than 20 litter items per 100m of coastline.

7.2. Governance structures and stakeholder involvement

The large number of countries present in the Mediterranean and the magnitude of environmental threats brought about several cooperation mechanisms in the field of environmental protection. The following sections describe some of the different types of strategic governance organizations that are considered to be of interest for achieving the Mission’s objectives within this lighthouse area.

7.2.1. Governmental institutions

7.2.1.1. International governmental institutions

Under the **United Nations Convention on the Law of the Sea (UNCLOS)**, of 1982, countries sharing an enclosed sea are required to cooperate with each other to protect the marine environment and ensure the management and conservation of the sea’s living resources. In the Mediterranean region, several agreements and mechanisms have been set into place to achieve the objective of protecting the coastal and marine environments.

The most important agreement in the basin is the Convention for the Protection of the Mediterranean Sea against Pollution (i.e., the **Barcelona Convention**), signed in 1976 and revised in 1995 to be renamed as the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean. The Contracting Parties are 21 Mediterranean countries including 8 European Union Member States (Cyprus, Croatia, France, Greece, Italy, Malta, Slovenia, Spain) as well as the European Union and is administered by the United Nations Environment Programme (UNEP). More specifically, the Mediterranean Action Plan (MAP) was established in 1975, as a multilateral environmental agreement in the context of the regional seas programme of UNEP, to be institutional framework for addressing common challenges or marine degradation³⁸¹. The main objective of the Barcelona Convention is to prevent, combat and eliminate pollution

³⁷⁶ UNEP/MAP and Plan Bleu (2020). State of the Environment and Development in the Mediterranean. Nairobi, p. 6.

³⁷⁷ Idem, p.168.

³⁷⁸ Idem

³⁷⁹ Idem

³⁸⁰ Galewski et al. Living Mediterranean Report – Monitoring species trends to secure one of the major biodiversity hotspots. Tour du Valat, 2021. France.

³⁸¹ <https://www.unep.org/unepmap/>

of the sea, to protect the marine and coastal environments, as well as to contribute to sustainable development. To achieve this, the Contracting Parties adopted a comprehensive institutional, legal and implementation framework to fulfil its objectives. Moreover, the Barcelona Convention adopted seven protocols that constitute the “principal regional legally binding Multilateral Environmental Agreement (MEA) in the Mediterranean”³⁸²:

- Dumping Protocol: prevent, abate, and eliminate pollution by dumping of wastes or other matter.
- Prevention and Emergency Protocol: provides a regional framework in preparing for and responding to oil and hazardous noxious substances (HNS) pollution incidents.
- Land-Based Sources Protocol: prevent, abate and eliminate pollution from land-based sources and activities, by the reduction and phasing out of substances that are toxic, persistent and liable to bioaccumulate.
- Specially Protected Areas and Biological Diversity Protocol: regional framework for the conservation and sustainable use of biological diversity.
- Offshore Protocol: addresses all aspects of offshore oil and gas activities in the Mediterranean and includes measures to reduce pollution from all phases of offshore activities, to respond to offshore pollution incidents and concerning liability and compensation.
- Hazardous Wastes Protocol: protect human health and the marine environment against the adverse effects of hazardous wastes. To reduce and eliminate hazardous wastes generation; reduce the amount of hazardous wastes subject to transboundary movement; and create a regulatory system applying to cases where transboundary movements are permissible.
- Integrated Coastal Zone Management Protocol: integrated management of the Mediterranean coastal zone. Take the necessary measures to strengthen regional cooperation in order to meet the objectives of integrated coastal zone management.



Figure 128 Status of ratification of the Barcelona Convention

Source: UNEP/MAP³⁸³

Also, **UNEP/MAP** provides secretariat services to the Contracting Parties, through the Coordinating Unit located in Athens, Greece, to promote and facilitate the implementation of the Barcelona Convention and its protocols, as well as ensuring that the MAP system operates correctly. The MAP also operates through seven regional specialised activity centres (RAC). The Programme for the Assessment and Control of Marine Pollution in the Mediterranean (MEDPOL), also located in Athens; the RAC for Sustainable Consumption and

³⁸² <https://www.unep.org/unepmap/who-we-are/barcelona-convention-and-protocols>

³⁸³ UNEP Grid Arendal, <https://www.grida.no/resources/5911>

Production (SCP/RAC), in Barcelona, Spain; the Plan Bleu RAC (PB/RAC) for sustainable development in Marseille, France; the RAC for Information and Communication (INFO/ RAC) in Rome, Italy; the Priority Actions Programme RAC (PAP/RAC) located in Split, Croatia; the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) in Valletta, Malta; and, the Specially Protected Areas RAC (SPA/RAC) in Tunis, Tunisia³⁸⁴.

The **Mediterranean Commission on Sustainable Development (MCSD)** was established in 1995 as an advisory body to the Contracting Parties of the Barcelona Convention “to assist them in their efforts to integrate environmental issues in their socioeconomic programmes and to promote sustainable development policies in the Mediterranean region and countries”³⁸⁵. It acts as a forum for experience sharing and peer learning between the 22 Contracting Parties and 18 stakeholders from local authority networks, civil society/Non-Governmental Organizations (NGOs), socioeconomic actors, Inter-Governmental Organizations (IGOs), the Scientific community, and Parliamentarians. Particularly, the Mediterranean Strategy on Sustainable Development (MSSD) was prepared as a strategic framework to translate the 2030 Agenda and its Sustainable Development Goals (SDGs) at regional, sub-regional, national and local levels, and was first adopted in 2005 and then updated in 2016 by the Contracting Parties³⁸⁶.

Union for the Mediterranean (UfM) brings together the 27 EU countries and 15 countries of the Southern and Eastern Mediterranean, namely Albania, Algeria, Bosnia and Herzegovina, Egypt, Israel, Jordan, Lebanon, Mauritania, Monaco, Montenegro, Morocco, Palestine, Syria, Tunisia, and Turkey. The UfM's objective is to reduce the gap between developing and developed countries by promoting integration among Northern, Southern and Eastern Mediterranean actors. In particular, UfM promotes regional cooperation to protect the sea basin by contributing to depollution and pollution prevention actions in the region, as well as supporting green and blue economy models³⁸⁷.

The **WestMED Initiative**, and its Steering Committee, sets a roadmap for the development of a sustainable blue economy in the Western Mediterranean by boosting growth, creating jobs, and improving the environment. It is the result of the “**5+5 Dialogue**” between five EU Members States (France, Italy, Portugal, Spain, and Malta), and five Southern countries (Algeria, Libya, Mauritania, Morocco, and Tunisia). The initiative was initiated with the support of the UfM and the European Commission. The improvement of the maritime governance is among the main objectives of the initiative which is translated into six work priorities, including maritime safety and the fight against marine pollution³⁸⁸.

The “**Coalition for an exemplary Mediterranean in 2030**” is one of the frameworks of One Planet Summit to contribute to renew international cooperation for the ecological transition. The platform was a joint commitment of the government of France, the United Nations, and the World Bank, launched in 2021. It focuses on France, Monaco, Spain, Italy, Greece, Algeria, Morocco, Tunisia, and Egypt. Specifically, the framework set different priorities for i) preserving marine biodiversity, ii) reducing the impact of fishing, iii) combating marine pollution (especially plastic), and iv) sustainable shipping³⁸⁹.

The **International Maritime Organization (IMO)** is a United Nations specialized agency aiming at improving shipping through the adoption of standards. One of its strategic lines of action is the engagement in ocean governance. The Marine Environment Division is the technical body on marine pollution by oil, chemicals, other harmful substances, garbage, sewage, air pollution and emissions from ships³⁹⁰. IMO has adopted different treaties on marine pollution produced by ships such as **MARPOL**³⁹¹ or the **Ballast Water Convention** (BWM Convention)³⁹². IMO also administers in cooperation with UNEP/MAP the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (**REMPEC**) which mandate is to assist Mediterranean coastal States in ratifying, transposing, implementing and enforcing international maritime conventions related to the prevention, preparedness and response to pollution from ships.

The **General Fisheries Commission for the Mediterranean (GFCM)** is a regional fisheries management organization³⁹³ (RFMO) established under the umbrella of the Food and Agriculture Organization of the United Nations³⁹⁴ (FAO) which covers both the Mediterranean and in the Black Sea. It governs fisheries topics in the basin and has the authority to make binding recommendations for the conservation and management of fisheries among its Contracting Parties. The latter are 23 countries of which 19 are in the Mediterranean (and

³⁸⁴ UNEP/MAP and Plan Bleu (2020). State of the Environment and Development in the Mediterranean. Nairobi.

³⁸⁵ <https://www.unep.org/uneppmap/who-we-are/governing-and-subsidiary-bodies>

³⁸⁶ <https://www.unep.org/uneppmap/what-we-do/mediterranean-strategy-sustainable-development-mssd>

³⁸⁷ <https://ufmsecretariat.org/what-we-do/water-environment/>

³⁸⁸ <https://www.westmed-initiative.eu/westmed-initiative/>

³⁸⁹ <https://www.oneplanetsummit.fr/en/coalitions-82/coalition-exemplary-mediterranean-2030-197>

³⁹⁰ <https://www.imo.org/en/OurWork/Environment/Pages/Default.aspx>

³⁹¹ [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx)

³⁹² <https://www.imo.org/en/MediaCentre/HotTopics/Pages/Implementing-the-BWM-Convention.aspx>

³⁹³ <https://www.fao.org/fishery/rfb/en>

³⁹⁴ <https://www.fao.org/docrep/x5584e/x5584e0i.htm>

3 Black Sea states) alongside the European Union. The GFCM is headquartered in Rome (Italy) and has technical subregional units in Malaga, Spain, for the Western Mediterranean; in Tunis (Tunisia) for Central Mediterranean; in Beirut, Lebanon, for the Eastern Mediterranean; and in Split, Croatia, for the Adriatic Sea³⁹⁵. Even though the focus is on the sustainable development of aquaculture, the Commission also tackles the conservation of marine resources at biological, environmental, economic, and social levels.

The **Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)**³⁹⁶ is an intergovernmental mechanism adopted by 108 countries and the European Commission in 1995. The main aim is to deal with land-based impacts on the marine environment with a particular emphasis on marine litter, nutrients and sewage, since 2012, as well as persistent organic pollutants (POP), radioactive substances, heavy metals, and oils, among others³⁹⁷. The implementation of the GPA is conducted by governments in close collaboration with international and public organizations, local communities, non-governmental organizations, and the private sector. The review of the status of implementation is organized every five years in the Intergovernmental Review Meeting (IGR), which took place for the last time in 2018 in Indonesia.

The **Intermediterranean Commission of the Conference of Peripheral Maritime Regions (CPMR)**, created in 1990, gathers 40 regions from several EU and non-EU countries (Albania, Cyprus, France, Greece, Italy, Malta, Morocco, Spain and Tunisia). It works as a political forum to articulate and represent the common interests of peripheral and maritime regions at EU policy negotiations. The CPMR is open to all sub-national levels in the Mediterranean basin. The work is focused on territorial cooperation around the topics of Transport and Integrated Maritime Policy, Economic and Social Cohesion, Water and Energy³⁹⁸.

7.2.1.2. EU institutions and legal frameworks

The **European Union** for its part is a major regional power of which 8 Member States are bordering the Mediterranean and is active in many areas of marine and coastal affairs.

The European Union adopted in 2000 the **Water Framework Directive (WFD)** to protect freshwater resources based on river basins. The objective is to address pollution and to achieve good ecological and chemical status throughout Europe by 2015 and tackle the pressures due to economic activities, population growth and urbanisation. The WFD obliges Member States to develop river basin management plans to protect 110 river basin districts. It covers inland, transitional and coastal surface waters as well as groundwaters³⁹⁹ whose management may have an impact on marine and coastal waters.

The WFD is complemented by more specific EU laws, including the **Marine Strategy Framework Directive (MSFD)** adopted in 2008. The EU MSFD is the environmental pillar of the EU's maritime policy which introduced the principle of ecosystem-based marine spatial planning and provided a framework for policies aiming to achieve a good environmental status (GES)⁴⁰⁰.

In addition, the European Union is another important player in the development agenda of the Mediterranean through the **Southern Neighbourhood Economic and Investment Plan**. This partnership, including Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, Syria, and Tunisia, revolves around key policy areas such as human development and good governance, peace and security, migration and mobility, the digital transition, and the green transition (i.e., climate resilience, energy and environment). The latter proposes measures to protect and restore biodiversity, including marine and terrestrial, as well as to promote initiatives on waste management such as marine litter. It also includes actions to transition to a circular economy while promoting the sustainable use of natural resources⁴⁰¹.

The **EU Strategy for the Adriatic and Ionian Region (EUSAIR)** is a macro-regional strategy adopted by the European Commission in 2014 to promote economic and social prosperity and growth in the region. It covers four EU Member States (Croatia, Greece, Italy, Slovenia) and six non-EU countries (Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, San Marino, Serbia). The strategy is focused around four thematic areas, namely sustainable tourism, connecting the region, blue growth, and environmental quality. Specifically, the latter thematic area aims at improving waste management by reducing waste flows to the sea, as well as reducing nutrient flows and other pollutants to the sea. It also focuses on ensuring good environmental and ecological status of marine and coastal ecosystems, and contribute to biodiversity protection⁴⁰².

³⁹⁵ <https://www.fao.org/gfcm/about/fr/>

³⁹⁶ <https://www.unep.org/explore-topics/oceans-seas/what-we-do/addressing-land-based-pollution/governing-global-programme>

³⁹⁷ <https://www.unep.org/explore-topics/oceans-seas/what-we-do/addressing-land-based-pollution/governing-global-programme>

³⁹⁸ <https://cpmr-intermed.org/who-we-are/>

³⁹⁹ https://ec.europa.eu/environment/water/water-framework/info/intro_en.htm

⁴⁰⁰ https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

⁴⁰¹ https://www.eeas.europa.eu/sites/default/files/joint_communication_renewed_partnership_southern_neighbourhood.pdf

⁴⁰² <https://www.adriatic-ionian.eu/about-eusair/pillars/green-pillar/>

7.2.1.3. National governmental institutions

The following table presents the models of political organisation in the EU countries of the Mediterranean Sea basin, where the majority follow a centralised model.

Country	General implementation of policies
Croatia	Centralised
Cyprus	Centralised
France	Centralised
Greece	Centralised
Italy	Decentralised
Malta	Centralised
Slovenia	Centralised
Spain	Centralised

Table 64 Implementation of policies in the Mediterranean EU countries

The following table provides an overview of the national ministries relevant to the Mission in the EU countries of the Mediterranean lighthouse area. These national authorities correspond to potential partners for the implementation of the Mission.

Country	Relevant ministries and agencies
Croatia	Ministry of Environmental Protection and Energy Ministry of Regional Development and EU Funds Croatian Waters (Hrvatske Vode) - national water management agency
Cyprus	Ministry of Agriculture, Rural Development and Environment
France	Ministry of Ecological Transition and Territory Cohesion State Secretary in charge of the Sea
Greece	Ministry for the Environment, Physical Planning and Public Works Ministry of Maritime Affairs, Islands and Fisheries Ministry of Regional Development and Competitiveness
Italy	Ministry of Ecological Transition – MiTE Italian Institute for Environmental Protection and Research - ISPRA
Malta	Ministry for the Environment, Energy and Enterprise (MEEE)
Slovenia	Ministry of the Environment and Spatial Planning
Spain	Ministry for the Ecological Transition and the Demographic Challenge (MITECO)

Table 65 National authorities of EU Member States relevant to the Mission in the Mediterranean

The **French Agency for Sustainable Mediterranean Cities and Territories (AVITEM)**⁴⁰³ was created in 2002 with the political objective of promoting a community of sustainable development in the Mediterranean region. The agency promotes exchange of experiences, expertise, formation, and cooperation to achieve urban and territorial development between French stakeholders and Mediterranean countries.

The **Italian Alliance for Sustainable Development (ASViS)**⁴⁰⁴ was established in 2016 to raise awareness among various stakeholders of the importance of the global agenda for sustainable development. It includes among its objectives proposing policies to achieve the Sustainable Development Goals (SDGs), foster research and innovation as well as to promote educational programs.

The **Italian National Agency for New Technologies, Energy and Sustainable Economic Development**⁴⁰⁵ is a public body aimed at research, innovation and the provision of advanced services to enterprises, public sector and citizens in the sectors of the environment, sustainable economic development and energy.

⁴⁰³ <https://avitem.fr/avitem-agence-des-villes-et-territoires-mediterraneens-durables/>

⁴⁰⁴ <https://asvis.it/mission-and-objectives/>

⁴⁰⁵ <https://www.enea.it/en>

Casa Mediterráneo⁴⁰⁶ is a public Spanish consortium between the Spanish Ministry of Foreign Affairs, European Union and Cooperation (MAUEC), the Spanish Cooperation Agency for International Development (AECID), the region of Valencia, the municipalities of Alicante and Benidorm. It was created in 2009 as public diplomacy instrument to encourage knowledge and cooperation between Spain and the Mediterranean basin countries in topics related to climate change, scientific and technological innovation, culture, and economy, among others.

The **Energy and Water Agency**⁴⁰⁷ is an agency from the government of Malta created in 2014 and tasked to formulate and implement national policies in the energy and water sectors. For example, the National Water Conservation Awareness Centre (Għajnej)⁴⁰⁸, launched in 2017, aims to increase awareness on the challenges faced by the water sector in the Maltese islands and the need to support educational activities around the topic.

The **Nicosia Development Agency (ANEL)** in Cyprus promotes and implements the environmental policy at regional and local level in the municipalities of the district of Nicosia and the capital district of Cyprus, as well as for the management and preservation of natural resources such as water⁴⁰⁹.

Sustainable development strategies provide a policy framework for the implementation of the Mission Objective in the Mediterranean. As such, detailed strategies could contribute with a roadmap for successfully achieve the specific Mission targets related to pollution in the sea basin. However, most of the Mediterranean countries have incomplete or outdated national strategies regarding sustainable development. The map below presents an assessment of the published national sustainable development strategies in the region to provide a clear picture of the situation including both EU and non-EU countries. Such strategies are often too broad and lack clarity regarding definitions, objectives, budgets, and indicators. Only four countries (France, Italy, Morocco, and Tunisia) are considered to have detailed strategies for sustainable development, which include specific roadmaps. Other countries, such as Albania, Bosnia and Herzegovina, Cyprus, Egypt, Palestine, Spain, and Slovenia, have outdated strategies or do not count with any at all⁴¹⁰.

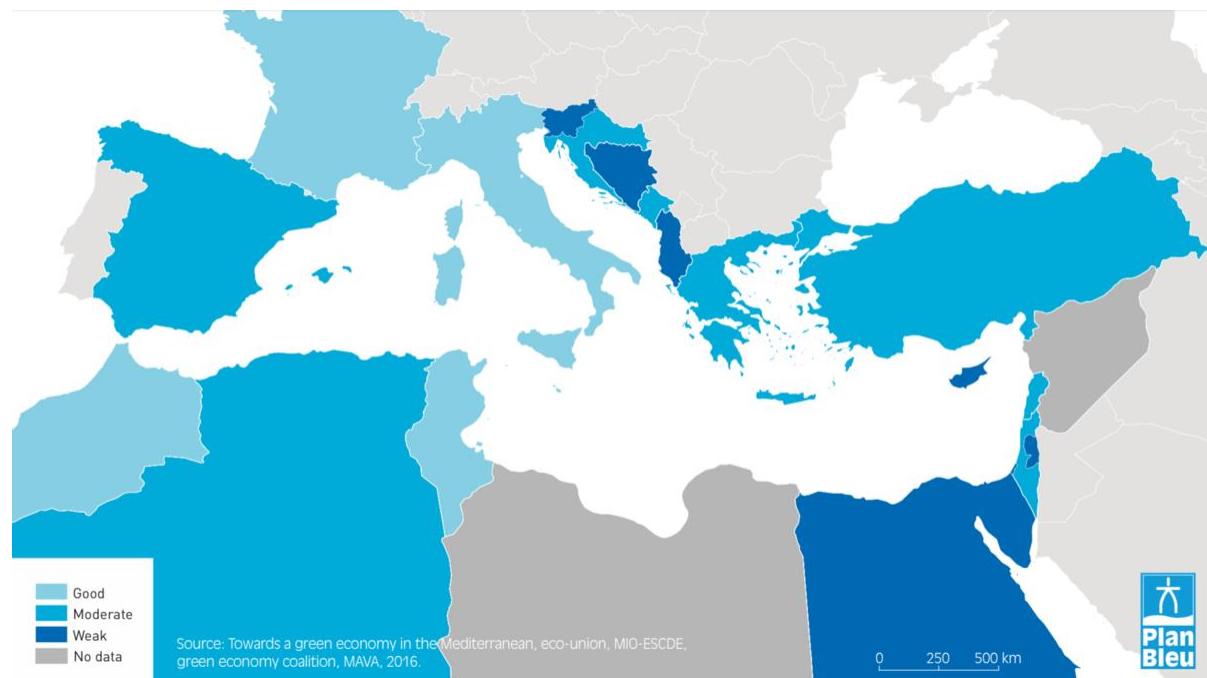


Figure 129 Assessment of published national sustainable development strategies

Source: Plan Bleu

⁴⁰⁶ <https://www.casa-mediterraneo.es/sobre-nosotros/>

⁴⁰⁷ <https://www.energywateragency.gov.mt>

⁴⁰⁸ <https://www.energywateragency.gov.mt/ghajnej/>

⁴⁰⁹ www.anel.com.cy

⁴¹⁰ <https://www.obs.planbleu.org/cartes/gouvernance-cartes-illustrant-les-relations-entre-pressions-des-activites-humaines-et-etats-de-lenvironnement/>

7.2.2. R&D and innovation entities

Even though some countries have prioritized research and innovation (and education), the Mediterranean region lags behind as a whole compared to other areas like Northern Europe.

The **BlueMed Initiative** was initially developed between Cyprus, Croatia, France, Greece, Italy, Malta, Portugal, Slovenia, and Spain in 2014 with the support of the European Commission. It was then endorsed by all EU Members States, and, in 2017, it was adopted by all the member countries of the UfM. The main objective is to foster blue growth-related research and innovation activities in the Southern and Northern regions of the Mediterranean. Among the objectives of the initiative there is the promotion of innovative research to generate knowledge and increase ecosystem resilience, hence mitigating impacts from environmental stressors in the Mediterranean Sea (such as plastic pollution). Regarding marine litter, the BlueMed Pilot Action On A Healthy Plastic-Free Mediterranean Sea, launched in 2018, aims at promoting the “circulation of good practices, R&I actions but also demonstration, communication and educations actions” by mapping and assessing the actions regarding plastic pollution in the EU and non-EU countries⁴¹¹.

The **Mediterranean Strategy on Education for Sustainable Development (MSESD)**, part of the MSSD, was adopted in 2014 by the ministers of environment of the UfM “to ensure that national frameworks support ESD, promote sustainability through all levels and types of education, develop educators’ competencies, and promote materials, research and cooperation on ESD”⁴¹². The country Members of the Mediterranean Committee on ESD are Cyprus (chair), Croatia, Greece, Jordan, Malta, and Portugal. Among the most relevant activities, the MSESD promotes sustainable development through different types of learning (i.e., formal, non-formal and informal), promote R&D on topics related to education for sustainable development, ensuring coordination between policy frameworks on sustainability, strengthen cooperation and capacity building across the Mediterranean region, among others⁴¹³.

The **Mediterranean Science Commission (CIESM)** has a long history of research in the Mediterranean since its creation in 1919 in Monaco. Today, 24 Member States take part of the Commission to understand, monitor, and protect the sea basin. The work is conducted through workshops, collaborative programs, and regular congresses with the objective to provide independent advice to both national and international agencies. It is organized around six scientific committees in the topics of Marine Geosciences, Physics and Climate of the Ocean, Marine Biogeochemistry, Marine Microbiology and Biotechnology, Living Resources and Marine Ecosystems, Coastal Systems and Marine Policies⁴¹⁴.

The **Center for Mediterranean Integration (CMI)** is a regional initiative bringing together international development institutions, national governments, local authorities and the civil society, founded in 2009 and that recently joined the United Nations, hosted by UNOPS. The members are the World Bank, the European Investment Bank, UN Habitat, the governments of Egypt, France, Greece, Italy, Jordan, Lebanon, Morocco, Palestine, Tunisia, and Spain, the French region Provence Alpes Cote d'Azur Region, the city of Marseille (France), and counts with the European External Action Service – EEAS as observer. The main objective is to discuss public policies, exchange ideas and identify regional solutions to address challenges in the Mediterranean⁴¹⁵. CMI has currently several active programs spanning from human capital and mobility to territorial resilience to climate change. In particular, the centre has the “Water Security Nexus in North Africa: Catalyzing Regional Coordination Around Climate Change, Resilience and Migration”⁴¹⁶ program currently active since 2020 with the objective to enhance water security through better informed public governance and management in Algeria, Morocco, and Tunisia. Moreover, the “Mediterranean Youth for Water Network”⁴¹⁷ was launched in 2017 with the support of CMI to engage the youth across the Mediterranean and create a knowledge-based platform in different disciplines around water.

Mediterranean Universities Union (UNIMED) is an association of 144 universities from 23 Mediterranean countries founded in 1991, headquartered in Rome (Italy) and with branches in Palestine, Morocco, Portugal and France. UNIMED promotes the international dimension of universities, conducts fundraising activities, promotes student and researcher mobility within the Euro-Mediterranean region, and organizes discussions and seminars at both national and international level⁴¹⁸.

⁴¹¹ <http://www.bluemed-initiative.eu/about-the-bluemed-initiative/>

⁴¹² <https://www.unep.org/unepmap/what-we-do/MSSD/MSESD>

⁴¹³ https://medies.net/wp-content/uploads/2019/12/MSESD_brochure.pdf

⁴¹⁴ <https://www.ciesm.org/marine/committees/index.htm>

⁴¹⁵ <https://www.cnimarseille.org/center>

⁴¹⁶ <https://www.cnimarseille.org/programs/water-security-nexus-north-africa-catalyzing-regional-coordination-around-climate-change>

⁴¹⁷ <https://www.cnimarseille.org/programs/mediterranean-youth-water-network>

⁴¹⁸ <https://www.uni-med.net/en/about-us/>

7.2.3. Industry and business grouping and networks

In the Mediterranean Sea, the involvement of business and industry groups in topics related to the Mission's objectives is not very expanded. Only some organizations were found to be actively working towards the reduction of pollution in the sea basin.

BUSINESSMED (Union of Mediterranean Confederations of Enterprises) is a platform for multilateral cooperation focusing on the private sector in the Mediterranean basin, created in 2002. BUSINESSMED's activities focus, among others, on i) increasing exchanges between the European Union and Mediterranean countries; ii) enhancing technological transfer and know-how toward South-Mediterranean countries; iii) undertaking partnership actions between the business communities; and iv) business advocating for a wider participation of the private sector in policymaking⁴¹⁹. The Union gathers 24 confederations of enterprises of countries from the Northern and Southern sides of the Mediterranean, which are members of the UfM. Among the most relevant projects, BUSINESSMED participates in the ENU CBCMED Interreg Program MED4WASTE to facilitate governance models for integrated and efficient waste management across the Mediterranean. Particularly, the MED4WASTE⁴²⁰ project (Mediterranean Dialogue for Waste Management Governance) aims to develop new governance models for an efficient and integrated management of waste across the basin, emphasizing on organic waste and circular economy, through management plans and policies. The project targets actors in the waste management chain (i.e., households, collectors, etc.), but also social cooperatives, educators, and policymakers. It is located across six EU and third countries (Spain, Greece, Tunisia, Lebanon, Jordan, Italy) with a total budget allocation of €1,1 million (90% financing from the Interreg instrument), and will be running until September 2023.

The **Mediterranean World Economic Foresight Institute – IPEMED** is an independent Euro-Mediterranean think tank, located in France and established in 2006. It aims at integrating the countries South and North of the Mediterranean via economic means. This business network is financed through private companies which founded the IPEMED. Moreover, **IPEMED Tunisia** is a branch located in Tunis (Tunisia) which was created in 2016 to provide "operational information to companies and by favouring the implementation of coproduction partnerships"⁴²¹.

7.2.4. NGOs and civil society organizations

The traditional form of cooperation among national governments in the Mediterranean basin has been gradually complemented with cooperation among networks of NGOs and civil society organizations.

The **IUCN Centre for Mediterranean Cooperation (IUCN-MED)** is the regional operational centre of the International Union for Conservation of Nature in the Mediterranean Sea basin launched in 2001. It aims at promoting sustainable livelihoods and biodiversity conservation through six strategic working lines. The Marine Biodiversity and Blue Economy, and the Ecosystem Resilience and Spatial Planning working areas are of relevance to the Mission's objectives. In fact, IUCN-MED has a topic and regional focus by mainstreaming biodiversity conservation into agricultural and fishing practices, and also tourism planning through the development of evidence-based content for decision-making in the region. It has a particular regional focus in North African countries. To achieve its objectives, IUCN-MED searches for partnerships to build alliances, fund and implement projects on Building the Mediterranean Ecological Network; Assessing tourism impacts on ecosystem services in coastal areas; Capacity Building Initiative for conservation; Reducing the impact of fisheries on vulnerable species and ecosystems; and Reduce the impact of plastic pollution in the Mediterranean islands, among others. The approach is to influence policy and convene multi-stakeholders, generate knowledge and solutions, create capacity building, and promote nature-based solutions to address challenges (i.e., climate change and urban). Currently, IUCN-MED supports projects to reduce the impact of plastic pollution in the Mediterranean islands with the objectives of⁴²²:

- Bringing together actors to develop solutions to plastic waste management in the Mediterranean basin.
- Enhancing capacities of coastal cities and islands to reduce plastic leakage into the environment.
- Providing scientific evidence to policymakers, manufacturers, and consumers to spearhead appropriate technological.

Currently, two relevant projects are projects being implemented to address the issue of plastic pollution in the Mediterranean basin. First, IUCN-MED is coordinating the activities of the "Beyond Plastic Med - BeMed"⁴²³ project in partnership with Tara Expeditions Foundation, with the financing of the Prince Albert II Monaco

⁴¹⁹ <https://businessmed-umce.org/en/content/who-we-are>

⁴²⁰ <https://www.enicbcmed.eu/projects/med4waste>

⁴²¹ <http://www.ipemed.coop/en/>

⁴²² <https://www.iucn.org/regions/mediterranean/our-work>

⁴²³ <https://www.iucn.org/regions/mediterranean/projects/current-projects/beyond-plastic-med-bemed>

Foundation. The project objective is to assess plastic waste, and leakages and sinks, to understand the origin and pathways of plastics, with a focus on Southern Mediterranean countries, to disseminate information and increase awareness on marine plastic pollution. Second, “Plastic Waste Free Islands Med project”⁴²⁴ aims to repurpose island into commercially viable products in the islands of Menorca and Cyprus. Also, the project pursues the development of Plastic Waste Free Island blueprint to be endorsed by regional bodies. It has been developed with the financial support of the Didier and Martine Primat Foundation since 2019 and is part of the broader IUCN programme “Close the Plastic Tap”⁴²⁵. The latter seeks solutions to tackle plastic pollution at its source in different seas and oceans worldwide, including the Mediterranean, through different projects⁴²⁶, that include various stakeholders from governments, industries, and civil society.

WWF is another global NGO that has a regional presence through the **WWF Mediterranean Marine Initiative** working towards the protection of the basin by bringing together WWF offices and from across the region (North Africa, Adria, EPO, France, Greece, Italy, Spain, and Turkey) with a network of partners including NGOs (i.e., MedPan, Tethys, etc.), international organizations (i.e., UNEP/MAP, IUCN, GFCM, etc.) and corporate partners (i.e., ImpactHub, Unicredit, etc.). WWF MMI focuses its work on six actions lines: blue economy, fisheries, MPA, wildlife, and plastic. The latter aims at stopping plastic pollution from reaching the sea by advocating for a UN treaty to eliminate plastic leakage, working with islands and cities to become plastic-free, as well as involving businesses from the tourism and fisheries sectors⁴²⁷.

The **Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE)** has a long track record of 25 years working as a technical and political platform in the Euro-Mediterranean focusing on biodiversity and nature, chemicals, climate change, marine and coastal environment, waster, and water resources⁴²⁸. It is a non-profit federation of 133 Mediterranean NGOs located in 28 countries of the Euro-Mediterranean area. MIO-ECSDE is currently participating in different projects with the objective of reducing plastic pollution, namely Plastic Busters CAP, Plastic Busters MPAs, and Med4Waste. Moreover, it was previously involved in completed projects such as ACT4LITTER, Derelict Fishing Gear Management System in the Adriatic Region, and MARine Litter in European Seas: Social Awareness and CO-Responsibility.

The **Partnership for Research and Innovation in the Mediterranean Area (PRIMA Foundation)**, partly funded by the programme Horizon 2020, is a ten-year initiative to improve water availability and sustainable agriculture production⁴²⁹. It is established as an NGO under Spanish private law since 2018, operating both at the national and international level, and including 19 participating countries (Croatia, Cyprus, Egypt, France, Germany, Greece, Israel, Italy, Jordan, Lebanon, Luxembourg, Malta, Morocco, Portugal, Slovenia, Spain, Tunisia, and Turkey). PRIMA has received €274 million to date from participating countries as well as a €220 million contribution from the EU (through Horizon 2020)⁴³⁰. Its main objective is “to build research and innovation capacities and to develop knowledge and common innovative solutions for agro-food systems and water management and provision in the Mediterranean region, through the implementation of the PRIMA Programme”⁴³¹. PRIMA cooperates closely with the UfM’s activities as well with its relevant Ministerial Conferences statements. The Foundation develops projects related to chemical and nutrient pollution in groundwater and surface water through the treatment of wastewater from agricultural in the Mediterranean basin. For instance, the project EADANMBRT⁴³² (“Evaluation and Development of Anaerobic Membrane Bioreactor (AnMBR) technology to promote unrestricted wastewater reuse and mitigate compromised surface water quality in the Mediterranean region”), launched in 2019 with a duration of 36 months, aims to treat the persistence and emerging of contaminants in wastewater sources for the preservation of surface water quality. Also, the project WATERMED 4.0⁴³³ was launched in 2018 (36 months duration) and has the objective of treating wastewater to control the effects of nitrate and phosphate released to the soil.

⁴²⁴ <https://www.iucn.org/regions/mediterranean/projects/current-projects/plastic-waste-free-islands-med-project>

⁴²⁵ <https://www.iucn.org/theme/marine-and-polar/our-work/close-plastic-tap-programme>

⁴²⁶ <https://www.iucn.org/theme/marine-and-polar/our-work/close-plastic-tap-programme/projects>

⁴²⁷ https://www.wwfmmi.org/what_we_do/plastic/

⁴²⁸ <https://mio-ecsde.org/what-we-do/>

⁴²⁹ <https://prima-med.org>

⁴³⁰ https://ec.europa.eu/info/research-and-innovation/research-area/environment/prima_en#background

⁴³¹ <https://prima-med.org/wp-content/uploads/2021/07/STATUTES-PRIMA-FOUNDATION.pdf>

⁴³²

<https://app.powerbi.com/view?r=eyJrIjoiM2Q0N2l0MWYtZWI1My00ODQ1LWE0NjYtYmQ2NWEyMTYyZTNliwidCl6ljdhNzM2ZDlkLWQ3NDMINDVIMC1IMTk3LTrYWM5NTNkMTI3YlsImMiOjI9>

⁴³³

<https://app.powerbi.com/view?r=eyJrIjoiM2Q0N2l0MWYtZWI1My00ODQ1LWE0NjYtYmQ2NWEyMTYyZTNliwidCl6ljdhNzM2ZDlkLWQ3NDMINDVIMC1IMTk3LTrYWM5NTNkMTI3YlsImMiOjI9>

7.2.5. Philanthropic organisations

The **Prince Albert II of Monaco Foundation**⁴³⁴ has the general objective of protecting the ocean, fighting against climate change, safeguarding biodiversity, and managing water resources and combatting desertification. Although the Foundation conducts its work at a global scale, there is a specific mission targeting the Mediterranean basin. It has participated in the development of several relevant initiatives related to the governance of the sea such as The MedFund, Beyond Plastics Med, and Because the Ocean. Moreover, the Foundation is currently undertaking the following projects to tackle the issue of marine pollution: Sustainable and innovative waste management on the Mediterranean islands⁴³⁵ project, launched in 2018 with a duration of 47 months, has the objective to provide technical support for effective waste management in 5 small islands (Levant and Lavezzi Islands in France; Tavolara Island in Italy; Kerkennah Island in Tu'sia; Sazani Island in Albania). Also, the Sea'ties⁴³⁶ project located in France was launched in January 2021 and spans for 3 years, aiming at facilitating the development of public policies and the implementation of adaptation solutions for coastal cities.

The **Med Fund** is a private NGO that provides funding for marine biodiversity conservation in MPAs, as well as supports cooperation between the civil society and Mediterranean states. It was launched in 2015 between the governments of France, Monaco, Tunisia, and the Prince Albert II of Monaco Foundation. Today, it also includes Albania, Morocco and Spain as member countries, and is supported by macroregional organizations, such as the Oceanographic Institute – Prince Albert 1st of Monaco Foundation, and regional organizations involved in the conservation of marine ecosystems (i.e., UNEP/MAP, Critical Ecosystem Partnership Fund, MedPAN, WWF Mediterranean, IUCN Mediterranean, the French coastal protection agency Conservatoire du Littoral and the NGO Mediterranean Small Islands Initiative)⁴³⁷. More specifically, MedFund is funded by bilateral and multilateral donors as well as from private and philanthropic sources. It is a hybrid environmental fund composed of endowment, sinking and revolving funds, in which the returns from the invested capital are used to provide grants to NGOs and MPA management authorities. The grants provided by the Fund are employed to restore key habitats, build partnerships and good governance, promote sustainable economic activities, improve surveillance and tackle illegal activities, among others. The target has been set to reach a capital of 30 million euros by 2025 through their different types of funds to provide long-term support to approximately 20 MPAs in the sea basin. To date, the MedFund is supporting 8 MPAs, reaching approximately 3.700 km², that amount more than 8 million euros (from which 5 million euros correspond to capitalization).

7.2.6. Financial institutions

The **European Investment Bank Group** finances projects and activities in the Mediterranean focusing on the private sector, climate and infrastructure. Besides EU countries in the sea basin, the EIB supports the development in the following partner countries: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, Syria and Tunisia. During the period 2016 to 2020, the EIB developed 21 projects in the Mediterranean amounting €1,79 billion⁴³⁸ in topics related to water, sewerage, solid waste, agriculture, fisheries and forestry, among other. Moreover, the advisory facility **MED 5P** was created to support Public-Private Partnership Project Preparation in the Southern and Eastern Mediterranean for infrastructure projects⁴³⁹.

The **World Bank (WB)** is a major global partnership of five institutions working for sustainable solutions to reduce poverty and contribute to development in developing countries. Even though the WB does not count with a regional facility in the Mediterranean, it actively supports the development of countries in the Middle East and North Africa (MENA) region. In the region, the bank's strategy focuses on expanding regional cooperation, tackling social and human issues, as well as enabling green growth through strengthening resilience to climate change. The portfolio of ongoing projects in the MENA region totals about US 23 billion. Moreover, in the upcoming regional Climate Action Plan for the period 2021-2025, four main areas of transformation were prioritized to boost climate action, including i) climate-smart cities and resilient coastal infrastructure; ii) energy transition and low-carbon mobility; iii) food systems, natural capital, and water security; and, iv) sustainable finance⁴⁴⁰. In addition, the WB has been supporting the development of several projects in Croatia during the last decades. This country is developing a blue economy model to tackle increasing impacts such as growing tourism, pollution, marine litter and plastics that will benefit from the capitalization of the WB's knowledge and support⁴⁴¹. Finally, it is important to mention the **PROBLUE** multi-donor trust fund, housed by the WB, which aims at supporting the development of integrated, sustainable and

⁴³⁴ <https://www.fpa2.org/en/index>

⁴³⁵ <https://www.fpa2.org/en/projects/sustainable-and-innovative-waste-management-on-the-mediterranean-islands-00497>

⁴³⁶ <https://www.fpa2.org/en/projects/sea-ties-00533>

⁴³⁷ <https://themedfund.org/en/about-us/>

⁴³⁸ <https://www.eib.org/en/projects/regions/med/index.htm>

⁴³⁹ <https://www.eib.org/en/projects/regions/med/med5p/index.htm>

⁴⁴⁰ <https://www.worldbank.org/en/region/mena/overview#2>

⁴⁴¹ <https://www.worldbank.org/en/country/croatia/brief/towards-a-blue-economy-model-in-croatia>

healthy marine and coastal resources. As of 2021, PROBLUE supports a portfolio of projects worth US 9 billion focusing on four key areas: i) addressing threats by marine pollution (including litter and plastics, from marine or land-based sources); ii) building government capacity to manage marine resources; iii) management of sustainable fisheries and aquaculture; and iv) development of oceanic sectors (i.e., tourism, maritime transport and off-shore renewable energy)⁴⁴². Within the Mediterranean sea basin, the fund has supported projects in Albania, Egypt, Lebanon, the West Bank, Morocco and Turkey.

The **Global Environment Facility (GEF)** is a multi-trust fund tackling environmental issues worldwide in topics related to climate change, chemicals and waste, international waters, biodiversity, and land degradation, as well as promoting stakeholder engagement. Within the basin, the **Mediterranean Sea Programme** (MedProgramme) is of particular interest to enhance environmental security with a budget allocation of US\$43 million. The main objective is to “reduce the major transboundary environmental stresses affecting the Mediterranean Sea and its coastal areas while strengthening climate resilience and water security, and improving the health and livelihoods of coastal populations”⁴⁴³. The main axes of the programme correspond to the i) reduction of land-based pollution in priority coastal hotspots; ii) enhancing sustainability and climate resilience in the coastal zone; iii) protecting marine biodiversity; and iv) knowledge management. Moreover, it is jointly implemented by UNEP and the European Bank for Reconstruction and Development (EBRD) in ten countries (Albania, Algeria, Bosnia and Herzegovina, Egypt, Libya, Lebanon, Morocco, Montenegro, Tunisia and Turkey). It is composed of seven projects, among which Project 1.1 Reducing Pollution from Harmful Chemicals and Wastes in Mediterranean Hotspots and Measuring Progress to Impacts, and Project 1.2 Mediterranean Pollution Hot Spots Investment Project are of particular interest for the Mission⁴⁴⁴.

The **French Development Agency (AFD) Group**⁴⁴⁵ implements the country’s policy in the areas of development and international aid, by financing different types of stakeholders. It aims at financing, supporting, and accelerating the transition towards a fairer and more sustainable world. For instance, the public sector, NGOs and, research and education in sustainable development are financed through the AFD; private sector financing is allocated through the subsidiary Proparco; and Expertise France provides technical cooperation. The Agency’s regions of intervention correspond to Africa, Latin America, and the Orients (from the Western Balkans to the Indo-Pacific). More precisely, the North Africa regional office encompassed 10% of the AFD’s global activity in 2021, covering the countries of Algeria, Egypt, Libya, Morocco, and Tunisia with a total amount of €5 billion invested since 2015. In particular, the project Depolluting the Mediterranean (DEPOLMED)⁴⁴⁶ provides an example of the work conducted in the Mediterranean basin that related to the Mission. The project aims to preserve water quality on the coast of Tunisia through the rehabilitation of 4 coastal wastewater treatment plants, hence reducing water pollution and protecting the marine environment. The project started in 2016 and has received a financing amount of €60 million.

The **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)** is the German development agency providing services in the field of international cooperation for sustainable development and international education work. Moreover, the GIZ has national offices in the different countries composing the Mediterranean.

7.3. Conclusion

Although marked by major differences between the Southern, Eastern and Western shores, the Mediterranean Basin is rich in governance organisations and structures. The regional cooperation features strongly the European Union, of which eight countries are Mediterranean, the Union for the Mediterranean (UM), an intergovernmental Euro-Mediterranean organisation which brings together all countries of the European Union and 15 countries of the Southern and Eastern Mediterranean and is active in the field of environment, water management and blue economy, and the Barcelona Convention with the objective to protect the Mediterranean marine and coastal environment while achieving sustainable development.

Though a number of governance bodies have been operating over the last decades in the region, in a number of areas including the environment, pollution control and the protection of sea ecosystems and habitats, the Mediterranean governance appears to be the less integrated of the four lighthouse areas covered by this project. This integration would benefit from being strengthened to bring more consistency into regional activity in this regard and efficiently mobilise it in order to achieve sea and water quality targets. The implementation

⁴⁴² <https://www.worldbank.org/en/programs/problue/overview>

⁴⁴³ https://publicpartnershipdata.azureedge.net/gef/PMISGEFDocuments/Multi%20Focal%20Area/Regional%20-%20289607%29%20-%20Mediterranean%20Sea%20Programme%20%28MedProgramme%29-%20Enhanc/MED_PFD_MedProgramme-Approval-Request_REVfinal_clean.pdf

⁴⁴⁴ <https://www.unep.org/unepmap/what-we-do/projects/MedProgramme>

⁴⁴⁵ <https://www.afd.fr/en>

⁴⁴⁶ <https://www.afd.fr/en/carte-des-projets/depolluting-mediterranean>

of legislation, regulations, and policies at various levels, involving all relevant stakeholders, is key to improve the governance in the region. This could be considered along several lines:

- Integration of regional governance, establishing stronger links between all relevant regional frameworks, particularly the UNEP/MAP, UfM and EU by supporting common strategies and coordinated action plans including marine spatial plans at a macro-regional scale involving several territories. As such, existing international agreements at regional and supra-national level should be signed, ratified, and implemented across the region. In parallel, integrated marine and land-sea spatial planning and the strengthening of related policy and tools. This should be in line with the trend observed at the overall level to shift from fragmented governance of maritime and marine affairs towards more integrated and coherent governance, fully considering protection of the marine environment as a primary policy objective.
- Development of further international cooperation on marine issues in the region relying on major organizations already present in the basin, such as the European Union, UN agencies (i.e., UNEP, UNEP/MAP), UfM, the World Bank, among others.
- An interface between science and policy could be established to reach effective governance, and bridge scientific gaps that prevent pollution programmes (monitoring, removal, etc.) at regional and national levels.
- Increasing financing by including diversified funding tools (i.e., traditional, innovative, national, international) from both public and private sources (i.e., philanthropy, development banks, international funds, businesses, etc.).
- Challenges such as pollution could be tackled with a combination of political, regulatory, and economic instruments.
- Establishment of dialogue between public and private actors to mainstream best practices and sustainability principles into their strategies to tackle challenges on marine and maritime issues.

The governance and stakeholder involvement structures presented play a transversal role in achieving the Mission Objective 2 to prevent and eliminate pollution from the Mediterranean Sea. The organizations mapped provide different opportunities to achieve the four targets set within this specific Objective. In fact, different organizations are working towards reducing plastic litter at sea (target 1), microplastics released into the environment (target 2), nutrient losses and chemical pesticides (target 3), and coastline litter (target 4). It is important to highlight that the Mission should involve diverse type of stakeholders to achieve the targets since they play a specific role to achieve the objective. For instance, international governmental institutions will provide political partnerships and serve as entry points to the countries that compose the basin. Also, NGOs will provide a leading role when implementing the activities set up to achieve the targets. Moreover, financial institutions as well as philanthropic organizations will ensure the financing and programming of the activities that are needed to secure the long term sustainability of the results.

7.4. Opportunities for collaboration

In the following, the 10 organizations deemed most important for collaboration with regard to achieving the Mission's objectives in the Mediterranean Lighthouse area are presented. The list contains at least one organization from each category – governmental institutions and international intergovernmental organizations, research institutions, NGO, finance institutions and philanthropic organizations – to acknowledge the broad scope of the Mission's objectives and the necessity to involve all relevant stakeholder groups. The order of the organizations is not to be understood as a prioritization. Instead, the list contains examples of actors crucial to talk to in order to go forward with the implementation of Mission's objectives:

- **UNEP/MAP**

Potential role as partner to the Mission: Political partner, and Decision makers.

- **Union for the Mediterranean (UfM)**

Potential role as partner to the Mission: Political partner, and Decision makers.

- **WestMED Initiative**

Potential role as partner to the Mission: Political partner.

- **IUCN Centre for Mediterranean Cooperation (IUCN-MED)**

Potential role as partner to the Mission: Potential project leader.

- **WWF Mediterranean Marine Initiative**

Potential role as partner to the Mission: Financing/programming partner, and Potential project leader.

- **PRIMA Foundation**

Potential role as partner to the Mission: Science partner.

- **Prince Albert II of Monaco Foundation**

Potential role as partner to the Mission: Financing/programming partner, and Potential project leader.

- **European Investment Bank (EIB)**

Potential role as partner to the Mission: Financing/programming partner.

- **Global Environment Facility (GEF)**

Potential role as partner to the Mission: Financing/programming partner, and Potential project leader.

- **World Bank**

Potential role as partner to the Mission: Financing/programming partner.

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TASK 4 – ANALYSIS OF SMART SPECIALISATION STRATEGIES (RIS3)

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1. EXECUTIVE SUMMARY

This is the final report outlining the results of Task 4 – Analysis of RIS3s and other strategies, submitted as part of the project “Baseline study for the implementation of lighthouses of Mission ‘Restore our Ocean and Waters by 2030”, under Framework Contract Nº FRA/C.2/ENV/2020/OP/0032.

The purpose of this report is to provide information on the extent to which several types of policy strategies existing at regional, national, and inter-regional level in the EU are in line with the objectives of the Mission ‘Restore our Ocean and Waters by 2030’(also referred to as Mission ‘Ocean and Waters’ hereafter, for brevity purposes):

- Mission Objective 1 (MO1): Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030 (for the Atlantic, Arctic, and Danube areas);
- Mission Objective 2 (MO2): Prevent and eliminate pollution of our ocean, seas, and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil (for the Mediterranean area).

Specifically, the objectives of the report are to:

Analyse Regional Innovation Strategies for Smart Specialisation (RIS3) and other macroregional or lighthouse area level strategies, as well as National Recovery and Resilience Plans (RRPs) to identify synergies with the topics of the Mission objectives per lighthouse area;

- Identify opportunities to align RIS3s with Mission objectives;
- Analyse selected measures foreseen to implement the Marine Strategy Framework Directive (MSFD) and the Water Framework Directive (WFD), which are relevant to the Mission objectives implemented in the lighthouse areas.

In this report, we present the results of the strategy mapping process, performed from March to June 2022, and the conclusions of the cross-analysis of the synergies between the Mission’s objectives and the priorities and actions outlined in RRPs, RIS3s and other lighthouse area level strategies. Below are the key findings from the mapping and analysis process.

The Mission is a novel research and innovation policy instrument with a transformative theory of change, which operates in the EU’s multi-level governance setting and complex policy environment. In this study, the analysis relies on developments in the innovation policy academic literature that help in understanding how transformative innovation and system change happens in specific socio-technical systems⁴⁴⁷. The interdisciplinarity of the Mission means that, in order for it to achieve the goals set, it has to act towards accelerating the development, scaling up, and diffusion of research and innovation results (or newly formed “niches”) in very diverse sectors such as water management, wastewater management, river basin or sea basin management, shipping and ports infrastructure, etc. (the “regime”). The role of the Mission is not only to nurture the niches and the disruptive innovations that can have the desired environmental impact, but especially to “unlock” or open up the “regime” sectors, the incumbents, towards these more disruptive innovations. The mapping performed in this study provides an overview of the existing policy commitments and synergies that the Mission can create with them.

Potential synergies of Mission ‘Ocean and Waters’ objectives with RIS3s

RIS3s are place-based strategies that aim to channel research and innovation efforts towards developing specific niches of competitive advantage in the regions. From this point of view, the RIS3s can be considered as a starting point for understanding the specialisation and the development trajectory envisioned by each region, and whether they would be relevant as counterparts for a) sources of innovations in support of the Mission goals, or b) becoming specific demonstration sites for achieving goals relevant to the Mission. While the results of this mapping are not representative of the entire lighthouse areas, the results show that, for the 13 strategies mapped more in-depth⁴⁴⁸, the Mission Objectives are relatively well covered in the RIS3s that were mapped for the Mediterranean (MO2), and Atlantic and Arctic Areas (MO1). The Danube area has the least alignment with the Mission Objectives among all lighthouse areas, for the field of biodiversity protection in freshwater ecosystems.

⁴⁴⁷ Based on Palavicino, Matti, & Witte, 2022: MOTION Handbook. Developing a transformative theory of change, <https://www.tipconsortium.net/wp-content/uploads/2022/02/MOTION-Handbook-180222.pdf>

⁴⁴⁸ Selected based either on a survey of the regions, or the relevance of the regions’ specialisation and geographical location to the Mission (See Chapter 3 for more explanations on the regions’ selection)

The interviews with regional officials revealed several factors that could support the regions in engaging and mobilising stakeholders towards the Mission Objectives. It is important that the Mission works towards creating a clearer mandate for the regions in relation to the Mission, also the national level. Developing governance mechanisms and clearer operational guidelines would be useful in this sense. Moreover, further promoting the Mission at the Member State and regional level, as well as providing opportunities for peer learning on how to implement Mission-relevant activities, are useful suggestions. In terms of direct funding or support, the regional officials interviewed suggested that direct funding for regional ecosystem orchestration be ensured for achieving Mission-relevant objectives, as well as for funding and/or demonstration of Mission-relevant solutions in the regions would be welcome.

Potential synergies of RRPs towards Mission ‘Ocean and Waters’ objectives

Overall, the RRPs have a rather general and sectoral focus, and do not always focus on targeted support for deploying innovative digital or technological solutions, for example for marine habitat restorations or promoting the Blue Economy. Rather, RRPs cover activities for activities such as: improvement of framework conditions (through reforms); infrastructure investments; sectoral environmental policy measures promoting biodiversity on land (and at sea in many cases); and horizontal measures promoting digitalisation, research and innovation. From a systems transformation perspective, the RRPs are important sources of funding that the Mission could tap into for the short term (until 2026), and the organisations managing the funds could be encouraged to take up the innovations that could tilt the system towards the desired Mission goals.

In terms of current alignment with the Mission objectives, there are discrepancies between the different lighthouse areas in their support for the Mission objectives.

MO1 is better covered in the Atlantic and Arctic areas, with more partial coverage in the Danube area. The challenges in many countries in the Danube region (except for Austria and Germany) are generally more related to reforming the Water management system, or to complying with the EU Water Framework Directive, Floods Directive, or Biodiversity Strategy.

MO2 (only focusing on the Mediterranean area) shows significant gaps in coverage in terms of RRP priorities. In general, there are no specific holistic measures targeting the reduction of pollution in the Mediterranean Sea through research and innovation or scaling up of innovative solutions. Italy, Malta and Cyprus have more measures focusing on greening ports, improving the energy efficiency of ports, and promoting the use of alternative fuels for ports and ships. Greece, for instance, has a large number of measures focused on marine ecosystems, biodiversity protection, aquaculture and eco-tourism, and port renewal, as well as the reform of the National Water Management Authority. However, if specifically analysed for their focus on MO2, these RRPs have only a partial or indirect synergy with reducing pollution through reducing plastic litter, microplastics, or chemical pesticide pollution in the sea.

Potential support of inter-regional strategies towards Mission ‘Ocean and Waters’ objectives

The majority of the inter-regional strategies (generally covering macro-regional areas designated by the EU, or self-organised conventions or international bodies that work across similar regions as the lighthouse areas)⁴⁴⁹ cover measures that are very relevant to the Mission objectives. All the strategies cover objectives and/or actions that touch on issues relevant to the MSFD, and almost all cover objectives relevant to the Blue Economy, the EU2030 Biodiversity Strategy, and the EU Adaptation Strategy. At the same time, the strategies have a different intervention reasoning from the EU Mission, working more towards improving and harmonising regulations, policy, markets, and education, for the fields of environment, marine and freshwater ecosystems and habitats, biodiversity protection, maritime spatial planning etc. They also aim to create or manage relevant thematic networks of policy makers or researchers, and foster knowledge exchange on the topics relevant to healthy oceans, seas and rivers. All of the strategies (except for the OSPAR⁴⁵⁰ 2030 strategy) also target support for developing Blue Economy sectors, such as ports and shipping, blue skills, marine renewable energy, sustainable tourism etc. The All-Atlantic Ocean Alliance and BlueMed initiative are particularly focused on supporting collaborative research and innovation projects, offering technology development and innovation platforms at the Atlantic area level.

⁴⁴⁹ See the Introduction section to understand which strategies were covered by the analysis

⁴⁵⁰ Convention for the Protection of the Marine Environment of the North-East Atlantic

Summary Assessment

Based on the mapping performed in this study, it is evident that the Mission operates in an environment where policy mixes are already set up at the European, lighthouse area, national and regional levels for at least the upcoming five to seven years approximately. The mapping provides an overview of how the Mission is already aligned with existing policies and strategies, or where there are perhaps gaps.

Mission-oriented policies are meant to support system-wide transformations and require the collaboration of diverse sectors and value chains, in order to promote both the acceleration of the implementation of tested solutions to urgent problems in the short term, as well as the deployment of ambitious innovations that can disrupt and upgrade the system⁴⁵¹. The process for mainstreaming disruptive innovations can be illustrated through the Multi-level Perspective on socio-technical transitions (Figure 130 below).

According to the theory related to the Multi-Level Perspective on socio-technical system transformation, systemic change happens when the innovations that are currently considered as "niche" replace dominant practices ("regimes"), once they start opening up to new alternatives. The landscape is the condition in which transformations occur, described by processes, trends and externalities that actors cannot influence directly, such as climate change or the Covid-19 pandemic⁴⁵².

In this report, the focus has been on mapping the relevance of:

- strategies that could be considered as part of the current “regime”** (in socio-technical transition theory terms), and which would mainly follow the tried and tested routes towards sometimes similar goals like the Mission; the broad sectoral policy support initiatives mapped in the National Recovery and Resilience Plans, and sectoral (environmental and water) policy frameworks for inter-regional cooperation such as the macro-regional strategies can be categorised as "regime" type of policies;
- strategies that support the new niches' development**, or the investments in new technologies or system innovations, such as inter-regional research and innovation alliances and networks, as well as regional innovation and industrial policy approaches such as the Regional Innovation Strategies for Smart Specialisation (RIS3) in the fields relevant to the Mission Ocean and Water Objectives.

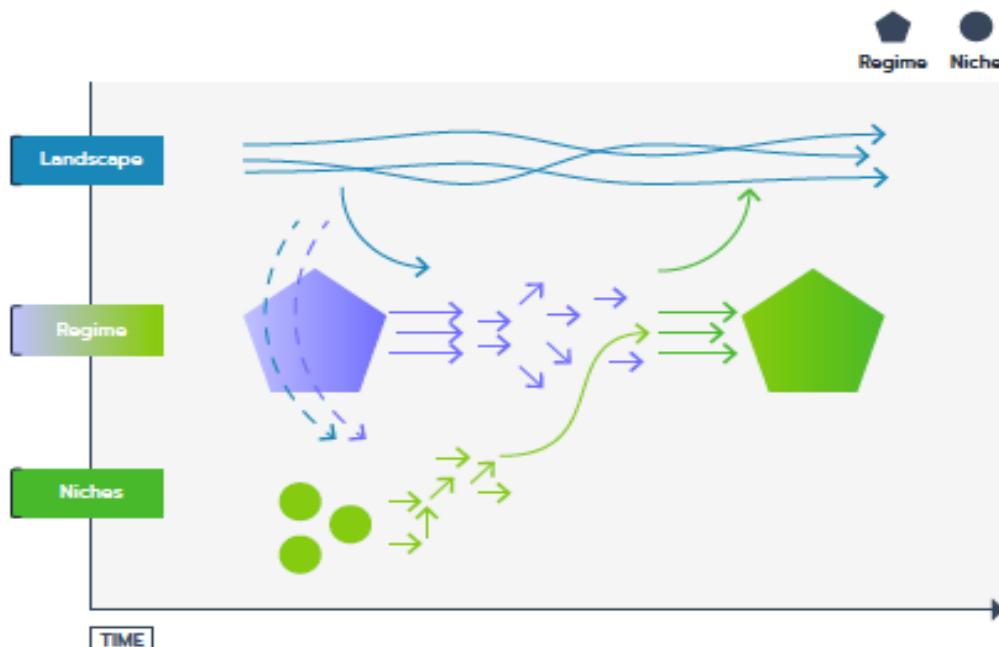


Figure 130 The multi-level perspective on socio-technical transitions

Source: Palavicino, Matti, & Witte, 2022, based on Geels (2002), Geels and Schot (2007)

⁴⁵¹Miedzinski, Mazzucato et al., 2019: A framework for mission-oriented innovation policy roadmapping for the SDGs: The case of plastic-free oceans, Working Paper WP 2019-03, https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/a_framework_for_mission-oriented_policy_roadmapping_for_the_sdgs_final.pdf

⁴⁵² Palavicino, Matti, & Witte, 2022: MOTION Handbook. Developing a transformative theory of change, <https://www.tipconsortium.net/wp-content/uploads/2022/02/MOTION-Handbook-180222.pdf>

The mapped RIS3s and the inter-regional research and innovation alliances can support the Mission through channeling and legitimizing investments in developing the required technologies or innovations needed for the systems transformation intended by the Mission, and leveraging other relevant sources of funds (such as regional, European Structural and Investment Funds, other national or inter-regional funds). The research and innovation alliances like BlueMed and the All-Atlantic Ocean Alliance are examples of ways to nurture the niches along with research and development investments.

The Mission could therefore act more on expanding and mainstreaming the niches, and connecting the innovations to the actors that are the incumbents in the “regime”. For this, the Mission secretariat could act at the interface between the different parts of the system (Figure 131). Below we offer suggestions on how the Mission could further intervene:

On building and nurturing niches: understand how the development of disruptive technologies could be further accelerated, or how already developed initiatives could be scaled up at regional level. Based on the regional mapping performed, regions need support for the orchestration of their water-related innovation ecosystems, building on their RIS3s as starting points and legitimizing tools for focusing on the waters, seas, ocean and blue economy sectors.

On expanding and mainstreaming niches: the Mission should engage with the mapped actors that are part of RIS3s or coordinate the macro-regional strategies, in order to help connect the developed innovative practices and technologies to potential users (within or outside the region), many of them being public bodies in charge of water, sea, river or ocean bed.

On opening up and unlocking regimes: engage with the actors that are coordinating the macro-regional or national sectoral policies related to environmental, water management, ports management, industrial policies, etc. – and support their learning process towards new alternative practices and technologies relevant to support progress in reaching the objectives of the Mission.

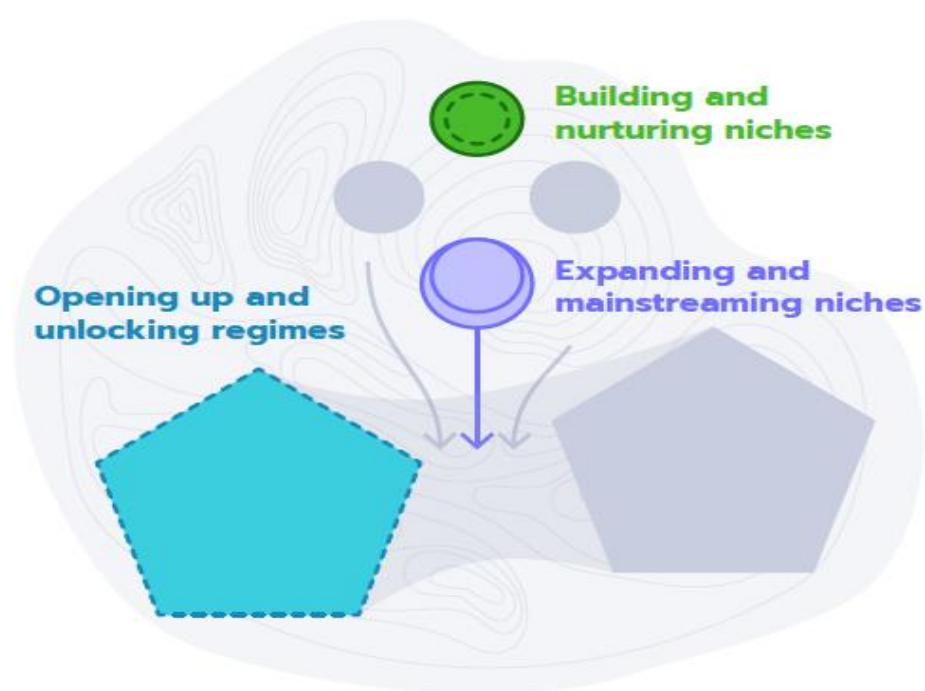


Figure 131 Macro-processes that lead to systems transformation

Source: Palavicino, Matti, & Witte, 2022, based on Geels (2002), Geels and Schot (2007)

2. INTRODUCTION

This is the final report outlining the results of Task 4 – Analysis of RIS3s and other strategies, submitted as part of the project “Baseline study for the implementation of lighthouses of Mission ‘Restore our ocean and waters by 2030’”, under Framework Contract Nº FRA/C.2/ENV/2020/OP/0032.

The objectives of this task were to:

- Analyse Regional Innovation Strategies for Smart Specialisation (RIS3)⁴⁵³ and other macroregional strategies, as well as National Recovery and Resilience Plans (RRPs)⁴⁵⁴ to identify synergies with the topics of the Mission objectives per lighthouse area;
- Analyse selected measures foreseen for implementing the Marine Strategy Framework Directive and Water Framework Directive, which are relevant to the Mission objectives implemented in the lighthouse area;
- Identify opportunities to align RIS3 / S4 with Mission objectives.

In this report, we present the results of the strategy mapping processes, performed from March– June 2022, and the conclusions of the cross-analysis of the Mission objective synergies with RRPs, RIS3s and other lighthouse area level strategies. Under the present study, synergy is defined as “the interaction between the different instruments, able to generate a greater effect than the sum of their separate parts.”⁴⁵⁵ The Mission objectives that are in the scope of this study are presented in the table below.

#	Objective	Sub-objectives	Lighthouse areas
1 (fresh-water)	Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030 (freshwater)	a. Protect a minimum of 30% of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network. b. Strictly protect at least 10% of the EU's sea area. c. Restore at least 25,000 km of free-flowing rivers. d. Contribute to relevant upcoming marine nature restoration targets, including degraded sea bed habitats and coastal ecosystems.	Danube river basin
1 (marine)	Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030 (freshwater)	a. Protect a minimum of 30% of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network. b. Strictly protect at least 10% of the EU's sea area. c. Restore at least 25,000 km of free-flowing rivers. d. Contribute to relevant upcoming marine nature restoration targets, including degraded sea bed habitats and coastal ecosystems.	Atlantic and Arctic coast
2	Prevent and eliminate pollution of our oceans, seas and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil	a. Reduce by at least 50% plastic litter at sea. b. Reduce by at least 30% microplastics released into the environment. c. Reduce by at least 50% nutrient losses, the use and risk of chemical pesticides.	Mediterranean Sea

Table 66 Mission “Restore our Ocean and Waters by 2030” objectives

⁴⁵³ Regional Innovation Strategies for Smart Specialisation (RIS3) are part of the EU's approach to place-based innovation and industrial policy, which entails “the identification of strategic areas for intervention in regions, based both on the analysis of the strengths and potential of the economy and on an Entrepreneurial Discovery Process (EDP) with wide stakeholder involvement” (see JRC, 2022: What is Smart Specialisation? <https://s3platform.jrc.ec.europa.eu/what-we-do>)

⁴⁵⁴ Recovery and Resilience Plans (RRPs) are the plans that the EU Member States need to submit to the European Commission in order to benefit from the European Recovery and Resilience Facility (RRF), a funding scheme launched following the COVID-19 pandemic. The RRPs outline reforms and investments to be implemented by the end of 2026 with support from the RRF. More information on this page: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

⁴⁵⁵ JRC, 2021: Linking the ‘Recovery and Resilience Plan’ and Smart Specialisation. The Portuguese case, based on Oxford, 2011

Chapter 3 explains the methodology for the selection of the RIS3 strategies and other strategies to be mapped as well as the methodology for the analysis of the results. The table below provides an overview of the **37 strategies mapped in the data matrix** across the four lighthouse areas, including the RIS3s mapped, the RRPs and the **macro-regional or other available lighthouse area strategies**. The data matrix is provided as an Excel document alongside this document.

Lighthouse area	Nr. of regional RIS3 analysed	Nr. of RRPs mapped	Nr. of other strategies mapped
Atlantic	5 (Bretagne, Norte, Porto, Navarra, Galicia)	5 (FR, IT, IE, PT, ES)	3 (Atlantic Action Plan 2.0, OSPAR (strategy 2030), All-Atlantic Ocean Research Alliance)
Arctic	2 (Norrbotten, Council of Oulu Region)	2 (FI, SE)	1 (North-East Atlantic Environment Strategy / OSPAR Strategy (2030)) (Shared with Atlantic Area)
Mediterranean	3 (Lombardy, Occitanie, Emilia Romagna)	5 (CY, EL, HR, MT, SI) (ES shared with Atlantic area)	3 (Western Med Sea-basin strategy, EU Strategy for Adriatic and Ionic Region, BlueMed Initiative)
Danube	3 (Salzburg, North-East Romania, South-East Romania)	5 (AT, CZ, DE, SK, RO); BG and HU were still not validated by the EU at the time of the mapping	1 (Danube River Basin Action Plan (2020+))
Total	13	17	7 (OSPAR covers both Atlantic and Arctic areas)

Table 67 Overview of strategies mapped

Chapter 4 outlines the results of the mapping process that focused on the RIS3s in the four lighthouse areas and the extent to which they are in synergy with the Mission objectives. Due to the delay in the regions' publishing of the updated RIS3s for the 2021-2027 EU funding programming period, the mapping has relied on information obtained both through a survey with the regions in the four lighthouse areas, and desk research. The results for the 2021-2027 period are not representative of the four lighthouses, due to the low response rate to the survey and the delays in the regions' publishing of 2021-2027 strategies. Furthermore, seven interviews have taken place with regions from the four lighthouse areas, in order to gain more qualitative insights on the potential role of the regions in the implementation of the Mission objectives.

Chapter 5 provides an overview of the results of the mapping of synergies with RRPs, while Chapter 6 reviews the results of the mapping of interregional strategies that are relevant at lighthouse area level. Chapter 7 concludes on the findings.

3. METHODOLOGY FOR MAPPING THE RIS3S AND OTHER STRATEGIES

The initial mapping of synergies with RIS3s was performed based on the data available through the JRC Eye@RIS3 tool⁴⁵⁶, which contained information on the RIS3s developed for the 2014-2020 period. The table below shows regions that were selected based on criteria related to the regions' coastal status or their RIS3's broad alignment with the following broad objectives (which were integrated into the JRC search engine):

Environmental objectives related to water:

- Related to marine or coastal water: restoration and protection of marine ecosystems and biodiversity and their sustainable use, restoration of coastal areas and their biodiversity and their sustainable use, climate change resilience of coastal areas
- Related to freshwater: restoration of rivers and their sustainable use (e.g. removal of dams, ecotourism on rivers, aquaculture), restoration and sustainable use of other freshwater environments (wetlands), restoration and sustainable use of lakes
- Related to pollution, e.g. pollution prevention, including prevention of litter, plastic, chemical and nutrient pollution of marine areas; monitoring of pollution (litter, plastic, chemicals, nutrients), including development/deployment of digital technologies, elimination of pollution from marine and freshwaters (e.g. wastewater cleaning, collection of waste, circular uses of waste), including development of technologies for that purpose, etc.

⁴⁵⁶ See JRC, Eye@RIS3 tool, <https://s3platform.jrc.ec.europa.eu/map>

Exploration of the earth: mapping / exploration of sea bed or water resources; digital technologies for biodiversity monitoring or pollution monitoring; hydrology; mineral, oil and/or natural gas prospecting, etc.

Blue growth, which covers a wide range of interlinked established and emerging sectors, including blue bioeconomy, blue biotechnologies, circular value chains, etc.

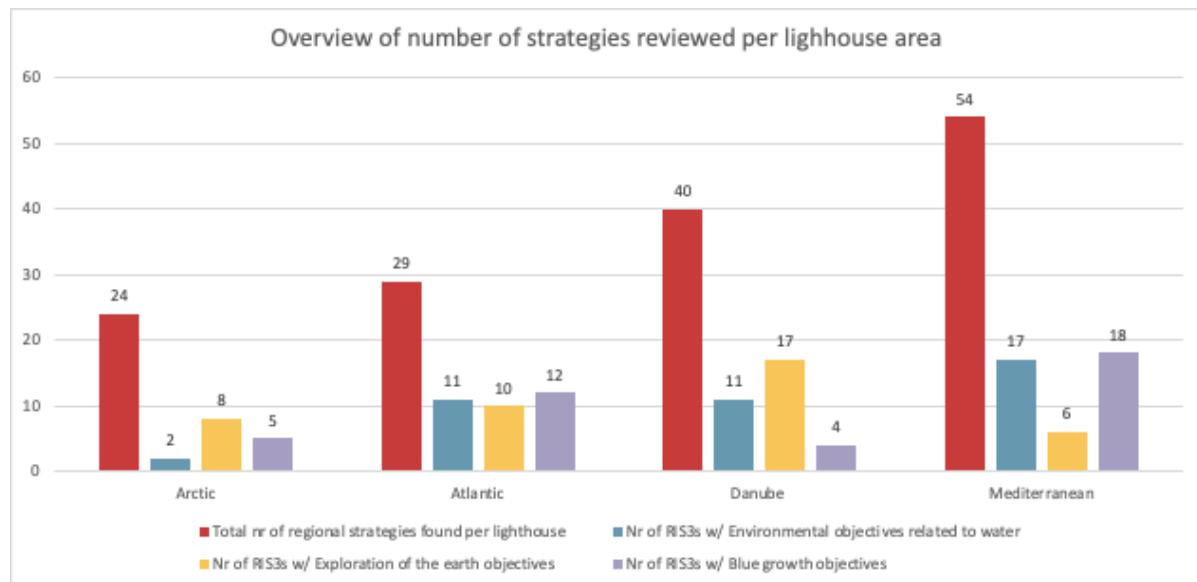


Figure 132 Overview of nr. of strategies identified per lighthouse area from the JRC Eye@RIS3 platform (2014-2020)

Source: Technopolis Group; strategies may include two or three of the objectives

Figure 131 above and Figure 132 below show that the four lighthouse areas had a different pattern in prioritising aspects related to the Mission objectives from 2014-2020. In particular, the regions in the **Arctic and the Danube lighthouses** had a stronger focus on objectives related to “**exploration of the earth**” from 2014-2020, while the **Atlantic and Mediterranean areas show more interest in “Blue Growth” and “Environmental objectives related to water”** in the 2014-2020 period. **The regions in the Danube area** showed a **strikingly low interest in Blue Growth fields** in their RIS3s in their field, as only 4 out of 40 strategies scanned (10%) were prioritising this field in that period.

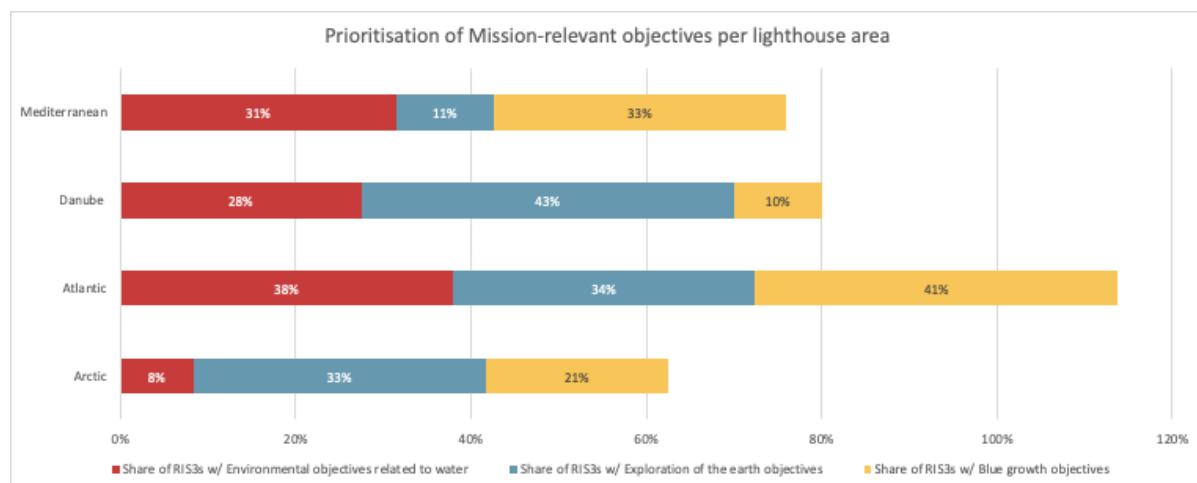


Figure 133 Prioritisation of Mission-relevant objectives per lighthouse area (2014-2020)

Source: Technopolis Group; strategies may include two or three of the objectives

Based on the analysis of the RIS3s available, the table below identifies 28 regions / countries whose RIS3s covered at least two of the objectives related to the Mission (Environmental objectives related to water / Exploration of the earth / Blue growth), during the period 2014-2020, and/or have a coastal status, which makes them more likely to have included water-related objectives in their RIS3.

The table below also shows that the Eye@RIS3 Platform only provides information on RIS3s that were published from 2014-2020. These are being replaced with new ones for the 2021-2027 period and are therefore outdated. For this reason, while the above table gives an indication of the likelihood that the above regions may have carried forward similarly relevant priorities for the 2021-2027 period, it cannot be taken for

granted. As a consequence, **the data collection on the objectives of the regions took a combined approach**, drawing on the following sources to cover the most up-to-date information on the objectives of published strategies:

A survey was developed to collect information on the actual status of the RIS3s in the EU regions, and to understand their perspective on their RIS3 synergies with the EU Mission on Restoring the Ocean and Waters by 2030.

Desk research and mapping of objectives were performed on the **National Recovery and Resilience Plans (RRPs)** of the EU Member States that are part of the four lighthouse areas, to compensate for the lack of information on national-level RIS3s.

Online desk research was performed for the prioritised regions that did not reply to the survey (majority of the regions).

In summary, the table below provides information on the availability of the data on regional or national objectives for the prioritised regions. Out of the 21 regions, there were only four RIS3s found online for the 2021-2027 period, while the rest were not found online or in draft version only. In the case of the RIS3s that had been designed at national level in the previous programming period, we have replaced them with the RRPs.

#	Basin	NUTS levels ⁴⁵⁷	Name	Country	Coastal	RIS3 available for 2014-2020? (on EYE@RIS3)	RIS3 available for 2021-2027? (based on online search)
1	Mediterranean	FRJ1	Languedoc-Roussillon	France	YES	YES	YES
2	Mediterranean	FRL0	Provence-Alpes-Côte d'Azur	France	YES	YES	NO
3	Mediterranean	EL30	Attiki	Greece	YES	NO	NO
4	Mediterranean	EL61	Thessalia	Greece	YES	NO	NO
5	Mediterranean	EL62	Ionia Nisia	Greece	YES	NO	NO
6	Mediterranean	EL63	Dytiki Elláda	Greece	YES	NO	NO
7	Mediterranean	ITF4	Puglia	Italy	YES	YES	NO, found online in draft from March 2022
8	Mediterranean	ITF5	Basilicata	Italy	YES	YES	NO
9	Atlantic	FRG0	Pays de la Loire	France	YES	YES	NO, but answered the survey
10	Atlantic	FRI1	Aquitaine	France	YES	YES	NO
11	Atlantic	PT15	Algarve	Portugal	YES	YES	NO
12	Atlantic	PT17	Área Metropolitana de Lisboa	Portugal	YES	YES	NO, but answered the survey
13	Atlantic	PT18	Alentejo	Portugal	YES	YES	NO
14	Atlantic	PT20	Região Autónoma dos Açores	Portugal	YES	YES	NO
15	Atlantic	ES11	Galicia	Spain	YES	YES	YES
16	Atlantic	ES13	Cantabria	Spain	YES	YES	NO, but it is in the making
17	Atlantic	ES70	Canarias	Spain	YES	NO	NO
18	Danube	AT	Austria	Austria	NO	YES	RIS3 mapping replaced with RRP mapping
19	Danube	BG	Bulgaria	Bulgaria	YES	YES	RIS3 mapping replaced with RRP mapping, but RRP not available
20	Danube	HR	Croatia	Croatia	YES	YES	RRP
21	Danube	CZ	Czechia	Czech Republic	NO	YES	RRP
22	Danube	HU	Hungary	Hungary	NO	YES	RIS3 mapping replaced with RRP mapping, but RRP not available
23	Danube	RO21	Nord-Est	Romania	NO	YES	YES
24	Danube	RO22	Sud-Est*	Romania	YES	NO	YES
25	Danube	SK	Slovakia	Slovakia	NO	YES	RRP
26	Danube	SI	Slovenia*	Slovenia	YES	YES	RRP
27	Arctic	FI19	Länsi-Suomi (means Western Finland)	Finland	YES	YES	YES – one RIS3 of one sub-region found, but the 3 other sub-regions do not have it
28	Arctic	NO0B	Nord-Norge (centralised to Troms og Finmark)	Norway	YES	YES	NO

Table 68 List of regions with coastal status and/or alignment with two broad objectives relevant to the Mission

Source: Technopolis Group, June 2022. Note: the objectives according to which the RIS3s have been selected relate to the EYE@RIS3 platforms' categorisation of specialisation areas that are relevant to the current Mission's objectives, including 'Environmental objectives related to water', 'Exploration of the earth', and 'Blue growth', as explained at the beginning of this chapter.

⁴⁵⁷ RIS3 strategies can be designed at different NUTS levels, from the national (NUTS1), to the NUTS2, or NUTS3 levels, depending on the country's choice. The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the EU for statistical and policy relevant purposes (see: <https://ec.europa.eu/eurostat/web/nuts/background>)

Finally, the table below provides an overview of the regions from which the most recent and published RIS3s were mapped (thus, not the ones that answered the survey).

Lighthouse area	Nr. of regional RIS3s analysed
Atlantic	5 (Bretagne, Norte, Porto, Navarra, Galicia)
Arctic	2 (Norrbotten, Council of Oulu Region)
Mediterranean	3 (Lombardy, Occitanie, Emilia Romagna)
Danube	3 (Salzburg, North-East Romania, South-East Romania)
Total	13

Table 69 RIS3 Strategies mapped in the data matrix

Source: Technopolis Group, June 2022

In addition to the RIS3s, the mapping also focused on providing an overview of the synergies with the National Recovery and Resilience Plans (RRPs) and other strategies that are relevant at lighthouse area level. The table below provides an overview of the **37 strategies mapped in the data matrix** across the four lighthouse areas, including the RIS3s mapped, the RRPs and the **macro-regional or other available lighthouse area strategies**. The data matrix is attached to this document.

Lighthouse area	Nr. of regional RIS3 analysed	Nr. of RRPs mapped	Nr. of other strategies mapped
Atlantic	5 (Bretagne, Norte, Porto, Navarra, Galicia)	5 (FR, IT, IE, PT, ES)	3 (Atlantic Action Plan 2.0, OSPAR (strategy 2030), All-Atlantic Ocean Research Alliance)
Arctic	2 (Norrbotten, Council of Oulu Region)	2 (FI, SE)	1 (North-East Atlantic Environment Strategy / OSPAR Strategy (2030)) (Shared with Atlantic Area)
Mediterranean	3 (Lombardy, Occitanie, Emilia Romagna)	5 (CY, EL, HR, MT, SI) (ES shared with Atlantic area)	3 (Western Med Sea-basin strategy, EU Strategy for Adriatic and Ionic Region, BlueMed Initiative)
Danube	3 (Salzburg, North-East Romania, South-East Romania)	5 (AT, CZ, DE, SK, RO); BG and HU were still not validated by the EU at the time of the mapping	1 (Danube River Basin Action Plan (2020+))
Total	13	17	7 (OSPAR covers both Atlantic and Arctic areas)

Table 70 Overview of strategies mapped

In the next sub-chapters, we provide an overview of the results of the mapping of synergies, per type of strategy mapped. It is important to mention that the mapping process is based on a **qualitative appraisal of the strategies**, which has the **following limitations**:

The diverse range of priorities and objectives that can be found in RIS3s sometimes caused overlaps in the answers of the regions in the survey or the results of the mapping done in the desk research; many measures are relevant to several of the objectives. This also makes the assessment of priorities and their synergies with Mission objectives more difficult. This is confirmed by the experience of other studies mapping RIS3 priorities and objectives (e.g. Gianelle et al., 2020⁴⁵⁸, Iacobucci and Guzzini, 2016⁴⁵⁹). Gianelle et al., (2020) developed a typology of archetypal RIS3 priorities, which we find useful to outline here, for further reference:

- “the archetypal Smart Specialisation priority is defined as a distinctive combination of two out of four dimensions: (A) the sectors or value chains of primary interest for the intervention; (B) the transformative processes to be activated (technology applications); (C) the societal challenges to be addressed; and (D) the natural and/or cultural resources to be used (e.g., maritime ecosystem, alpine ecosystem, cultural heritage). The intersection of these dimensions determines the (set of) activities to be targeted by the policy intervention.”(Gianelle et al., 2019).

⁴⁵⁸ Carlo Gianelle, Fabrizio Guzzo & Krzysztof Mieszkowski, 2020, Smart Specialisation: what gets lost in translation from concept to practice?, Regional Studies, 54:10, 1377-1388, DOI: 10.1080/00343404.2019.1607970

⁴⁵⁹ Iacobucci, D., & Guzzini, E., 2016, Relatedness and connectivity in technological domains: Missing links in S3 design and implementation. European Planning Studies, 24(8), 1511–1526. doi: 10.1080/09654313.2016.1170108

- The measures included in the strategies (especially RIS3s) are rather vague (see also examples in the survey analysis, Appendix A), such as: support SMEs in the Blue Economy, aquaculture or tourism businesses, etc. This impedes the provision of concrete figures or numbers in terms of amounts foreseen to be invested. There is no information on budgets from the RIS3s and lighthouse area strategies mapped. The only information available on budgets allocated mainly stems from the RRPs (not fully covering all measures either).
- It was not always possible to perform a detailed analysis of the measures foreseen by the RIS3 strategies in the above fields, as, in the majority of cases, the measures are generic, related to R&I activities, and deployed across the water-relevant fields prioritised. Typical R&I activities prioritised by the RIS3s include: Supporting key projects led by regional clusters or research centres, Supporting the development of new research infrastructures, and supporting the development of cooperative projects between academia and private sector, in the relevant smart specialisation fields.
- The categorisation of the measures that was performed at the end is based on a subjective understanding of the synergies, therefore it can be considered rather as an indicative status quo, without attempting to be comprehensive and definitive.

Therefore, the information summarised below resulting from the mapping process should be considered as qualitative and indicative of the changing landscape of how regions and countries are prioritising actions that are relevant to the Mission objectives in the lighthouse areas in focus (Atlantic, Arctic, Mediterranean, Danube).

4. ANALYSIS OF MISSION OBJECTIVES' SYNERGIES WITH RIS3 STRATEGIES

This chapter outlines the main results of the mapping process of the RIS3 strategies with the Mission objectives (MO) (see Chapter 2 – Introduction – for more details on the specific objectives):

- MO1: Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030 (for the Atlantic, Arctic, Danube areas);
- MO2: Prevent and eliminate pollution of our ocean, seas, and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil (for the Mediterranean area).

The analysis relies on triangulating both the results of the survey conducted with regions and the desk research of relevant RIS3s published for the 2021-2027 period. The strategies to be analysed have been selected based on the process explained in Section 3 above. As mentioned, the results for the 2021-2027 period are not representative of the four lighthouses, due to the low response rate to the survey and the delays in the regions' publishing of 2021-2027 strategies.

Furthermore, in order to complement the desk research and survey findings, seven interviews have taken place with regions from the four lighthouse areas in focus, which provide a more comprehensive understanding and insights on the potential role of the regions in the implementation of the Mission objectives.

4.1. Results of the mapping of synergies with RIS3 strategies for 2021-2027

Following the review of the availability of updated RIS3s, and the understanding that the majority of the RIS3s are not published for the regions and countries that were prioritised for the scanning of RIS3, the study proceeded with collecting data through a survey with regional authorities competent in developing the RIS3.

The survey was distributed during the period 25 March–6 May 2022 to 166 regional stakeholders from the four lighthouses, and several multipliers (organisations who could forward the survey invitation to relevant regional stakeholders) such as EU Commission contacts and European regional networks for further promotion. More details on the individual survey results are in Appendix A.

The survey had a total of 18 valid answers, with varying numbers of answers to different questions. Thus, it cannot be considered as statistically representative, and its results can only be considered as qualitative insights, and not offering a full picture of the situation at the four lighthouse area levels. However, we can obtain a qualitative overview on the status of the RIS3 process in some regions. A short summary of the results shows that:

- The bulk of respondents mainly come from the Mediterranean and Atlantic areas, with 12 regions replying to the survey from those areas.

- Two thirds of regions with valid responses (12 out of 18) mention they have finalised their RIS3 strategy, while the other six are in the final phase of validating the draft version.

The survey served as a starting point for understanding the status of the regions' RIS3 processes and understanding general synergies with the Mission objectives. The RIS3 strategies that were provided by the regions were added and screened by the team together with other RIS3 strategies.

Based on the survey results, there is **a positive landscape related to the relevance of the 14 regions' RIS3 objectives to the Mission Ocean objectives, across all lighthouse areas** (see Figure 134). The majority of the respondent regions (equal numbers, 11 out of 14) have included or are planning to include, objectives related to the fostering of the Blue Economy or the prevention and reduction of pollution. More than half of the regions are also prioritising investing in Environmental objectives related to freshwater and to marine and coastal areas, but almost 40% of them do not prioritise these objectives.

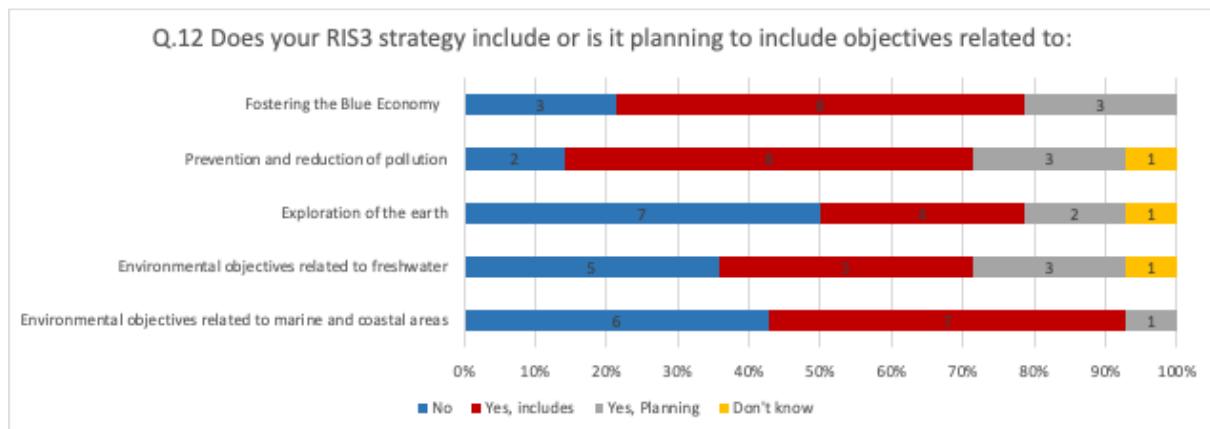


Figure 134 Survey results: RIS3 priorities relevant to the Mission objectives

Source: Technopolis Group, n=14

The majority of the responding regions mention that their RIS3s include **measures** that are particularly relevant to fostering the Blue Economy (9 out of 11 responding) and measures relevant to climate change/EU adaption strategy (10 out of 11 responding).

When consolidating the survey and the data matrix information analysed, as shown in Table 71, the Mission objectives are relatively well covered in the RIS3s that were mapped for the Mediterranean, Atlantic and Arctic Areas. In the Arctic, there were less strategies found (only 3), therefore the results are not as negative as for the Danube. In the Danube area, there were no strategies mapped that were prioritising biodiversity and environmental objectives in marine, coastal or freshwater areas. Therefore, **the Danube area has the least alignment with the Mission objectives among all lighthouse areas**.

Lighthouse area	Environmental objectives related to marine and coastal areas	Environmental objectives related to freshwater	Objectives related to the exploration of the earth	Objectives related to Prevention and reduction of pollution	Objectives related to fostering the Blue Economy
Mediterranean	5	2	4	6	6
Atlantic	5	4	3	4	5
Danube	0	0	1	2	3
Arctic	1	2	2	2	2

Table 71 Nr. of RIS3 2021-27 strategies having synergies with Mission objectives in the four lighthouse areas

Source: Technopolis Group, June 2022. (Note: includes the mapping of objectives based both on the survey and desk research)

Based on the overview of the finalised 2021-2027 RIS3s, examples of interesting measures and priorities proposed to be pursued in the region through the RIS3s, and which are strictly relevant to the Mission objectives are presented in the table below.

Examples of RIS3 priorities relevant to MO1 (Protect and restore marine and freshwater ecosystems and biodiversity)

- Pays de la Loire:
 - Measures related to Aquaculture: Creating an inter-professional association of fishermen; Supporting the salt production ecosystem: Ensuring an adequate recognition of organic character of salt production; Supporting the deployment of a micro-algae industry in the Region;
 - Measures related to circular Blue Economy: Support to key projects related to the development of new materials, and to recycling. For instance, there are projects related to the recycling of aquaculture waste.
- Centro, Portugal: The regional council, through the Regional Operational Programme, has allocated funds to the Sustainable and Blue Economy Partnership from Horizon Europe, giving a clear sign to regional stakeholders that this is an important thematic area for the Region and, at the same time, promoting the participation of the regional innovation ecosystem in European networks and projects.
- Norte Region, Portugal (RIS3 still to be validated and published): There are two important domains defined in the S3 NORTE 2027 that are relevant for the theme of the Mission 'Ocean and Waters', namely: "Sea Resources and Economy" and "Food and environmental systems".

Region of Blekinge (Sweden): Plans two action points in relation to the Mission, both of them relying on involving the local stakeholders (companies, universities) and civil society to a great extent, to increase awareness about oceans through activities such as events, hackathons, and competitions:

- Bottom-up approach: To implement and develop the method of the Mission Oceans on the topics of sea, water, and climate adaptability. The region has chosen specific parts of the Mission and created an implementation plan;
- Top-down approach: Focus on marine techniques, especially in relation to defence, offshore wind, and Mission Oceans – working with large scale infrastructure at sea, increasing monitoring and efforts in relation to the sea bed.

Examples of RIS3 priorities relevant to MO2 (Prevent and eliminate pollution of our ocean, seas, and waters):

- Malta:
 - Aquaculture and Biotechnology: Previous investments in the Malta Aquaculture Research Centre resulted in a variety of national and EU-funded projects. There is strong innovation potential at the interface between aquaculture and marine biotechnology, such as using fish waste as a resource for producing commercial products;
 - Shipping: Investment in maritime technology to enable Malta to build on its existing and traditional sectors, as well as its large human resources and expertise. Opportunities to shift to higher added value work, including liquified natural gas (LNG) conversions of vessels, new technological solutions linked to infrastructures and retrofitting existing ships, and greening maritime vessels.
- Occitanie (FR): Measure 2.3. Coastal and marine economy - Priorities 2021-2023: Promote the emergence of "intelligent" and clean boats (pleasure craft, fishing, trade, services, recreational, fishing, commercial, services, watercraft) that are safer, more operational, and respectful of the environment, throughout their life cycle (smart & green ships) linked with the uses of the ports.
- Emilia-Romagna: The region's RIS3 is one example of an RIS3 strategy in strong alignment and synergy with the Mission objectives, focusing, among others, on developing technologies for the cross-sectoral area of blue growth. One of the measures relates to supporting the Protection from anthropogenic pollution, to contribute to the rehabilitation of the marine ecosystem, as well as raising awareness of new measures for preventing waste abandonment at sea, and waste management at sea. The region intends to support the development and adoption of best practices and technologies for the following purposes:
 - removing or valorising waste accidentally caught or occasionally / voluntarily collected by any means, placing them in existing value chains;
 - promoting virtuous behaviours to prevent the abandonment of waste at sea, also through awareness campaigns;
 - reducing anthropogenic pollution of emerging pollutants, noise pollution and acidification
 - monitoring through surface investigation technologies, air and submarine;
 - carrying out the measurement and classification of plastics (macro, meso and micro) in all biotic and abiotic components.

Table 72 Examples of RIS3 priorities and measures relevant to Mission objectives

Source: Technopolis Group, based on the survey with regions and the desk research of individual strategies.

4.2. Discussion of the synergies between the mapped RIS3s and the Mission objectives

Based on the insights into the types of priorities, objectives and measures foreseen by the RIS3 strategies analysed in the four lighthouse areas, the mapping process performed provides insights into the **difference between the general intervention logic frameworks (or theory of change) used by the RIS3 versus the Mission intervention logic**. This matters in how the synergies can be created between the Mission and the RIS3s, as well as the contribution of regional actors to the Mission in general.

While the primary goals of the Mission in the four lighthouses under discussion are to reduce pollution or to improve the ecological status of marine or freshwater ecosystems, the mapped RIS3s have been relying on an industrial policy framework and target the creation of different niches and innovation ecosystems in the regions (often related to priorities relevant to marine or coastal areas), with the purpose of contributing primarily towards economic growth. The results cannot be considered as representative. However, almost all the thirteen mapped RIS3s are aiming to develop the Blue Economy, such as through fostering: "*Strategic innovation area: The maritime economy for blue growth*" (Region of Bretagne), fostering the "*Resources and*

Economy of the Sea"(Norte Region, Portugal), and "Valorising endogenous natural resources" (e.g. water; sea; spas; fisheries; mineral/geological and energy resources; etc) (Centro Region, Portugal). This is the case even in the Atlantic and Mediterranean Areas, where the alignment with Mission objectives is generally highest in principle. Of the mapped RIS3s, good practice examples could be considered the Emilia-Romagna region in Italy, with an environmental objective such as the "*protection from anthropogenic pollution*", or in the North-East Romania region RIS3 "*Environment sector objective of: Ensuring a clean environment for the current and future generation*".

The fact that RIS3 priorities tend not to target societal challenges is a similar finding to what the literature shows. For instance, a mapping⁴⁶⁰ of RIS3 priorities in Italy and Poland (two of the largest recipients of European Regional Development Fund (ERDF) funding), shows that the majority of the priorities (51% in Italy and 48% in Poland) target the development of sectors/value chains of primary interest for the region (A); only a few (4.5% in Italy and 10% in Poland) target technologies or processes (B); relatively low percentages of the analysed priorities (16% in Italy and 9% in Poland) tackle societal challenges (C); and (around 1%) tackle natural or cultural resources (D). Therefore, one may conclude that there is **little likelihood that the RIS3s are in general in synergy with the Mission objectives, in terms of the priorities they target for the 2021-2027 programming period also**, as the official guidelines for implementing RIS3s do not differ fundamentally from the previous programming period in this respect.

More recent conceptual developments of the RIS3 framework, such as the proposed Regional Innovation Strategies for Smart Specialisation for Sustainability (S4)⁴⁶¹, as well as the Partnerships for Regional Innovations⁴⁶² are more promising in terms of creating more synergies with the Mission objectives. These EU-level initiatives are at an incipient phase, but may pave the way towards increasing the directionality of the RIS3 framework towards sustainability.

The measures fostered by RIS3s can, nevertheless, contribute to some of the Mission's goals even if, per se, they do not have an environmental challenge as ultimate objectives. Almost all of the screened RIS3s also aim to foster the development of triple helix cooperation in the Blue Economy field, e.g. in niches such as aquaculture, marine biotechnology, water management technologies, ports and shipping, etc. **The RIS3s are thus relevant for the development of such new niches relevant for the Blue Economy**, which can contribute significantly to creating the proper framework conditions for the Mission to reach its impact in the regions.

According to interviewees, for regions where the water-relevant ecosystems are less developed but could become more important, **the Mission could support regions in orchestrating and articulating how their regional ecosystems could also be directed towards solving the Mission environmental challenges**. The RIS3 framework would offer a way to link the activities of the Mission to regional economic specialisation, or, if deemed appropriate, offer the regions ideas and/or opportunities to grow relevant regional innovation ecosystems that could support the Mission. At the same time, several interviewees at regional level mentioned that incorporating the approach of the Mission in the RIS3 process could be beneficial. Having a more coordinated approach to developing the ecosystems and governance of the Blue Economy at regional and national level would be beneficial – e.g. through involving civil society more in the RIS3 process related to the Blue Economy, but also connecting to the national or regional authorities competent for pursuing sustainability goals in the Blue Economy (e.g. Ministries of Environment, Energy, Ports Authorities, Water or River Basin Management Authorities, etc.). Such issues were mentioned by regions in very diverse countries such as Romania, Sweden, Spain, and France.

The Mission can also be highly relevant in **scaling up the technologies and solutions developed / funded through the RIS3 / ERDF or regional programmes and connecting them to the market or the public authorities** (who, from a supply and demand / market perspective could act as demand owners). The interviews performed in different regions in the four lighthouses within this study have shown that, depending on the national or regional competences, in many regions, there is a **disconnect between the actors who are in charge of coordinating the RIS3 process and Entrepreneurial Discovery Process, and the national / regional Authorities who are in charge of Water Management, Coastal Area Management, Maritime Affairs, Ports, etc.** These latter organisations are in general the demand owners, who can procure the innovative solutions to deploy them in the marine or coastal areas they manage, and accelerate the improvement of their environmental status, or reduce pollution. **The Mission could thus act as a platform or marketplace to connect pioneers in regional innovation ecosystems (who can supply the innovations) to the market.** Working with initiatives such as the Partnerships for Regional Innovation, or the upcoming S3 Partnerships on Blue Economy can also support these goals.

⁴⁶⁰ Carlo Gianelle, Fabrizio Guzzo & Krzysztof Mieszkowski, 2020, Smart Specialisation: what gets lost in translation from concept to practice?, *Regional Studies*, 54:10, 1377-1388, DOI: 10.1080/00343404.2019.1607970

⁴⁶¹ See JRC, 2020, <https://ec.europa.eu/newsroom/ircseville/items/670313/en>

⁴⁶² See JRC, 2022, <https://cor.europa.eu/en/news/Pages/Pilot-Action-on-Partnerships-for-Regional-Innovation.aspx>

Based on the interviews with the regions, it is striking how the following common **factors supporting the creation of more synergies** and complementarities with RIS3s emerge as important for the Mission Ocean to address:

- There is a need for a **clearer mandate from the European Commission that better defines the roles of regions in relation to the Mission** and encourages national or regional governments to put in place coordination mechanisms with Mission Ocean and Waters.
- **Developing the governance for deploying the Mission at national and/or regional levels** should be a key focus of the Mission, to ensure that the regions have contact points on the specific topics at national level, and then the Member States are represented at EU level. As previously mentioned, the EU Missions have a logic that is different from traditional R&I policy approaches, and requires the development of cooperation with other types of stakeholders such as Ministries for the Environment, Water Authorities etc. More consistent involvement of the appropriate types of stakeholders is needed in the deployment of the Missions at national and/or regional level.
- Regions have scarce resources in terms of staff, budgets, or the capacity to develop complex activities, which may be required in order to participate in the Mission Ocean. **Clearer operational guidelines** e.g. in terms of budgets or funding required from the regional level would be useful.
- **Promoting the Mission** at regional level is very important, through organising events and communications, to be able to mobilise the relevant regional stakeholders.
- **Organising peer learning and sharing experience** of how regions have created synergies with the Mission objectives could be another interesting support mechanism.

The regions have also provided suggestions in terms of types of funding needed, including:

- **Funding for demonstration and/or piloting of Mission-relevant solutions in regions.** Regions such as Blekinge Region, Friesland, which have shown their experience in developing regional innovation ecosystems for water-related challenges can be considered as pilots or as useful cases for the Mission, which can take forward the Mission goals and demonstrate how to reach its objectives at regional level.
- For regions with a lower level of development of the regional innovation ecosystem and governance in water-innovation related fields, **support for developing and orchestrating R&I ecosystems**.
- Combining regional funding and EU funding has been considered difficult. For instance, some difficulties mentioned relate to the EU's state aid regulation (General Block Exemption Regulation), which is being updated for the use of ERDF at the moment. Combining funds might not be allowed under this regulation. In addition, regional funding from regions themselves is scarce, which is why regions found it difficult to get involved through co-funding.

Inter-regional cooperation on S3 can also be a source of inspiration and support to the Mission objectives. Below we provide information on different initiatives that would be interesting to follow up on:

- For instance, the Vanguard Initiative, an organisation of EU regions developing innovative interregional partnerships, is also undertaking a study on how to combine EU funding with regional funding in interregional settings, to be performed in the summer of 2022. However, no further information could be obtained on the status of the study at the end of June 2022.
- In addition, organisations such as the ERRIN Blue Growth Working Group, as well as the Conference of Peripheral and Maritime Regions (CPMR) could be useful partners. During the course of this study, the study team has interacted with and obtained support from the ERRIN Blue Growth WG. In addition, CPMR is performing a similar survey on RIS3 synergies with the EU Mission objectives, planned for the end of 2022. For this reason, the CPMR took the decision not to promote the survey of this Baseline Study to the regions in their network, in order to not overburden them. The CPMR survey could be a useful tool in the future for following up on the development of the RIS3s.
- Moreover, the EU is launching an S3 Partnership on the Blue Economy, coordinated by the Commission through DG MARE, where more synergies could be explored in future with the Mission objectives.

5. MISSION OBJECTIVE SYNERGIES WITH RECOVERY AND RESILIENCE PLANS

The mapping of the synergies of the mission objectives with National Recovery and Resilience Plans (RRPs) reveals interesting patterns related to the way the Recovery Plans target the two Mission objectives (MO):

- MO1: Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030 (for the Atlantic, Arctic, Danube areas);
- MO2: Prevent and eliminate pollution of our ocean, seas, and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil (for the Mediterranean area).

Overall, **the RRPs have a rather general and sectoral focus**, and do not always focus on targeted support for deploying innovative digital or technological solutions for e.g. marine habitat restorations or the Blue Economy. Rather, RRPs cover the improvement of relevant wider framework conditions, such as wide-scoping reforms of national authorities, or sectoral environmental policy measures promoting biodiversity on land and at sea in many cases, or horizontal measures promoting digitalisation, research and innovation.

Table 73 provides an overview of the general mapping of synergies per lighthouse area, showcasing in green where the RRPs contain measures that are relevant to the topics considered in line with the Mission objectives, and in red the topics where measures are found but only with partial alignment to the topic. More details on the individual measures are provided in the data matrix. In general, there are **discrepancies between the different lighthouse areas in their support for the Mission objectives**:

- **MO1 is better covered in the Atlantic and Arctic areas, with more partial coverage in the Danube area.** The challenges in many countries in the Danube region (except for Austria and Germany) are generally more related to reforming the water management system, or to complying with the EU Water Framework Directive, Floods Directive, or Biodiversity Strategy.
- **MO2 (only in focus for the Mediterranean area) shows significant gaps in coverage in terms of RRP priorities.** In general, there are no specific holistic measures targeting the reducing pollution in the Mediterranean Sea, focused e.g. on supporting research and innovation, or the scaling up of innovative solutions. Italy, Malta and Cyprus have more measures focusing on greening ports, or improving the energy efficiency of ports, and promoting the use of alternative fuels for ports and ships. Greece, for instance, has a large number of measures focused on marine ecosystems, and biodiversity protection, aquaculture and eco-tourism, as well as renewing the ports, and reforming the National Water Management Authority. However, if specifically analysed for their focus on MO2, there is little synergy with reducing pollution through reducing plastic litter, microplastics, or chemical pesticide pollution in the sea (the objective of the Mission).

Lighthouse area	Country	Broad focus of RRP measures relevant to the Mission objectives	Allocated budget (EUR)	Relevance to MSFD	Relevance to Blue Economy topics	Relevance to EU 2030 Biodiversity Strategy	Relevance to climate change / EU Adaptation Strategy	Relevance to other topics (SMEs, digital)
Atlantic	FR	Ecology & biodiversity	40,000,000					
Atlantic	IE	Water management	518,000,000					
Atlantic	PT	Climate transition	252,000,000					
Atlantic	ES	Ecology & biodiversity	10,437,300					
Arctic	FI	Climate transition						
Arctic	SE	Ecology & biodiversity						
Mediterranean	FR	Shipping & ports infrastructure	200,000,000					
Mediterranean	IT	Climate transition	5,650,000					
Mediterranean	ES	Ecology & biodiversity						
Mediterranean	MT	Shipping & ports infrastructure	166,000,000					
Mediterranean	EL	Climate transition Shipping & infrastructure, Ecology & Biodiversity						
Mediterranean	HR	Shipping & ports infrastructure						
Mediterranean	CY	Shipping & ports infrastructure						
Danube	AT	Climate transition	50,000,000					
Danube	CZ	Ecology & biodiversity						
Danube	SK	Water management						
Danube	RO	Water management, Ecology & biodiversity, Support to RDI in water sector						
Danube	SI	Water management						
Danube	DE	Climate transition						

Table 73 Overview of synergies of RRPs with Mission objectives per lighthouse area

Source: Technopolis Group

Legend:

	Partial synergies with the Mission Objective
	Significant synergies with the Mission Objective
	No measures found

Good practice examples of interesting programmes where alignment could be found include:

- **Austria:** A Biodiversity Fund is foreseen, which can also cover water-related investments; a Green Finance Agenda has been introduced in Austria to support the transition to a green, renewable and nationally available resource-based energy sector. The support of circular economy and energy-efficiency improvement support to family households is included as well.
- **Croatia:** Several measures are foreseen for improving the environmental impact of ports and shipping. Measures focused on flood-risk protection and disaster management are also included.
- **Ireland:** The Grand Challenges Mission Oriented Programme. In Ireland, only one RRP measure targets the protection of riverbeds. There are other measures that are potentially interesting, but these are general, and not specifically focused on water: one is related to the Climate Adaptation Law, and also other broader measures targeting digital transformation and the environmental goals of SMEs, but not directly linked to Mission objectives. Nevertheless, the Launch of the Grand Challenges Mission Oriented Programme will focus on the transition to climate neutrality and clean economy. Even if the latter measure does not yet have a specific focus on ocean ecosystems related challenges, it could be a good leverage point for the EU Mission. The Programme will have a budget of EUR 71m and will be coordinated by the Ministry for Further and Higher Education, Research, Innovation and Science.
- **Italy:** Mission 3: Infrastructure for sustainable mobility - Investment 1.1: Interventions for the environmental sustainability of ports (Green Ports): promotion of the environmental sustainability of port areas. The Port reform measures aim at reducing greenhouse gas emissions.
- **Portugal:** Component 10 – Sea of the Climate Transition Dimension: creation of a Blue Hub, Green and digital transition and security in fisheries, Atlantic Defence Operations Centre and Naval Platform, and Development of the "Sea Cluster of the Azores"; Component 12. Sustainable Bioeconomy accelerating high-value-added production from biological resources promoting climate transition and the sustainable and efficient use of resources.
- **Romania:** Reform 2 – Reconfiguration of the current economic mechanism of the National Water Administration (ANAR) in order to ensure the modernisation and maintenance of the national water management system and proper implementation of the Water Framework Directive and Floods Directive - Investment 5. Appropriate endowment of river basin administrations for flood monitoring, prevention and emergency response.
- Investment 3 – Update of approved management plans and identification of potential areas for strict protection in natural terrestrial and marine habitats in order to implement the EU Biodiversity Strategy for 2030; Investment 4 – Integrated investments for the ecological reconstruction of habitats and the conservation of species related to meadows, aquatic and water-dependent areas.
- Reform 5 – Supporting RDI and the private sector; Component 9 – Investment 5 in the development of a Competence Centre for the EU Mission on Restoring our Ocean & Waters (as for the other 4 missions).
- **Slovakia:** Component 5 – Adaptation to Climate change: Revitalising watercourses, including wetlands. A framework for more efficient management of watercourses, and better conditions for achieving their favourable status will be created; Conservation of biodiversity and restoration of habitats. Mitigating extreme water level changes.

6. SYNERGIES WITH INTER-REGIONAL, MACRO-REGIONAL OR LIGHTHOUSE AREA WIDE STRATEGIES

In this chapter, we present the mapping of synergies with strategies relevant to the water, sea, ocean and river-basin topics that cover the lighthouse areas in the focus of this study. The table below provides an overview of the strategies mapped and the extent to which they are in general alignment with the Mission objectives for the respective lighthouse areas.

Lighthouse area	Strategy name	Relevance to MSFD (Marine Strategy Framework Directive)	Relevance to Blue Economy topics	Relevance to EU 2030 Biodiversity Strategy	Relevance to climate change / EU Adaptation Strategy	Relevance to other topics (SMEs, digital)
Atlantic	Atlantic Action Plan 2.0					
Atlantic/ Arctic	North-East Atlantic Environment Strategy / OSPAR Strategy (2030)					
Atlantic	All-Atlantic Ocean Research Alliance					
Mediterranean	Western Med Sea-basin strategy					
Mediterranean	EU Strategy for Adriatic and Ionic Region					
Mediterranean	BlueMed Initiative					
Danube	Danube River Basin Action Plan (2020+)					

Table 74 Overview of inter-regional strategies and broad synergies mapped

Source: Technopolis group; green colour denotes relatively high alignment. For the cells in white, no relevant priorities or actions were found.

As shown in the table above, the majority of the inter-regional strategies cover measures that are very relevant to the Mission objectives. All the strategies cover objectives and/or actions that touch on issues relevant to the Maritime Strategy Framework Directive, and almost all cover objectives relevant to the Blue Economy, the EU2030 Biodiversity Strategy and the EU Adaptation Strategy. The strategies have, at the same time, different intervention logics:

- The macro-regional strategies for the Adriatic and Ionic region and the one for the Danube Region, the Atlantic Action Plan 2.0, the BlueMed Initiative and the OSPAR Strategy 2030 for the North-East Atlantic have objectives that are in synergy with the Mission on Ocean and Waters. They can be considered as supportive frameworks that also legitimise the implementation of the Mission. At the same time, their foreseen interventions take the shape of actions that work at the level of framework conditions from an innovation ecosystem perspective (regulation, policy, markets, education, etc.). They aim to improve the policy frameworks of the signatory countries related to the diverse fields of environment, marine and freshwater ecosystems and habitats, biodiversity protection, maritime spatial planning etc.
- The above-mentioned macro-regional strategies or initiatives also aim to create or manage relevant thematic networks of policy makers or researchers, and foster knowledge exchange on the topics relevant to healthy oceans, seas and rivers.
- All of the strategies (except OSPAR 2030) also target support for developing Blue Economy sectors, such as ports and shipping, blue skills, marine renewable energy, sustainable tourism etc.
- The OSPAR Strategy 2030 is more focused on pursuing the natural ecosystem approach, related to creating the framework conditions for the sustainable use of ecosystem goods and services, in the North-East Atlantic Area. The strategy does not focus specifically on Blue Economy topics, SMEs, or promoting digital technologies.
- The All-Atlantic Ocean Alliance and BlueMed initiative are particularly focused on supporting collaborative research and innovation projects, offering technology development and innovation platforms at the Atlantic area level.

7. SUMMARY ASSESSMENT

Based on the mapping performed in this study, it is evident that the Mission operates in an environment where policy mixes are already set up at the European, lighthouse area, national and regional levels for at least the upcoming five to seven years approximately. The mapping provides an overview of how the Mission is already aligned with existing policies and strategies, or where there are perhaps gaps.

Mission-oriented policies are meant to support system-wide transformations and require the collaboration of diverse sectors and value chains, in order to promote both the acceleration of the implementation of tested solutions to urgent problems in the short term, as well as the deployment of ambitious innovations that can disrupt and upgrade the system⁴⁶³. The process for mainstreaming disruptive innovations can be illustrated through the Multi-level Perspective on socio-technical transitions (Figure 135).

According to the theory related to the Multi-Level Perspective on socio-technical system transformation, systemic change happens when the innovations that are currently considered as “niche” replace dominant practices (“regimes”), once they start opening up to new alternatives. The landscape is the condition in which transformations occur, described by processes, trends and externalities that actors cannot influence directly, such as climate change or the Covid-19 pandemic⁴⁶⁴.

In this report, the focus has been on mapping the relevance of:

- strategies that could be considered as part of the current “regime”** (in socio-technical transition theory terms), and which would mainly follow the tried and tested routes towards sometimes similar goals like the Mission; the broad sectoral policy support initiatives mapped in the National Recovery and Resilience Plans, and sectoral (environmental and water) policy frameworks for inter-regional cooperation such as the macro-regional strategies can be categorised as “regime” type of policies;
- strategies that support the new niches’ development**, or the investments in new technologies or system innovations, such as inter-regional research and innovation alliances and networks, as well as regional innovation and industrial policy approaches such as the Regional Innovation Strategies for Smart Specialisation (RIS3) in the fields relevant to the Mission Ocean and Water Objectives.

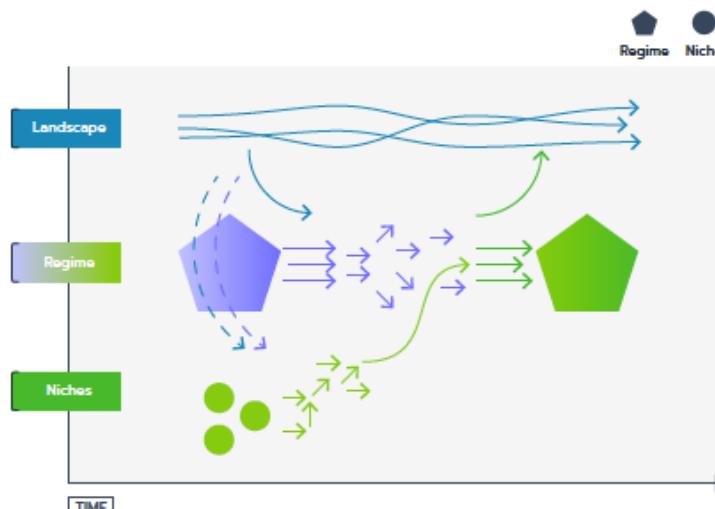


Figure 135 The multi-level perspective on socio-technical transitions

Source: Palavicino, Matti, & Witte, 2022, based on Geels (2002), Geels and Schot (2007)

The mapped RIS3s and the inter-regional research and innovation alliances can support the Mission through channeling and legitimizing investments in developing the required technologies or innovations needed for the systems transformation intended by the Mission, and leveraging other relevant sources of funds (such as regional, European Structural and Investment Funds, other national or inter-regional funds). The research and innovation alliances like BlueMed and the All-Atlantic Ocean Alliance are examples of ways to nurture the niches along with research and development investments.

⁴⁶³Miedzinski, Mazzucato et al., 2019: A framework for mission-oriented innovation policy roadmapping for the SDGs: The case of plastic-free oceans, Working Paper WP 2019-03, https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/a_framework_for_mission-oriented_policy_roadmapping_for_the_sdgs_final.pdf

⁴⁶⁴ Palavicino, Matti, & Witte, 2022: MOTION Handbook. Developing a transformative theory of change, <https://www.tipconsortium.net/wp-content/uploads/2022/02/MOTION-Handbook-180222.pdf>

The Mission could therefore act more on expanding and mainstreaming the niches, and connecting the innovations to the actors that are the incumbents in the “regime”. For this, the Mission secretariat could act at the interface between the different parts of the system. Below we offer suggestions on how the Mission could further intervene:

- **On building and nurturing niches:** understand how the development of disruptive technologies could be further accelerated, or how already developed initiatives could be scaled up at regional level. Based on the regional mapping performed, regions need support for the orchestration of their water-related innovation ecosystems, building on their RIS3s as starting points and legitimizing tools for focusing on the waters, seas, ocean and blue economy sectors.
- **On expanding and mainstreaming niches:** the Mission should engage with the mapped actors that are part of RIS3s or coordinate the macro-regional strategies, in order to help connect the developed innovative practices and technologies to potential users (within or outside the region), many of them being public bodies in charge of water, sea, river or ocean bed.
- **On opening up and unlocking regimes:** engage with the actors that are coordinating the macro-regional or national sectoral policies related to environmental, water management, ports management, industrial policies, etc. – and support their learning process towards new alternative practices and technologies relevant to support progress in reaching the objectives of the Mission.

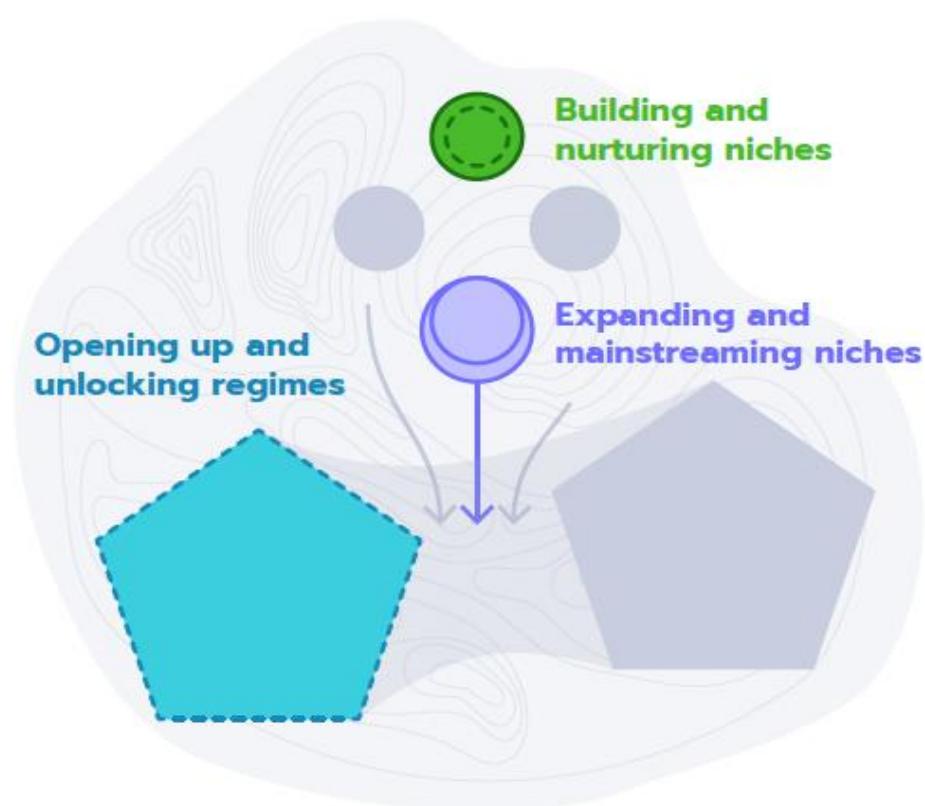


Figure 136 Macro-processes that lead to systems transformation

Source: Palavicino, Matti, & Witte, 2022, based on Geels (2002), Geels and Schot (2007)

Appendix H Analysis of RIS3 survey results

H.1 Implementation of the survey

The survey was open in the period from 25 March – 6 May 2022, and targeted the collection of answers from regional stakeholders with competence in the design and implementation of the RIS3 strategy, in order to understand the RIS3 strategy status and the relevance of its objectives in relation to the Mission objectives.

The survey was distributed to a list of 166 RIS3 stakeholders or ERDF managing authority contacts from the four lighthouse areas in focus, which were collected from the JRCEYE@ RIS3 website or the DG REGIO Inforegio website with regional authority contacts.

In addition, the survey was distributed for further promotion to multipliers from the JRC, Committee of the Regions, WestMed Initiative, CPMR, group of European Entrepreneurial Regions to which Technopolis Group has access, and ERRIN. ERRIN shared the invitation to participate in the survey with the members of the ERRIN Blue Growth Working Group.

H.2 Results

The survey had a total of 18 valid answers from regional officials, even if with some gaps for some of the regions. A short summary of the results shows that:

- The bulk of respondents mainly come from the Mediterranean and Atlantic region with 12 countries being represented from these regions.
- Two thirds of regions with valid responses (12 out of 18) mention they have finalised their RIS3 strategy, while the other six are in the final phase, validating the draft version of the RIS3.
- There is a **positive picture related to the relevance of the RIS3 objectives to the Mission Ocean objectives**. The majority of the respondent regions (equal numbers, 11 out of 14) have included or are planning to include measures related to the fostering of the Blue Economy or the Prevention and reduction of pollution. More than half of the regions are also prioritising investment in Environmental objectives related to freshwater and to marine and coastal areas, but almost 40% of them do not prioritise these objectives.
- The majority of the responding regions mention that their RIS3s include **measures that are particularly relevant for fostering Blue Economy** (9 out of 11 responding) **and measures relevant to climate change/EU adaption strategy**.
- Initiatives related to the mission and the mission itself are not sufficiently known.

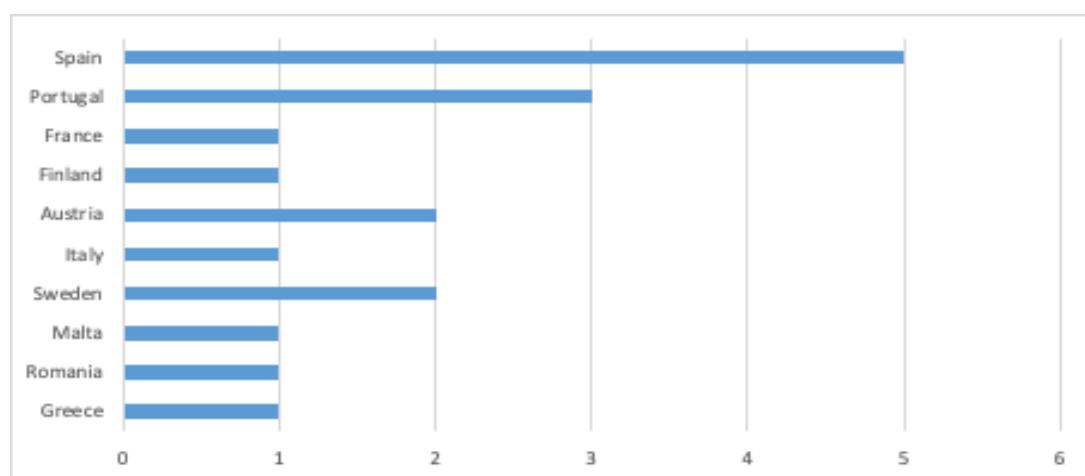


Figure 137 Country of origin of the respondents

Source: Technopolis Group, n=18

Nearly a third of the respondents (28%, 5 people) come from Spain. Portugal has 16% of respondents (3 in total). The remaining countries have 1 or 2 respondents. Thus, the majority of respondents come from the Mediterranean (7). The Atlantic is the next most common at 5. The Danube has 2 and the Arctic has none. However, there are regions from the Artic that we would consider to be part of the basin.

The majority of the respondents (12 regions) have already developed their RIS3 strategy for 2021-2027 with another 40% of them still developing their strategy. The regions which have provided their RIS3 strategy include: [Region Blekinge](#), [Lombardy](#), [Navarra](#), [Northern Ostrobothnia](#), [Norte of Portugal](#), [Centro](#), [Salzburg](#), [Norrbotten](#) and [Malta](#). All the regions which are still developing their strategy, have their strategy already in draft phase, and it is still undergoing validation before publishing. Four of the latter regions have also finalised their EDP, two don't know the status of the RIS3.

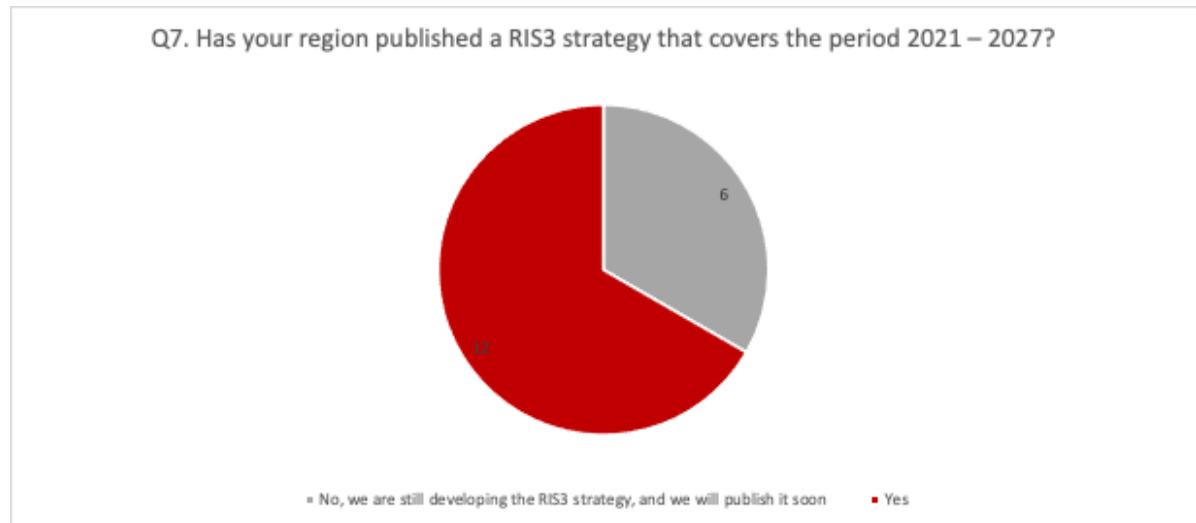


Figure 138 Number of regions which have published their RIS3 for 2021-2027

Source: Technopolis Group, n=18

The majority of the respondents (11 of the 18 regions) mention they have applied principles of the S4 approach, for instance by emphasising the strategy's connection to the European Green Deal or mobilising a systemic approach for transformation. Only one mentions that they have not, while two other respondents don't know.

There is a positive picture related to the inclusion of objectives in the strategies related to the Mission Ocean objectives. The majority of the respondent regions (equal numbers, 11 out of 14) have included or are planning to include measures related to the **fostering of the Blue Economy** or the **Prevention and reduction of pollution**. More than half of the regions are also prioritising investment in Environmental objectives related to freshwater and to marine and coastal areas, but almost 40% of them do not prioritise these objectives. The priorities related to "Exploration of the earth" are the least frequent, with half of the regions mentioning they do not prioritise them. Norrbotten (Sweden) is the only region to have none of these objectives included. Whereas Blekinge (Sweden), Lombardy (Italy), Andalusia (Spain), Lisbon (Portugal) and Norte (Portugal) are either planning to include or have included all the objectives.

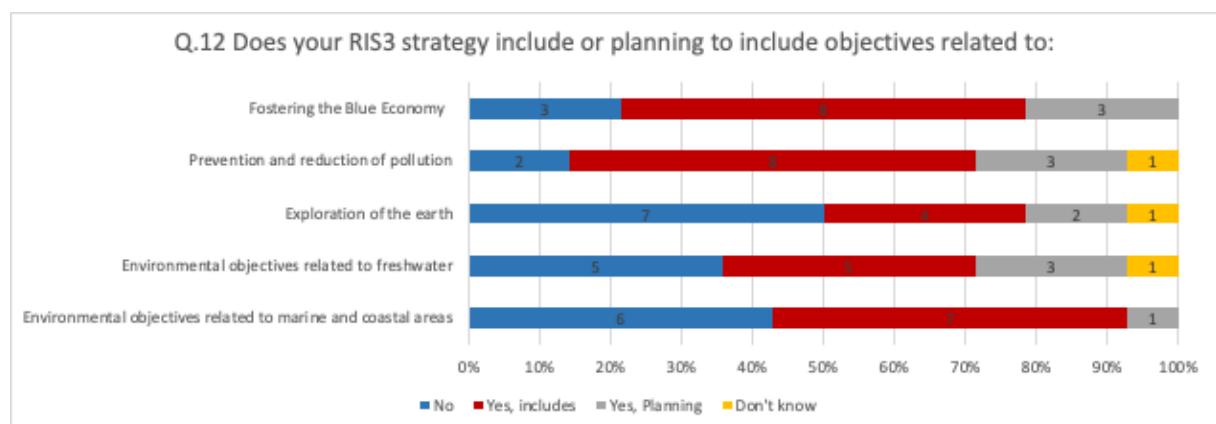


Figure 139 Type of objectives included or planned to be included in the RIS3s that are relevant to the Mission objectives

Source: Technopolis Group, n=14

The full definitions of the objectives that were provided to the regions in the survey are explained below:

- 12.1. Environmental objectives related to marine and coastal areas, e.g. a) Restoration and protection of marine ecosystems and biodiversity and their sustainable use; b) Restoration of coastal areas and their biodiversity and their sustainable use; c) Climate change resilience of coastal areas; d) Pollution; e) Other;

- 12.2. Environmental objectives related to freshwater, e.g. a) Restoration of rivers and their sustainable use (e.g. removal of dams, ecotourism on rivers, aquaculture etc.); b) Restoration of other freshwater environments (e.g. wetlands) and their sustainable uses; c) Restoration and sustainable use of lakes d) Other;
- 12.3. Objectives related to the exploration of the earth, e.g. a) Mapping / exploration of sea bed or water resources; b) Digital technologies for biodiversity monitoring or pollution monitoring; c) Hydrology; d) Mineral, oil and/or natural gas prospecting; e) Other;
- 12.4. Objectives related to Prevention and reduction of pollution, e.g. a) Prevention of litter, plastic, chemical and nutrient pollution of marine waters and/or freshwater; b) Monitoring of pollution (litter, plastic, chemicals, nutrients), including development/deployment of digital technologies; c) Elimination of pollution from marine and freshwater (e.g. wastewater cleaning, collection of waste, circular uses of waste etc.), including development of technologies for that; d) Other;
- 12.5. Objectives related to fostering the Blue Economy (including blue bioeconomy, blue biotechnologies, circular value chains, etc.).

The majority of the responding regions are including measures to generally foster the Blue Economy (10 out of 11), or relevant to climate change or the EU adaptation Strategy (9 out of 11). The second type of measures that are included to a large extent (7 out of 11 regions) are: Measures relevant to SME competitiveness in the Blue Economy, and digitalisation in the Blue Economy. Whereas measures related to the achievement of EU 2030 Biodiversity targets and marine and freshwater targets of the European Green Deal are the least common.

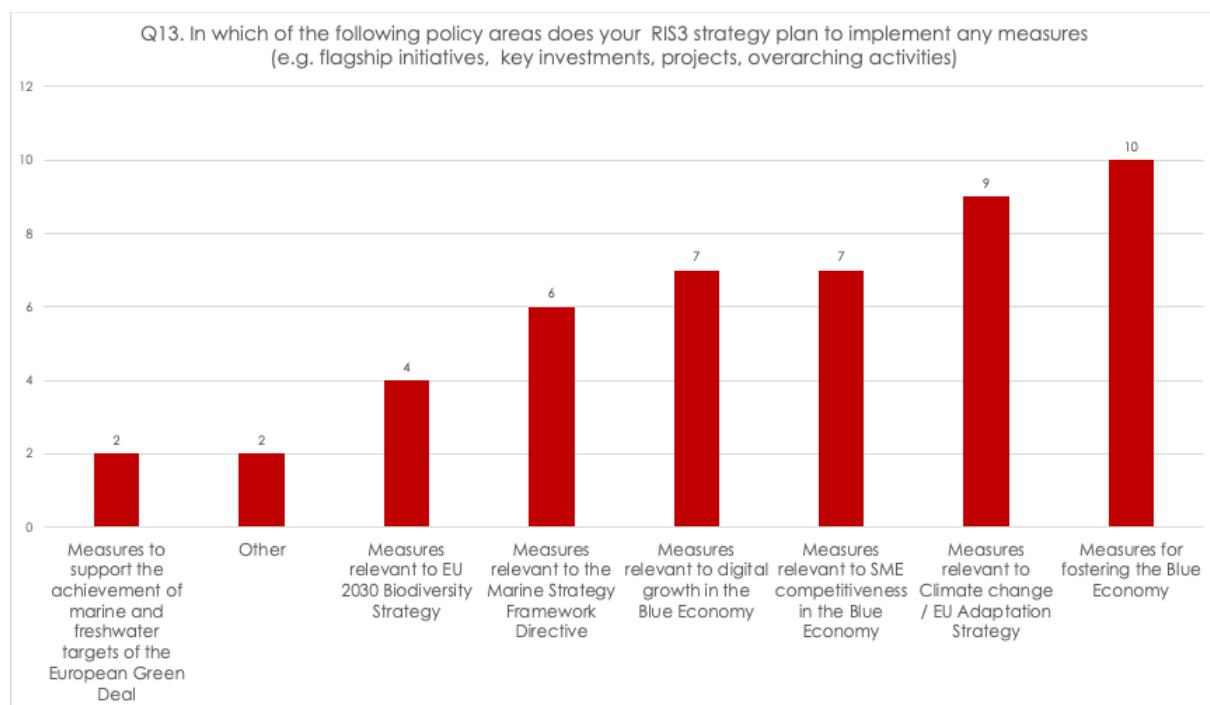


Figure 140 Types of measures prioritised by the regions

Source: Technopolis Group, n=11

Examples of the measures that were provided by the regions which replied to the survey are explained below (answers to be further analysed in subsequent versions of the survey analysis):

- 1) Measures for generally **fostering the Blue Economy**: Aquaculture, biotechnology, coastal tourism etc.
- **Central Macedonia**: Activities related to coastal tourism, eco-tourism, yachting.
 - **Northern Ostrobothnia**: Generating business in bio- and circular economy and creating new companies.
 - **Lisbon Metropolitan Area**: Development of projects leading to the development of marine biotechnology as a source of bioactive compounds and biomaterials with industrial, food, pharmaceutical, cosmetic or other applications.

- **Pays de la Loire:**

- Measures related to Aquaculture: Creating an inter-professional association of fishermen; Supporting the salt production ecosystem: ensuring an adequate recognition of organic character of salt production; Supporting the deployment of a micro-algae industry in the Region
- Measures related to marine renewable energy (MRE): Supporting the implementation of 2 offshore wind farms; Supporting the internationalisation of the value chain of MRE; Implementing port infrastructure related to MRE -Supporting the development of a Hydrogen ecosystem around the Great Port of Nantes Saint-Nazaire *Measures related to shipping: -Great Port of Nantes Saint-Nazaire: investment plan to support infrastructure projects. -Supporting innovative projects related to alternative engine and alternative fuels: wind-power propulsion, hydrogen, electricity, etc. -Water-sport sector: implementation of a regional action plan for the future of water-sport sector. It notably supports innovation for ports, and focuses on reinforcing attracting tourists to the sector. *Measures related to circular Blue Economy: -Supporting key projects related to the development of new materials, and to recycling. For instance, there are projects related to the recycling of aquaculture waste. *Measures related to R&I activities: -Supporting several key projects led by regional clusters, or research centres. -Supporting the development of new research infrastructures -These measures are also part of the support to blue skills and jobs.

- **Centro, Portugal:** CCDRC, through the Regional Operational Programme, has allocated some money to the Sustainable and Blue Economy Partnership, from Horizon Europe, giving a clear sign to regional stakeholders that this is an important thematic area for the Region and, at the same time, promoting the participation of the regional innovation ecosystem in European networks and projects.

- **Malta:**

- Aquaculture and Biotechnology: Previous investments in the Malta Aquaculture Research Centre resulted in a variety of national and EU-funded projects. There is strong innovation potential at the interface between aquaculture and marine biotechnology, such as using fish waste as a resource for producing commercial products.
- Marine renewable energy and offshore technologies: Investments towards the identification of the most feasible marine energy source for the Maltese Islands and the Mediterranean region. There is scope for investments in terms of equipment for development of technology or an innovation space for Blue Growth developments.
- Shipping: Investment in maritime technology to enable Malta to build on its existing and traditional sectors, as well as its large human resources and expertise. Opportunities to shift to higher added-value work, including LNG conversions of vessels, new technological solutions linked to infrastructures and retrofitting existing ships, and greening maritime vessels.
- Blue Skills and Jobs: There is scope for using structural funds to continue developing the research infrastructure in the maritime engineering sector and using the European Social Fund to strengthen the workforce.

- **The Norte Region (PT)** Smart Specialisation Strategy 2021-2027 (S3 NORTE 2027) defines the priority domains for supporting R&D, innovation and business competitiveness measures, namely to be financed by the Norte Regional Operational Programme 2021-2027 (NORTE 2030). There are two important domains defined in the S3 NORTE 2027 that are relevant for the theme of the Oceans and Waters namely: "Sea Resources and Economy" and "Food and environmental systems".

- The NORTE 2030 programme is still in preparation but it is expected to have the following examples of policy instruments related to the regional smart specialisation strategy priority domains that could support the measures that are relevant for the Marine Strategy Framework Directive (e.g. preserving and promoting the sustainable use of marine resources, preserving and management of resources such as water, etc.): (1) Specific Objective (SO) 1.1 "Develop and strengthen research and innovation capacities and the adoption of advanced technologies", e.g. (a) Creation of Scientific and Technological Knowledge (including support for scientific infrastructure and equipment); (b) Creation, Transfer and Enhancement of Knowledge (including support for R&DT); (c) Qualified Entrepreneurship associated with knowledge; (d) Collective Actions for the transfer of knowledge and technology; (e) Technological System to strengthen Competitiveness (infrastructures and technological equipment). (2) SO 1.3 "Enhance sustainable growth and competitiveness of SMEs and job creation in SMEs, including through productive investment", e.g. (a) Business investment to strengthen competitiveness; (b) Qualification, digitisation and internationalisation of companies; (c) Territorial based investments; (d) Collective Actions; (e)

Infrastructure and equipment to support Competitiveness (non-technology based). (3) SO 1.4 “Developing skills for smart specialisation, industrial transition and entrepreneurship”, e.g. (a) Strategic consultation and coordination.

- 2) Measures relevant to **Climate change/EU adaption strategy**: Marine and coastal resistance, circular economy, energy efficiency, renewable and offshore technologies.
- **Lisbon Metropolitan Area:** Development of demonstration projects, of alternative power systems on land, looking for model roads in estuaries and mooring with a view to zero emissions, development or adaptation of solutions, environmentally sustainable technologies (e.g. new port supply points, new methods of propulsion, new concepts of naval architecture and engineering for ferries or other vessels), projects of acceleration of port modernisation, river transport and recreational boating, in the context of estuaries, with high export potential and geographic expansion.
 - **Pays de la Loire:** Measures related to marine and coastal resilience: Regional action plans consider it as a priority, and they include support to key projects and stakeholders.
 - **Centro Region (PT):** CCDRC, as the entity responsible for managing and implementing the regional smart specialisation strategy as well as the Regional Operational Programme, is partner in one of the applications to the Horizon Europe call launched in the context of the Mission Ocean, seas and waters (HORIZON-MISS-2021-OCEAN-02-03). One of the main goals of the call is to develop implementable blueprints for making communities climate-proof and weather-resilient, in particular by adapting to extreme weather events in coastal areas and sea-level rise and other climate change impacts. Therefore, if the project is approved, CCDRC will support, in Centro Region, the restoration of marine and coastal ecosystems and increase the coastal resilience of the specific area where the demonstrator will be implemented.
 - **Malta:** Renewable Energy and Offshore Technologies is one of the niche areas of focus in the 'Marine and Maritime Technologies' thematic area. Another niche area is related to downstream space applications in the shipping sector, to process data concerning ship registers and to facilitate scenario planning, early warning systems, disaster risk management and adaptation strategies to mitigate the effects of climate change. Innovation linked to Earth Observation Data and downstream space technologies could also be useful in monitoring issues related to Malta's high levels of water scarcity. In the maritime sector, there is scope to shift to higher added-value work, including LNG conversion of vessels, new technological solutions linked to infrastructures and retrofitting existing ships, and greening maritime vessels.
 - **The Norte Region (PT)** Smart Specialisation Strategy 2021-2027 (S3 NORTE 2027) defines the priority domains to support R&D, innovation and business competitiveness measures, namely to be financed by the Norte Regional Operational Programme 2021-2027 (NORTE 2030). There are two important domains defined in the S3 NORTE 2027 that are relevant for the theme of the Oceans and Waters namely: “Sea Resources and Economy” and “Food and environmental systems”.
 - The NORTE 2030 programme is still in preparation but it is expected to have the following examples of policy instruments related to the regional smart specialisation strategy priority domains that could support the **measures that are relevant to Climate Change / EU Adaptation Strategy (e.g. preserving and promoting the sustainable use of marine resources, preserving and management of resources such as water, etc.)**: (1) Specific Objective (SO) 1.1 “Develop and strengthen research and innovation capacities and the adoption of advanced technologies”, e.g. (a) Creation of Scientific and Technological Knowledge (including support for scientific infrastructure and equipment); (b) Creation, Transfer and Enhancement of Knowledge (including support for R&DT); (c) Qualified Entrepreneurship associated with knowledge; (d) Collective Actions for the transfer of knowledge and technology; (e) Technological System to strengthen Competitiveness (infrastructures and technological equipment); (2) SO 1.3 “Enhance sustainable growth and competitiveness of SMEs and job creation in SMEs, including through productive investment”, e.g. (a) Business investment to strengthen competitiveness; (b) Qualification, digitisation and internationalisation of companies; (c) Territorial based investments; (d) Collective Actions; (e) Infrastructure and equipment to support Competitiveness (non-technology based); (3) SO 1.4 “Developing skills for smart specialisation, industrial transition and entrepreneurship”, e.g. (a) Strategic consultation and coordination.

- 3) Measures relevant to **SMEs in competition in the Blue Economy**: support regional clusters, support research infrastructure:
- **Central Macedonia:** Activities to promote SME competitiveness in sectors that are relevant with Blue Economy such as Tourism, Agrofood 4.0 and ICT.
 - **Pays de la Loire:** Support for digitalisation; Support for research infrastructure; Support for regional clusters.
 - **Centro (PT):** The Blue Economy is one of the intervention areas specifically foreseen within the Water priority from Centro RIS3. With this, CCDRC wants to promote the development of products, processes and services that will bring social, environmental and economic valorisation of marine resources. Therefore, in the context of research and innovation projects, it is expected that some new initiatives, from regional SMEs, may emerge in this context.
 - **Malta:** Support for SMEs to undertake impactful projects, together with academics, in the area of marine renewable energy and offshore technologies.
 - **The Norte Region** The Smart Specialisation Strategy 2021-2027 (S3 NORTE 2027) defines the priority domains for supporting R&D, innovation and business competitiveness measures, namely to be financed by the Norte Regional Operational Programme 2021-2027 (NORTE 2030). There are two important domains defined in the S3 NORTE 2027 that are relevant for the theme of the Oceans and Waters namely: "Sea Resources and Economy" and "Food and environmental systems". The NORTE 2030 programme is still in preparation but it is expected to have the following examples of policy instruments related to the regional smart specialisation strategy priority domains which could support the measures that are relevant to SME competitiveness in the Blue Economy: (1) Specific Objective (SO) 1.1 "Develop and strengthen research and innovation capacities and the adoption of advanced technologies", e.g. (a) Creation of Scientific and Technological Knowledge (including support for scientific infrastructure and equipment); (b) Creation, Transfer and Enhancement of Knowledge (including support for R&DT); (c) Qualified Entrepreneurship associated with knowledge; (d) Collective Actions for the transfer of knowledge and technology; (e) Technological System to strengthen Competitiveness (infrastructures and technological equipment); (2) SO 1.3 "Enhance sustainable growth and competitiveness of SMEs and job creation in SMEs, including through productive investment", e.g. (a) Business investment to strengthen competitiveness; (b) Qualification, digitisation and internationalisation of companies; (c) Territorial based investments; (d) Collective Actions; (e) Infrastructure and equipment for supporting Competitiveness (non-technology based); (3) SO 1.4 "Developing skills for smart specialization, industrial transition and entrepreneurship", e.g. (a) Strategic consultation and coordination of actors; (b) Plans for concerted impact investments; (c) Training for smart specialisation; (d) Qualified Entrepreneurship.
- 4) Measures relevant to **digital growth in the Blue Economy**: Digitisation of the processes associated with the value chain of all sectors of the Blue Economy, deploying broadband coverage in the whole territory:
- **Central Macedonia:** activities to promote Industry 4.0 and ICT.
 - **Pays de la Loire:** On this aspect, the Region has a roadmap for the Industry of the Future, which includes digitalisation as a key priority. Examples of actions: Modernising production Deploying broadband coverage in the whole territory.
 - **Malta:** Digital growth mainly in the maritime sector. Downstream space applications in the shipping sector, to process data concerning ship registers and to facilitate scenario planning, early warning systems, disaster risk management and adaptation strategies to mitigate the effects of climate change. Development of necessary ICT systems to keep up with market and operational demands. Better service and more cost-effective solutions through investments in digital technology for shipping logistics and services.
 - **The Norte Region** Smart Specialisation Strategy 2021-2027 (S3 NORTE 2027) defines the priority domains for supporting R&D, innovation and business competitiveness measures, namely to be financed by the Norte Regional Operational Programme 2021-2027 (NORTE 2030). There are two important domains defined in the S3 NORTE 2027 that are relevant for the theme of the Oceans and Waters namely: "Sea Resources and Economy" and "Food and environmental systems". The NORTE 2030 programme is still in preparation but it is expected to have the following examples of policy instruments related to the regional smart specialisation strategy priority domains that could support the measures relevant to digital growth in the Blue Economy: (1) Specific Objective (SO) 1.1 "Develop and strengthen research and innovation capacities and the adoption of advanced technologies", e.g. (a) Creation of Scientific and Technological Knowledge (including support for scientific infrastructure and equipment); (b) Creation,

Transfer and Enhancement of Knowledge (including support for R&DT); (c) Qualified Entrepreneurship associated with knowledge; (d) Collective Actions for the transfer of knowledge and technology; (e) Technological System to strengthen Competitiveness (infrastructures and technological equipment); (2) SO 1.3 "Enhance sustainable growth and competitiveness of SMEs and job creation in SMEs, including through productive investment", e.g. (a) Business investment to strengthen competitiveness; (b) Qualification, digitisation and internationalisation of companies; (c) Territorial based investments; (d) Collective Actions; (e) Infrastructure and equipment to support Competitiveness (non-technology based); (3) SO 1.4 "Developing skills for smart specialization, industrial transition and entrepreneurship", e.g. (a) Strategic consultation and coordination of actors; (b) Plans for concerted impact investments; (c) Training for smart specialisation; (d) Qualified Entrepreneurship Training.

- 5) Measures relevant to the Marine Strategy Framework Directive: Restoration & protection of ecosystems:

- **Northern Ostrobothnia:** Producing needs-based solution models, bio- and circular platform economy.
- **Lisbon Metropolitan Region:** Support for the development of projects for the analysis and enhancement of the region's marine natural capital, namely the two large estuarine protected areas – Tagus Estuary Natural Reserve and Sado Estuary Natural Reserve - and the coastline - Luiz Saldanha Marine Park and Natural Park Sintra Cascais, reinforcing its marine extension and promoting the restoration of ecosystems and their services, such as the installation of artificial reefs in maritime-port infrastructures.

- 6) Measures relevant to EU 2030 Biodiversity Strategy: Reduction, reuse and recycling of marine litter within the framework of the Circular Economy:

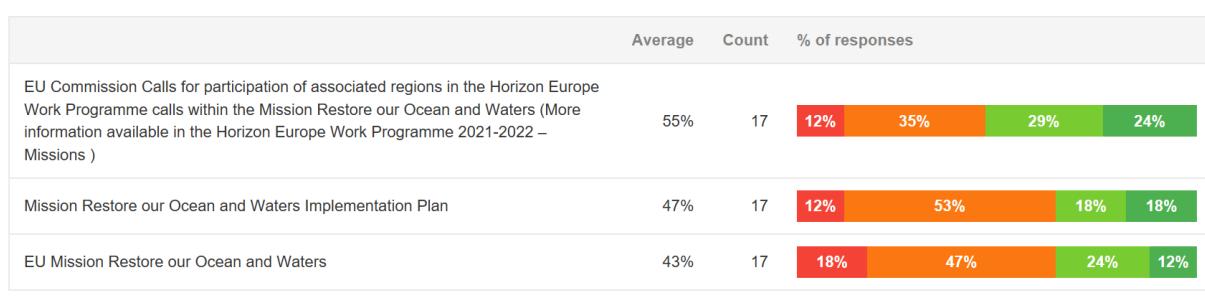
- **Lisbon Metropolitan Region:** Reduction, reuse and recycling of marine litter within the framework of the Circular Economy, with the promotion of use of new environmentally friendly materials in fishing and catching gear.

- 7) Measures to support the achievement of marine and freshwater targets of the European Green deal:

- **Lisbon Metropolitan Region:** Reduction, reuse and recycling of marine litter within the framework of the Circular Economy, with the promotion of use of new environmentally friendly materials in fishing and catching gear.

In terms of the regions' awareness of opportunities, as is shown in the graph below, there is a mixed level of knowledge of the EU's mission to achieve those targets. The only initiatives with over 50% of either some extent or great extent are the calls for participation in the Horizon Europe Work Programme and calls within the Mission Restore our Ocean and Waters. The EU Mission Restore our Ocean and the implementation plan both have only 36% of either some or great knowledge.

Q14. To what extent are you aware of the following EU initiatives in support of achieving the marine and freshwater targets of the European Green Deal, such as protecting 30% of the EU's sea area and restoring marine eco-systems and 25,000 km of free-flowing rivers?



N 17

Appendix I Interviews

Interviews took place with the following regions (which answered positively in the survey as being willing to be contacted, or which volunteered to offer support), to understand their views on how they would see synergies with the Mission objectives, and how regional and EU funding could be leveraged / combined:

	Region
Med	Central Macedonia
Atlantic	Pays de la Loire
Atlantic	Centro Region (PT)
Med	Andalusia
Arctic	Blekinge Region (Sweden)
Danube	North-East Romania
North Sea	Friesland region & Water4All partnership

The purpose of the interviews was to identify the potential for creating more synergies between the regional level and the Mission objectives, and for mobilising stakeholders and funding in the region for this reason. The questions related to:

- How the RIS3 framework and Entrepreneurial Discovery Process could be used to implement the Mission objectives in the future;
- What type of stakeholders could or should be mobilised;
- Any other ways to create synergies or develop incentives for the regional stakeholders to get involved in implementing the Mission;
- What could be ways to combine Mission Ocean funds and regional funds for projects relevant to Mission objectives.

The interview questionnaire is included as follows :

- How aware are you in general of the Mission Ocean, and the opportunities that are going to be open through the EU Mission funding in Horizon Europe? (Available in the Horizon Europe Missions Work Programme for 2021-22 [wp-12-missions_horizon-2021-2022_en.pdf](#) (europa.eu)).

[interviewees are asked to tailor the text in grey highlights to their own situation]

- From our own mapping or the survey, it seems that your region is (or is not) prioritising x y z types of priorities / objectives / measures relevant to the Mission Objectives....
 - a) if the region has relevant priorities / measures, mention what the major topics prioritised are (the concrete measures) and give a general overview
or
 - b) if the region might not have prioritised any measures – in this case, we want to verify the relevance, if there are other regional strategies in place, or other initiatives.

We want to verify, in general: how do you see the relevance of the Mission Objectives within the foreseen RIS3 / S4 in general?

- If the answer is yes, there are synergies; if the answer is no, please skip this one
- Could you give examples of measures you are planning that can be highlighted as measures that would be interesting to replicate across regions?
- How flexible is the RIS3 prioritisation? Is there a process in place to readjust priorities / funding in light of new opportunities? *Could you explain how / if the RIS3 could be adjusted to take into account new priorities?*

Prompt: For instance, is there a continuous Entrepreneurial Discovery Process in place, like a regional S3 committee meeting regularly to decide on new priorities?

- Could the stakeholders that have been participating in the RIS3 Entrepreneurial Discovery Process be mobilised to support the achievement of projects relevant to the Mission Objectives? Please explain.
- If not, Which types of actors would be the most competent ones to be mobilised for this reason, also bearing in mind the national / regional / local competences for implementing solutions for protecting waters / preventing pollution?
- What are challenges (if any) in using the RIS3 framework, or the Entrepreneurial Discovery Process to support the Mission Objectives and involving the relevant quadruple helix regional actors in the EU Mission, e.g. as co-investors in developing or in adopting solutions relevant to the Mission's challenges?

Quadruple helix = actors of the innovation ecosystem, including universities, companies, public sector, societal actors.

Prompt: For instance, Do you think you would need to take any steps to further integrate (new) objectives in the RIS3/S4 relevant to the Mission, in order to be able to co-invest in projects that are relevant to the mission, but not yet included in your RIS3?

- Can regional (co-)investments be made in projects related to the Mission Objectives? Could EU funding and regional funding be combined? What could be ways to do that?
- What ways would there be for the EU Commission to support you in mobilising those types of regional actors towards developing or adopting innovative solutions for the achievement of MO1 or MO2 (choose depending on the region).
- Any final remarks?

TASK 5 – ANALYSIS OF CITIZEN ENGAGEMENT AND OCEAN/WATER LITERACY ACTIVITIES – ATLANTIC/ARCTIC, MEDITERRANEAN AND DANUBE LIGHTHOUSE AREAS

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1. INTRODUCTION

1.1. Objective of task 5 of the Baseline study

Citizen engagement and empowerment for the co-design and co-implementation of solutions is a pillar concept for the EU Mission ‘Restore our Ocean and Waters by 2030’. According to the Mission Implementation Plan, it will promote participatory governance based on public mobilisation and engagement, empowering citizens to take action and drive transitions through deliberative democracy, social innovation, citizen science and awareness campaigns.

Task 5 of the Baseline study for the implementation of the European Mission ‘Restore our Ocean and Waters by 2030’ aims to map activities for citizen engagement and ocean and water literacy in each of the three lighthouses (Atlantic/Arctic Sea basin, Mediterranean Sea basin, Danube River basin), including participatory processes, citizen-led initiatives, awareness, advocacy, education and communication. The aim is to support the Mission Secretariat to gather knowledge and build on major activities already in place.

It is noted that the activities mapped under this task are a selection and not an exhaustive list of all citizen engagement and ocean and water literacy activities taking place in each lighthouse. The selection of activities is based on a set of criteria, in specific the task focuses on activities for citizen engagement and water and ocean literacy that:

- Are relevant to Mission objectives for each specific lighthouse (see box below);
- Take place at large scale (macroregional, national levels);
- Are impactful in terms of citizens and stakeholders' engagement;
- Are ongoing activities and/or took place in the last two-to-five years (2017-2021);
- Have a permanent (long-term) character, i.e. focus on repetitive activities (for example, taking place on annual basis).

Based on that information, Task 5 aims to recommend successful processes that the Mission can build on, for each lighthouse area, as well as entities for useful cooperation on citizen engagement and literacy. As traditions and backgrounds may differ in each lighthouse area, the type of communication and engagement approach may be different. Accordingly, the task will identify any regional and local specificities that should be taken into account.

1.2. Aim and structure of this report

This report presents the main findings and conclusions of the analysis of citizen engagement and water literacy activities in each lighthouse area (Deliverable 7). The report is accompanied by one database (in MS Excel) for each of the three lighthouse areas, containing the information for each key activity on citizen engagement and literacy (Deliverable 8).

Section 2 presents and describes the steps followed in the methodological approach developed for this task.

Section 3 presents the findings, main conclusions and recommendations for the Atlantic region of the Atlantic and Arctic basin lighthouse, with a thematic focus on marine ecosystem restoration.

Section 4 presents the findings, main conclusions and recommendations for the Arctic region of the Atlantic and Arctic basin lighthouse.

Section 5 presents the findings, main conclusions and recommendations for the Mediterranean Sea basin lighthouse, with a thematic focus on pollution prevention, elimination and remediation.

Section 6 presents the findings, main conclusions and recommendations for the Danube basin lighthouse, with a thematic focus on freshwater ecosystem restoration.

2. METHODOLOGY/APPROACH

The methodology for this task comprised a stepwise approach, beginning with developing a matrix to map relevant activities from each lighthouse area that meet a set of agreed criteria. Information on relevant activities was gathered and compiled in the matrix via desktop work and web searches. Based on the compilation of information in the matrix, a set of 'top 5' activities were selected for further in-depth exploration through direct exchanges with activity coordinators.

2.1. Step 1: Mapping citizen engagement and literacy activities

Relevant activities on citizen engagement and literacy were identified and mapped in a specific-purpose matrix. The Excel database systematically categorised and coded activities based on pre-selected fields.

The matrix recorded the following **types of information** for each mapped activity:

- Name of activity;
 - Short general description;
 - Organiser(s) and supporting partners
 - Target group(s);
 - Category of engagement and/or literacy activity;
 - Tools/means used for engagement;
 - Focus/topic(s) of activity;
 - Geographical scope;
 - Frequency;
 - Financing source;
 - Impact information;
 - Web link;
 - Contact information
- The activities mapped per lighthouse were required to meet the following conditions:
- Relevant to the Mission objectives for each specific lighthouse;
 - Take place at large scale (macroregional, national levels);
 - Impactful in terms of citizens and stakeholders' engagement;
 - Ongoing activities and/or took place in last two-to-five years (2017-2021);
 - Have a permanent (long-term) character, i.e. focus on repetitive activities (for example, taking place on annual basis).

Table 75 presents the main categories of citizen engagement and ocean and water literacy used in the matrix.

Citizen engagement and literacy activities	Examples of specific category of activity
Water and ocean literacy	Water and ocean literacy networks, initiatives for raising awareness and promoting action, water and ocean literacy resources libraries, demonstrations, training, toolkits The concept of ocean literacy can be defined as 'an understanding of the ocean's influence on you and your influence on the ocean' ⁴⁶⁵ . It was first created in the United States (us) and includes a framework of seven essential principles and 45 fundamental concepts that are currently accepted worldwide both in formal (universities and schools) and non-formal (research institutes, etc.) Education settings ⁴⁶⁶
Training and education activities	Courses for students and educators (emphasis here on primary/secondary schools rather than academic level of MSc and PhD courses); school curricula projects; basic courses on water and marine sciences; vocational training (often part of horizon 2020 and Horizon Europe projects)
Citizen science initiatives	Scientific activities in which the general public participate, for example data collection, analysis, and dissemination (e.g. Using smartphone apps, other digital tools, crowdsourcing). These are typically activities concerning monitoring of invasive species or pollution monitoring. It may also include activities where citizens are involved in scientific project design
Other activities targeting citizens	These can include various types of activities targeting citizens that do not strictly fit the categories above. Examples are participatory processes and co-creation processes to implement measures and actions together with citizens, citizen volunteer networks and citizen-led cases of activism or community action, artistic projects for citizens in particular youth, public festivals, etc.
Social innovations that engage citizens and mobilise the public, as well as bring businesses and citizens together	Social innovation is a broad term referring to new solutions (products, services, models, markets, processes, etc.) That simultaneously meet a social need and lead to new or improved capabilities and relationships and better use of assets and resources ⁴⁶⁷ . Examples of social innovation can include citizen-initiated sustainable production projects, new business models, community farms, community-led or citizen-led establishment of nature reserves, work of grassroots organisation to bring about measures and actions Large regional forums, networks or platforms where businesses can meet with the general public to work together on projects or involve citizens in projects can also contribute to social innovation

Table 75 Categories of relevant citizen engagement and literacy activities

For each lighthouse, the following sources were screened to identify relevant citizen engagement and literacy activities:

- EU4Ocean Platform and EU4Ocean Coalition for Ocean Literacy;
- European or cross-border regional projects that are relevant to the topic of citizen engagement (Community Research and Development Information Service (CORDIS) database, LIFE and INTERREG projects, European Maritime, Fisheries and Aquaculture Fund (EMFAF) programme, Fisheries Local Action Groups (FLAG) factsheets in the Fisheries Areas Network⁴⁶⁸;
- Webpages and other information sources from basin Commissions or equivalent organisations/platforms of international character, e.g. International Commission for the Protection of the Danube River; Danube region strategy; for the Atlantic/Arctic: Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), European Marine Board, Arctic Council Working Groups, Mediterranean sea macroregional activities, United Nations Environment Programme/Mediterranean Action Plan (UNEP/MAP), PlanBleu, UfM
- Webpages of international non-governmental organisations (NGO) platforms active in the lighthouse areas;
- Keyword based web searches for citizen engagement and literacy activities in English and in national languages of the lighthouse areas (with specific checks of the websites of national authorities responsible for policies relevant to the Mission objectives and research, NGOs, research institutes, coordinators of community-led actions). Web searches were carried out using both academic and non-academic search engines: Research Gate, Google Scholar and Google.

⁴⁶⁵ Cava, F., et al., *Science content and standards for ocean literacy: A report on ocean literacy*, 2005, https://www.coexploration.org/oceanliteracy/documents/OLit2004-05_Final_Report.pdf

⁴⁶⁶ Mokos, M., et al., 'Mediterranean Sea Literacy: When Ocean Literacy becomes region-specific', *Mediterranean Marine Science*, Vol. 21, No 3, 2020, pp. 592–598, <https://doi.org/10.12681/mms.23400>

⁴⁶⁷ https://ec.europa.eu/environment/integration/research/newsalert/pdf/IR10_en.pdf

⁴⁶⁸ https://webgate.ec.europa.eu/fpfis/cms/farnet2/on-the-ground/flag-factsheets_en?field_term_country_tid=120&field_term_theme_tid=61

It is noted that several activities on citizen engagement, citizen science and ocean literacy have taken or are taking place as part of projects funded under Horizon 2020 and Horizon Europe (see also database of projects and case studies relevant for the Mission objectives in Deliverables 2 and 3 of the Baseline Study). However, such projects have not been in the focus of the mapping exercise in this report due to their limited time duration. As one of the aims has been to map citizen engagement and ocean literacy activities of permanent (long-term or repetitive) character that the Mission can build upon, certain Horizon 2020 and Horizon Europe projects have been recorded in case they supported initiatives of more permanent nature.

A total of 111 activities were mapped: 33 in the Atlantic and 14 activities in the Arctic region of the Atlantic and Arctic lighthouse (47 for the entire lighthouse), 29 activities in the Mediterranean Sea basin lighthouse and 35 activities in the Danube basin lighthouse. Several activities were mapped in more than one lighthouse area due to their broader scope.

2.2. Step 2: In-depth exploration of ‘top 5’ initiatives per lighthouse

Each lighthouse team selected five citizen engagement and literacy initiatives from matrix of the activities for in-depth exploration, supported with justifications for each activity’s selection as ‘top 5’. The selection was then agreed for each lighthouse with the European Commission. The selection included:

- A mix of international/macroregional or national initiatives in each lighthouse;
- A variety of activity types (e.g. citizen science, literacy/education network, important festivals or art projects for citizens);
- A mix of financing sources (European, national, private).

These initiatives were developed into more detailed presentations using a factsheet format, gathering further information via personal contact with the coordinators of the activities. The purpose of exploring the ‘top 5’ activities per lighthouse was to gain deeper insights into specific forms of engagement and participation, success factors and challenges, impacts of these activities on the ground, networks, future plans, as well as to draw key lessons for planning future citizen engagement processes in the context of the Mission.

2.3. Step 3: Synthesis and recommendations

Based on the information gathered in the mapping exercise (step 1) and in-depth exploration of the ‘top 5’ activities (step 2), a synthesis and analysis of key citizen engagement and literacy activities was developed for each lighthouse area. It was used to provide recommendations on successful activities and success factors in the specific lighthouse, together with any particularities of the lighthouse that should be taken into account in future planning. The recommendations were formulated according to specific priority opportunities for Mission cooperation with existing citizen engagement and literacy activities.

3. ATLANTIC LIGHTHOUSE AREA

3.1. Introduction

Information on citizen engagement in the Atlantic Sea basin lighthouse is not centrally collected (e.g. by an international actor with a coordination role). The OSPAR website does not include information on public engagement or education initiatives. Mapping citizen engagement and literacy activities in the Atlantic lighthouse area thus meant exploring relevant initiatives in each of the four relevant Member States (Ireland, Spain, Portugal, France), together with international/macroregional initiatives on the European side of the Atlantic.

Backgrounds and traditions in public participation and citizen involvement differ in the EU countries of the Atlantic Sea basin lighthouse. The four Member States have some citizens’ assemblies in place, but the majority address social issues and policy fields other than the environment (e.g. gender equality, constitutional issues, health). To date, citizens’ assemblies relevant to environmental issues have focused mainly on climate change⁴⁶⁹.

⁴⁶⁹ Overview of citizens’ assemblies worldwide, <https://www.buergerrat.de/en/about-citizens-assemblies/what-are-citizens-assemblies/>

In Ireland, development and innovation in participatory governance has advanced rapidly in recent years and the country has received considerable praise for its national participatory governance initiatives, in particular the Citizens' Assembly 2016-2018 on constitutional issues^{470,471}. In 2019, there was also a Citizens' Assembly on gender equality⁴⁷². There is also an Irish Citizens' Assembly on Biodiversity⁴⁷³ and a Climate Assembly⁴⁷⁴. In 2021, the Organisation for Economic Co-operation and Development (OECD) reported that the government has integrated environmental and sustainable development education into curricula at all levels, from childhood to postgraduate education. The Green Schools and several awareness-raising programmes operated by the National Trust of Ireland promote climate action and environmentally friendly behaviour among students, teachers and the wider community⁴⁷⁵.

In France, according to the OECD⁴⁷⁶, strengthening dialogue on environmental and social issues remains a priority following protest movements against government policy. To improve civil society involvement, the 'Macron Act'⁴⁷⁷ in 2015 streamlined and modernised the procedure of public participation in the preparation of projects, plans and programmes. Despite good quality access to environmental information, French citizens consider themselves less well informed on environmental matters than elsewhere in Europe⁴⁷⁸. In 2016, the OECD reported that substantial progress had been made in environmental education on sustainable development, as a result of ambitious initiatives from primary to tertiary education since 2004. France has a Climate Assembly, whose mandate is to define a series of measures that will facilitate a reduction of at least 40 % in greenhouse gas (GHG) emissions by 2030 (compared to 1990) in a spirit of social justice⁴⁷⁹.

In 2015, the OECD reported that Spain did not have a strong tradition of public participation in environmental policy-making⁴⁸⁰. However, a law in 2006 (No. 27/2006 on the rights of access to information)⁴⁸¹ aimed to promote transparency in decision-making and citizen participation. In particular, the regulatory framework for strategic environmental assessment, environmental impact assessment and environmental permitting introduced ways to enhance public influence over final decisions. The OECD also noted that further steps could be taken to broaden participation in the development of policies and strategies. The legal framework for access to justice in environmental matters is well established, and environmental groups have broader legal standing than in many other OECD countries. Spain had a citizens' assembly on climate issues in 2021/2022, which had a mandate to develop recommendations for a more just and secure Spain in the face of climate change, concentrating on consumption, food and land use, work, community, health and care, and ecosystems⁴⁸².

In 2011, the OECD reported that Portugal had developed a comprehensive system of environmental information and broadened public participation⁴⁸³. In 2019, the European Commission reported⁴⁸⁴ that public participation is regulated by the Constitution, the Code for Administrative Procedures and Law-Decree No 232/2007⁴⁸⁵, which regulates public participation in plans and programmes. It recommended that Portugal take steps to better inform the public about access to justice, especially in relation to air pollution and nature.

The main citizen engagement and literacy activities identified as relevant to the Mission objectives in this lighthouse were recorded in an Excel database, as per step 1 of the methodology.

⁴⁷⁰ <https://2016-2018.citizensassembly.ie/en/Home/>

⁴⁷¹ Forde, *Participatory governance in Ireland: Institutional innovation and the quest for joined-up thinking*, 2020, https://www.researchgate.net/publication/344176511_Participatory_governance_in_Ireland_Institutional_innovation_and_the_quest_for_joined-up_thinking

⁴⁷² <https://www.citizensassembly.ie/en/previous-assemblies/2020-2021-citizens-assembly-on-gender-equality/>

⁴⁷³ <https://www.citizensassembly.ie/en/assembly-on-biodiversity-loss/about/about.html>

⁴⁷⁴ <https://citizens-democracy.ch/examples-of-citizens-assemblies/>

⁴⁷⁵ OECD, *Environmental Performance Reviews: Ireland 2021*, Assessment and recommendations, 2021, https://read.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-ireland-2021_d5748a08-en#page14

⁴⁷⁶ OECD, *Environmental Performance Reviews: France 2016*, Assessment and recommendations, 2016, https://read.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-france-2016/assessment-and-recommendations_9789264252714-7-en#page8

⁴⁷⁷ Law for Growth, Activity and Equality of Opportunities, Law No. 2015-990 of 6 August 2015, known as the Macron Act.

⁴⁷⁸ European Commission, *Attitudes of European citizens towards the environment*, 2014, <https://op.europa.eu/en/publication-detail-/publication/c138fd8e-d160-4218-bbd5-ecd2e0305d29/language-en>

⁴⁷⁹ <https://www.conventioncitoypreneurleclimat.fr/en/>
<https://www.buergerrat.de/en/news/climate-assemblyadopts-recommendations/>

⁴⁸⁰ OECD, *Environmental Performance Reviews: Spain 2015*, Policy-making environment, 2015, https://read.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-spain-2015/policy-making-environment_9789264226883-6-en#page26

⁴⁸¹ Law 27/2006 of 18 July regulating the rights of access to information, public participation and access to justice in environmental matters, <https://www.boe.es/buscar/act.php?id=BOE-A-2006-13010>

⁴⁸² <https://www.buergerrat.de/en/news/climate-assembly-in-spain/>

⁴⁸³ OECD, *Environmental Performance Reviews: Portugal 2011*, 2011, https://www.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-portugal-2011_9789264097896-en

⁴⁸⁴ European Commission, *EU Environmental Implementation Review 2019 Country Report – PORTUGAL*, 2019, https://ec.europa.eu/environment/eir/pdf/report_pt_en.pdf

⁴⁸⁵ Decreto-Lei n.o 232/2007, Diário da República n.º232/2007, Série I de 2007-07-31, Art. 3.

3.2. Mapping citizen engagement and literacy activities

3.2.1. Overview

The screening of citizen engagement and ocean literacy activities identified 33 activities relevant to the Mission lighthouse objectives in the Atlantic Sea basin that matched the selection criteria.

Activity categories: The majority of the mapped activities involves citizen science and other activities targeting citizens (e.g. activities for youth, festivals for citizens, volunteer activities). Several activities include literacy networks, training, education (courses), school curricula and school projects (primary, secondary level) and social innovation (citizen-led marine waste cleanup efforts; marine litter transformation involving people with disabilities and fisheries associations; platform for businesses and citizens) (Figure 140).

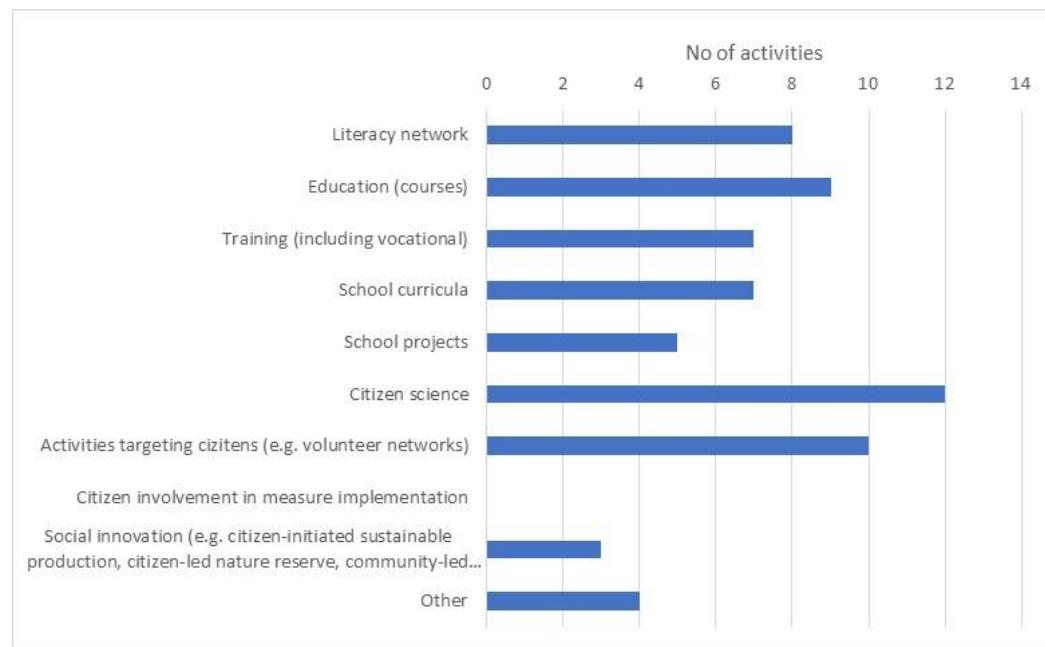


Figure 141 Number of activities per category in the Atlantic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Topics: The mapped activities are mainly about marine issues (i.e. broad issues related to the importance and condition of the sea and the ocean, sustainable management of the ocean, marine environment protection, including coastal ecosystems) (32 of 33) and biodiversity (12 of 33), as these reflect the selection criterion to map activities relevant to the Atlantic lighthouse objective (marine ecosystem restoration). Several activities (9 of 33) concern plastic litter in the sea, while a small number relate to climate change adaptation and fisheries (Table 76 below).

Topics	No of relevant activities
Marine (e.g. sea, ocean)	32
Freshwater and marine (e.g. water cycle)	1
Biodiversity (species, habitats)	12
Ecosystem protection	1
Climate change adaptation	3
Marine pollution (e.g. nutrients, chemicals, underwater noise)	1
Plastic (plastic litter in seas, plastic in water)	9
Fisheries and aquaculture	2
Other	2

Table 76 Primary focus of activities in the Atlantic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Geographical scope and funding: The majority of activities are national (18 of 33; majority in Ireland, France and Portugal, with few activities in Spain) and international/macoregional (14 of 33) in scope. Six activities have a regional geographical scale, taking place at regional level in Spain (Canary Islands, Galicia) and in Portugal (Azores). Most activities are funded by national sources (17 of 33), followed by EU funds (Horizon 2020 (H2020), European Maritime and Fisheries Fund (EMFF), European Maritime, Fisheries and Aquaculture Fund (EMFAF), Interreg) (10 of 33), private sources and philanthropy (mainly foundations). (Figure 142). Ten of 33 activities receive combined funding from more than one source (five activities combine EU with national and/or private funds; and five combine national with private and/or philanthropy sources).

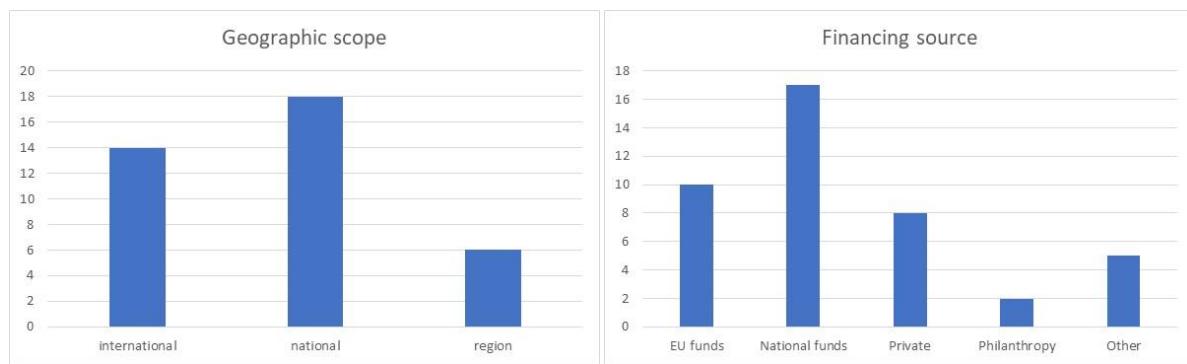


Figure 142 Geographical scope and financing sources of activities in the Atlantic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Organisers and target groups: The largest share of activities is coordinated by university/research actors (14 of 33) and/or NGOs and foundations (15 of 33), with a smaller number coordinated by governmental actors (10 of 33) (Table 77). The target groups are typically the general public (24 of 33 activities), followed by students (primary, secondary, one activity for university), teachers (primary, secondary), scientists and professionals. NGOs were a target group for a minority of activities but were frequently organisers of activities and thus actively driving citizen engagement and citizen processes. (Figure 143).

Type of organisation	No of relevant activities
University/research	14
NGO	15
Government	10
Intergovernmental	1
Museum	1
Education centre	1
Project	4

Table 77 Organisers of activities in the Atlantic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

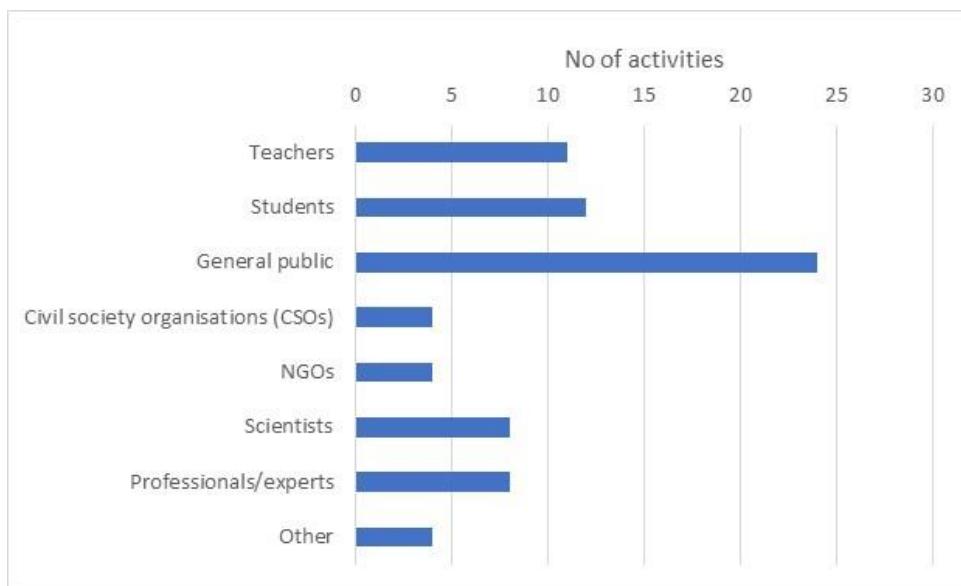


Figure 143 Target groups for activities in the Atlantic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Means and tools of engagement: The activities use a variety of tools for engagement and literacy, with approximately half being events, workshops or webinars, as well as resource libraries. Other means and tools include booklets/guidelines, social media and media campaigns, videos, toolkits, artistic projects, social/living labs and games/apps (Figure 144).

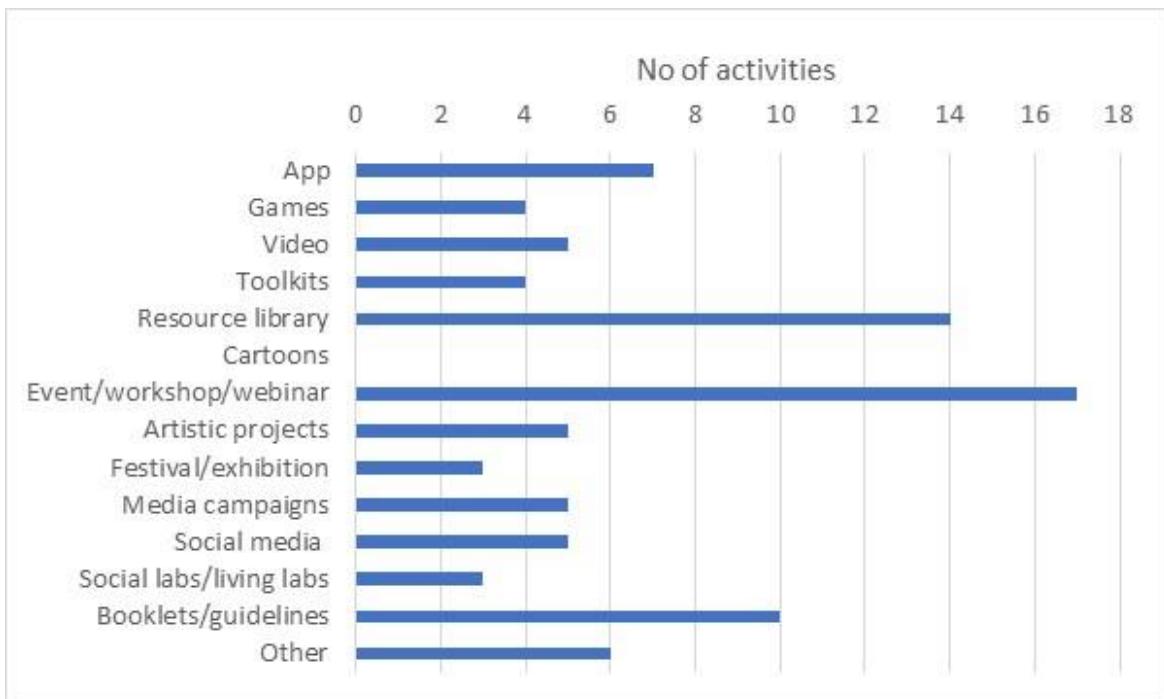


Figure 144 Tools and means of engagement for activities in the Atlantic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

The main citizen engagement and ocean literacy activities that were mapped as relevant to the lighthouse Mission objectives are briefly summarised below. For further details, please refer to Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

3.2.2. Literacy initiatives and networks

International scope

European ocean literacy coalition (EU4Ocean)

<https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1482>

<https://ec.europa.eu/ocean-literacy/youth4ocean>

EU4Ocean was set up by the European Commission to bring together all European groups and organisations active in ocean sustainability and ocean literacy. The coalition combines EU-wide activities with actions dedicated to the Arctic Ocean, the Atlantic Ocean (including the North Sea), the Baltic Sea, the Black Sea, the Mediterranean Sea and the global ocean. EU4Ocean consists of three major communities: a members' platform of professional organisations, the Youth4Ocean forum, and a Network of European Blue Schools. Members of the EU4Ocean Platform exchange expertise, knowledge and best practices in ocean literacy, leading to synergies and new collective initiatives that can reach broader audiences and generate larger impact. The Youth4Ocean forum provides young changemakers with opportunities to speak up for their generation, share their ideas and interests, present projects related to marine issues, and connect and network with like-minded young people and experts all over Europe on marine topics. It targets young people aged 16-30. (See the description below of the Network of European Blue Schools). Sources of financing are EU funds (EMFAF).

All-Atlantic Ocean Youth Ambassadors

<https://allatlanticocean.org/view/atlanticambassadors/introduction>

As part of education and training pathways for career development, the Youth Forum integrates, science and citizen engagement, communication and outreach, and will become a major vehicle to promote young people's competences and skills. The Youth Ambassadors programme is the cornerstone of this larger effort. It was set up in the AANCHOR Coordination and Support Action, which has received funding from H2020. A group of ambassadors are selected on a yearly basis.

UNESCO Ocean Literacy Portal

<https://oceanliteracy.unesco.org/>

The Ocean Literacy Portal serves as a one-stop shop, providing resources and content with the goal of creating an ocean-literate society. The portal acts as a hub to: (1) collect experiences, stories, events on ocean literacy; and (2) offer training to teachers, media, and the general public on ocean literacy. Ocean literacy training courses are developed by the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO), specifically targeting educators, media and government officials. The training courses are hosted on IOC-UNESCO's training platform, the Ocean Teacher Global Academy⁴⁸⁶. Funding for the portal was received from the Government of Sweden.

National scope

Irish Ocean Literacy Network (Ireland)

<https://irishoceanliteracy.ie/>

The mission of the Irish Ocean Literacy Network is to create, maintain and develop an informal network of ocean literacy champions to facilitate collaboration, sharing and coordination of marine outreach and ocean literacy projects across the island of Ireland. Formed in 2016, the Irish Ocean Literacy Network has over 100 members from 40+ organisations with a diverse range of backgrounds, including NGOs, public/government, academic, and media. The network is guided by a steering group of diverse ocean literacy advocates (Konree Innovation Ltd, Aqua TT, the Irish Fisheries Board (*Bord Iascaigh Mhara – BIM*), Clean Coasts, Coastwatch, Dublin College University Water Institute, MaREI Centre for Marine and Renewable Energy Research, Marine Institute (State agency responsible for marine research), Geological Survey, Leave No Trace, the Camden Education Trust, Spindrift Press). The network organises events and engages in outreach and education activities. There are no membership fees and the Secretariat is funded by the State's Marine Institute.

Merci la Mer (France)

<http://www.mercilamer.com/>

Merci la Mer is an educational programme to raise awareness of sea and ocean issues. It is distributed throughout France through a network of ambassadors - teachers, parents of students, association leaders, members of the Navy, etc. Organisers and partners are *Fondation de la Mer*, the National Ministry of Education and Youth and the French Navy. It is financed from national funds. Interactive presentations are provided to schools (from primary to high school), using teaching aids and tools to make young people more aware of the climatic, ecological, scientific, strategic and economic challenges faced by the sea. The initiative also provides a quiz to check knowledge about the ocean, as well as online maps and other visual elements for use in classrooms.

Regional scope

Azores Sea Observatory (*Observatório do Mar dos Açores - OMA*)

<http://www.oma.pt/oma.php>

The Azores Sea Observatory (OMA) is a non-profit association established by marine biologists in 2002. In addition to its scientific and technological objectives, it aims to disseminate and promote environmental education within the scope of marine sciences. Its activity portfolio includes a pedagogical offer for teachers and young students (second and primary level) on marine life, marine litter, oceanography, sustainable fishing, marine archeology, and from whaling to science and the deep sea.

486 <https://classroom.oceanteacher.org/>

3.2.3. Training and education (including courses, school curricula)

International scope

All-Atlantic Blue Schools Network

<https://allatlanticocean.org/jointaction/all-atlantic-blue-schools-network>

The All-Atlantic Blue Schools Network (AA-BSN) Joint Pilot Action aims to connect schools from the Atlantic countries to raise and promote ocean literacy and society awareness, with no geographical, cultural, social, or language boundaries. It supports the creation of responsible and active generations that contribute to ocean sustainability through an international collaborative programme of different National Blue Schools Networks at the Atlantic Ocean level. The AA-BSN promotes a bottom-up process where each school builds its own project based on its socio-cultural-economic reality. It was set up under the AANChOR Coordination and Support Action, with funding from H2020. AA-BSN activities involve coordinating national teams and the international network, developing and disseminating communication resources, implementing online courses (webinars and workshops) to empower AA-BSN teachers, organising annual meetings and evaluation of the Network.

Network of European Blue Schools

<https://ec.europa.eu/ocean-literacy/blue-schools>

The Network of European Blue Schools is one of the communities of the EU4Ocean coalition on ocean literacy, which connects diverse organisations, projects and people contributing to ocean literacy and the sustainable management of the ocean (see the section above on literacy initiatives and networks). Blue Schools aim to inspire teachers, school directors and staff of education services to challenge their students (ranging from kindergarten, primary, lower and upper secondary, as well as technical or vocational schools) to develop a 'Find the blue' project that links them to the ocean. To become a Blue School, schools need to undertake a Find the Blue challenge, identifying an ocean-based topic relevant to their students and collaborating with their pupils to create a school project. A handbook is made available to assist teachers and students to develop their project⁴⁸⁷. The aim is to make the ocean a relevant part of the school curriculum through project-based learning. By successfully completing the project and sharing its results, schools receive the European Blue School certification and become part of the Network. Interested schools can apply to join the Network and become a Blue School through a biannual application cycle. As part of the wider EU4Ocean coalition, the Network is financed through European funds (EMFAF). European Blue Schools in the Atlantic Sea basin are presented in the European Atlas of the Seas (4 in Ireland, 3 in France, 12 in Spain, 11 in Portugal)⁴⁸⁸.

National scope

Tara Ocean Foundation Teacher Training (France)

<https://fondationtaraocean.org/en/teacher-training/>

The Tara Ocean Foundation makes a variety of resources available to teachers and organisers to design courses, programmes and events, including participatory education initiatives, educational files, and conferences and discussions with researchers. The foundation is based in France but its ocean education and training activities have an international scope. The foundation primarily receives private funding (e.g. donations, sponsorship from founding members and signatory partners), as well as some public funding (e.g. small grants from local/regional authorities)⁴⁸⁹.

⁴⁸⁷ https://webgate.ec.europa.eu/maritimeforum/sites/default/files/handbook_eueopean_blue_schools_220221.pdf

⁴⁸⁸ <https://webgate.ec.europa.eu/maritimeforum/en/node/5916>

⁴⁸⁹ Tara Ocean Foundation, *Annual Activity Report 2019*, 2019, https://fondationtaraocean.org/app/uploads/2021/12/annual-report2019_compressed.pdf

Blue Generation Programme of Oceano Azul Foundation (Ocean Literacy Pillar) (Portugal)

<https://www.oceanoazulfoundation.org/initiatives/blue-generation/?parent=1634>

<https://www.oceanoazulfoundation.org/what-we-do/ocean-literacy/>,

The Oceano Azul Foundation is connected to the Oceanario, the largest aquarium in Portugal. It aims to set up a plan and work with the relevant authorities to introduce ocean themes in the school curricula of all children aged between five and nine years old, creating a new generation more aware of the importance of the ocean and its fragile condition. The Blue Generation Programme is to be developed in partnership with the Ministry for Education. Several initiatives are being considered, including training courses for teachers, developing content and learning materials, and supporting water sports in schools.

Escola Azul – Blue School (Portugal)

<https://escolaazul.pt/en>

Escola Azul - Blue School is an educational programme of the Portuguese Ministry of the Sea. It was established in 2017-2018 and developed by the Directorate-General for Maritime Policy (with national funds), with a geographical scope of Portugal nationally. Its main goal is to improve the level of ocean literacy in schools, creating responsible and active generations that contribute to ocean sustainability. It is primarily targeted at school teachers and students (all levels). With 321 Blue Schools already awarded across the country, it is considered a very successful and impactful national programme. The Blue Schools have 110 partners all over Portugal (e.g. research centres, museums, NGOs, small personal projects) that provide relevant activities for schools.

Educational Passages PT (Portugal)

<https://www.dgpm.mm.gov.pt/educational-passages-pt>

Based on a US initiative, schools decorate and launch a small, unmanned sailboat equipped with GPS. This creates the opportunity to develop relationships between the school that launched the boat and the school that finds it, fostering an interaction between young people from different countries and cultures. The development of the project in schools is monitored by the Ministry of the Sea, with technical-scientific support provided by the *Instituto Superior Técnico* through its research centre, ISR-Lisbon. The project is financed nationally, with five boats launched between 2016-2019. It is unclear if this activity is continuing in Portugal, but the broader project continues (based in the US).

Explorers Education Programme (Ireland)

<https://www.marine.ie/Home/site-area/areas-activity/education-outreach/explorers/explorers?language=en>

The Explorers Education Programme aims to inspire school teachers and their students to develop their interest, knowledge and engagement with the ocean. Supported by the Marine Institute and funded by the Irish Government under the Marine Research Programme, Explorers Education provides cross-curricular lesson plans, resources and activities that support the national curriculum. The Programme also provides teacher training (approved by the Department of Education), while outreach experts visit schools around the coast of Ireland. The programme is delivered by the Camden Education Trust⁴⁹⁰.

Regional scope

Blue Azores

<https://www.blueazores.org/oceanliteracy>

Set up in 2019, Blue Azores is the result of an international partnership between the Regional Government of the Azores⁴⁹¹, the Oceano Azul Foundation⁴⁹² and the Waitt Institute⁴⁹³. Its activity portfolio includes an ocean literacy component, the 'Educating a Blue Generation' programme, which provides Azorean primary school teachers with tools to inspire a Blue Generation (e.g. teacher manuals and training, printed material for pupils).

⁴⁹⁰ Camden Education Trust, www.thecamdeneducationtrust.org

⁴⁹¹ <https://portal.azores.gov.pt/en/home>

⁴⁹² <https://www.oceanoazulfoundation.org/>

⁴⁹³ <https://www.waittinstitute.org/>

3.2.4. Citizen science

International scope

Coastwatch

<https://coastwatch.org/europe/>

Coastwatch Europe (CWE) is an international network of environmental groups, universities and other educational institutions that work with local groups and individuals around the coasts of Europe. CWE primarily protects wetlands by raising public awareness of their value and demonstrating practical ways to save them. It has participated in hundreds of events since the 1980s and published several dozen articles, scientific papers and books. The organiser is the Irish Coastal Environment Group – Coastwatch (commonly called Coastwatch). The annual Coastwatch Survey is designed to give an overview of the state of the coast. It involves volunteers from all walks of life checking their chosen 500 metre stretch of coast (survey unit) once around low tide and noting observations on the survey questionnaire. It takes place in several countries in Europe (Ireland, Spain, Portugal, south-west England). In Ireland, Coastwatch applies for core funding each year from the Irish Department of Communications, Climate and Environment and the Marine Environment Policy Budget of the Department of Housing, Planning, Community and Local Government).

EyeOnWater

<https://www.eyeonwater.org/>

The EyeOnWater colour app helps to classify rivers, lakes, coastal waters, seas and oceans based on colour (it can be used for both fresh and salt natural waters). Using the app, citizens can take photos of the water colour in a specific location, which is then compared with a pre-defined colour scale and automatically submitted. The observations of citizens via the app are an extension of a long-term (over 100 years) set of water colour observations made by scientists in the past. The data are publicly available and can be used as time series to indicate changes in the water over time (e.g. from blue to green) but can also be used to validate remote sensing data. It was developed by MARIS B.V. (a dutch private company), based on a concept by the Royal Netherlands Institute for Sea Research (NIOZ), and is supported by the Vrije Universiteit Amsterdam (VU Amsterdam) and University Oldenburg (Germany). It is an ongoing activity, with international scope. The EyeOnWater app was originally funded by the EU seventh framework programme for research and technological development (FP7) but is currently funded through spin-off citizen science concepts in Australia (EyeOnWater Australia for Australia's national science organisation (CSIRO)) and in the Netherlands (e.g. for water plant monitoring)⁴⁹⁴.

Fish Watch Forum

<https://www.fish-watch.org/index.php?lang=en>

Devised and managed by the French scientific association *Peau-Bleue* and the research laboratory ECOMERS (Nice – Sophia Antipolis University), the Fish Watch Forum is an ongoing participatory observatory that gathers citizens' pictures and observations on marine fish in Western Europe and in the Western Mediterranean Sea. The funding source is unclear, but it is likely funded by the organisations managing the initiative.

Plankton Planet

<https://planktonplanet.org/>

Plankton Planet is an international non-profit initiative that brings together academic partners (led by the French National Centre for Scientific Research) and citizens (Tara Ocean Foundation). Plankton Planet aims to generate new knowledge on the evolutionary biology of plankton and the ecological dynamics of the ocean, and to influence collective awareness of the ocean microbiome. Specific actions include the provision of a simple toolbox of scientific instruments, plankton sampling, sharing of plankton images and genetic data for an assessment of aquatic biodiversity. Users of the tools can be yachtsmen, offshore racing professionals, fishermen or cargo ship crews. The initiative has already accomplished plankton sampling by 20 crews in 2015-2016, as well as the development of Plankton-Kit and PlanktoScope (an on-board mini-laboratory and automated microscope) to measure plankton. The aim is to provide robust and efficient equipment to implement the programme from 2020 to 2025 on selected navigation loops. The activity is international in scope and has a mix of funding sources (national (e.g. from the French government programme OCEANOMICS), private, philanthropy (e.g. Tara Ocean Foundation, Richard Lounsbery Foundation)).

⁴⁹⁴ <https://eu-citizen.science/project/103>

Global Litter Observatory

<https://www.oceandecade.org/actions/global-litter-observatory-glo/>

This open access system aims to harmonise and compile information generated by numerous initiatives on macro-litter around the world. It aims to implement a mass-based measuring tool in mobile phones to create broader space for more effective citizen participation in global monitoring, as well as to ease the flow and analysis of information through digital data sharing. Organised by the University of Cadiz, it runs from 2021-2026 and is sponsored by the UN Decade of Ocean Science for Sustainable Development.

National scope

OBSenMER (France)

<https://www.obsenmer.org/pages/home>

OBSenMER is a free, collaborative digital platform that facilitates the collection, saving and sharing of observations at sea. It stores all types of citizen observations: marine mammals, fish, birds, but also human activities, such as boating, fishing, pollution, etc. The organiser is *Groupe d'Etude des Cétacés du Cotentin* (GECC). It is an ongoing national activity, supported by a mix of private funding (insurance company) and national support.

BioLit Coastline Monitors (France)

<https://www.biolit.fr>

This is a national participatory science programme to promote coastline biodiversity in France, led by the non-profit association *Planète Mer*. The Marine Station of Dinard (*Museum National d'Histoire Naturelle*) is responsible for its development, supported by a scientific council and in partnership with environmental and sustainable development education organisations, regional authorities, and managers of protected spaces and natural resources. BioLit calls on all citizens to observe changes in coastal habitats and species. The observations, data and photos recorded on the website are sent to scientists so they can better understand coastal biodiversity, how it is changing, and the impact of human activities on wildlife. It is an ongoing activity that covers the whole of France and receives national and foundation funding.

Explore Your Shore! (Ireland)

<https://exploreyourshore.ie/>

Explore Your Shore! is a national marine biodiversity citizen science recording project for the Republic of Ireland. It focuses on increasing citizens' knowledge of the distribution of intertidal species, exploring their potential as bio-indicators of water quality and climate change, and highlighting actions that can be taken to address water pollution and climate change. Organised by the National Biodiversity Data Centre, the activity is ongoing, with citizens able to submit readings voluntarily at any time. It is funded by the Environmental Protection Agency (EPA) and the National Biodiversity Data Centre.

SeaSearch Ireland

<https://seasearchireland.ie/>

Seasearch is a project for divers and snorkelers who are interested in what they are seeing under water and who want to help to protect the marine environment around the coasts of Ireland and the UK. The main aim is to map the various types of sea bed found in the near-shore zone around the whole of Ireland and the UK. Organised by the National Biodiversity Data Centre, it is an ongoing activity supported by national funds.

Regional scope

RedPROMAR (Canary Islands)

<https://redpromar.org/>

The Observer Network of the Marine Environment of the Canary Islands (RedPROMAR) is a citizen science app for monitoring and supervising marine life in the Canary Island archipelago. Developed and supported by the Government of the Canary Islands, it aims to establish a surveillance system that records changes in this

ecosystem. It includes a marine species guide of the Macaronesian region, a system to report sightings, options to view and consult sightings maps, alerts (e.g. on presence of jellyfish), events of interest, and ranking of most active users. Funding sources are not clear on the RedPROMAR website, but it refers to the Government of the Canary Islands and the European Regional Development Fund (ERDF).

Los Ojos del Guirre (Canary islands)

https://www.wwf.es/participa/ciencia_ciudadana_en_canarias/

This is a citizen science initiative of the World Wide Fund for Nature (WWF) Spain to improve knowledge of the flora and fauna of the Canary Islands. Citizen observations can be provided via an app (EpiCollect5) and/or online via a form. This activity is focused on terrestrial flora and fauna, complementing the marine biodiversity initiative of the Government of the Canary Islands (RedPROMAR). However, it also includes the collection of data on marine species such as sea turtles, as well as activities that threaten marine biodiversity (e.g. plastic, fishing waste).

3.2.5. Other activities targeting citizens (e.g. volunteer networks, artistic initiatives, public festivals)

International scope

Ocean Initiatives

<https://www.initiativeoceans.org/en>

Ocean Initiatives are clean-up actions on beaches, lakes, rivers and sea beds all over the world. These citizen-led marine litter collections are organised by volunteers with the support of Surfrider Foundation Europe. Other supports include training and resources for organisers. Ocean Initiatives are an ongoing activity of international scope, funded by EU and private funds.

National scope

SeaFest Ireland

<https://www.seafest.ie/>

Hosted by Cork City Council and the Inter-Departmental Marine Coordination Group (MCG)⁴⁹⁵, SeaFest is Ireland's largest free maritime festival. SeaFest is under the remit of The Marine Institute in Galway. With over 100 free events for all ages, Seafest includes tours (via kayak, sailboat, etc.), demonstrations, workshops, performances and covers a range of topics including fisheries, UN Sustainable Development Goals (SDGs), ports, marine waste, folklore, and more. Its geographical scope is Ireland and it was scheduled to run annually, hosted by Cork City from 2019-2021. It did not take place in 2020 and 2021, due to COVID-19 restrictions. There are no current plans for it to return in 2022 and it is unclear if it will move forward. SeaFest is part-funded by the Government of Ireland and the EU (under Ireland's European Maritime and Fisheries Fund (EMFF) Operational Programme for the seafood sector).

4P Shore & Seas (France)

<https://www.4pshoreandseas.org/> <https://webgate.ec.europa.eu/maritimeforum/en/node/5538>

4P Shore & Seas draws its name from its focus - pollution, preservation, protection and prevention. It develops scientific investigations and uses the results to promote new public awareness campaigns on plastic waste in oceans. Campaigns include scientific events, communication projects, educational presentations in schools, and networking with partners at local and national level. In addition to its flagship voluntary litter collection event, the organisation creates short information videos and publishes research. Its geographical scope is France. The waste clean-up takes place annually, while educational material is published intermittently. It is supported through the EU Youth4Ocean programme, although its funding appears to be private.

⁴⁹⁵ <https://www.oceanwealth.ie/about-us>

Sailing Hirondelle (France)

<https://webgate.ec.europa.eu/maritimeforum/en/node/6476>

Sailing Hirondelle organises sailing expeditions dedicated to creating content to raise awareness of a more sustainable relationship with the ocean. The Hirondelle crew (including volunteer writers and technical experts) collects citizens' testimonies from port to port in order to discover stories of a changing coastline. These ocean stories show the local impacts of a global environmental crisis, as well as local solutions. The geographical scope is France, but the frequency is unclear (although likely annual). It is supported through the EU Youth4Ocean programme, but information on funding is unclear.

Mar de Mares Festival (Spain)

<https://festivalmardemares.org/>

The *Mar de Mares* Festival turns Spain's La Coruña (in Galicia) into the world capital of the oceans, a meeting point for all lovers of the sea, for whom loving the sea means not only enjoying its landscape, but acting to guarantee its survival and leave healthy oceans for future generations. Artists, scientists, activists, educators, cooks, athletes, adventurers, entrepreneurs and the public all become the voice of the oceans for a few days. It is organised annually by the *Redes de Sal Association*⁴⁹⁶. Funding comes from national and private funds.

Mário Ruivo Award – Ocean Generations (Portugal)

<https://www.dgpm.mm.gov.pt/post/pr%C3%A9mio-m%C3%A1rio-ruivo-gera%C3%A7%C3%A3o-oc%C3%A2nicas>

The Mário Ruivo Award seeks to raise awareness of the ocean in Portugal, challenging participants of all ages to create films that express the fundamental role of the ocean in human life. It is organised by the Directorate-General for Maritime Policy (Ministry of the Sea). Its geographical scope is Portugal and, despite being scheduled as an annual award, has taken place only twice since 2018. It is supported by national funds and a number of films were produced for its first edition.

3.2.6. Activities bringing businesses and citizens together

Business2Sea

<http://business2sea.org/>

This is an international event to facilitate interaction between people and organisations, and to promote projects and businesses within the marine economy. Organised by *Forum Oceano* and the CETMAR Foundation, it features a conference, workshops, pitches, and business-to-business (B2B) meetings, as well as networking possibilities. It is open to all stakeholders whose activities are related to the sea and its resources, including companies, associations, research centres, universities and public bodies. Its geographical scope is Portugal and Spain, and it is open to international participants. It takes place on annual basis and funding sources may differ depending on the year. Funding sources include EU funds (e.g. in 2021, via Interreg Atlantic Area programme⁴⁹⁷, national funds, and some private sources).

Litter Spain

https://ec.europa.eu/oceans-and-fisheries/news/upcycling-new-life-marine-litter-spain-inclusion-project-2021-12-22_en

The Litter Spain project in Galicia shows how to foster new opportunities in the circular economy while benefiting people with disabilities at risk of social exclusion. Clean-ups are organised by members of associations for disabled people, litter is then upcycled and purchased by fisheries' associations. The organisers are a marine litter transformation centre, disability associations, the University of La Coruña, the Costa Sostible FLAG⁴⁹⁸, the Association of Women in the Fisheries Sector and the local city council. The project involves training associations' members on the shellfish gathering sector, marine conservation, and the collection and processing of waste, as well as a workshop (in collaboration with the University of La

⁴⁹⁶ <https://www.es.redesdesal.org/>

⁴⁹⁷ Web presence of Business2Sea developed with financial support from project INTERREG VA 0101_GNP_AECT_1_E (European Group of Territorial Cooperation Galicia-North of Portugal (GNP, EGTC)).

⁴⁹⁸ <https://costasostible.com/>: FLAGs are partnerships between fishery actors and other local private and public stakeholders (<https://webgate.ec.europa.eu/maritimeforum/en/node/6463>).

Coruña) for fisheries professionals to learn about the design of fishing tools. To date, the geographical focus has been limited to the Spanish town of Concello de Outes. The project started in 2021, but it is unclear what the duration/frequency will be. It is supported by EU funding from the European Maritime and Fisheries Fund (EMFF).

3.3. In-depth exploration of selected initiatives

In the Atlantic part of the Atlantic and Arctic lighthouse, four initiatives were selected for in-depth exploration through written communications and/or interviews with their coordinators. The four activities selected were:

- 1) **Explore Your Shore!** - a citizen science initiative in Ireland, which is a well-developed active initiative, bringing many citizen science efforts together.
- 2) **Mário Ruivo Award** - an artistic initiative for young people in Portugal, as an interesting example of an arts-oriented citizen engagement activity.
- 3) **Tara Ocean Foundation teacher training** - a training and education initiative with international scope (based in France) that is well developed and offers a variety of formats to teachers and course organisers.
- 4) **Mar de Mares Festival** - a large, long-running ocean festival in Spain, with a broad range of activities.

The team contacted these initiatives and completed personal communications (interview or written communication) with their coordinators. The completed factsheets are presented below.

Factsheet 1: Explore your Shore!

1. Name of activity
Explore Your Shore! https://exploreyourshore.ie/
2. Introduction and context
<p>a. <u>Short general description to introduce the activity</u></p> <p>Explore Your Shore! is a national marine biodiversity citizen science recording project for the Republic of Ireland. It focuses on increasing citizens' knowledge of the distribution of intertidal species, exploring their potential as bio-indicators of water quality and climate change, and highlighting actions that can be taken to tackle water pollution and climate change.</p> <p>Explore Your Shore! began in 2019 and was one of two citizen science projects established at the National Biodiversity Data Centre as part of an EPA-funded project on aquatic species as bio-indicators of climate change and water quality.</p> <p>b. <u>Location/geographical scope</u></p> <p>Explore Your Shore! is a national activity whose geographical scope covers the whole of Ireland.</p> <p>c. <u>Activity category</u></p> <p>The activity is focused on citizen engagement via citizen science, but also aims to increase citizens' knowledge of the ocean. It also functions as a marine literacy initiative and contributes to education and training.</p> <p>d. <u>Frequency of activity</u></p> <p>The activity is ongoing, with citizens able to submit readings voluntarily at any time.</p>
3. Focus/topic of activity
<p>The focus of the activity is on marine issues, with specific attention to biodiversity and marine species.</p> <p>Its focus is linked to the Mission objective for the Atlantic and Arctic lighthouse, namely to 'Protect and restore ecosystems and biodiversity (marine), in line with the EU Biodiversity Strategy 2030'.</p>
4. Main objectives of the activity
<ul style="list-style-type: none">– Contribute to building a baseline dataset for marine species, especially intertidal species in Irish waters;– Explore marine species as bio-indicators of climate change and global warming;– Promote public engagement and awareness of marine biodiversity and marine biodiversity citizen science in Ireland, including training and supporting an active network of marine biodiversity recorders.
5. Key actors leading the activity
<ul style="list-style-type: none">– The organiser of Explore Your Shore! is the National Biodiversity Data Centre. The Data Centre is 'a programme of the Heritage Council and is operated under a service level agreement by Compass Informatics. The National Biodiversity Data Centre is funded by the Heritage Council and Department of Housing, Local Government and Heritage.'– The EPA funds the Project Officer position, with 50 % of the Project Officer's time allocated to Explore Your Shore!– The National Biodiversity Data Centre employs the Project Officer and assumes overall responsibility for the project. The Data Centre also supports Explore Your Shore! through allocation of publication funds and core funds to the project.

- Key collaborations are listed below under 'Networking', with **10 partner marine biodiversity citizen science projects**, including universities, partnerships with **Clean Coasts** and **Leave No Trace Ireland** (training), the **Waterford and Wexford Educational Training Board** to develop an online marine biodiversity citizen science course for schools, and the **Marine Institute**.

6. Target groups

The target groups for the activities are the general public/citizens, outdoor activity providers, and primary schools.

7. Specific tools/means used

- Online resource library, including guidelines on how to make species recordings;
- Online recording forms are available for the various surveys coordinated by Explore Your Shore!;
- Social media campaigns;
- Online visualisation of data;
- Species identification aids;
- Online marine biodiversity citizen science course;
- Printed material (e.g. print workbooks for dissemination to Irish primary schools);
- Training, talks, workshops, online videos on marine species identification and survey techniques.

8. Implementation successes and challenges

Achievement of objectives - implementation success

- 10 900 marine species records were submitted to the National Biodiversity Data Centre since Explore Your Shore! began in 2019-2021. This represents a 255 % increase in annual marine species records submitted to the Data Centre between 2019 and 2021.
- Explore Your Shore! has expanded its marine biodiversity recorder network with 1 340 recorders submitting records in the past three years (2019-2021).
- Explore Your Shore! now includes 10 active partner citizen science surveys, which have submitted an additional 17 943 marine biodiversity records to the Data Centre in 2019-2021. Partner surveys are promoted (along with Explore Your Shore! surveys) on the Explore Your Shore! website (exploreyourshore.ie). While marine biodiversity citizen science projects have been established as part of EU and/or university projects, some of these fail to generate records, largely due to a lack of appreciation of the level of training, promotion, support and investment that is required to run a successful citizen science project.
- The project started from a low baseline, with a low level of marine - especially intertidal - species record submissions to the data centre annually. The primary block to recording submissions is a lack of familiarity with marine species and their identification. When the project started, 7 of the top 10 marine species recorded were seals and jellyfish, however in 2021, 6 of the top 10 species recorded were intertidal seaweed and invertebrate species.
- The initiative begun to tackle this lack of familiarity with marine species by publishing new identification aids to intertidal seaweeds and bivalve shells, with 1 800 copies sold since publication. Additionally, in the past three years, Explore Your Shore! has delivered 34 talks, workshops and online videos in marine species identification and survey techniques, engaging with over 2 700 people, despite the limitations imposed by COVID-19.
- In 2021 and 2022, the initiative partnered with the Clean Coasts project, which has hundreds of local beach cleaning groups around the Irish coast. Through this partnership they help to deliver the Clean Coasts Observer Programme, where clean coasts volunteers undergo a four-part online Explore Your Shore! training programme on marine biodiversity citizen science identification and recording, followed by regional on-shore training. They are also supplied with National Biodiversity Data Centre marine species identification aids by Clean Coasts.

- In 2022 the initiative also partnered with Leave No Trace Ireland to deliver a similar four-week Explore Your Shore! training continuous professional development (CPD) programme to outdoor activity providers across Ireland to improve their knowledge of intertidal species and incorporate marine biodiversity citizen science in their activities.
- Explore your Shore! recently developed a free online marine biodiversity citizen science course for both the public and schools and this has been used as an educational tool by the Waterford and Wexford Educational Training Board, as well as promoted to the general public via the website and social media channels.
- While the number of marine records has increased significantly, uptake of effort-related site surveys has been slower, with the main inhibitors likely to be lack of confidence in species identification, and inability to run training workshops due to COVID-19 restrictions.

Implementation challenges

Funding and personnel resource challenges

The project is managed by a single Project Officer, with 50 % of their time allocated to Explore Your Shore! and 50 % allocated to managing a freshwater citizen science project. The current workload is would benefit from a full-time dedicated Project Officer. Assistance has been obtained from two volunteer placement interns, who have helped to progress specific projects such as social media, database management and preparation of draft text for a new identification aid to intertidal invertebrates. Plans for a six-year Marine Biodiversity Citizen Science Strategy (see below) will require significant additional project staff roles and project funding.

The project budget is small, with the EPA funding supporting the Project Officer role. Production of publications is supported through the National Biodiversity Data Centre's publications budget, while a small budget for other project costs is supplied under the National Biodiversity Data Centre's core budget.

Further technical development

The project has highlighted some potential technical development work to the National Biodiversity Data Centre digital infrastructure that would significantly benefit Explore Your Shore! marine biodiversity citizen science recording. This includes developing capacity to automatically update the Taxonomic Dictionary used in recording software and developing the data management interface to improve feedback to recorders in terms of user-friendly record validation.

9. Financing source

- Annual funding from the EPA to support the Project Offer role (for two citizen science projects) amounted to EUR 49 000 per annum 2019-2021 and EUR 54 390 in 2022.
- Provision of project funding for Explore Your Shore! from the National Biodiversity Data Centre's core funding annually amounts to EUR 2 000.

10. Impact of activity

The project collated key performance indicator (KPI) data (2019-2021) including:

- # validated marine biodiversity citizen science species records submitted per annum: 5 860 in 2021
- # published media articles/appearances on tv/radio/newspaper/online: 33
- # total marine biodiversity citizen science records submitted since 2019: 10 900
- # Tweets: 286, # Impressions: 1 302 659, # Engagements: 48 477
- # Facebook posts: 485, # Reach: 928 505, # Clicks: 30 581, # Reactions: 14 842
- # visitors to exploreyourshore.ie: 10 316 sessions in 2021
- # events: 37, # attending/viewing: 2,390
- # marine species recorders: 1 340
- % increase in annual marine species records (since 2019): 255 %

- % records validated on first submission in 2021: 62 % (55 % in 2019)
- % records failed validation in 2021: 9.4 % (18.3 % in 2019)

11. Future plans

The National Biodiversity Data Centre has just launched a Draft Marine Biodiversity Citizen Science Strategy 2023–2028 for stakeholder and public consultation⁴⁹⁹. The Strategy's goals are:

Goal 1: Establish a National Platform for Marine Biodiversity Citizen Science within the National Biodiversity Data Centre.

Goal 2: Integrate marine biodiversity citizen science into policy and research.

Goal 3: Deliver enhanced availability, useability, and integration of robust marine biodiversity data.

Goal 4: Build partnerships to build the national marine biodiversity data resource.

Goal 5: Improve our knowledge of marine species and habitats.

Goal 6: Promote actions to protect and regenerate marine biodiversity in Ireland.

Within the strategy are commitments to:

- Promote Explore Your Shore! as a national platform for marine biodiversity citizen science;
- Maintain and promote the Explore Your Shore! suite of marine biodiversity citizen science surveys;
- Promote Explore Your Shore! citizen science participation;
- Develop links between Clean Coasts and Explore Your Shore! objectives.

Delivery of the Strategy will be contingent on securing adequate funding and support and ensuring that the National Biodiversity Data Centre's citizen science platforms are maintained. A Programme Manager and two Project Officer roles are envisaged to deliver the Strategy over a six-year period.

The long-term goals of the project also envisage establishing a network of citizen science intertidal monitoring sites around the Irish coast.

12. Networking

Key collaborations:

- The project works with **10 partner marine biodiversity citizen science projects**, including universities who collaborate with Explore Your Shore! on activities and share their species record data with the National Biodiversity Data Centre. In turn Explore Your Shore! and the National Biodiversity Data Centre promote their surveys through the Explore Your Shore! website and social media campaigns, provide online visualisation of their data, provides backup for their databases, and in some cases houses partner project websites and provides IT backup for those websites.
- Explore Your Shore! has partnered with **Clean Coasts** and **Leave No Trace** Ireland to deliver training for Clean Coasts volunteers and outdoor activity providers. Both partners allow access to their network of volunteers and activity providers and fund the provision of National Biodiversity Data Centre marine species identification aids for participants.
- The **Waterford and Wexford Educational Training Board** were partners in the development of an online marine biodiversity citizen science course for schools and funded printing of supporting material and teacher training.
- In 2020, Explore Your Shore! partnered with the **Marine Institute** to incorporate a section on Explorer Your Shore! into the Marine Institute's Explorer Programme Seashore Guide Workbook. The Marine Institute and the National Biodiversity Data Centre co-funded the printing of workbooks for dissemination to Irish primary schools.

⁴⁹⁹ Biodiversity Ireland, Issue 22, Spring/Summer 2022, pp. 14-16, https://biodiversityireland.ie/app/uploads/2022/05/Biodiversity-Ireland-Issue-22_web.pdf

Further networks:

- Explore Your Shore! collaborates and shares data with the **Centre for Environmental Data and Recording in Northern Ireland**. It also collaborates with the **Ulster Wildlife-led Shore NI** marine biodiversity citizen science recording project, and conducts joint training talks and events with Shore NI.
- In a wider context, the Explore Your Shore! Project Officer and National Biodiversity Data Centre are active members of the **European Citizen Science Association** and promote their projects at European level through the **eu-citizen.science** website. Explore Your Shore! is also a partner in developing a **COST Action Proposal** on 'Citizen Science in support of the United Nations Sustainable Development Goals' and is working with multiple European partners on a **published review** of 'The 100 priority questions for advancing Conservation, Monitoring and Research of Seagrass Ecosystems in Europe'.
- Explore Your Shore! is always interested in seeking to collaborate with other marine biodiversity citizen science projects in Europe.

13. Conclusions and lessons

- Explore your Shore! is a very relevant activity for cooperation with the Mission in the areas of citizen science, marine literacy and training. It is already successfully implemented within Ireland (with a small project budget), it is very well networked with numerous marine biodiversity citizen science projects, other Irish activities working with volunteer citizens, and education institutions.
- There is concrete potential for further upscaling linked to a Draft Marine Biodiversity Citizen Science Strategy 2023–2028 that is currently in preparation and in stakeholder and public consultation. The delivery of the six-year Strategy will require significant additional project staff and its success depends on securing adequate funding and support.
- Long-term goals of the project include establishing a network of citizen science intertidal monitoring sites around the Irish coast.
- Some important lessons from the implementation of Explore Your Shore! for future citizen engagement activities of the Mission are:
- There is a strong appetite for marine biodiversity citizen science in Ireland, as shown by the high number of records submitted to the National Biodiversity Data Centre since Explore your Shore! started in 2019 (255 % increase in records). This shows that citizen science can significantly contribute to better knowledge on coastal and marine biodiversity.
- Explore Your Shore! shows the importance of partnering with other citizen science surveys to exploit synergies and co-promote each other surveys.
- Experience indicates that, in some cases, while marine biodiversity citizen science projects have been established as part of EU and/or university projects, some of these fail to generate records, largely due to a lack of appreciation of the level of training, promotion, support and investment required to run a successful citizen science project.
- The primary block to recording species submissions remains the lack of familiarity with marine species and their identification, therefore further efforts are needed in training interested citizens and disseminating relevant aids.
- While the number of marine records has increased significantly, uptake of site surveys has been slower, with the main inhibitors likely to be lack of confidence in species identification, and the inability to run training workshops due to COVID-19 restrictions.

14. Contact information

National Biodiversity Data Centre (www.biodiversityireland.ie), Ireland

Factsheet 2: Mário Ruivo Award

1. Name of activity
Mário Ruivo Award – Oceanic Generations https://www.dgpm.mm.gov.pt (site of responsible authority)
Disclaimer: <i>Information in factsheet not to be quoted in public reports in particular on implementation challenges (only for internal use)</i>
2. Introduction and context
a. <u>Short general description to introduce the activity</u> The Mário Ruivo Award is an artistic initiative for young people, challenging participants to create films that express the fundamental role of the ocean in human life.
b. <u>Location/geographical scope</u> Portugal.
c. <u>Activity category</u> Artistic initiative targeting school children and society generally.
d. <u>Frequency of activity</u> The award is scheduled as an annual event but has taken place only twice since 2018. The first edition of the Mário Ruivo Award – Oceanic Generations took place in 2017-2018. Application deadline for the latest edition was in December 2021, with the winning films to be awarded in 2022.
3. Focus/topic of activity
Issues related to the ocean and the marine environment in general.
4. Main objectives of the activity
The Mário Ruivo – Oceanic Generations Award aims to raise awareness and mobilise people of all ages through the creation of seven-minute films that express the fundamental role of the ocean in our lives and the need to conserve this resource that is the common heritage of humanity. The award is based on the motto ‘Knowing and interacting with the ocean’.
5. Key actors leading the activity
The Directorate-General for Maritime Policy (Ministry of the Sea) is responsible for the organisation and logistics of the Mário Ruivo Award. The award is based on a protocol co-signed in 2016 by the Ministry of the Sea, the Ministry of Education and the Ministry of Culture.
6. Target groups
The award primarily targets young people between the ages of 12-18, as well as society more generally. The first edition of the award targeted school children, while the second edition was broadened to society at large (the groups have to include only one child aged between 12-18, the rest of the group does not have an age limit). Applications are submitted by teams of maximum five members. Teams must identify one of their members as the ‘main director’ leading the team, who should be a young person aged between 12 and 18 years. At least one of the other team members must be over 18 years old, with no age restrictions applied to the other members.

7. Specific tools/means used
<ul style="list-style-type: none"> – Artistic projects (film-making) that compete for the award; – Social media and notifications in schools are used to advertise the competition; – The winning teams win a sea experience and snorkelling kits. The main director wins a professional GoPro camera. All finalists teams (the main director plus one more team member) participate in film production training (which can also be seen as a prize); – In the first edition of the award, there was EUR 5 000 prize for the winner, as well as two commended films (EUR 1 500 each).
8. Implementation successes and challenges
<p>What did/did not work</p> <ul style="list-style-type: none"> – The first edition of the Mário Ruivo Award – Oceanic Generations successfully took place in 2017-2018 (42 applications) and recognised films made in schools under the theme 'Knowing and interacting with the ocean'. The winning video was 'The Sea in Us', from the Santa Maria Elementary and Secondary School Azores, while two films received a commendation. Two further films received special recognition by the jury. – In the second edition of the award (2021-2022), only eight applications were received and all were short-listed as finalists (which has a maximum of eight). The reduced number of applications may be due to changes in participation requirements and the fact that the format of the competition became more demanding and required more time commitment from school children. – The changes to the format of the second edition were intended to make the award more appealing, as it was expected that the training would appeal to more participants. For the second edition, applicants were first asked to submit a script of their film idea. The film should fit into one of two thematic categories: a) On the route of Magellan (500th anniversary), or b) The change we need for the ocean we want (for the promotion of Ocean Literacy in the context of the UN Decade of the Ocean). The main director plus one other member from each of the eight shortlisted teams were to then participate in a 20-hour training programme on film-making (three hours per week) so as to improve the quality of films in the competition. Based on skills acquired during the training, applicants then developed their final film. One of the eight shortlisted applicant teams withdrew from the competition as they could not attend the training sessions. – Overall, the training improved the quality of films, but the number of applications was very low. In the first edition, the number of applications was at least five times higher but the quality of the films was low, except for the winning films.
<p>Funding challenges</p> <ul style="list-style-type: none"> – Although the award was planned as an annual award in 2016, it has only taken place twice. In the gap between the first (2018) and second (2021) editions, no funding could be committed to the award.
9. Financing source
National fund of the Ministry of the Sea.
10. Impact of activity
<ul style="list-style-type: none"> – Impact of the activity can be measured in terms of the number of interested applicants; – In the first edition of the award (2017-2018), 42 films were received from schools in mainland Portugal, the Azores and Madeira, showing interest from a relatively large number of school groups. – In the second edition of the award (2021-2022), the number of applicants fell to eight.
11. Future plans
<ul style="list-style-type: none"> – There are no concrete plans to continue the Mario Ruivo Award after the 2022 edition.

12. Networking

- The school that won in 2018 (Santa Maria Elementary and Secondary School) has been officially distinguished as a Blue School. The Escola Azul programme (<https://escolaazul.pt/en>) rewards and guides Portuguese schools that are developing ocean-themed projects.
- At an organisational level, there are some overlaps in the teams of the DG Maritime Policy that organise Escola Azul and the Mário Ruivo Award.
- An international Mário Ruivo Prize (with applications possible from all over Europe) was launched by EurOcean (<https://eurocean.org/>). The scope of the international Mario Ruivo Prize is broader than film-making and applicants may present proposals for a study, experiment or project that supports the **Blue Society Theme, ‘Your Ocean, Your Future’** (www.bluesociety.org).

13. Conclusions and lessons

- Although the Mário Ruivo Award is an interesting innovative initiative to engage young people in ocean literacy via film-making, it is not considered a successful programme due to the low number of applications in the second edition.
- A demanding art competition format that requires a lot of preparation and time commitment from school children, e.g. as in this case obligatory training course for the team main director (team member aged between 12-18), discourages participation.
- The award would have benefited from a stable line of annual funding independent of political priorities.
- The future of the initiative is uncertain due to significant changes in the political setting (change of government) linked to the set-up of the award.
- Portugal has a large network of initiatives on ocean literacy linked to the Escola Azul (Blue Schools) that started in 2017-2018. To date, 321 schools have been recognised as Blue Schools, with 110 partners all over Portugal (e.g. research centres, museums, NGOs, small personal projects) that provide activities about the ocean for schools.

14. Contact information

Direktorate-General for Maritime Policy, <https://www.dgpm.mm.gov.pt/>

Contact address for award: premiomarioruivo@dgpm.mm.gov.pt

Factsheet 3: Tara Ocean Foundation teacher training

1. Name of activity
Tara Ocean Foundation https://fondationtaraocean.org/
2. Introduction and context
a. Short general description to introduce the activity The Tara Ocean Foundation is the first foundation recognised in France for promoting public interest in the ocean. Through its associated scientific consortia, it is developing an open, innovative and unprecedented ocean science that will make it possible to predict, anticipate and better understand climate risks and protect biodiversity. The Foundation's teacher training programme provides a variety of formats and resources for teachers and organisers to design courses, programmes, events, including participatory education operations, education files, and conferences and discussions with researchers.
b. Location/geographical scope The geographical scope is both international and national (France). The work under the Foundation's teacher training programme does not differentiate between the Mediterranean and Atlantic Sea basins.
c. Activity category Training and education.
d. Frequency of activity The Foundation was created in 2003, and the teacher training programme began in 2013.
3. Focus/topic of activity
The foundation focuses on biodiversity, as well as marine pollution, plastic waste in seas and waters and microplastics. These topics are well aligned with the goals of reducing plastic waste at sea by at least 50 % and microplastics released to the environment by at least 30 %.
4. Main objectives of the activity
<ul style="list-style-type: none">- Support teachers to build projects or courses linked to their programme in the field of environmental education and science (ocean, biodiversity, climate, plastic pollution issues, etc.);- Help teachers to develop their abilities to conduct a multidisciplinary project and develop critical thinking;- Help teachers to plan their actions (tools for project planning);- Raise teachers' awareness of free, open-source educational tools developed by the Foundation.
5. Key actors leading the activity
Organiser(s)/coordinator The organiser is the NGO, Tara Ocean Foundation. It was founded in 2003 by Agnès Troublé known as agnès b. and is chaired by Etienne Bourgois. The teacher training programme is organised jointly with the French Ministry of Education.
Supporting partners The major partner is agnès b. In 2016, she created the Tara Ocean Foundation with her son Etienne Bourgois. They donated the schooner Tara to the Foundation, which they transformed into a floating scientific laboratory in the service of the protection of the ocean. Other partners are PRINCE ALBERT II OF MONACO FOUNDATION, Foundation VEOLIA, French Office for Biodiversity, French Fund for the Global Environment (FFEM), AtlantECO, the Decitre Fund, the European Molecular Biology Laboratory (EMBL), the Brittany region, the French Atomic Energy and Alternative Energies Commission (CEA), CNRS, BIOTHERM, Capgemini, etc.

6. Target groups
Target groups are teachers, students, public, civil society organisations, scientists and experts.
The Foundation offers teacher training. This includes institutional training courses where teachers participate (free of charge), face-to-face or by videoconference, as part of pedagogical days or academic training action plans (PAF), planned in conjunction with regional pedagogical inspectors or pedagogical advisers. There is also a self-directed training course on the M@gistere platform of the CANOPE Network. Through four modules (seven hours) of independent and online training, cycle 3 and 4 teachers are guided through Tara Ocean Foundation resources to develop their education project on sustainable development. Finally, the Foundation offers teachers support in designing their own teaching project for their class.
7. Specific tools/means used
The Foundation uses videos, a resource library, events/workshops/webinars, booklets/guidelines, expeditions with the Tara schooner and conferences (see list at https://fondationtaraocean.org/en/our-resources/).
Documentaries were made on the Tara schooner's major expeditions on biodiversity, climate, and plastic and are available to watch online (https://fondationtaraocean.org/education/documentaires-grand-public-education/).
Live videoconference: classes (from the age of seven upwards) can talk to researchers (https://fondationtaraocean.org/education/echanges-direct-en-ligne-avec-chercheurs/).
8. Implementation successes and challenges
Successes
<ul style="list-style-type: none"> – According to the teachers' evaluations, the programme is a success. Teachers particularly noted the high-quality tools that are adapted to their job, as well as having time to work with other colleagues to build their own project; – All costs of the teachers' participating in the training are paid by the French Ministry of Education.
Challenges
<ul style="list-style-type: none"> – Communication with schools is mainly done by the Ministry of Education and it can be challenging for the teachers to become aware of the training offer, especially those not working on scientific topics. As a consequence, it is challenging to get high participation numbers (e.g. more than 15 teachers). This can be due to lack of communication, long distance between home and the location of the training, and health constraints (COVID-19). Teachers register for the training days at the beginning of the school year (in September), and when they are invited a few months later to participate with a precise date, their programme and work schedule may mean they cancel their participation at the last minute (similar challenges exist for other teacher training in France).
9. Financing source
The funding comes from private funds and philanthropy. People can make donations through the website to support the Foundation.
An annual budget of EUR 4 million is earmarked for expeditions, scientific research, education and awareness-raising actions, and advocacy. The Foundation did not provide specific information on the budget for the teacher training programme.
10. Impact of activity
<ul style="list-style-type: none"> – In 2021-2022, the training programme reached 1 300 teachers, either in person or online; – 'Education and Sensitivity' component: 60 000 children visited the Tara schooner in France and around the world; 130 000 children in schools each year are more aware through dedicated educational programmes on the ocean; two million visitors to exhibitions since 2004;

- 'Research' component: 150 million genes from the marine world have been discovered; 250 scientific publications, including 15 in the journals Nature, Science and Cell;
- Expeditions: 12 expeditions with more than 200 stopovers in more than 60 countries since 2003; 450 000 kilometres travelled on the schooner Tara.

11. Future plans

- To maintain the quality of the training in particular to continue to create tools that meet teachers' needs.
- To increase the number of teachers engaged in training.

12. Networking

- The training programme is linked with the French Ministry of Education (co-organiser of teacher training).

13. Conclusions and lessons

- The teacher training programme of the Tara Ocean Foundation is a successful and well-established programme, jointly organised with the French Ministry of Education since 2013. It reaches a large number of teachers annually (1 300 in 2021-2022), supporting them to integrate ocean literacy in their teaching schedules/curricula and develop their own projects for students.
- It would be worthwhile for the Mission to collaborate with the Tara Ocean Foundation teacher training programme, as the programme has been in place for almost 10 years, with a wealth of practical experience. This is a permanent programme, with plans to further increase the quality of the training offered to teachers, as well as plans to increase the number of teachers reached, and thus to up-scale the activities and impact achieved.

14. Contact information

Tara Ocean Foundation
 8 Rue de Prague,
 75012 Paris
education@fondationtaraocean.org

Factsheet 4 : Mar de Mares Festival

1. Name of activity
Mar de Mares Festival https://festivalmardemares.org/
2. Introduction and context
<p>a. <u>Short general description to introduce the activity</u></p> <p>Each year, the Mar de Mares Festival turns La Coruña in Spain into the world capital of the oceans, a meeting point for all lovers of the sea, for whom loving the sea means not only enjoying its landscape but acting to guarantee its survival and leave healthy oceans for future generations.</p> <p>b. <u>Location/geographical scope</u></p> <p>Spain, Galicia.</p> <p>c. <u>Activity category</u></p> <p>Festival activity targeting citizens.</p> <p>d. <u>Frequency of activity</u></p> <p>The festival takes place on an annual basis since 2014 (seven editions to date).</p>
3. Focus/topic of activity
Ocean and marine protection issues (broad scope).
4. Main objectives of the activity
<p>The aim of the Mar de Mares Festival is for citizens to learn more about the ocean and raise awareness of the need to protect the sea. It emerged due to the need to publicise the richness of the oceans. Key objectives include:</p> <ul style="list-style-type: none">– Recover the close relationship that unites humanity with the sea;– Promote education, culture and creativity as the best engines to drive change, as well as art and science as tools to spread the economic, cultural and environmental wealth that the oceans provides;– Provide inspiring stories and optimistic messages to move more people to action;– Become a meeting and dialogue space for the different sectors involved in the marine world so that everyone can contribute knowledge, experience and ideas;– Inspire and motivate citizens, public and private entities to take action in favour of the sea.
5. Key actors leading the activity
<p>The organiser is the not-for-profit association <i>Redes de Sal</i> (whose aim is to defend the marine heritage of the coast, and the Artabro Gulf in particular).</p> <p>There is a long list of organisations that collaborate with the festival, ranging from local authorities, the European Maritime and Fisheries Fund (EMFF), scientific organisations, UNEP, UNESCO, museums, libraries, transport companies (https://festivalmardemares.org/colaboran/).</p>
6. Target groups
All audiences and all ages. Artists, photography and adventure enthusiasts, scientists, nature activists, educators, cooks, athletes, entrepreneurs, conscientious consumers, teenagers, and the general public.

7. Specific tools/means used
The festival offers dozens of participatory activities open to all types of audiences: exhibitions, activist workshops, inspiring meetings, artistic interventions, film festival, sustainable gastronomy, intertidal visits, sailing tours, a sea market.
8. Implementation successes and challenges
<p>What is working well</p> <ul style="list-style-type: none"> – Despite its modest budget, the festival is definitely achieving its objectives. It is well attended by the public, activities are usually fully booked, and well received by the media. It has featured relevant figures in marine protection, such as David Doubilet, Manu San Felix and Christina Mittermeier, as well as figures from scientific fields, such as Michel André and Francisco Sánchez. – Galician people have been particular protagonists in all seven editions of the festival (artists, scientists, chefs, sailors, and activists). – Working on reconnecting the city of La Coruña to the surrounding sea is an important objective. There is a growing programme focus on 'La Coruña and the sea', which tries to recover the city history and heritage linked to the ocean, learning about the sea habitat through walks, talks, workshops, rockpooling, and discussing the need to protect the ocean and develop sustainable production activities. In particular, the sea market aims to showcase seafood and other products made with sustainability criteria. <p>What is not working so well</p> <ul style="list-style-type: none"> – The festival lacks resources to communicate its message more effectively. The organising team is small and relies on public subsidies. Nearly every year, festival organisers must convince the authorities of the need for the event and wait for budgets to be approved. This also means that planning is quite short-term. The recent edition of the festival saw increased interest from private companies in providing funding, however. A pioneer when it began, the festival is atypical (compared to music, theatre or cinema festivals) and thus struggles to communicate and obtain the support needed. – Budget constraints mean that there is not much social media activity throughout the year. Increased use of these channels could keep the under-30s motivated and engaged. This year there is a bigger budget for digital media. – The Mar de Mares brand needs additional strategic positioning and awareness raising. This year's tagline: 'Catch the wave' represents the wave of activism and the wave of adventure, and a small campaign is planned to raise awareness and generate interest in the festival and its objectives/message.
9. Financing source
Funding sources are national, private and EU funds.
10. Impact of activity
<ul style="list-style-type: none"> – The festival is always positively received by the public and meets organisers' participation targets; – No formal evaluation, but informal research shows a high degree of satisfaction for the combination of learning/awareness/celebration and activism; – Seven annual festivals completed successfully, with many repeat visitors and supporters; – In its seven years, more than 160 000 people have enjoyed more than 200 activities.
11. Future plans
<ul style="list-style-type: none"> – The festival hopes to organise other activities throughout the year and to take some of the activities to other cities, rural areas, and especially inland in order to grow and spread the message. There are also plans for Mar de Mares Awards in activism, sustainable sea entrepreneurship, gastronomy, etc. that will focus on positive initiatives and high achievers in sea protection.

12. Networking

- The festival is not part of a broader network of similar activities in Spain or the Atlantic in general, but they are very interested in exploring potential for such networks.

13. Conclusions and lessons

- Positive experience organising Mar de Mares over a series of years shows that ocean festivals are an effective means to engage with the broader public and citizens of different ages and backgrounds in ocean literacy and ocean protection. It also provides a good platform for showcasing sustainable production activities;
- The impact is particularly strong for the city/area where the festival is organised but the key message is also spread to neighbouring regions;
- Addressing the challenges of the lack of resources and budget constraints would facilitate long-term planning and more intensive use of social media to reach younger target groups;
- The festival's plans for the future include organising other activities throughout the year and extending its reach to other cities, rural areas and inland.

14. Contact information

info@festivalmardemares.org

3.4. Main conclusions

The **majority** of citizen engagement and ocean literacy activities identified as relevant to the Mission lighthouse objective and scope on marine restoration are of **national scope** (18 of 33), with the largest number of activities taking place in **Ireland, France and Portugal**. A number of activities with **international scope** were also identified (14 of 33). Most of the activities are coordinated by academia, research organisations, NGOs and foundations, and in some cases by government institutions.

Compared to other Member States in the lighthouse, **Spain seems to be lagging behind** in the number of ongoing citizen engagement and ocean literacy activities, particularly related to the Atlantic Ocean. Some Atlantic regions though, particularly Galicia and the Canary Islands, are quite active and have ongoing citizen engagement activities in place for marine and coastal issues.

The citizen engagement and ocean literacy activities in the Atlantic part of the lighthouse present a **good mix of different activity types**, covering citizen science, other activities that directly encourage citizen engagement (e.g. volunteer actions, ocean festivals and activities for young people), as well as education, training and ocean literacy networks.

Citizen science on coastal and marine ecosystems is particularly well developed in Ireland and France, complemented with a number of citizen science projects of international Atlantic scope. In Ireland, there is a strong appetite for marine biodiversity citizen science⁵⁰⁰ and there is a well-developed network of projects that cooperate with one another.

Ocean literacy networks, education and training programmes with a focus on the Atlantic Ocean include activities of international scope (mainly driven by the All-Atlantic Ocean Research Alliance and the European Ocean Coalition) and of national scope. Impactful ocean literacy and education programmes were identified in Ireland, France and Portugal. In Portugal, ocean literacy and education programmes are the most successful and impactful type of activities identified. While the role of citizen science has been recognised in Portugal⁵⁰¹, citizen science initiatives specifically targeting the ocean and coastal areas are largely absent. Existing citizen science initiatives target invasive alien species (organised by the University of Coimbra) and biodiversity more broadly (organised by the Biodiversity for All Association)⁵⁰².

Some experiences have been gathered in recent years on the use of more innovative forms of citizen engagement and literacy for the Atlantic Ocean that go beyond well-known citizen science and pedagogical formats. Portugal, for example, has a prize for **artistic films** from school groups (Mario Ruivo Award), although it is not considered as successful as the national programme of ocean literacy (Escola Azul). A key lesson from the Mário Ruivo Award is that ocean art competitions for young people should follow a simple format that is not too demanding in terms of participation requirements (e.g. obligations to follow courses after school hours) or several successive steps in the application procedure.

Ocean festivals in Spain (Galicia) and Ireland have a clear focus on raising citizen awareness of the importance of the Atlantic Ocean. Their advantage is their ability to reach the broader public and citizens of different ages and backgrounds in a unique and attractive way, combining art, education and citizen activism. They were, however, constrained (at least in Ireland) by the COVID-19 pandemic. The ocean festival in Galicia (La Coruña) also provides a good platform for showcasing sustainable production activities (for seafood and other products made with sustainability criteria).

In the Atlantic lighthouse, there are no large regional forums or platforms where businesses meet with the general public to work together or involve citizens in projects. The **Business2Sea** annual event is an example of such a forum, which is organised by Spanish and Portuguese organisations to promote projects and businesses within the marine economy and targets a very broad range of stakeholders.

Finally, there are no **citizens' assemblies** active in the Atlantic lighthouse on issues of marine protection and restoration. However, countries in the lighthouse already have experience with citizens' assemblies on environmental topics, in particular on climate change issues (France, Spain and Ireland). There is also a citizens' assembly on biodiversity in Ireland.

⁵⁰⁰ Written communication with National Biodiversity Data Centre.

⁵⁰¹ European Commission, *Environmental Implementation Review 2019*, 2019, https://ec.europa.eu/environment/eir/pdf/report_pt_en.pdf

⁵⁰² National network on citizen science, <https://www.cienciaciadada.pt/>

3.5. Recommendations

Recommendation 1. Future cooperation of the Mission on citizen engagement and ocean literacy should focus on existing and well-functioning activities at national level; international citizen engagement and ocean literacy initiatives for the Atlantic are already linked/co-organised with/financed by the EU (e.g. through EU4Ocean). It is important that the Mission cooperate with academia, research organisations, NGOs and foundations that play a key role as coordinators of the majority of ocean literacy and citizen engagement activities in the Atlantic lighthouse countries.

Recommendation 2. Collaborate with citizen science initiatives in Ireland. Ireland's citizen science seems to be well- developed and impactful. The Mission can make initial contact with the National Biodiversity Data Centre that runs Explore your Shore! And is very well networked with numerous marine biodiversity citizen science projects, Irish activities with volunteer citizens and educational institutions. These activities could then be replicated in other countries of the Atlantic basin, with the support of the Mission and its lighthouse.

There is concrete potential for further upscaling linked to Ireland's **Draft Marine Biodiversity Citizen Science Strategy 2023–2028**. Currently in preparation and in stakeholder and public consultation, this six-year Marine Biodiversity Citizen Science Strategy will require significant additional project staff roles and project funding and its success depends on securing adequate funding and support. The Strategy could be an inspiration for other countries of the Atlantic basin to launch similar initiatives.

The Mission can invest in boosting training for interested citizens and dissemination of aid material for marine species identification. The lack of citizen confidence in species identification and training seems to be a primary block to citizen science success, in particular when the focus is on species monitoring.

Recommendation 3. Collaborate with well-established education programmes and citizen science in France. Impactful activities with which the Mission can cooperate are the well-developed teacher training programme of the Tara Ocean Foundation, which aims to strengthen ocean literacy in both sea basins of France (Atlantic and Mediterranean), the educational programme *Merci la Mer* (organised by *Fondation de la Mer*, National Ministry of Education and Youth, and the *Centre d'Etudes Stratégiques de la Marine*), as well as the citizen science BioLit Coastline Monitors (*Muséum National d'Histoire Naturelle* and *Université de Rennes*).

Recommendation 4. Collaborate with Blue Schools in Portugal and strengthen other formats of citizen engagement and ocean literacy. The Mission should cooperate with the successful and impactful national programme on ocean literacy Escola Azul (organised by the Ministry of the Sea). Collaboration can also be explored with the ocean literacy pillar of the Ocean Azul Foundation, which works with the Ministry of Education to improve school curricula on ocean protection.

Other types of citizen engagement activities, such as citizen science specifically targeting the ocean and coastal areas, seem to be less well-developed. A possible focus of the Mission could be to encourage research organisations in Portugal that already run activities on invasive alien species and broad biodiversity to develop citizen science for ocean and coastal issues, and possibly learn from exchanges with similar initiatives in Ireland and France.

Recommendation 5. Collaborate with existing initiatives to explore scale-up in Spain and make contact with key governance actors (in Atlantic regions of Spain; Ministry of Environment; foundations; marine research centres) to encourage ocean literacy programmes. The Mission could place particular emphasis on strengthening citizen engagement and Atlantic Ocean literacy activities in Spain. The Mission could begin cooperation with existing and well-developed activities in the regions that have been most active so far, in particular Galicia and the Canary Islands. The successful "Mar de Mares" ocean festival in Galicia (organised by *Redes de Sal*) could be an innovative entry point for the Mission lighthouse to have an inspiring presence and engage the broader public. There is also scale-up potential, as the festival's future plans include organising other activities throughout the year, including in other cities, rural areas and especially inland areas. Spain could benefit from bilateral collaboration with neighbouring Atlantic regions in Portugal and France on educational programmes in ocean literacy.

4. ARCTIC LIGHTHOUSE AREA

4.1. Introduction

The Arctic Ocean is the smallest and shallowest of the world's oceans. In total, eight states have territories within the Arctic and are therefore referred to as Arctic States: Canada, Denmark (via Greenland), Finland, Iceland, Norway, Russia, Sweden, and the US. Of these, only Finland and Sweden are EU Member States. Two others, Iceland and Norway, are European Economic Area (EEA) members, and are associated with the Horizon Europe programme. The Northern provinces of the eight Arctic States together are home to more than four million people⁵⁰³, including Indigenous peoples, whose presence constitutes a defining characteristic of the circumpolar Arctic region. Approximately one million people (9 % of the total population) living in the Arctic are indigenous⁵⁰⁴. The Arctic indigenous population is composed of more than 40 different ethnic groups⁵⁰⁵. For this baseline study, however, the geographical delimitation of the Arctic lighthouse is not circumpolar and only spans the marine and coastal waters of the Faroe Islands, (Eastern) Greenland (Overseas Countries and Territories), Iceland, and Norway. Areas Beyond National Jurisdiction (ABNJ) are not included in the scope of the Arctic lighthouse. This delimitation roughly corresponds to Region I as defined by the OSPAR Convention (i.e. Arctic Waters)⁵⁰⁶, which is one of the main regional bodies tasked with the monitoring and protection of the Arctic marine environment.

Citizen engagement activities in the Arctic lighthouse are diverse in nature and scope. At regional level, the Arctic Council acts as the principal body for citizen engagement and public participation in decision-making⁵⁰⁷, including environmental assessments⁵⁰⁸. An important focus of the Arctic Council is fostering the active participation of the Indigenous peoples living in the Arctic region. In the context of marine activities, engagement of Indigenous peoples is led by the Protection of the Arctic Marine Environment (PAME) Working Group, the focal point of the Arctic Council's activities on the protection and sustainable use of the Arctic marine environment⁵⁰⁹. Citizen engagement and public participation is not the only task the Arctic Council oversees, and the Council's activities extend beyond the boundaries of the States included in the geographical scope of the Arctic defined here. Within the wider scope of Arctic institutions, citizen participation is lacking, however⁵¹⁰.

Citizen engagement and public participation is further fostered at national and local level for each of the countries in the Arctic lighthouse. Activities, means and processes vary between countries, depending on their history and political system. Norway, for example, has established multiple citizen assemblies (*Borgerpanel*) at municipal level (e.g. the *Borgerpanel* 'New Water Ways' for flood management in Oslo; the *Ungt Borgerpanel* for youth interests in Stavanger; the standing citizens' assembly in Trondheim, etc.)⁵¹¹. In addition, following the Planning and Building Act of 2008, Norway sought to facilitate increased public participation and influence in municipal and regional planning⁵¹². Nevertheless, a gap persists in bridging local participation and central governance in the context of the management of terrestrial protected areas, with decision-making powers seldom devolved from central government to local actors⁵¹³. Recent studies assessing local participation in Marine Protected Area (MPA) governance in the country appear to be lacking. Similar issues persist in respect of the governance of Sámi⁵¹⁴ reindeer husbandry between herders and the Norwegian State⁵¹⁵. In Iceland, despite positive trends in citizen engagement and participation since the 2008

⁵⁰³ Arctic Council Secretariat, *Arctic States*, 2022, <https://www.arctic-council.org/about/states/>

⁵⁰⁴ Nordregio, *Indigenous population in the Arctic*, 2019, <https://nordregio.org/maps/indigenous-population-in-the-arctic/#:-:text=Approximately%20one%20million%20people%2C%20or%20than%2040%20different%20ethnic%20groups>

⁵⁰⁵ *Ibid.*

⁵⁰⁶ OSPAR Convention (2015–2022), *The North-East Atlantic*, n.d., <https://www.ospar.org/convention/the-north-east-atlantic>

⁵⁰⁷ Poto, M. P. and Fornabaio, L., 'Participation as the essence of good governance: some general reflections and a case study on the Arctic Council', *Arctic Review*, Vol. 8, 2017, <https://doi.org/10.23865/arctic.v8.714>

⁵⁰⁸ Arctic Council, *Good practices for environmental impact assessment and meaningful engagement in the Arctic – including good practice recommendations*, 2019, <https://oaarchive.arctic-council.org/handle/11374/2377>

⁵⁰⁹ Meaningful Engagement of Indigenous Peoples and Local Communities in Marine Activities (MEMA), <https://www.pame.is/document-library/resource-exploration-and-development/meaningful-engagement-of-indigenous-peoples-and-local-communities-in-marine-activities-mema>

⁵¹⁰ Middleton, A., 'The power of connectivity in the Arctic: citizen participation in Arctic Institution', *Arctic and North*. No. 42, 2021, doi: 10.3748/issn2221-2698.2021.42.170.

⁵¹¹ Overview of citizens' assemblies worldwide, <https://www.buergerrat.de/en/about-citizens-assemblies/what-are-citizens-assemblies/>

⁵¹² Ministry of Local Government and Modernisation, *Public participation in planning: how to facilitate increased public participation and influence in municipal and regional planning pursuant to the Planning and Building Act*, 2014, https://www.regjeringen.no/contentassets/7fa15b41220849c9adba3eeca28538ec/medvirkning_veileder_engelsk.pdf

⁵¹³ Hovik, S., Sandström, C. and Zachrisson A., 'Management of protected areas in Norway and Sweden: challenges in combining central governance and local participation', *Journal of Environmental Policy & Planning*, Vol. 12, No 2, 2010, pp. 159-177, doi: 10.1080/15239081003719219.

⁵¹⁴ The Saami Council (*Sámiráddi*), a Saami NGO with Saami member organisations across Finland, Norway, Russia and Sweden, is actively involved in Saami policy tasks (<https://www.saamicouncil.net/en/home/>).

⁵¹⁵ Johnsen, K. I., Benjamin, T. A. and Eira, I. M. G., 'Seeing like the state or like pastoralists? Conflicting narratives on the governance of Sámi reindeer husbandry in Finnmark, Norway', *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, Vol. 69, No 4, 2015, pp. 230-241, doi: 10.1080/00291951.2015.1033747.

financial crisis and the subsequent 2010-2013 constitutional reform period⁵¹⁶, organised civic participation remains relatively new, being seen largely in neighbourhood councils, school boards and youth councils, as well as mostly top-down (i.e. organised by the government rather than by citizens themselves⁵¹⁷).

Broader ocean literacy activities in the Arctic lighthouse Area are diverse and cover a wide range of topics, geographical scopes and funding sources, organisers and target groups, and means and tools of engagement. The following section presents an overview of citizen engagement and ocean literacy initiatives mapped in the Arctic lighthouse.

4.2. Mapping citizen engagement and literacy activities

The main citizen engagement and literacy activities identified as relevant to the Mission objectives were recorded in an Excel database, as described in step 1 of the methodology.

4.2.1. Overview

The screening of citizen engagement and ocean literacy activities identified 14 activities relevant to the Mission objectives and matching the selection criteria. However, certain activities that are local in scale (e.g. kelp restoration activities near a single city) were included despite not fully matching the selection criteria of national to international-level activities. The inclusion of these activities better reflects the diversity of citizen engagement and ocean literacy activities in the Arctic lighthouse. Irrespective of their scale, such local activities contribute to increased ocean literacy and may be of interest for upscaling and/or replication across the Arctic lighthouse and beyond.

Activity categories: Most of the activities involve citizen science (e.g. day-to-day monitoring of the marine Arctic environment, study of human-whale interactions, monitoring marine litter) and other activities targeting citizens, through either citizen involvement in measure implementation (e.g. kelp forest restoration) or citizen-led marine litter clean-up efforts. Other mapped initiatives include training activities, literacy networks, and social innovation. The ‘other’ category includes conferences and podcasts. A number of mapped activities (9 of 14) cut across categories (Figure 145).

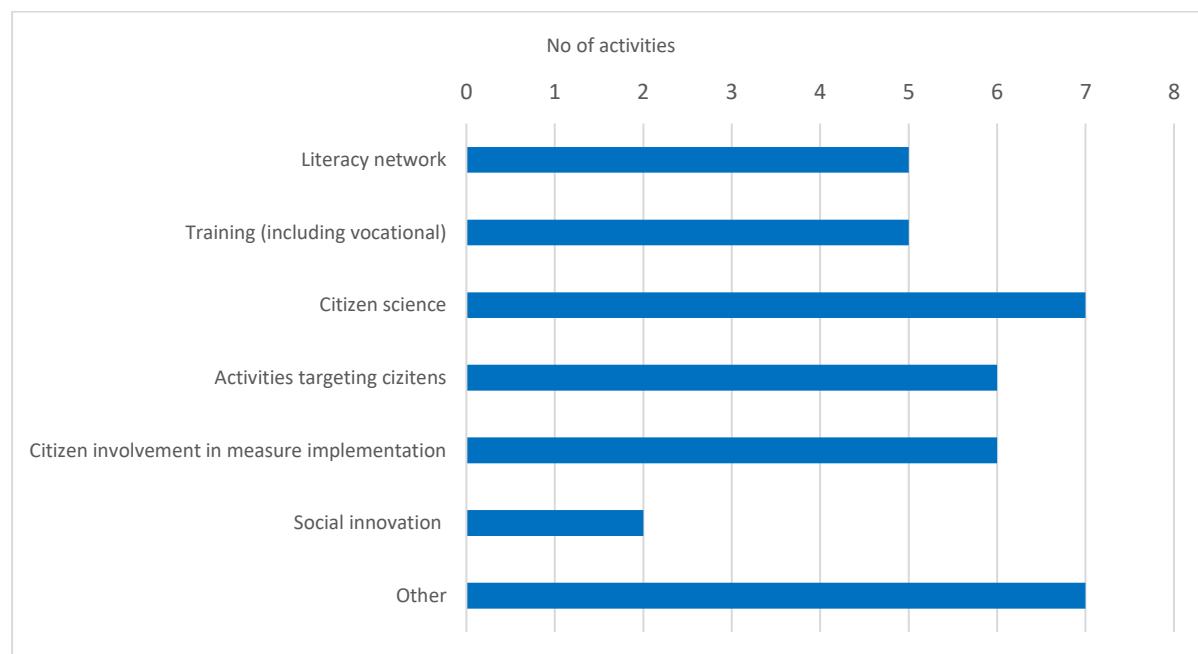


Figure 145 Number of activities per category in the Arctic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

⁵¹⁶ Bernburg, J. G., 'The cascading crisis and the changing base of popular protest: The case of Iceland', *Current Sociology*, Vol. 67, No 7, 2019, pp. 1018-1038, <https://doi.org/10.1177/0011392119833104>; Burgess, S. and Cricket Keating, C., 'Occupy the social contract! Participatory democracy and Iceland's crowd-sourced Constitution', *New Political Science*, Vol. 35, No 3, 2013, pp. 417-431, doi: 10.1080/07393148.2013.813694.

⁵¹⁷ Eypörsson, G.P. and Hlynssdóttir, E.M., 'Local State–society relations in Iceland', in: F. Teles, A. Gendžwill, C. Stänuš and H. Heinelt (eds). *Close Ties in European Local Governance*, Palgrave Studies in Sub-National Governance, Palgrave Macmillan, Cham., 2021, https://doi.org/10.1007/978-3-030-44794-6_13

Topics: all of the mapped activities are marine related. Most also relate to other topics, including biodiversity and plastic pollution (12 of 14 activities), ecosystem protection and fisheries and aquaculture (11 of 14), as well as marine pollution (9 of 14). Other important topics include climate change mitigation and microplastics (8 of 14) and water pollution (7 of 14). The ‘other’ category includes coastal tourism and marine security (Figure 146).

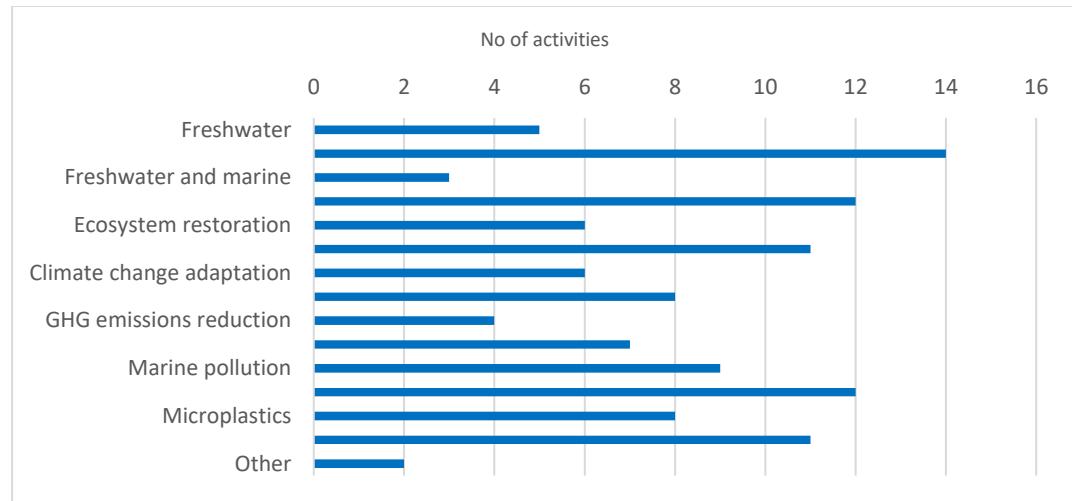


Figure 146 Topics of activities in the Arctic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Geographical scope and funding: the majority of activities are national in scope (12 of 14), with most implemented in Norway. Activities of international scope were also identified (8 of 14). A minority of activities are regional (5 of 14). Most activities are funded from national sources (11 of 14), followed by private/business sources (3 of 14). EU funding is greatly underrepresented among the identified activities (only 1 of 14). The ‘other’ category includes an unclear funding source. A number of initiatives are also implemented through combined funding (3 of 14), through either national and private/business funding (two activities) or national and philanthropic funding (one activity) (Figure 147).

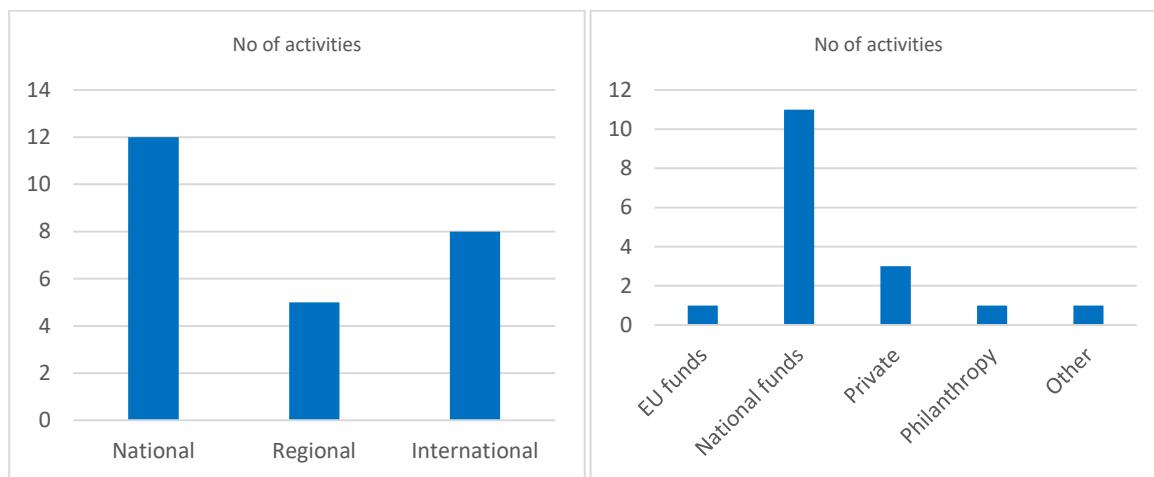


Figure 147 Geographical scope and financing for activities in the Arctic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Organisers and target groups: the largest share of activities is organised by university/research actors and by governments (6 of 14). A smaller number of activities is organised by NGOs (5 of 14) (Figure 148). The target groups of the identified activities are usually the general public, civil society organisations, and NGOs (for all 14 mapped activities), scientists (13 of 14), professional/experts (12 of 14), followed by students and teachers (8 of 14 and 6 of 14, respectively). The ‘other’ category (4 of 15) includes policymakers (Figure 149).

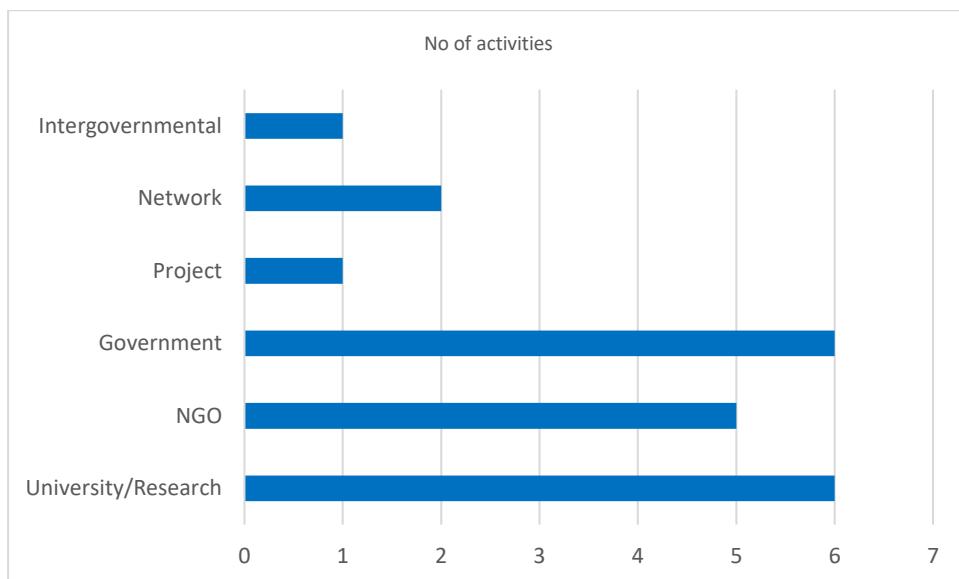


Figure 148 Organisers of activities in the Arctic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

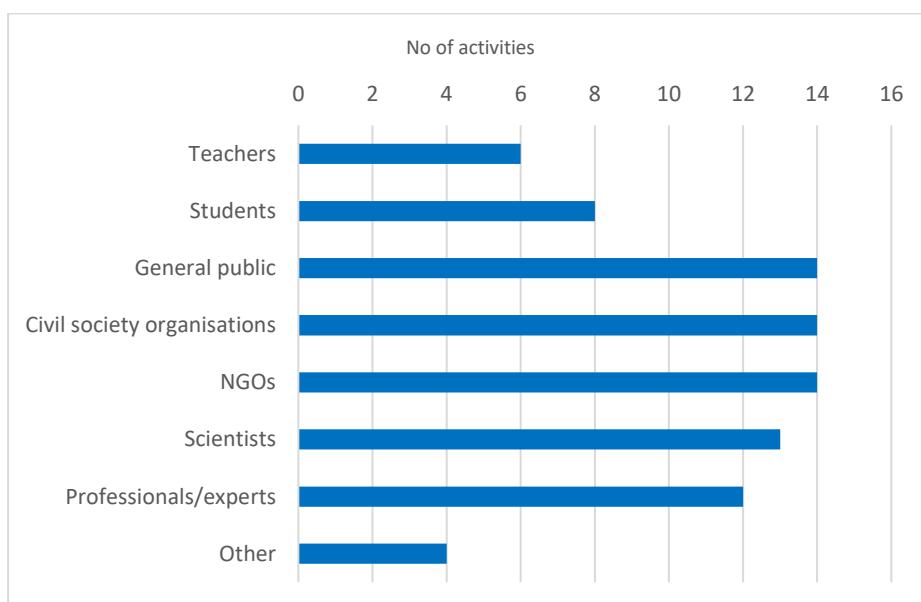


Figure 149 Target groups of activities in the Arctic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Means and tools of engagement: the activities used a variety of tools and means for engaging citizens and increasing ocean literacy. The most widely employed means are events/workshops/webinars (8 of 14 activities), followed by social media (7 of 14). The wide-ranging 'other' category (5 of 14) includes policy briefs, kiosks, maps, ocean dives and podcasts. Other tools/means of citizen engagement include video, toolkits, and resource libraries (4 of 14), social labs/living labs and booklet/guidelines (3 of 14). Additional tools/means include cartoons, artistic projects, and festivals/exhibitions (2 of 14), as well as games (1 of 14). Most mapped activities make combine at least two of these tools/means of citizen engagement in their work to protect and/or restore the marine environment (Figure 150).

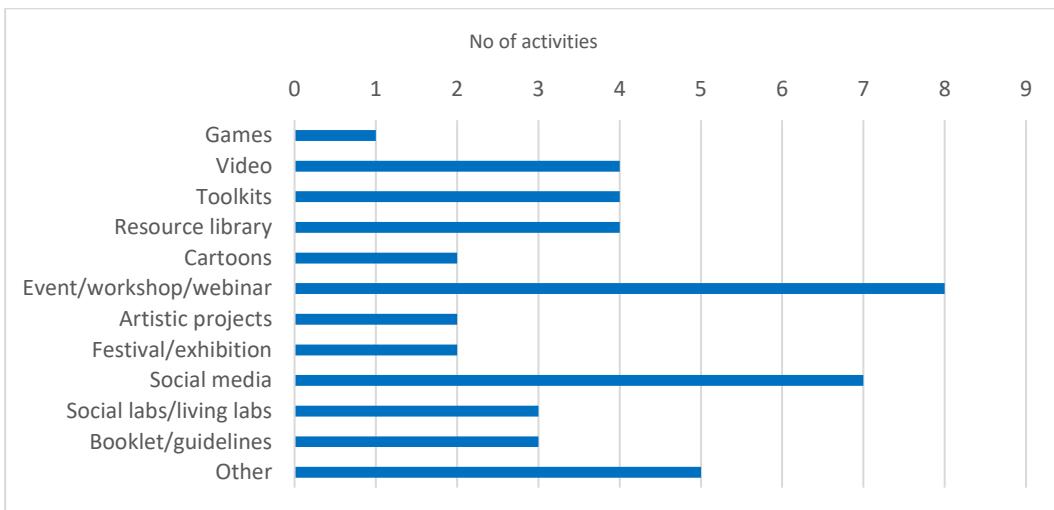


Figure 150 Tools and means of engagement for activities in the Arctic lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

The following section summarises the main citizen engagement and ocean literacy activities that have been mapped as relevant to the lighthouse Mission objectives. For further details, see Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

4.2.2. Literacy initiatives and networks

International scope

Arctic Frontiers conference

<https://www.arcticfrontiers.com/>

Arctic Frontiers fosters citizen engagement by providing a forum for dialogue and communication between science, government and industry within the Arctic region. The conference has a pan-Arctic perspective and provides a space for building new partnerships across nations, generations and ethnic groups. An annual conference hosted by Akvaplan-niva (located at the Fram Centre), Arctic Frontiers is funded through three primarily sources – partner contributions, grants through applications from public institutions supporting work related to Arctic issues, and income from the Arctic Frontiers conference week. In addition, Arctic Frontiers receives ad hoc funding for different activities throughout the year.

High-Level Political Forum 2021 Side Event: Partnering to educate the ocean science leaders of the future

<https://www.uib.no/en/sdgbergen/146154/side-event-partnering-educate-ocean-science-leaders-future>

Organised by the University of Bergen (Norway), this side event to the 2021 UN High-Level Political Forum on Sustainable Development sought to raise awareness of ocean literacy and to educate the ocean science leaders of the future.

NTNU Ocean Week

<https://www.ntnu.edu/ocean-week>

The Norwegian University of Science and Technology (NTNU) is one of Norway's most important universities. NTNU Oceans is one of NTNU's four strategic research areas⁵¹⁸. Each year NTNU hosts the Ocean Week conference – funded by the Norwegian Government, to contribute to Norway's role as an 'ocean nation'. As the signature event of NTNU Oceans, the purpose of the Ocean Week is to lay the foundation for ground-breaking interdisciplinary ocean research and for cross-sectoral collaboration to solve the sustainability challenges of the global oceans.

⁵¹⁸ NTNU Strategic Research Areas (2014-2023) are Energy, Health, Oceans, and Sustainability (<https://www.ntnu.edu/research/strategicareas>).

Our Ocean conference 2019

<https://eurocean2019.no/>

The Our Ocean conference 2019 brought together leaders from governments, businesses, civil society and research institutions to share their experience, identify solutions and commit to action for a clean, healthy, and productive ocean. The conference included the Ocean Youth Leadership Summit. The conference was organised and funded by the Norwegian Ministry of Foreign Affairs. The seventh and most recent edition of the Our Ocean Conference was co-hosted by the Republic of Palau and the US on 13-14 April 2022.

ResponSEAble

<https://responseable.acteon-environment.eu/>

The ResponSEAble project spent four years looking at ways to help European citizens to understand their connection to the sea. The project sought to find innovative ways to encourage Europeans to take a closer interest in their seas and to treat them with greater respect. As such, it builds on the following questions: What knowledge do Europeans need? Who needs to know what? How should knowledge be communicated? ResponSEAble was organised by a consortium of European research institutes and NGOs led by ACTeon, and funded through H2020. The project is now complete.

Uarctic Congress

<https://www.uarctic.org/members/meetings/uarctic-congress-and-assembly-2024/>

The Uarctic Congress is a yearly event organised by the University of the Arctic (Uarctic), a cooperative network of universities, colleges, research institutes and other organisations concerned with education and research in and about the North. The Uarctic Congress brings together heads of institutions, Indigenous peoples, academics, educators, and students from the circumpolar north and beyond. The Congress has established itself as an effective platform for interaction among all Uarctic members and for promoting cooperation in the field of Arctic science and education.

National scope

Fram Forum Junior (Norway)

<https://framcenteret.no/fram-forum-junior/> (in Norwegian)

Developed by the High North Research Centre for Climate and the Environment (Fram Centre), Fram Forum Junior is an online magazine for children and young people between the ages of 10 and 15. A collaboration between the member institutions of the Fram Centre, Fram Forum Junior resources are intended to be used by schools. The project will run from 2022-2024, feature multiple activities and be funded by the Norwegian Ministry of Climate and Environment via the Fram Centre and its member institutions.

Lighthouse Lofoten Conference 2022 (Norway)

<https://www.marfo.no/arrangementer/lighthouse-lofoten-conference-2022/>

Organised by the Norwegian Centre against Marine Litter, the Lighthouse Lofoten Conference took place on 5-6 April 2022. It aimed to showcase preventive solutions and create a dialogue around successful models to reduce marine litter. It also sought to explore how awareness can lead to changes in attitudes, actions and systems. This year's edition was the first and it is unclear whether there will be another conference.

4.2.3. Citizen science

International scope

Circumpolar Local Environmental Observer (CLEO) Initiative

<https://www.arctic-council.org/about/working-groups/acap/home/projects/circumpolar-local-environmental-observer-cleo-initiative/>

The main objective of the CLEO Initiative is to increase awareness of the impacts of climate change among Arctic communities through observations by local residents. The Initiative has expanded the coverage of an existing community-based monitoring tool, the Local Environmental Observer (LEO) Network, while also

inspiring local solutions. LEO is a network of citizens/local observers and topic experts who share knowledge of unusual fauna, environment, and weather events. The web-based platform provides a space for direct observers to submit news articles and make observations about unusual events and a changing Arctic environment. The Initiative is funded through the Arctic Council by selected countries leading the project and allocating funding and/or providing in-kind support (Finland, Sweden, Norway and the US are key contributors).

National scope

Whale Wise (Iceland, Scotland and Norway)

<https://whalewise.org/>

Whale Wise aims to promote a harmonious relationship between humans and whales through scientific research and citizen engagement. Whale Wise studies the interactions between whales and human activity. By engaging the public with this research, Whale Wise strives to inform, promote and inspire marine conservation in Iceland, Scotland and Norway.

4.2.4. Other activities targeting citizens (e.g. volunteer networks, artistic initiatives, public festivals)

National scope

Hold Norge Rent (Keep Norway Clean) – National clean-up work (Norway)

<https://holdnorgeren.no/nasjonale-ryddedugnader> (in Norwegian)

Hold Norge Rent is a non-profit organisation that works against littering. It invites companies, organisations and other actors who wish to contribute to keeping Norway clean to become members. The idea behind *Hold Norge Rent* is that littering is a shared responsibility, with everyone being part of the solution. The spring clean-up day is arranged by *Hold Norge Rent*, most recently in 2021, and supports the tradition of cleaning marine waste during the spring. The activities of *Hold Norge Rent* are co-funded by the Ministry of Climate and the Environment, the Norwegian Environment Agency, DNB (bank), the Norwegian Retailers' Environment Fund, as well as by membership fees and sponsorship income.

Kelp forest restoration through removal of sea urchins by *Tarevoktere* ('Kelp Guards') (Norway)

<https://www.tarevoktere.org/en/about>

Part of a wider, global network of volunteer, non-profit, kelp restoration initiatives, *Tarevoktere* was formed in 2019 to help to organise clearing events to remove overgrazing sea urchins around Tromsø (Norway) and support the restoration of kelp forests. Led by the Students' Underwater Club in Tromsø and volunteer scientists from the Norwegian Institute for Water Research (NIVA), *Tarevoktere* has begun training efforts to restore kelp forests in and around the Tromsø area. *Tarevoktere* has entered into an agreement with Urchinomics, a restorative aquaculture venture, to fund restoration efforts on an ongoing basis. The larger urchins removed during clearing efforts are sent to Urchinomics for ranching. Once ranned and sold, a percentage of the revenue is donated back to *Tarevoktere* to fund the clearing efforts.

Kystpuls ('Coastal Pulse') podcast (Norway)

<https://www.havarktis.no/en/projects/kystpuls-2019>

Asking questions such as 'what challenges face people in the communities and marine enterprises along the Norwegian coast?' and 'what are the possibilities and how does the future look?', the *Kystpuls* podcast is taking the pulse of coastal Norway and its inhabitants. Organised yearly by the Norwegian Centre for the Ocean and the Arctic, the podcast was financed from national funds and ran from 2019-2021. It has not been continued in 2022.

4.2.5. Activities bringing businesses and citizens together

International scope

Deep Dive

<https://deepdive.grida.no/aboutDeepDive/>

Deep Dive is an open access digital system for beach litter analysis and data collection in the Arctic and beyond. Deep Dive beach litter analysis involves identifying the type, country of origin and age of containers, such as household, food, oil and chemical containers. This analysis gives insight into the likely geographical origin of the litter and whether discarding is continuing at sea. The Deep Dive approach was developed jointly by SALT Lofoten and GRID-Arendal through Norwegian national funds.

4.3. In-depth exploration of selected initiatives

In the Arctic part of the Atlantic and Arctic Lighthouse Area, two initiatives were selected for in-depth exploration through written communications and interviews with the initiatives' coordinators. The two activities selected are:

- 1) **Circumpolar Local Environmental Observer (CLEO) Initiative** – a pan-Arctic citizen science initiative building on and extending the Local Environmental Observer (LEO) Network.
- 2) **Fram Forum Junior** – an online ocean literacy initiative developed by the Fram Centre for Norwegian students aged between 10-15 years.

Note on methodology for the in-depth exploration of the two selected initiatives: factsheet 1 for the CLEO Initiative was completed based on a review of relevant grey literature (websites and reports) and in consultation with the Secretariat of the Arctic Council's Arctic Contaminants Action Program (ACAP); factsheet 2 for the Fram Forum Junior initiative was completed based on a review of the initiative's official website, complemented with written feedback from the coordinator.

Factsheet 1: Circumpolar Local Environmental Observer (CLEO) Initiative

1. Name of activity
Local Environmental Observer (LEO) Network (https://www.leonetwork.org/) promoted and expanded by the Circumpolar Local Environmental Observer (CLEO) Initiative (https://www.arctic-council.org/about/working-groups/acap/home/projects/circumpolar-local-environmental-observer-cleo-initiative/)
2. Introduction and context
a. Short general description to introduce the activity
<p>Observation networks are crucial to understanding and adapting to climate change. In 2009, the Alaska Native Tribal Health Consortium (ANTHC) established the Centre for Climate and Health with the aim of describing connections between climate change, environmental impacts and human health effects. Recognising the value of traditional and local knowledge and the need for a tool to document and share environmental observations, the ANTHC developed the Local Environmental Observer (LEO) Network (see leonetwork.org), with funds from the US EPA.</p> <p>The LEO Network was launched as a tool to support the tribal health system and help local observers to share valuable information about climate and other drivers of environmental change. The LEO Network is a web-based platform where first-person observations and news articles about unusual environmental events are published to raise awareness of climate change impacts. While most of those participating are based on land, reports of observed environmental changes also pertain to coastal and marine environments (e.g. changes in fish abundance and distribution). Observers can connect with others in communities around the world, share observations, raise awareness, and find answers to significant environmental events. Members can engage with topic experts in many different organisations and become part of a broader observer community. The focus of the Network is on specific, geo-located events, which are considered local level symptoms and signals of potential regional trends. Aiming to encourage inclusion of traditional and local knowledge, the LEO Network is open to anyone to contribute. During the US Chairing of the Arctic Council (2015-2017), ACAP and its Expert Group, the Indigenous Peoples' Contaminants Action Program (IPCAP), worked to expand the LEO Network. The result of this work is the CLEO Initiative, currently used by communities across the Arctic region. In 2017, a ministerial deliverable to the Arctic Council encouraged ACAP and CLEO partners to continue developing and expanding the network⁵¹⁹. In 2021, the Arctic Ministers also recognised the progress in developing and expanding the CLEO Initiative, together with its value for capacity development and knowledge sharing, including among indigenous and local young people⁵²⁰.</p>
b. Location/geographical scope
The CLEO Initiative is pan-Arctic in scope and is implemented across the Arctic. The usage of the tool itself – the LEO Network – spans beyond the Arctic region to non-Arctic States.
c. Activity category
The CLEO Initiative is primarily a citizen engagement initiative. However, it also functions as an ocean literacy network and contributes to training volunteer networks.
d. Frequency of activity
The CLEO Initiative constitutes a one-off activity under which multiple activities are undertaken (see 'activity category' above). Launched in 2012, the LEO Network provided the umbrella for the CLEO Initiative launched in 2016. The CLEO Initiative is expected to continue indefinitely, depending on available funding (see section 9 on financing sources).
3. Focus/topic of activity
The CLEO Initiative focuses on the following:
<ul style="list-style-type: none">– Freshwater (river, lake, wetlands, deltas);– Marine (e.g., sea, ocean, coastal);

⁵¹⁹ ACAP, *Circumpolar Local Environmental Observer Network: Summary for Policymakers*. Arctic Contaminants Action Program (ACAP), 2021, p. 12, <https://oarchive.arctic-council.org/handle/11374/2608>

⁵²⁰ Arctic Council, *Reykjavik Declaration on the occasion of the 12th Ministerial meeting of the Arctic Council*. Arctic Council, 2021, p. 24, <https://oarchive.arctic-council.org/handle/11374/2600>

- Biodiversity (species, habitats);
- Ecosystem protection;
- Climate change adaptation;
- Water pollution (e.g. pesticides, nutrients, heavy metals);
- Marine pollution (e.g. nutrients, chemicals, underwater noise) ;
- Plastic (plastic litter in seas, plastic in water);
- Fisheries and aquaculture.

The focus of the CLEO Initiative is on specific/unusual environmental events that are considered symptoms of environmental changes at local level and signals of potential trends regionally (e.g. climate change, pollution, biodiversity trends).

Although not all of the topics covered by the CLEO Initiative are relevant to the Mission objective 1 and associated targets, its focus on marine biodiversity and marine ecosystems is highly relevant to Mission objective 1 and targets (i) and (ii) for the Atlantic/Arctic Lighthouse Area ('Protect a minimum of 30 % of the EU sea area and integrate ecological corridors as part of a true Trans-European Nature Network' and 'Strictly protect at least 10 % of the EU sea area'). While the initial motivation for the development of the LEO Network and later the CLEO Initiative was the need to share information on climate change and other drivers of environmental change in the Arctic region, the monitoring of marine environmental changes by Arctic people may provide evidence-based guidance towards protection and restoration actions under the aegis of the Mission and in line with the EU Biodiversity Strategy for 2030. In addition to developing citizen science around environmental changes taking place in the Arctic region, the CLEO Initiative contributes to fostering ocean literacy among Arctic people.

4. Main objectives of the activity

While diverse specialised platforms exist for collecting environmental monitoring data, few are dedicated specifically to the collection of first-person observational data. The latter is the main focus of the LEO Network, with its mission to emphasise the importance of observation data, raise awareness of environmental changes, amplify the voices of local people, and further develop constructive and respectful ways of sharing information and collaborating with diverse knowledge systems. These are the very qualities that make the LEO Network a unique space for sharing information and provide the foundation for the CLEO Initiative. Expanding the geographical coverage of the LEO Network, the main objective of the CLEO Initiative is to further increase awareness of the impacts of environmental changes, including climate change, in the Arctic region through observations by local residents⁵²¹. Other objectives of the CLEO Initiative include:

- Raise awareness of the LEO Network;
- Engage local communities on the potential benefits of LEO;
- Develop best practices for LEO usage;
- Establish secure, long-term funding for the LEO Network and CLEO Initiative activities;
- Explore interoperability of LEO with other community-based monitoring networks, especially those already active in the Arctic region;
- Raise the profile and standing of the LEO Network within the Arctic science community.

5. Key actors leading the activity

Organiser(s)/coordinator

The CLEO Initiative is coordinated by ACAP, one of the six Working Groups of the Arctic Council. ACAP acts as a strengthening and supporting mechanism of the Arctic Council, encouraging national actions to reduce emissions and releases of pollutants and to reduce environmental, human health and socioeconomic risks. ACAP raises awareness of the LEO Network and explores how it can best be used by communities, research and educational institutions by arranging international workshops on the CLEO Initiative, connecting/bringing together different actors around the Arctic, fostering partnerships, producing communication materials, and

⁵²¹ ACAP, *Circumpolar Local Environmental Observer Network: Summary for Policymakers*. Arctic Contaminants Action Program (ACAP), 2021, p. 12, <https://oarchive.arctic-council.org/handle/11374/2608>

tracking and reporting on different activities under the CLEO Initiative. The CLEO Initiative is an outgrowth of the LEO Network, which is coordinated by the ANTHC and its Centre for Climate and Health.

Supporting partners

Different national environmental agencies and research and educational institutions in the US, Finland, Sweden, Norway and other Arctic states are supporting partners of the CLEO Initiative.

6. Target groups

Key target groups for the CLEO Initiative are teachers and students from primary school and above. The initiative was, for example, introduced at the Sámi High School and Reindeer Husbandry School in Guovdageaidnu/Kautokeino, Norway, with the aim of increasing Indigenous young people's knowledge of sudden environmental changes in the Arctic, with special focus on snow conditions. Other target groups include the general public, scientists, relevant professionals/experts and Arctic Indigenous peoples.

7. Specific tools/means used

The main means employed for citizen engagement as part of the CLEO Initiative are the LEO Network portal (<https://www.leonetwork.org/>) and the LEO Viewer mobile app (<https://www.leonetwork.org/en/mobile>). The LEO Viewer App provides easy access to first-hand accounts of climate and environmental changes from observers based on local and traditional knowledge in the circumpolar Arctic area. With LEO Viewer, the public can observe trends and analyse patterns, share knowledge, and stay informed of environmental change in their local region. As the LEO Viewer App is currently only available for iPhone users, another version is now being developed for Android users. Local versions of the app are also being developed at specific sites to better handle the privacy requirements of certain Indigenous peoples (e.g. land use practices - see section 11 on future plans).

Other means employed for citizen engagement as part of the CLEO Initiative include video clips, a resource library (accessible on the LEO Network portal), cartoons (animation videos), events/workshops/webinars, exhibitions (kiosks in selected museums across the Arctic region), social media (Twitter account [@leonetworkorg](#)), social labs (e.g. in Kautokeino, Norway, home of the Sámi University of Applied Sciences), booklets and reports⁵²².

8. Implementation successes and challenges

The CLEO Initiative has achieved all of its objectives to some extent. However, certain challenges persist. For example, information sharing is a critical component of the LEO Network, but remains an important challenge in certain areas of the Arctic region. This is underpinned by several factors:

- Protection and security of culturally, economically and otherwise sensitive information is a priority among traditional knowledge holders when considering if and how to participate;
- Indigenous peoples are dealing with rapidly accelerating climate changes on the ground, creating challenges for participation in collaborative efforts such as logging observations and identifying staff to take part.

Partners in the LEO Network and CLEO Initiative are working together to address these challenges and to secure the time and resources to strengthen partnerships, conduct training, build trust, and improve sharing across Arctic Indigenous communities⁵²³.

9. Financing source

Both the LEO Network and the CLEO Initiative are financed through national funds. Since its establishment in 2012, the following foundations, governments agencies, and institutions based in the US, Canada and beyond have contributed funding to the LEO Network: the Alaska Native Tribal Health Consortium, Alaska Pacific University, Arctic Landscape Conservation Cooperative, Bristol Bay Native Association, Bureau of Ocean Energy Management (US), Commission for Environmental Cooperation (US), First Nations Health Authority, Government of Northwest Territories (Canada), *Grupo de Ecología y Conservación de Islas* (Mexico), Indian

⁵²² CLEO Initiative, *Circumpolar Local Environmental Observer Network: full report and summary for policymakers*, 2021, [Circumpolar Local Environmental Observer Network: Full report and Summary for Policymakers \(arctic-council.org\)](#)

⁵²³ ACAP, *Circumpolar Local Environmental Observer Network: Summary for Policymakers*. Arctic Contaminants Action Program (ACAP), 2021, p. 12, <https://oarchive.arctic-council.org/handle/11374/2608>

Health Services, National Aeronautics and Space Administration (NASA), National Science Foundation, National Snow and Ice Data Centre, Northwest Indian College, US EPA, University of Alaska – Fairbanks, Western Alaska Landscape Conservation Cooperative, and Yurok Tribe (US).

The CLEO Initiative has been funded through the Arctic Council by the selected countries leading the project and allocating the necessary funding and/or providing in-kind support (i.e. Finland, Sweden, Norway, and the US as key contributors). In addition, other Arctic States at times provide in-kind support to the Initiative (e.g. hosting workshops, providing expertise). Providing a clear picture of the funding of the Initiative is complicated, as the funding changes every year based on the support of the partners involved, while in-kind support is not quantified.

10. Impact of activity

Since its launch in 2012, the LEO Network has grown to over 3 000 members across the Arctic region and helped to enhance understandings of the emerging effects of climate and other environmental changes. This environmental monitoring by remote communities serves as an early warning system that has informed policy while bridging communications across diverse levels of government and among relevant institutions. In practical terms, LEO members have recognised observed changes based on local and traditional knowledge and have been able to connect with other knowledge systems. Excellent potential exists to interconnect communities further and share experiences and observations of environmental changes, for instance between schools and administrations. Cooperation with Arctic academic and indigenous institutions has provided opportunities to increase activity of the CLEO Initiative, engage students, and explore research opportunities. Educational institutions at different levels (schools, vocational schools, colleges, universities) were engaged and trained, with plans to develop that engagement further through activities aimed at mobilising Arctic people.

Since the CLEO Initiative was launched in 2016, it has helped to spur a steady growth in LEO membership, a significant increase in contributions from observers in the Arctic region, and major improvements to the online platform, all of which served to strengthen its user-friendliness and enhanced access for Arctic people. During 2019-2020, over 900 observations of environmental changes from the North were shared through the LEO Network, with new observations posted daily. The overarching themes that have emerged include observed changes in seasonal timing, extreme temperatures, and unusual range sightings of plants and marine/terrestrial wildlife in Arctic and sub-Arctic regions⁵²⁴.

11. Future plans

Future plans include further geographical expansion of the CLEO Initiative and further development of the LEO apps. Based on the collective experiences from users across the Arctic, partners involved in the CLEO Initiative have identified several ways to enhance community local observations, with the hope of better incorporating indigenous and local knowledge, including changes in the marine environment:

- Bridging observation systems: engagement with other observation and community-based monitoring systems would enhance common goals and objectives, and help to develop new partnerships in the Circumpolar Arctic;
- Respect for intellectual property, indigenous knowledge and sensitive information: information collected and derived from the LEO Network should be used with care. Users of the LEO Network should bear in mind that the information submitted to the Network is intended for sharing broadly with its members. Contributors should avoid submitting information that they consider culturally, ethically or otherwise sensitive;
- Education and outreach: knowledge-sharing through workshops and educational events is crucial. The LEO Network has considerable potential for engaging people with varied interests and expertise. This potential should be harnessed further;
- Youth engagement: investing in young people through training, dialogue and enhanced engagement in observation platforms is an important element of developing capacity for addressing climate change impacts;

⁵²⁴ Ibid.

- System enhancements: continued refinement and development of the LEO Network (including the LEO Viewer app and others) would help to ensure that Arctic people can continue to actively contribute their knowledge of climate and other environmental changes and related impacts in the years to come⁵²⁵.

The CLEO Initiative does not have an end date.

12. Networking

The CLEO Initiative explored possible linkages between the LEO Network and other environmental observation systems in the Arctic (e.g. the *Järviviki* system in Finland). In general, all nationally initiated CLEO-associated projects from Finland, Norway and Sweden suggest that different nature observations systems in these countries could benefit from interlinkages with the LEO Network because of the opportunities the latter provides to share and use indigenous knowledge.

13. Conclusions and lessons

Jointly coordinated by ACAP and various national environmental agencies and research/educational institutions across the Arctic States, the CLEO Initiative is an ongoing, successful citizen engagement activity that targets a wide range of societal groups. It is highly relevant to the deployment of the Mission in the Arctic lighthouse. The following conclusions and lessons can be drawn from the Initiative:

- The CLEO Initiative is a good example of citizen engagement achieved by means of digital tools (LEO Network portal and LEO Viewer mobile app) and demonstrates the strong interest of Arctic citizens in engaging in environmental monitoring activities across their region.
- Despite being primarily a citizen engagement initiative, the CLEO Initiative also functions as an ocean literacy network and contributes to training volunteer networks.
- Under the umbrella of the LEO Network, the CLEO Initiative provides a space for enabling and facilitating the collection of first-person observational data on environmental changes taking place in the Arctic, while also raising awareness of environmental changes, amplifying the voices of local people, and further developing constructive and respectful ways of sharing information and collaborating with diverse knowledge systems.
- The CLEO Initiative demonstrates its value for capacity development and knowledge sharing, including for Indigenous peoples and local young people.
- The ongoing expansion of the CLEO Initiative highlights the need to address the specific demands of Arctic Indigenous peoples, in particular the intellectual property of their knowledge. This further underlines the need to build mutual trust between national/regional coordinating institutions and local Indigenous peoples' organisations.
- With its pan-Arctic scope, the CLEO Initiative extends beyond the geographical scope that is of interest to the deployment of the Mission in the Arctic region. Seeking to further upscale such an initiative by expanding the network – as already achieved with the expansion of the LEO Network to the CLEO Initiative – would not be of the greatest relevance to the Mission. Rather, it would be more useful to further consolidate and deepen the existing network – as is already planned with the development of local versions of the app, as well as its expansion to other mobile phone platforms.
- In allowing for further exploration of the interoperability of LEO with other community-based monitoring networks active in the Arctic region, the CLEO Initiative may inform the deployment of the Mission to develop relationships with existing citizen engagement mechanisms and networks in the Arctic lighthouse.
- Although providing a clear picture of the funding of the CLEO Initiative is complicated – the funding changing yearly based on the support of partners involved – sustaining existing funding streams is a clear requirement to secure the Initiative in the longer term.

14. Contact information

Arctic Contaminants Action Program (ACAP), Arctic Council

<https://www.arctic-council.org/about/working-groups/acap/>

⁵²⁵ *Ibid.*

Factsheet 2: Fram Forum Junior

1. Name of activity
Fram Forum Junior https://framsenteret.no/fram-forum-junior/
2. Introduction and context
<p>a. <u>Short general description to introduce the activity</u></p> <p>Fram Forum Junior is an online magazine adapted for children and young people between the ages of 10 and 15. A collaboration between the member institutions in the Fram Centre, the resources of the Fram Forum Junior are intended to be used by schools primarily.</p> <p>Member institutions in the Fram Centre include Akvaplan-niva; the Centre for International Climate Research (CICERO); the Institute of Marine Research; the National Coastal Administration; the National Veterinary Institute; the Geological Survey of Norway (NGU); the Norwegian Institute for Air Research (NILU); the Norwegian Institute for Nature Research (NINA); the Norwegian Institute for Cultural Heritage Research (NIKU); the Norwegian Institute of Food, Fisheries and Aquaculture Research (Nofima); the Norwegian Meteorological Institute; NORCE; the Norwegian Polar Institute; the Norwegian Institute for Bioeconomy Research; the Norwegian Institute for Water Research (NIVA); the Norwegian Mapping Authority; the Norwegian Radiation and Nuclear Safety Authority; SINTEF; the University Centre in Svalbard (UNIS); the Arctic University of Norway (UiT); and one associated member: Polaria.</p> <p>b. <u>Location/geographical scope</u></p> <p>Fram Forum Junior is implemented in Norway with a strictly national scope.</p> <p>c. <u>Activity category</u></p> <p>Fram Forum Junior is an ocean literacy initiative targeting young Norwegians. The activities developed as part of the Fram Forum Junior are primarily educational (through articles and videos).</p> <p>d. <u>Frequency of activity</u></p> <p>Fram Forum Junior constitutes a one-off activity under which multiple activities are undertaken (see ‘activity category’). The Fram Forum Junior was launched in January 2022 and does not have an end date. After the current test period, the activity is expected to run for two years (until 2024) before a final decision is made on its duration.</p>
3. Focus/topic of activity
Fram Forum Junior focuses on several topics: <ul style="list-style-type: none">– Freshwater (river, lake, wetlands, delta);– Marine (e.g. sea, ocean, coastal?);– Freshwater and marine (e.g. water cycle);– Biodiversity (species, habitats);– Ecosystem restoration;– Climate change adaptation;– Climate change mitigation;– Water pollution (e.g. pesticides, nutrients, heavy metals);– Marine pollution (e.g. nutrients, chemicals, underwater noise);– Plastic (plastic litter in seas, plastic in water);– Microplastics;– Fisheries and aquaculture.

Fram Forum Junior areas of focus are relevant to Mission objective 1 and associated targets (i) and (ii) for the Atlantic/Arctic lighthouse – ‘Protect a minimum of 30 % of the EU sea area and integrate ecological corridors as part of a true Trans-European Nature Network’ and ‘Strictly protect at least 10 % of the EU sea area’. By enhancing ocean literacy among Norwegian young people, Fram Forum Junior contributes to educating younger generations about the importance of a healthy and protected ocean.

4. Main objectives of the activity

The main objective of Fram Forum Junior is to increase ocean literacy among young Norwegians by providing an online platform for sharing relevant resources on oceans, seas and rivers, including popularisation of scientific research conducted by member institutions of the Fram Centre, across both natural and social sciences.

5. Key actors leading the activity

Organiser(s)/coordinator

Fram Forum Junior initiative is organized by the High North Research Centre for Climate and the Environment (Fram Centre). Based in Tromsø, Norway, the Fram Centre comprises employees from 20 institutions involved in interdisciplinary research and outreach in the fields of natural science, technology and social sciences. The Fram Centre contributes to Norway’s sound management of the environment and natural resources in the north. With scientific research as its foundation, the Fram Centre communicates knowledge to management authorities, the business community and the general public, and strengthens the connection between research and education. It is an important arena nationally and internationally, and contributes input to climate-related issues, among other environmental issues.

Supporting partners

Fram Forum Junior is supported by the Government of Norway through the Fram Centre.

6. Target groups

The target group is students aged from 10-15 years.

7. Specific tools/means used

The main means employed for citizen engagement as part of the Fram Forum Junior are an online resource library, primarily stocked with short articles and videos.

8. Implementation successes and challenges

Fram Forum Junior still in a development phase, thus neither implementation successes nor challenges can be highlighted at this stage. To date, diverse news items and videos have been posted on the Fram Forum Junior website.

9. Financing source

Fram Forum Junior is funded through national funds by the Norwegian Ministry of Climate and Environment via the Fram Centre and its member institutions. The technical and graphic budget for the activity is NOK 100 000 (approx. EUR 10 000). Possible additional costs for content are covered by the contributing member institutions. The estimated budget for 2023 is NOK 150 000 (approx. EUR 15 000).

10. Impact of activity

Fram Forum Junior is still in a development phase thus its impact cannot be assessed at this stage.

11. Future plans

Fram Forum Junior is still in a development phase and no future plans have been formulated at this stage.

12. Networking

Fram Forum Junior is still in a development phase and the activity has not been linked to any other at this stage.

13. Conclusions and lessons

Due to its recent launch, no clear conclusions nor lessons can yet be drawn on Fram Forum Junior. It seems likely, however, that its implementation may inform the deployment of the Mission in the Arctic area as regards citizen engagement and ocean/water literacy activities targeting young people.

14. Contact information

<https://framsenteret.no/fram-forum-junior/>

4.4. Main conclusions

Despite their diversity in topics, geographical scope and funding sources, organisers and target groups, and means and tools of engagement, all of the activities mapped are deemed relevant to the Mission objectives and targets as formulated for the Arctic lighthouse. The **most prevalent category of activities is citizen science, as well as other forms of citizen involvement, while educational activities above local level were noticeably lacking**. The factsheets of the CLEO Initiative and Fram Forum Junior sought to present an in-depth exploration of two relevant initiatives reflecting the diversity of activities, although Fram Forum Junior remains too new for any clear conclusions.

On the scope of activities, **the regional level (focusing on the broadly defined Arctic region) remains underrepresented**, although it is at times implicitly nested within activities with an international scope. This comparative lack of regional-level initiatives may be driven by a preference - among governments in particular - for initiatives of national scope associated with national policy objectives and of international scope (e.g. conferences). There may thus be a need to develop and implement citizen engagement and educational initiatives with a regional (pan-Arctic) scope, or at least to emphasise the regional level within activities of international scope.

Of the four countries included in the geographical scope of the Arctic lighthouse, **Norway is most advanced in the implementation of citizen engagement and ocean literacy activities**, with activities ranging from the national – and even local – to the international level. This may be due to the **significant financial resources allocated to ocean-related activities**, as the country's decision-makers substantially focused on the ocean – for both conservation and exploitation purposes – under the mandate of Prime Minister Erna Solberg. **Norway may thus be an important partner in developing and expanding citizen engagement and ocean literacy activities in the Arctic lighthouse**, not least given its EEA membership and increasingly important involvement in EU-funded research projects and activities, including water/ocean literacy-related initiatives.

4.5. Recommendations

Recommendation 1 – Build on existing activities and foster the development of educational/training activities: A number of relevant citizen engagement and/or ocean/water literacy activities are already implemented across the Arctic lighthouse by different institutions/organisations. The Mission Secretariat could usefully build on these activities and foster synergies with possible future initiatives in relevant topics. In addition, the Mission Secretariat could consider funding and supporting the development of educational/training activities, which were found to be comparatively less represented in the Arctic area.

Recommendation 2 – Increase the share of EU funding for citizen engagement and/or ocean and water literacy activities: In comparison to national funding streams, the overall share of EU funding for citizen engagement and/or ocean and water literacy activities was limited. The Mission Secretariat could consider working towards increasing EU funding supporting the development of these activities at relevant decision-making levels.

Recommendation 3 – Explore possible collaborations with the Arctic Council and other relevant regional bodies: Regional bodies are important institutions for fostering citizen engagement and/or ocean/water literacy above national level. The Mission Secretariat could explore possible collaboration avenues with the Arctic Council, as the main intergovernmental body in the Arctic region.

Recommendation 4 – Consider prioritising collaborations with activities already implemented in Norway: Most of the mapped citizen engagement and/or ocean/water literacy activities with a national scope are implemented in Norway, which clearly leads the field in this area. The Mission Secretariat could prioritise collaborations with activities already implemented in Norway, engaging with the relevant institutions/organisations/networks implementing and/or funding these activities, including universities, other research actors, NGOs⁵²⁶ and others⁵²⁷. This would build on pre-existing and well-functioning networks of implementing/funding institutions/organisations across the country.

Recommendation 5 – Support the development and implementation of activities that duly recognise and include Indigenous peoples and their knowledge: Indigenous peoples are integral to Arctic social-ecological systems. Their culture, histories, and practices should be duly recognised, and their knowledge included in future citizen engagement activities through the Mission in the Arctic area. With the aim of fostering the active participation of Indigenous peoples and their representatives, the Mission Secretariat could consider engaging with the relevant NGOs (e.g. Saami Council) and Working Groups under the Arctic Council (e.g. the Sustainable Development Working Group).

⁵²⁶ For example, the University of the Arctic, the Arctic University of Norway, the University of Bergen, the Norwegian University of Science and Technology, the Norwegian Institute for Water Research.

⁵²⁷ For example, GRID-Arendal and the Association of Early Career Polar Scientists.

5. MEDITERRANEAN LIGHTHOUSE AREA

5.1. Introduction

The Mediterranean Sea covers an area of approximately 2 600 000 km², with an average depth of 1.460 metres. It stretches from the Atlantic Ocean to the west, southwestern Asia to the east, Europe to the north, and the Maghreb region of northern Africa to the south, making it the largest enclosed sea on the planet⁵²⁸, even though it only represents 0.82 % of the surface area of the world's oceans⁵²⁹. Approximately one-third of the Mediterranean population lives in the coastal area, more than 70 % of whom are in cities⁵³⁰.

The biogeographical region enclosing the Mediterranean Sea includes coastlines of 21 EU and non-EU Member States: Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia and Turkey. The result is a region that is both ecologically and socio-politically complex.

The Mediterranean is a relatively small and enclosed sea, with limited exchange with ocean basins, amplifying the human-induced effects of pollution. Its main pollutants are nutrients, heavy metals, Persistent Organic Pollutants (POPs), pesticides, hydrocarbons and marine litter. Fertilisers and pesticides used in agriculture in Mediterranean countries are above global averages, creating environmental impacts such as nutrient and agro-chemical pollutant run-off. The Mediterranean Sea basin also hosts around 30 % of the world's international tourists (amounting to 360 million people per year⁵³¹), as well as being the second largest destination for cruise ships worldwide. Accordingly, there is increasing depletion of natural resources (water, soil, biodiversity, food, energy), but also pollution of marine and land environments. As a result, the Mediterranean is one of the most marine littered areas in the world, with around 730 tonnes of plastic entering the sea daily⁵³².

Many EU and international institutions have demonstrated high awareness of the current situation in the Mediterranean Sea, putting in place various policies, frameworks and arrangements to tackle the negative impacts, such as the Mediterranean Action Plan (MAP), the Barcelona Convention, the Marine Strategy Framework Directive (MSFD), among others. Other institutions have also demonstrated their awareness of these issues (see Deliverable 4 from Task 3 for details). If the marine resources of the Mediterranean Sea are to be protected and conserved, there is an urgent need for the actors within the basin to understand the connections, i.e. to be ocean-literate⁵³³.

Ocean-literate citizens understand ocean issues, can communicate about the ocean and make informed decisions concerning the ocean⁵³⁴. Ocean literacy does not exclusively represent knowledge of ocean issues, but also people's ability to protect, conserve and sustainably use and manage marine resources. However, that necessitates an increase in ocean literacy in the Mediterranean Sea basin, from education and school curricula through to decision-makers and the public at large⁵³⁵.

The European Marine Science Educators Association (EMSEA) formed the Med-Working Group and launched the Mediterranean Sea Literacy (MSL) guide, comprising seven principles and 43 concepts, all adapted to the specificities of the Mediterranean Sea⁵³⁶. The MSL guide serves as 'guidance to educators, teachers, scientists, non-governmental organisations, policymakers, the blue business sector, and the general public are expected to raise awareness and create a Mediterranean-Sea-literate society'⁵³⁷. In addition to the ecological and biological characteristics of the basin, this region-specific framework takes into account the social and cultural specificities of the 21 Mediterranean countries.

The MSL guide aims to boost ocean literacy and citizen engagement by implementing it through a network of educators (formal and non-formal) and scientists, targeting a broad audience that includes policymakers and the general public. Principle 7 of the MSL guide includes the concept ML7-E, 'different scientific approaches combined with education, training, public awareness and transnational cooperation can pave the way towards an inter-disciplinary direction of exploration, understanding, and protection of the Mediterranean Sea.'

⁵²⁸ <https://www.medqsr.org/mediterranean-marine-and-coastal-environment>

⁵²⁹ <https://www.intechopen.com/chapters/55867>

⁵³⁰ UNEP/MAP and Plan Bleu, *State of the Environment and Development in the Mediterranean*, Nairobi, 2020.

⁵³¹ Galewski et al., *Living Mediterranean Report – Monitoring species trends to secure one of the major biodiversity hotspots*, Tour du Valat, France, 2021.

⁵³² UNEP/MAP and Plan Bleu, *State of the Environment and Development in the Mediterranean*, Nairobi, 2020.

⁵³³ Ibid.

⁵³⁴ Mokos, M., et al., *Mediterranean Sea Literacy brochure*, 2021.

⁵³⁵ Mokos, M., et al., 'Mediterranean Sea Literacy: When ocean literacy becomes region-specific', *Mediterranean Marine Science*, Vol. 21, No 3, 2020, pp. 592–598, <https://doi.org/10.12681/mms.23400>

⁵³⁶ Ibid.

⁵³⁷ Ibid.

Everybody should collaborate to preserve and sustain Mediterranean Sea resources: scientists, educators, teachers, policy-/decision-makers, artists, and the private sector⁵³⁸.

Finally, citizen assemblies allow to address and tackle societies' pressing issues related to diverse topics such as the policy, participation, social inclusion, or the environment. Within the latter topic, ocean literacy could be promoted while creating awareness among citizens. In the Mediterranean basin, the Mediterranean Citizens' Assembly Foundation (MCAF) was created in 2008 and has been promoting and sponsoring beaches clean-ups since 2017 and involving young participants from 9 countries⁵³⁹. Regarding the EU Mediterranean countries, citizen assemblies related to climate change were found at the national level in France and Spain (see the following section). This section presents different actions to improve the involvement of citizens and augment ocean literacy in the Mediterranean Sea basin.

5.2. Mapping citizen engagement and literacy activities

The main citizen engagement and literacy activities identified as relevant to the Mission objectives in the Mediterranean lighthouse were recorded in an Excel database, as described in step 1 of the methodology.

5.2.1. Overview

The screening of citizen engagement and ocean literacy activities saw 29 activities mapped as relevant to the Mission lighthouse objectives in the Mediterranean Sea basin and matching the selection criteria.

Activity categories: the large majority of the activities involves training activities, including vocational, educational (courses), literacy networks, school curricula and school projects (at different education levels). Citizen science activities are another important category within the basin. Social innovation activities were also found, albeit to a lesser extent. The figure below shows the number of activities per category in the Mediterranean Sea basin. Some activities may be included in more than one category.

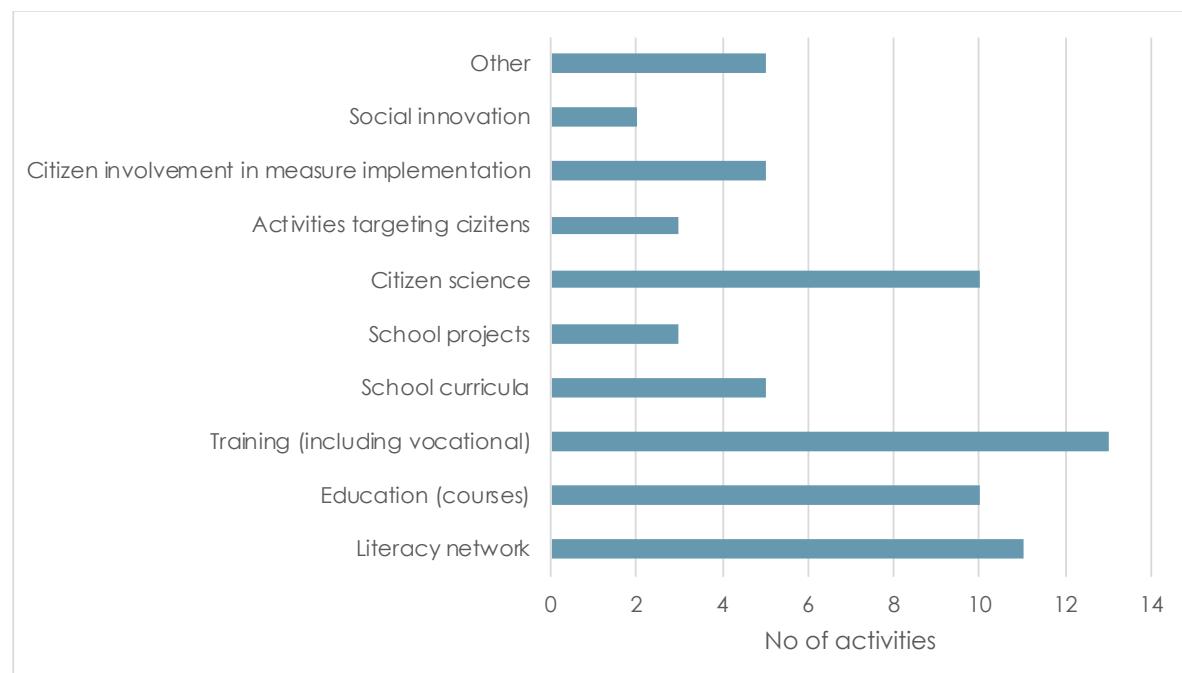


Figure 151 Number of activities per category in the Mediterranean lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Topics: the activities mainly target marine (21 of 29) and plastic (including litter at sea and in water) issues (20 of 29). Next is marine pollution (10 of 29), which includes underwater noise, nutrient, or chemical pollution. Finally, microplastics is a recurring topic (9 of 29). These topic categories reflect the selection criterion to map activities in the Mediterranean lighthouse according to the Mission's objectives. Some of the activities also include topics such as biodiversity, adaptation and mitigation to climate change, and freshwater (see the table below).

⁵³⁸ Ibid.

⁵³⁹ <https://fundacionacm.org/en/environmental-actions/>

Topics	No of relevant activities
Freshwater (river, lake, wetland, delta)	4
Marine (sea and/or ocean-related issues)	21
Freshwater and marine	3
Biodiversity (species, habitats)	7
Ecosystem restoration	2
Ecosystem protection	4
Climate change adaptation	6
Climate change mitigation	3
Water pollution (e.g. pesticides, nutrients, heavy metals)	6
Marine pollution (e.g. nutrients, chemicals, underwater noise)	14
Plastic (plastic litter in seas, plastic in water)	20
Microplastics	9
Fisheries and aquaculture	2
Other	4

Table 78 Primary focus of activities in the Mediterranean lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Geographical scope and funding: the majority of activities are of international scope, covering several Mediterranean countries (including non-EU countries) or the macroregion as a whole (20 of 29). Activities with a national scope were also mapped (14 of 29). Finally, some activities were found to have a regional scope (Figure 152 below). Similarly, most activities are funded by EU funds (16 of 29), followed by national funds (9 of 29) and philanthropy (7 of 29). For some activities, it was not possible to establish the funding sources. Certain activities receive combined funding from different types of sources (7 of 29): four activities combining EU and national funds; one combining private and philanthropic funding; one funded between EU, national, and private; and one combining EU, national and philanthropic funding.

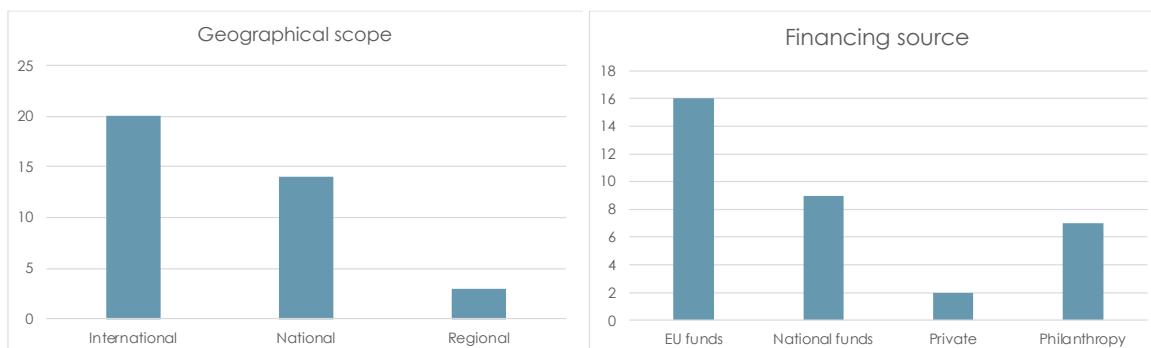


Figure 152 Geographical scope and financing of activities in the Mediterranean Sea basin lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Organisers and target groups: the largest share of activities is coordinated by NGOs, as well as projects (10 activities for each type of actor), followed by university/research actors (6 of 29), and a smaller number by schools and intergovernmental actors (3 of 29) (see Figure 153 below). The target groups for the identified activities are mostly students (for eight activities it was possible to determine the following age brackets: five targeting secondary, two university level, and one primary school), followed by the general public, then teachers, professionals and/or experts (see Figure 154 below). Scientists are another important target group for some of the activities mapped in the basin, as they are key actors for ocean literacy.

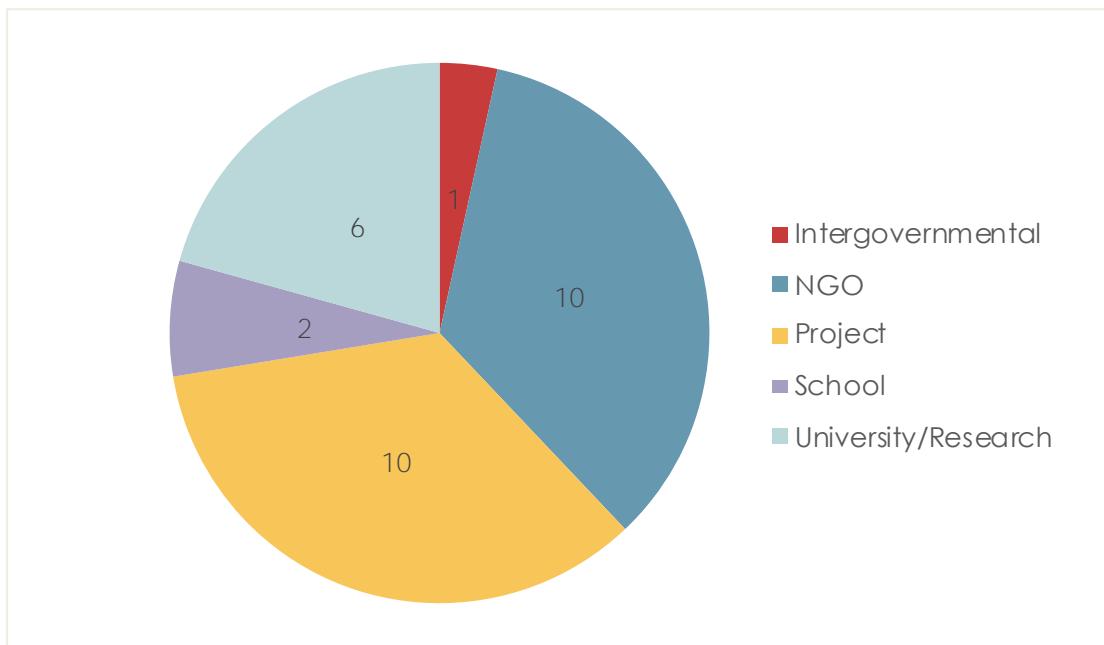


Figure 153 Organisers of activities in the Mediterranean lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

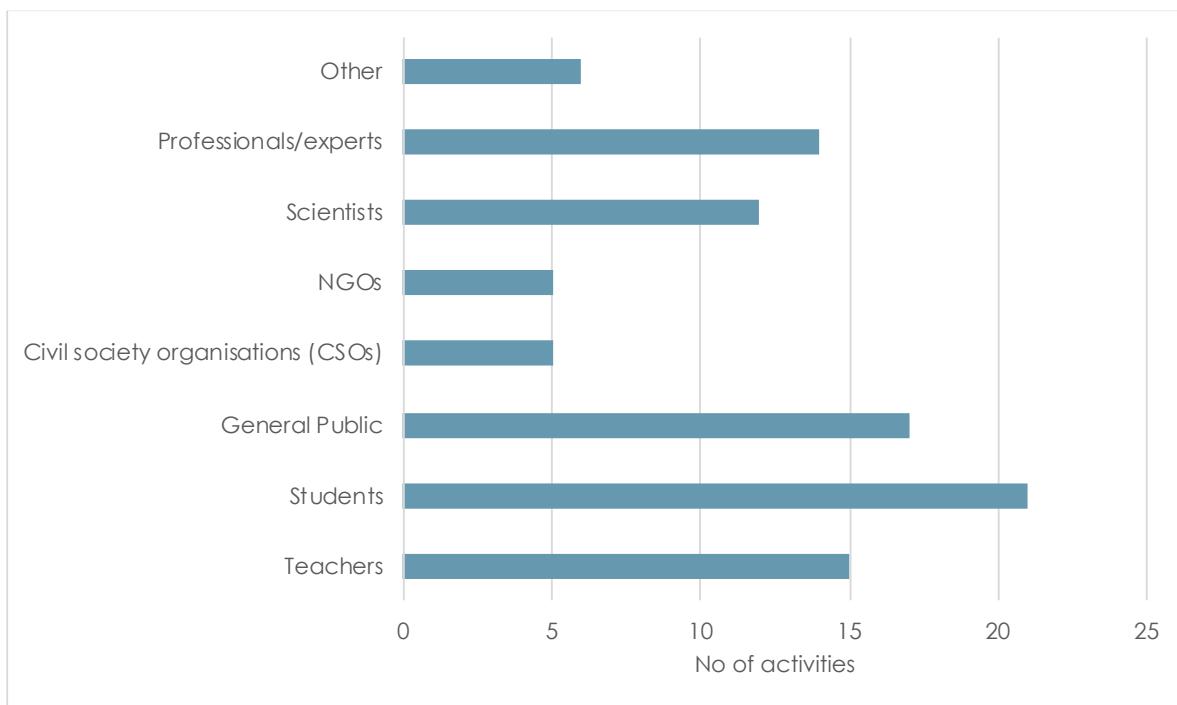


Figure 154 Target groups for activities in the Mediterranean Sea basin lighthouse

Source: Information from Deliverable 8 Database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Means and tools of engagement: the activities use a variety of tools for engagement and literacy, with the large majority using events, workshops or webinars, followed by activities using booklets/guidelines, and videos. Other important means and tools include resource library, media campaigns and toolkits, among others (see Figure 155 below).

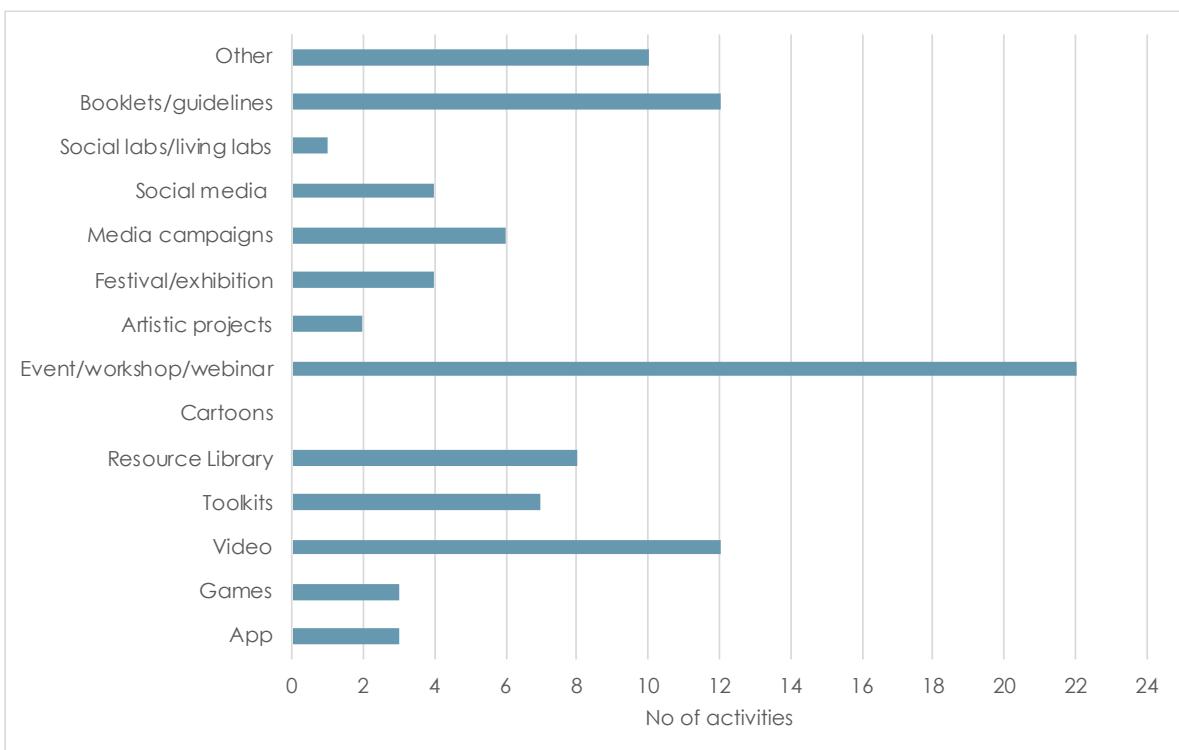


Figure 155 Tools and means of engagement for activities in the Mediterranean Sea basin lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

The following section summarises the main citizen engagement and ocean and water literacy activities that were mapped as relevant to the lighthouse Mission objectives. For further details, see Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

5.2.2. Literacy initiatives and networks

European ocean literacy coalition (EU4Ocean)

<https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1482>

<https://ec.europa.eu/ocean-literacy/youth4ocean>

The EU4Ocean coalition was established by the European Commission to bring together all European groups and organisations active in ocean sustainability and ocean literacy. It combines EU-wide activities with dedicated actions in the Arctic Ocean, the Atlantic Ocean (including the North Sea), the Baltic Sea, the Black Sea, the Mediterranean Sea and the global ocean. EU4Ocean consists of three major communities: a members' platform of professional organisations, the Youth4Ocean forum, and a Network of European Blue Schools. Members of the EU4Ocean Platform exchange expertise, knowledge and best practices in ocean literacy, leading to synergies and new collective initiatives that can reach broader audiences and generate larger impact. The Youth4Ocean forum provides young changemakers (aged 16-30) with opportunities to speak up for their generation, share their ideas and interests, present projects related to marine issues, and connect and network with like-minded young people and experts all over Europe. The main source of financing is EU funds (EMFAF).

Sea Change

<https://seachangeproject.eu>

<https://cordis.europa.eu/project/id/652644>

Sea Change was a H2020-funded project that aimed to establish a fundamental 'sea change' in the way European citizens view their relationship with the sea, by empowering them, as ocean literate citizens, to take direct and sustainable action towards a healthy ocean, healthy communities and ultimately a healthy planet. The project covered Europe and had 17 partners from nine countries. It ran from March 2015 until February 2018.

Mediterranean Education Initiative on Environment and Sustainability (MEdIES)

<https://medies.net>

MEdIES is a longstanding initiative of the Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE) on Education for Sustainable Development (ESD). It promotes ESD at all levels, from institutional to grass-roots level, aiming for responsible, environmentally literate, democratic and ethical global citizens, who make informed choices and engage in committed actions based on sustainability values. The geographical scope is international, with large projects covering the Mediterranean Sea basin (e.g. the Mediterranean Universities Network for Sustainable Development (SD) focusing on Education for Sustainable Development (MedUnNet); Summer Universities), and national, with projects focusing on one country (e.g. Greece, Malta). Different projects have run since 2002. MEdIES is financed through different sources, including philanthropy (Anna Lindh Foundation, Makhzoumi Foundation), European funds (LIFE, Erasmus+ (KA1 & KA2 grant)), and national funds (Greece, Cyprus), as well as international organizations (Global Water Partnership Mediterranean – GWP Med; UNESCO Regional Bureau for Science and Culture in Europe).

5.2.3. Training and education (including courses, school curricula)

The MedProgramme

<https://www.unep.org/unepmap/what-we-do/projects/MedProgramme>

The MedProgramme was implemented by UNEP/MAP to kick start the implementation of priority actions to reduce the major transboundary environmental stresses affecting the Mediterranean Sea and its coastal areas, while strengthening climate resilience and water security, and improving the health and livelihoods of coastal populations. Programme partners include UNESCO Intergovernmental Hydrological Programme (IHP), European Investment Bank (EIB), International Union for Conservation of Nature (IUCN) Med, GWP Med, WWF Med and the UNEP/MAP Regional Activity Centres Plan Bleu (France), PAP/RAC (Croatia), SCP/RAC (Spain) and SPA/RAC (Tunisia). Financed by the Global Environment Facility (GEF) with a total amount of USD 43 million, the project began in 2020 and is expected to run until 2024. The 10 beneficiary countries are: Albania, Algeria, Bosnia and Herzegovina, Egypt, Libya, Lebanon, Morocco, Montenegro, Tunisia and Turkey.

Network of European Blue Schools

<https://ec.europa.eu/ocean-literacy/blue-schools>

The Network of European Blue Schools is one of the communities of the EU4Ocean coalition that connects diverse organisations, projects and people contributing to ocean literacy and the sustainable management of the ocean. The ‘Blue Schools’ Network aims to inspire teachers, school directors and staff of education services to challenge their students (ranging from kindergarten, primary, lower and upper secondary, as well as technical or vocational schools) to develop a ‘Find the blue’ project that links them to the ocean. To become a Blue School, schools need to identify an ocean-based topic that is relevant to their students and then collaborate with their pupils to create a school project. A handbook is available to assist teachers and students to develop their project⁵⁴⁰. The aim is to make the ocean a relevant part of the school curriculum through project-based learning. By successfully completing the project and sharing their results, schools receive European Blue School certification and become part of the Network. Interested schools can apply through a biannual application cycle. As part of the wider EU4Ocean coalition, the Network is financed through European funds (EMFAF). European Blue Schools in the Mediterranean Sea basin are presented in the European Atlas of the Seas (12 in Spain, 3 in France, 26 in Italy, 1 in Slovenia, 8 in Greece, 6 in Croatia, 1 in Cyprus, 37 in Turkey, 9 of which focus specifically on the Black Sea)⁵⁴¹.

⁵⁴⁰ https://webgate.ec.europa.eu/maritimeforum/sites/default/files/handbook_eueopean_blue_schools_220221.pdf

⁵⁴¹ <https://webgate.ec.europa.eu/maritimeforum/en/node/5916>

Understanding and acting for a healthy plastic free Mediterranean Sea – BlueMed e-training on marine litter

<http://www.bluemed-initiative.eu/e-training-course/>

http://www.bluemed-initiative.eu/wp-content/uploads/2020/04/e-training_Venice.pdf

<http://www.bluemed-initiative.eu/bluemed-hackathon/>

<http://www.bluemed-initiative.eu/startup-europe-mediterranean-semed-launch-event-in-matera-on-march-1st/>

Organised by the BlueMed Initiative, these two e-training courses have an international and national geographical scope, including countries such as Cyprus, Croatia, France, Greece, Italy, Malta, Portugal, Slovenia and Spain. The activities were co-financed by national funds and European Commission funds (H2020).

Understanding and acting for a healthy plastic-free Mediterranean Sea brings together experts working on marine litter and the blue economy to share knowledge, showcase best practices and suggest methods to enable more sustainable blue jobs in the framework of the circular economy strategy, taking into due consideration education for sustainable development and citizen science. The course took place in 2020 and is currently closed. However, the materials and information are available online for consultation.

The main objective of the BlueMed e-training on marine litter is to address plastic pollution in the Mediterranean Sea by showcasing best practices and suggesting ways and methods to make blue jobs more sustainable by addressing their inputs following a circular economy strategy. The course is now closed.

These online courses are support actions for the *BlueMed Pilot Action On A Healthy Plastic-Free Mediterranean Sea*, launched in 2018 which consists of mapping and assessing the actions in place regarding marine plastic pollution in EU and non-EU countries in the Mediterranean area. Other supporting actions are the BlueMED Hackathon challenge to develop ideas and solutions for a healthy and plastic-free Mediterranean Sea, to promote sustainable blue growth and a circular bioeconomy in the Mediterranean. And the Startup Europe Mediterranean (SEMED) initiative which aims to map and connect all the actors of the innovation system in the Mediterranean region.

EPIC Academy- Ocean Plastics Educational Curriculum

<https://edu.oceanlegacy.ca/>

Ocean Legacy Foundation (OLF) created a 10-part curriculum series from beginner to advanced levels, focusing on teaching about ocean plastic, how to change the world, and how to make a difference in the community. The initiative is based in Canada and funded through philanthropic sources. Its scope is international, with all courses and materials freely available on their website.

MARLISCO

<https://www.marlisco.eu/education.en.html>

MARLISCO's overarching goal is to raise public awareness, facilitate dialogue and promote co-responsibility among the different actors towards a joint vision for the sustainable management of marine litter across all European seas. The activity is complete, having taken place between June 2012 and May 2015. Covering the Mediterranean basin, it was organised by MIO-ECSDE and MedIES and funded through EU funds (FP7).

BlueSkills - Blue jobs and responsible growth in the Mediterranean throughout enhancing skills and developing capacities

<https://ufmsecretariat.org/project/blueskills-blue-jobs/>

<https://blueskills.inogs.it>

The BlueSkills project promotes opportunities for 'blue' (marine and maritime) careers by developing skills, exchanging knowledge and valuing research for a more sustainable Mediterranean Sea. It aims to develop new curricula and increase employability in the marine and maritime sectors. The activity proposes an advanced Master's programme (between 20 to 25 students per year) and a summer school (30 to 35 trainees

per year) that could potentially be linked to the Mission's objectives. The organiser is the Italian National Institute of Oceanography and Applied Geophysics (OGS) and spans 10 countries (Algeria, Italy, Malta, Mauritania, Morocco, Libya, Portugal, Spain, France and Tunisia). It is fully financed by the Italian Ministry of Education, Universities and Research (MIUR), with a total cost of EUR 1 million. It has been in place since 2019 and is due to run for five years.

Non-Conventional WAtter Re-use in Agriculture in MEditerranean countries – MENAWARA

<https://www.enicbcmed.eu/projects/menawara>

The joint challenges of MENAWARA project consist in providing additional resources by recycling drainage and wastewater, tapping water losses, rationalizing water use practices and setting operational governance models in line with national and international plans. The project is designed to enhance access to water through the treatment of wastewater to be re-used as complementary irrigation and to strengthen the capacity of governmental institutions, non-state actors operating in the sector, technicians, and farmers. The project is led by the Desertification Research Centre in Italy, with other research institutions and volunteer groups. The project covers EU countries (e.g., Italy and Spain) as well as third countries (e.g., Palestine, Jordan and Tunisia). It is an ongoing project that started in September 2019 and will run until August 2022; it has a total budget of €2,9 million (of which 90% come from the Interreg ENI CBC MED instrument).

Interreg Euro-MED Academy

<https://www.interreg-euro-med-academy.eu>

The Interreg MED thematic communities and PANORAMED joined forces to make the knowledge and skills developed by their transnational cooperation projects more accessible and available to a wider audience. It aimed to shape the 'Next Generation of Mediterranean leaders of inclusive and sustainable development'. Financed through Interreg funds and covering the Mediterranean basin, it resulted in the development of two Massive Open Online Courses (MOOCs).

Composting for Limiting Pollution inputs to Ammiq Ramsar site

<https://tourduvalat.org/en/actualites-en/composting-for-limiting-pollution-inputs-to-ammiq-ramsar-site-lebanon/>

The main objective of the project is to reduce or stop the practice of dumping cow manure into waterways leading to the Ammiq wetland in Lebanon. It teaches local dairy farmers how to use thermal composting to turn cow manure into grade A compost, free of weed seeds and harmful pathogens. The project organised four training sessions. The organisers are Tour du Valat and the Society for the Protection of Nature in Lebanon (SPNL). It is financed with national funds of the *Agence Française de Développement* (AFD) and the French Facility for Global Environment (FFEM).

5.2.4. Citizen science

Study marine litter dispersion: citizen science application (ML-CSA)

<https://sites.google.com/view/seacleaner/educazione/tracciando-i-rifiuti?authuser=0>

The aim of the project is to investigate the effects of marine currents, winds and river discharge on marine litter dispersion in the Ligurian and Tyrrhenian Seas in Italy. The initiative involves students to participate in the research, which will later be presented to the general public. It is organized by the Istituto di Istruzione Superiore Capellini-Sauro of La Spezia in Italy. The activity started in January 2022 and is due to finish in October 2022. It is also relevant for other categories, such as training and education.

COastal Management and MOnitoring Network for tackling marine litter in Mediterranean seaName of activity - COMMON

<https://www.enicbcmed.eu/projects/common>

The project will apply integrated coastal zone management (ICZM) principles to the challenge of marine litter, improving knowledge of the phenomenon, enhancing the environmental performance of five pilot coastal areas, and engaging local stakeholders in marine litter management. It is financed by the Interreg programme ENI CBC Med. It has a regional scope, covering Tyre (Lebanon), Maremma and Northern Puglia (Italy) and Kuriat Island and Monastir (Tunisia). Currently, the project is ongoing, with a total duration of three years.

Ocean Initiatives

<https://www.initiativeoceans.org/en/>

Organized by the Surfrider Foundation Europe, the goal is to raise awareness of ocean pollution, encourage people to take action, and collect data on ocean litter to help scientific research and lobbying actions. Waste collections are organised on beaches, lakes, rivers and sea beds all over the world, including the Mediterranean Sea. It is financed with European (Life programme), national (France) and private funds (Bouygues Telecom Foundation, Biotherm, Capgemini, Sanso Investment Solutions).

Pescadors de Plastic

<https://mon.uvic.cat/pescadors-de-plastic/>

<https://eu-citizen.science/project/170>

School children engage in citizen science activity to assess the presence of plastic pollution in rivers and investigates the role of these systems as transporters of plastic waste from terrestrial to marine ecosystems. The organiser is the *Universitat de Vic* and *Universitat Central de Catalunya* in Spain. The activity took place twice in two years, with a regional geographical scope (Catalonia) and financed with national funds.

Good Karma Projects

<https://goodkarmaprojects.org/?lang=en>

This NGO focuses on the development of educational and environmental awareness projects to promote respect and care for the environment. Activities are currently ongoing: beach clean ups and expeditions have been organised in the Mediterranean since 2018. There are three lines of work: i) action, including clean up and citizen science activities; ii) education, which involves children; and iii) sustainability in the sports industry (surfing). One of the main developments is the production of the documentary '*Mediterraneamente Plastico*'. The initiative has an international geographical scope and it is funded by philanthropy.

5.2.5. Other activities targeting citizens (e.g. volunteer networks, artistic initiatives, public festivals)

Young Person's Guide to the Mediterranean Action Plan and the Barcelona Convention

<https://www.unep.org/uneppmap/news/news/young-persons-guide-mediterranean-action-plan-and-barcelona-convention>

UNEP/MAP published this guide, which provides a simplified introduction to the legal framework of the Barcelona Convention. It covers a wide range of themes relating to the Mediterranean marine and coastal environment, as well as sustainable development.

Plastic Pirates – GO EUROPE!

<https://www.plastic-pirates.eu/en>

Plastic Pirates is a joint citizen science initiative by the Trio-Presidency of the German Federal Ministry of Education and Research, the Portuguese Ministry of Science, Technology and Higher Education, and the Slovenian Ministry of Education, Science and Sport. It aims to engage and empower young people across Europe to monitor and tackle plastic pollution in rivers, coasts and the sea, raise public awareness of avoiding plastic waste, and produce scientific research on the plastic waste problem. Students and youth groups are invited to identify the types of plastic waste found along riverbanks and waters, with the results supporting the scientific community and the monitoring of EU policies. From June 2022, the initiative is extended to other EU Member States, supported by Horizon Europe funds, in order to launch a synchronised plastic sampling campaign across Europe. Austria, Hungary, Italy, Lithuania, Belgium, Greece, Spain, Bulgaria, as well as (possibly) Turkey, Norway and Moldova, have expressed an interest in joining the initiative.

5.2.6. Activities bringing businesses and citizens together

Let's make the Mediterranean blue

<https://webgate.ec.europa.eu/maritimeforum/en/node/6360>

Organised by EU4Ocean, this Mediterranean Sea basin event is planned around Med Coast Day. It combines a rich and diverse programme on-site, online and in hybrid format, organised in different Mediterranean locations. By connecting Mediterranean ocean literacy actors and initiatives, it serves as a focal point for ocean literacy in thought and action. Financed from the EMFAF, its geographical scope is international.

5.3. In-depth exploration of selected initiatives

Five activities were selected for in-depth analysis through interviews with the initiative coordinators:

- 1) **Plastic Busters CAP: fostering knowledge transfer to tackle marine litter in the Mediterranean.** This activity aims to boost training through the transfer of knowledge and tools that address the entire management cycle of marine litter. It focuses on EU countries, as well as the southern and eastern parts of the Mediterranean Sea.
- 2) **Beyond Plastics Med (BeMed)** is a literacy network offering a range of training courses and citizen science activities targeting teachers and students at different levels.
- 3) **MED Expedition** seeks to raise awareness of plastic waste at sea by contributing to scientific research. It targets a wide audience, from young students to decision-makers, and is considered a citizen laboratory.
- 4) **Surfing for Science** is an initiative that seeks to assess the level of microplastic pollution in shoreline waters involving the participation of citizens through the collection of scientific samples while paddle boarding.
- 5) **Tara Ocean Foundation** has an education programme offering a wide range of tools for teachers in formal and non-formal formats. It also conducted an expedition in the Mediterranean.

Factsheet 1: Plastic Busters CAP: fostering knowledge transfer to tackle marine litter in the Mediterranean

1. Name of activity
Plastic Busters CAP: fostering knowledge transfer to tackle marine litter in the Mediterranean by integrating an ecosystem-based management (EBM) into ICZM https://www.enicbcmed.eu/projects/plastic-busters-cap
2. Introduction and context
a. Short general description to introduce the activity The Plastic Busters CAP project, Fostering knowledge transfer to tackle marine litter in the Mediterranean by integrating EBM into ICZM, seeks to capitalise on and effectively transferring the available knowledge and tools that address the entire management cycle of marine litter, from monitoring and surveillance to prevention and mitigation actions.
b. Location/geographical scope The activity has an international scope, focusing primarily on southern Mediterranean countries. More specifically, it is located in Egypt, Tunisia, Lebanon and Jordan, as well as in Italy, Greece and Spain.
c. Activity category The activity is about ocean literacy and seeks to create knowledge about the issue of marine litter in the Mediterranean.
d. Frequency of activity The project has a duration of 24 months, from November 2021 to November 2023.
3. Focus/topic of activity
It focuses on marine pollution and plastic litter in the Mediterranean.
4. Main objectives of the activity
Plastic Busters CAP aims to help decision-makers and stakeholders to effectively address the problem of marine litter. The project seeks to consolidate and fully use the knowledge gained through five relevant projects in order to develop tailored capitalisation actions that set the conditions for social change towards sustainable consumption and production patterns, and a truly circular and green economy. In the long term, the project will contribute to the improvement of ecosystem services by reducing marine litter spills and marine plastic pollution in the Mediterranean Sea, as well as reducing GHG emissions through rational use and sustainable disposal of plastics.
5. Key actors leading the activity
The project is developed within the framework of the ENI CBC MED programme. Organiser(s)/coordinator The project is led by the Universita' di Siena – Department of Physical Sciences, Earth and Environment. It is responsible for project coordination and communication work packages and provides expertise on marine litter monitoring and assessment. Supporting partners The supporting partners are: <ul style="list-style-type: none">– MIO-ECSDE, which leads the marine litter monitoring and mitigation work package and contributes to policy mainstreaming, capitalisation, capacity-building and networking;– Legambiente Onlus (Italy);

- Higher Council for Scientific Research – Institute of Marine Sciences (Spain);
- El Ramis Society for Local Community Development of Barrany (Egypt);
- National Institute of Marine Sciences and Technologies – Department of Marine Environment (Tunisia);
- Tyre Coast Nature Reserve (Lebanon), University of Jordan – Aqaba Branch Faculty of Basic and Marine Sciences, Department of Marine Biology (Jordan).

UNISI and MIO-ECSDE bring longstanding expertise of marine litter monitoring, assessment and mitigation measures, while MIO-ECSDE, CSIC and LEGAMBIENTE are experienced in participatory science campaigns. All partners, but particularly MIO-ECSDE, Legambiente and the Barrany NGO are characterised by strong skills in awareness-raising, communication and participatory approaches. MIO-ECSDE, CSIC, INSTM, TCNR and the University of Aqaba have longstanding experience in EBM and ICZM approaches, while Legambiente and UNISI bring skills on marine litter and EBM/ICZM. All partners have worked for many years on capacity-building and knowledge exploitation through a series of EU and regional projects, and also exhibit strong management and coordination skills.

6. Target groups

Public administrations, researchers, businesses, environmental NGOs and civil society actors generally, citizens.

7. Specific tools/means used

To achieve their objectives, they use tools like video, toolkits, workshops, media campaigns, social media and booklets.

8. Implementation successes and challenges

The activity was launched recently and has yet to be monitored.

9. Financing source

The project has a total budget of EUR 1.1 million, of which EUR 0.9 million is an EU contribution from the Interreg ENI CBC MED.

10. Impact of activity

As the activity was launched recently, it has yet to be monitored. However, the expected outcomes are:

In the short-term and medium-term:

- Improved knowledge and deeper understanding of the marine litter threat by obtaining fit-for-purpose data from the pilot marine litter monitoring campaigns;
- Enhanced capacities of public institutions and stakeholders to address the entire lifecycle of marine litter from monitoring and assessment to prevention and mitigation;
- Strengthened local planning of coastal areas by introducing and promoting an ICZM approach for marine litter that embeds EBM principles;
- Roll-out of extended replication actions to prevent and mitigate marine litter, guided by the project pilots;
- Enhanced awareness among local communities, citizens and professionals on the role they can play to address the marine litter threat via the project's participatory, people-to-people interactions and communication actions;
- Reinforced waste management and environmental protection policies and marine litter priorities mainstreamed via the engagement of public administrations and decision-makers at local, national and regional level;

- Strengthened multi-stakeholder networking at basin level for tackling marine litter in a coordinated and integrated manner.

In the long-term, Plastic Busters CAP will lead to:

- Sustainable use of the coastal and marine environment, fully exploiting the blue growth potential to generate new job opportunities;
- Enhanced ecosystem services via reduced leakage of marine litter and marine plastic pollution of coasts and seas;
- Reduced GHG emissions by reduced use, wise use and sustainable disposal of plastics.

11. Future plans

The planned activities and expected outcomes are:

- Four national hands-on training activities on marine litter monitoring and assessment;
- One e-course on marine litter monitoring and assessment;
- Four pilot marine litter monitoring and assessment campaigns;
- Four national hands-on training activities on marine litter prevention and mitigation measures;
- One e-course on marine litter prevention and mitigation measures;
- Four pilots showcasing marine litter prevention and mitigation measures;
- One roadmap on marine litter policy priorities;
- One coastal cities network for a litter-free Mediterranean.

12. Networking

The backbone of Plastic Busters CAP is the Interreg Med Plastic Busters MPAs. Both projects are implemented within the framework of the Union for Mediterranean-labelled Plastic Busters initiative that addresses the issue of marine litter and plastic pollution in the entire Mediterranean region. Plastic Busters MPAs implemented pilot marine litter monitoring and mitigation actions in northern Mediterranean countries (Albania, Croatia, France, Greece, Italy, Montenegro, Spain, Slovenia), while Plastic Busters CAP will replicate such actions in Egypt, Jordan, Lebanon and Tunisia.

There are numerous plastic pollution initiatives engaging with citizens in all Mediterranean countries.

13. Conclusions and lessons

The entire project is implemented within the framework of the UfM-labelled Plastic Busters initiative, thus is strategic in its design. It is, to some extent, a replication project of Plastic Busters MPAs and has considerable potential for further replication and upscaling.

14. Contact information

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Factsheet 2: Beyond Plastics Med (BeMed)

1. Name of activity
Beyond Plastics Med (BeMed) https://www.beyondplasticmed.org/en/
2. Introduction and context
<p>a. <u>Short general description to introduce the activity</u></p> <p>BeMed supports and brings together actors committed to fight plastic pollution in the Mediterranean.</p> <p>b. <u>Location/geographical scope</u></p> <p>BeMed is an international activity covering the Mediterranean Sea basin. Currently, the activities are focused on the northern and southern parts of the basin. They support projects in 15 countries: Spain, France, Italy, Croatia, Montenegro, Albania, Greece, Turkey, Lebanon, Cyprus, Egypt, Tunisia, Algeria, Malta and Morocco. Of the 12 members in its Business Club, two are Tunisian companies.</p> <p>c. <u>Activity category</u></p> <p>The activity targets ocean literacy and citizen engagement.</p> <p>d. <u>Frequency of activity</u></p> <p>BeMed Initiative was launched in 2015, with the BeMed Association subsequently created in 2019 in Monaco. It brings together and supports several projects each year through different calls for projects. It also works with private companies to help them to decrease their plastic footprint (Business Club).</p> <p>BeMed does not have an end date but will continue as long as it is necessary and funded.</p>
3. Focus/topic of activity
BeMed focuses on marine pollution - essentially plastic litter in the Mediterranean Sea. The goal of the association is not to clean the Mediterranean, but rather to reduce waste generation and/or improve its management to reduce littering in the Med.
4. Main objectives of the activity
<p>The key objectives are:</p> <ul style="list-style-type: none">– Reduce plastic pollution at source and reduce its impact on the marine environment;– Support the implementation of sustainable solutions;– Strengthen the capacities of local stakeholders and create partnerships;– Create a dynamic among stakeholders and facilitate experience sharing and good practices. <p>There are two main lines of action in relation to reducing the use of plastic and improving its management:</p> <ul style="list-style-type: none">– Support (financially) the fight against plastic pollution through calls for projects. This will allow sharing of experiences between participants and connect different stakeholders;– Work directly with companies to support them to reduce their plastic footprint: Business Club. <p>In addition, a planned third line of action aims to create a community of practice and connect stakeholders. To date, the association has insufficient human resources, but intends to recruit shortly.</p> <p>Business Club: the objective is to create a group of companies that are active in reducing plastic pollution and act on their chain of pollution. BeMed works on their internal strategy for plastic management.</p>

5. Key actors leading the activity

Organiser(s)/coordinator

The founder members are: Prince Albert II of Monaco Foundation, Tara Ocean Foundation, Surfrider Foundation Europe, MAVA Foundation, IUCN (International Union for Conservation of Nature).

The association has now a Secretariat (with three employees), with a Board of Directors representing each of the members.

Supporting partners

Blue Marine Foundation, Foundation Veolia, Monaco private label, CHANEL, *Fondation Didier et Martine Primat*, Foundation for Future Generations, France's South Region (*Provence Alpes Côte d'Azur*).

These founding members are involved in all activities and take part of strategic decisions. They are also involved in the project selection committee, as well as in discussions of the Business Club. New partners are involved through the call for projects that takes place every year.

BeMed reaches out to relevant companies to join Business Club, identifying their needs and assessing their interest.

6. Target groups

In the projects they support, the targets groups are: teachers, students, civil society organisations, general public, NGOs, scientists and professional/experts. For teachers and students, the levels are specific to each project.

Target groups for the Business Club are large companies that are present in the Mediterranean and that have an interest in working towards reducing their plastic footprint. BeMed also aims to work alongside companies at different stages of the plastic value chain.

BeMed is primarily interested in working with other associations and is making efforts to engage with municipalities.

7. Specific tools/means used

BeMed uses different tools to achieve its objectives:

- Best practice guides (<https://www.beyondplasticmed.org/en/resources/best-practice-guides/>);
- Webinars and seminars on plastic pollution (<https://www.beyondplasticmed.org/en/resources/webinars-and-seminars/>);
- Awareness-raising tools (<https://www.beyondplasticmed.org/en/resources/awareness-raising-tools/>);
- Scientific protocols (<https://www.beyondplasticmed.org/en/resources/scientific-protocols/>);
- Reports and data (<https://www.beyondplasticmed.org/en/resources/reports-and-data/>).

8. Implementation successes and challenges

Successes:

- Funding projects: there is always the need for more resources for plastic pollution-related projects;
- Business Club: BeMed was able to identify a need among companies and successfully connect them with scientists;
- It was easier to work with companies in closer countries to the Secretariat located in Monaco (e.g. France, Spain) at the beginning of the operations rather than in southern or eastern Mediterranean countries.

Challenges:

- Difficulty in creating the dynamic community initially envisioned, due to a lack of human resources to connect stakeholders, their needs, their expertise, etc.;
- Challenging to connect companies across the Mediterranean. Currently, most are in France, Spain and Tunisia. There is a need to find a way to achieve a better balance;
- Language is a major challenge;
- Expansion of Business Club membership is not as rapid as expected.

Challenges in reaching target groups:

- Easier to reach associations;
- Harder to get municipalities or agencies to work with BeMed;
- Difficulty in knowing which companies are willing and motivated to work on plastic issues. Creating awareness does not succeed if there is no motivation and willingness from companies.

9. Financing source

Since its creation, BeMed has allocated EUR 1.23 million to support 82 projects in 15 countries.

As of 2022, the association's expenses are approximately EUR 900 000.

The project is financed through philanthropy from private foundations. The Prince Albert II of Monaco Foundation provides a yearly contribution.

Companies belonging to the Business Club pay a small yearly membership fee.

10. Impact of activity

The 2021 activity report is available (in French) and includes information on the impact of the activity:

- They measured the impact of the activity only once and there is no specific timeline for evaluation;
- BeMed has supported 82 projects in 15 different countries;
- To strengthen its impact, in January 2020 it created a Business Club that brings together companies that want to commit to a plastic-free Mediterranean. The Club has 12 members: CHANEL, Monte-Carlo Société des Bains de Mer, Veolia, Haribo, Carrefour, Nielsen Recycling, Iberostar, Intercontinental Marseille- Hotel Dieu, L'Occitane en Provence, Nestlé France, Cogitel of the Altea Packaging Group and the Tunisian hotel La Badira.
- BeMed lacks the human resources to conduct a qualitative evaluation to find out whether the activities are positively received and to obtain feedback. As it is now approaching 100 supported projects, such an evaluation is becoming increasingly important.

11. Future plans

BeMed aims to reinforce the involvement of the partners in the association (IUCN, Surfrider, Tara Foundation) and capitalise on their experiences to increase its presence in the field (e.g. in countries such as Albania or Tunisia).

12. Networking

There is a plan to develop a community of practice and to connect with Break Free from Plastic, MedWaves, Smilo (French) initiatives on islands.

BeMed already shares its calls for projects, as well as sharing its experiences of projects.

13. Conclusions and lessons

BeMed has seen different types of stakeholders' work and understands the need to conduct work at its own scale and pace. It is important to work with more than one type of stakeholder. For example, associations have a role to play in helping citizens, while associations have a role to play in lobbying politicians at different levels. Companies have key roles in reducing their plastic chain. The important thing is to understand the specific role each can play to create awareness of plastics.

Scalability:

BeMed can be scaled and replicated:

- Different projects: every area has activities that can be replicated;
- A Business Club could be opened for third countries to see what they are doing and share experiences and solutions;
- Every region in the Mediterranean is different and the reality has to be understood thoroughly before implementing any initiative.

14. Contact information

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Factsheet 3: MED Expedition

1. Name of activity
MED Expedition https://www.expedition-med.org/
2. Introduction and context
<p>a. <u>Short general description to introduce the activity</u></p> <p>MED Expedition is a collective of scientists, environmentalists and European citizens who fight against plastic pollution. They raise awareness and mobilise the general public, decision-makers and politicians to address the challenges of plastic pollution through educational and scientific exhibitions. They also identify the sources and origins of plastic waste to contribute to the implementation of sustainable solutions.</p> <p>b. <u>Location/geographical scope</u></p> <p>The geographical scope is international.</p> <p>c. <u>Activity category</u></p> <p>The activity targets ocean literacy and citizen engagement.</p> <p>d. <u>Frequency of activity</u></p> <p>Since 2010, MED Expedition has used its citizen laboratory to carry out scientific and participatory research expeditions to study plastic pollution. These expeditions take place yearly.</p>
3. Focus/topic of activity
MED Expedition focus on marine pollution, especially plastic and microplastics.
4. Main objectives of the activity
MED Expedition aims to raise awareness and recognition of the problem of plastic waste at sea by contributing to scientific research on plastic waste at sea and supporting alternative solutions to traditional petroleum-based plastic. The key objectives are:
<ul style="list-style-type: none">– Create educational and scientific travelling exhibitions on the challenges of plastic waste pollution;– Identify the origin of the waste in order to target the sources of emission and direct actions for the implementation of sustainable solutions;– To modify the behaviour of the population through better knowledge of the stakes in plastic waste pollution;– To propose common solutions (adapted by country) to fight this pollution effectively, and to present these solutions in the framework of the travelling exhibitions;– Strengthen cooperation between Mediterranean countries on concrete and adapted actions.
5. Key actors leading the activity
<p><u>Organiser(s)/coordinator</u></p> <p>The organiser is the NGO, MED Expedition, which initiated and implements the programme.</p> <p><u>Supporting partners</u></p> <p>The public partners are: ADEME, Ministry of Ecological Transition (France), South Region Provence Alpes Côte d'Azur and UNESCO 'The Decade of the Ocean'.</p> <p>The private partners are: Club Med Corporate Foundation, Novamont, Small bag, Sphere and SUEZ.</p>

The association partners are: Regional Activity Centre for Sustainable Consumption and Production SCP/RAC, France Ocean Committee, FNE Provence Alps French Riviera, LPO Provence Alpes Côte d'Azur, Ocean Climate Platform and Respect Ocean.

The scientific partners are: Proteomics and Microbiology Laboratory (ProtMic), *Centre National de la Recherche Scientifique* (CNRS), Italian Agency for New Technologies, Energy and Sustainable Development (ENEA), International Center for Environmental Monitoring (CIMA Foundation), Ecomers Laboratory, University of Corsica, Laboratory of Information and Systems Sciences (LSIS), Laboratory of Electromagnetic Soundings of the Terrestrial Environment (LSEET), NIOZ, *Villefranche-sur-Mer* Oceanological Observatory, University of Mons, University of Savoie Mont-Blanc.

Technical and skills sponsorship partners are: Biocoop, Metrohm, Southern Runners and Tecnomar.net.

6. Target groups

The target groups are teachers, students, general public, young people, industrialists, decision-makers and politicians.

7. Specific tools/means used

The project uses different tools to achieve their objectives:

- Expeditions at sea 'VigiePlastic Méditerranée': A scientific and participatory research programme in the Mediterranean Sea to study plastic waste, which knows no borders and moves with marine currents throughout the basin (<https://www.expedition-med.org/nos-actions/vigieplastic-mediterranee/>);
- 'Plasticised oceans and seas' exhibitions: educational and scientific travelling exhibitions (XXL) to raise public awareness and shift towards an urgency to act, personally, collectively and politically (<https://www.expedition-med.org/nos-actions/les-expositions-oceans-et-mers-plastifies/>).

There are also conferences, videos, media campaigns and publications and scientific reports.

8. Implementation successes and challenges

The activity is ongoing. Progress was delayed by COVID-19 and the geopolitical situation in Ukraine. It is not yet possible to give an opinion on this point.

9. Financing source

The project has a total budget of EUR 300 000.

10. Impact of activity

As the activity is ongoing, MED Expedition has not yet measured its impact (timeframe from 2020 until 2023).

11. Future plans

- The programme is intended to be developed in other countries;
- MED Expedition will continue until the global implementation of the programme (2023);
- As yet, no plans to add other components, target groups or to use new tools.

12. Networking

- MED Expedition is in a pilot phase with three test countries (Algeria, Morocco, Italy), in order to study its feasibility for other countries bordering the Mediterranean;
- In France and in other countries, there are other structures and/or associations that deal with the reduction of pollution in the Mediterranean (plastic, microplastic, chemical, etc.), but each works in its own way.

13. Conclusions and lessons

- The project is ongoing, with no lessons identified as yet;
- MED Expedition has the potential to be scaled up and replicated in other regions, as the pilot programme is intended to be developed in other countries bordering the Mediterranean Sea.

14. Contact information

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Factsheet 4: Surfing for Science

1. Name of activity
Surfing for Science https://www.asensiocom.com/surfingforscience/en/#aboutAnchor https://eu-citizen.science/project/179
2. Introduction and context
<p>a. <u>Short general description to introduce the activity</u></p> <p>Surfing for Science seeks to assess the level of microplastic pollution in shoreline waters. It involves citizens, who participate in the project by collecting scientific samples while paddle boarding.</p> <p>b. <u>Location/ Geographic scope</u></p> <p>The activity has a regional scope in the north-western Mediterranean coast, focusing on the Catalonian coast in Spain. More specifically, in the following locations: Llançà, Palamós, Arenys de Mar, Montgat, Barcelona, Castelldefels, Comarruga, and l'Ametlla de Mar.</p> <p>In addition, the activity will be enlarged from 2023 to include the Basque coast in the Atlantic Ocean.</p> <p>c. <u>Activity category</u></p> <p>The activity relates to citizen science and citizen involvement in measure implementation, as well as, to a lesser extent, to activities targeting citizens (volunteers).</p> <p>d. <u>Frequency of activity</u></p> <p>The project started in 2019 and conducted the sampling collection during 7 months starting October 2020. Currently, the activity is still ongoing until June 2023.</p>
3. Focus/topic of activity
The focus of the activity is microplastics.
4. Main objectives of the activity
<p>The objectives of the Surfing for Science project are to investigate the occurrence and fate of microplastics in the coastal zone. Research on plastic pollution has rapidly expanded in recent years and has led to the discovery of vast amounts of microplastics floating on the surface of the open sea, but there is still a lack of information from a few meters from the coastline where the largest plastic emissions take place.</p> <p>The Surfing for Science project provides floating microplastic data from manta trawl deployments collected by citizen scientists onboard stand-up paddleboards (SUP), kayaks, rowing boats, etc. This project has represented a paradigm shift in microplastic research, allowing to fill the gap in knowledge of this transitional coastal area, and actively involving citizens in the acquisition of scientific samples and the generation of new scientific data.</p> <p>Overall, the project's final objective is twofold: i) knowing how much and what type of microplastics are present in coastline waters in order to find solutions to reduce their impact; and ii) support society to become more scientifically aware of the problems that plastic pollution generates.</p>
5. Key actors leading the activity
<u>Organiser(s)/Coordinator</u> Universitat de Barcelona : Type: university/research institution.

The University of Barcelona is in charge of sample processing (microplastic extraction, quantification and characterization), of making data publicly available and disseminating the results (publication of scientific literature).

Surfrider Foundation Europe:

Type: NGO

The Spanish delegation of Surfrider Foundation Europe coordinates sample acquisition engaging and training the citizen scientists, providing feedback of the results, and promoting the general public understanding of scientific issues.

The foundation was established in 1990 with the objective of protecting, safeguarding and enhancing the oceans, as well as the population depending on them. The work is organized under three main thematics: i) marine litter; ii) coastal development and climate change; and iii) water quality and health. Regarding marine litter, Surfrider Foundation is involved as the lead organization in different projects and initiatives in the Mediterranean and in Europe to tackle the issue of plastic pollution both at sea (for example, Ocean Initiatives – see the part on citizen science in section 5.2 above) and in land (Plastic Origins⁵⁴²). It has also partnered with other organizations to tackle the issue of plastic pollution at sea (e.g., Surfing for Science, BeMed).

Supporting partners

The project has enhanced its spatial and temporal coverage with the involvement of several associations distributed along the territory. The associations provide the structure for implementing the citizen science project including storing the equipment (trawls), training volunteers in the use of the trawl and the recording of the transect, coordinating sample acquisition, shipping the scientific samples to Universitat the Barcelona, and disseminating the results.

The associations involved are: SK Kayak (Llançà), Ocean Cats (Palamós), Base Nàutica (Arenys de Mar), Escola del Mar (Montgat), Blue Salt School (Llevant—Barcelona), Anèl-lides, Oceanogami I Base Nàutica (Mar Bella—Barcelona), Ungravity Freestyle Company (Nova Icària—Barcelona), Manihi Surf School (Barceloneta—Barcelona), Anywhere Watersports (Sant Sebastià—Barcelona), Escola Garbí (Castelldefels), Club Nàutic (Comarruga), and Plàncton Diving (l’Ametlla de Mar).

6. Target groups

There is no specific target group. The citizen science project can be performed by any adult capable of paddling for about one hour. There has been participation of volunteers from 18 to 70 years old.

7. Specific tools/means used

Citizens participate in the project by collecting scientific samples whilst paddle surfing.

Also, the project contributed to increasing scientific knowledge related to microplastic pollution by publishing a scientific paper⁵⁴³ in the journal Environmental Research Letters (impact factor 6.4) with the first results of the project. This publication has captured the attention of the national and international media (including the national Spanish TV or Reuters International, and several radios and newspapers).

The project's results have also been presented in international conferences such as MICRO2020 and EGU2021.

8. Implementation successes & challenges

- To what extent is activity achieving its objectives?

The activity has exceeded its objectives. In some locations, volunteers have acquired one scientific sample per week during an entire year, which provided the scientists of the project a temporal and spatial resolution of samples that would not have been achieved solely by the project scientific team. The information extracted has an enormous value, more than 45,000 microplastic particles have been extracted, counted, and characterised for size, shape, colour and chemical composition so far.

⁵⁴² <https://surfrider.eu/en/our-missions/marine-litter/plastic-origins-70172.html> and <https://www.plasticorigins.eu>

⁵⁴³ <https://doi.org/10.1088/1748-9326/ac5df1>

- What is working well?

The involvement of the citizen scientists and their enthusiasm while collecting the sample has been very important. Their recently acquired scientific skills, observations while collecting the sample (wind, current, recent spills), and their questions posed after sample shipment (how many microplastic particles found) have motivated scientists behind the project to process more samples in the lab (which is not an easy task), to look for more funds, and, in consequence, this has made the project even bigger.

Communication made through social networks (sample acquisition via Wikiloc, sample characterisation via Instagram⁵⁴⁴) has facilitated interaction.

9. Financing source

The activity has been funded by 2 projects of the FECYT (Fundación Española para la Ciencia y la Tecnología, Spain) in 2019 and 2021 of 50,000€ each (co-funded projects, the project has to provide half of the funds). This financing has covered 2 years of sampling.

10. Impact of activity

Impact:

- More than 45,000 microplastic particles have been extracted, counted, and characterised for size, shape, colour and chemical composition so far.

Quantitative:

- Number of participants in each manta trawl deployment: performed >150 deployments.
- Number of interactions with social networks (Wikiloc, Instagram, Twitter): for example, some of the tweets on activities of the project had more than 6,000 impressions.

Qualitative:

There has been a positive reception of the activity. At the beginning of the sample acquisition activities, the associations and the citizen scientists were extremely efficient so that the laboratory at Universitat de Barcelona was overloaded with samples. Support from other teams was required in the lab.

Periodicity of impact measurement:

The impact of the activity is measured each year.

Self-reporting information on impact of activity:

Impact on the scientific knowledge: paper in the journal Environmental Research Letters (impact factor 6.4) with the first results of the project. Results presented in international conferences such as MICRO2020 and EGU2021.

11. Future plans

- The project has been enlarged: in 2023, the Basque coast in the Atlantic Ocean will be monitored. The plans are to continue growing as far as the funds can cover logistic and analytical costs.
- The plans include enlarging spatial coverage and continue with the temporal series. From some of the sampling points, there is a time series of 3 years of data, that has allowed to understand seasonal and interannual variability of floating microplastics in the coastal zone. Taking into account that plastic leakage from the continent is expected to increase in the following decades, it is essential to have long time series to monitor its impact on the marine environment.

12. Networking

- For the moment, there are no plans to involve other projects/organizations to this project. The organizers are aware of a similar initiative in Norway, but it is at its initial stage (trawl design).
- There are other citizen science initiatives around that deal with issues related to microplastics. For example, the initiative Observadores del Mar ("microplastic watchers") but it is targeted to school children and characterization of plastic litter in beaches, not floating. Surfing for Science is eminently scientific not educative.

⁵⁴⁴ <https://www.instagram.com/surfingforsciencelab/>

13. Conclusions and lessons learned

- The Surfing for Science project has proven that citizen science is a powerful tool in plastic research to monitor microplastics in the nearshore as it provides scientifically meaningful results while stimulating citizen engagement.
- The activity is strategic to collaborate with since the more initiatives of this type are, the more information will be available about sources of plastic pollution, types of plastic debris found (size, shape, polymer type, and chemical cocktail) and transport mechanisms (and variation over temporal and spatial scales) in order to understand the risk associated to plastic pollution.
- The activity has the potential to be upscaled to any nearshore area navigable by canoes, kayaks, rowing boats or SUP boards. This means that most of the marine environments, including polar areas, are subject to be monitored using this technique.

14. Contact information

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<https://www.asensiocom.com/surfingforscience/en/#aboutAnchor>

Factsheet 5: Tara Ocean Foundation

See section 3.3 above for the factsheet on the Tara Ocean Foundation Teacher Training, which is a joint factsheet produced by the project teams for the Atlantic and Mediterranean lighthouses.

5.4. Main conclusions

The Mediterranean Sea is a **very diverse basin and thus entails several challenges** for the promotion of ocean literacy on pollution. A **widespread increase in ocean literacy** in the Mediterranean basin **is required**, from education and school curricula to decision-makers and the public at large⁵⁴⁵. For instance, European Blue Schools are already established in some countries of the Mediterranean basin (Spain, France, Italy, Slovenia, Greece, Croatia, Cyprus and Turkey). There is an opportunity to continue increasing ocean literacy at school level in the sea basin by strengthening and expanding this network in other regions of the Mediterranean.

The European Marine Science Educators Association (EMSEA) formed the Med Working Group and launched the **Mediterranean Sea Literacy (MSL) guide**, comprising seven principles and 43 concepts. This region-specific framework **takes into account the social and cultural specificities** of the 21 Mediterranean countries. It aims to boost ocean literacy and citizen engagement through a network of educators (formal and non-formal) and scientists, targeting a wider audience including policymakers and the general public.

The **Mediterranean Citizens' Assembly Foundation** (MCAF) was created in 2008 and has promoted and sponsored beach cleans since 2017, involving young participants from nine countries⁵⁴⁶.

The diversity of the Mediterranean Sea and the resulting ocean literacy challenges was partly addressed in recent decades through setting up different organisations and structures from the supra-national to regional levels.

The mapping exercise revealed several **training and education activities**, as well as **citizen science initiatives**. The vast majority focus on the issue of plastic pollution at sea and coastline. However, inland pollution from other sources (e.g. chemical, nutrients) was not a topic for ocean literacy activities or citizen engagement.

Most of the activities have an international scope, even though they do not cover the entire basin. Some include solely EU countries, while others are working on collaboration between southern and northern Mediterranean countries.

5.5. Recommendations

Recommendation 1. EMSEA targets literacy in the Mediterranean and produced the MSL guide to the protection of the basin. It could therefore be an interesting entry point for development and participation in ocean literacy activities already being conducted.

Recommendation 2. Build on existing activities conducted by larger organisations already rooted in the Mediterranean basin. The Mission could benefit from synergies with organisations that worked on ocean literacy and citizen engagement for decades. Noteworthy entry points are the **MEDIES initiative (from MIO-ECSDE) or the Ocean Initiatives**, which have been active in the region for more than 20 years, promoting awareness and sustainability.

Recommendation 3. Capitalise on the work developed by ongoing or completed projects that included awareness-raising work packages, even if the main objective of the project is not within the scope of expanding ocean literacy in the Mediterranean. Several Interreg projects involving Member States and third countries are developing actions relevant to plastic pollution. For example, Plastic Busters CAP and MENAWARA both show the importance of linking the Mission to training activities that are included within funding instruments such as Interreg. Moreover, the Interreg Euro-Med Academy is an example of collaboration between thematic communities of different Interreg projects that bring together the experiences in capacity building.

Recommendation 4. Academia could play an important role in mainstreaming ocean literacy. Hence, it could be of interest for the Mission to **increase cooperation and support the work conducted by academic institutions** to reach a wider audience and develop programmes tailored to tackle the plastic pollution issue in the Mediterranean. For instance, the Interdisciplinary graduate school for the blue planet⁵⁴⁷ (ISblue) is the result of joining forces of universities and research institutions with the objective to train ocean innovators and science leaders in blue economy topics.

⁵⁴⁵ Mokos, M., et al., 'Mediterranean Sea Literacy: when ocean literacy becomes region-specific', *Mediterranean Marine Science*, Vol. 21, No 3, 2020, pp. 592–598, <https://doi.org/10.12681/mms.23400>

⁵⁴⁶ <https://fundacionacm.org/en/environmental-actions/>

⁵⁴⁷ <https://www.isblue.fr/en/>

Recommendation 5. Language differences remains one of the main barriers within the basin for the widespread and mainstream of ocean literacy. **Producing information in different languages** is essential to reach wider audiences, especially when targeting the general public and citizens in general.

6. DANUBE LIGHTHOUSE AREA

6.1. Introduction

The Danube is the second largest river basin in Europe, with a total area of 801 463 km². It spans central to eastern Europe, taking in both EU and non-EU countries: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, Ukraine. Its major river is the Danube, which flows through nine countries from the Black Forest to the Black Sea, making the river the most international river in the world. With a length of 2 857 km, the river flows through varied landscapes, from high mountainous areas to lowlands and before entering the Black Sea, forming the Danube Delta, one of the greatest marshlands of Europe, at 6 500 km². Several regional (basin-wide) organisations are active in the Danube River basin.

As the Danube region encompasses countries with diverse political systems, local and regional governance capacities vary considerably. Common challenges across the region are climate change, ageing populations and the COVID-19 pandemic, but certain challenges vary by geography and socioeconomics: the type of region (rural-urban), the position of a country (upstream/downstream), Gross Domestic Product (GDP) level, status of EU membership, structure (centralised-decentralised). The basin covers EU and non-EU, high-income and low-income countries, with different socioeconomic backgrounds. This is illustrated by the cohesion policy status of the Danube region, with only 17 (approx. 40 %) of the NUTS2 regions considered 'more developed', while the large majority is 'less developed' and only three are 'in transition'.

Citizen engagement and water literacy activities are widespread in the Danube River basin, but do not cover all regions and topics equally. The Danube River basin is culturally diverse and different regions have different relationships to the river. The projects found in the mapping of initiatives differ in:

- Project locations: different countries have different priorities, funding schemes and varying responsibilities, which affects how likely they are to initiate projects on citizen engagement and water literacy;
- Project content: projects related to ocean and water literacy along the Danube vary in their focus. Overall, those with a wider geographical scope engage participants to shape the project format and content (i.e. competitions to develop innovative solutions or artistic projects on a topic chosen by participants), while the more local projects have distinct objectives for a shorter timeframe and a specific content (i.e. delivery of training and courses with set content).

Generally, there has been an increase in activities and number of projects over the past 10 years. The scope of projects has also broadened. The presence of the International Commission for the Protection of the Danube River (ICPDR), with its own initiatives and coordinated efforts with partner organisations has raised awareness and contributed to water literacy among different target groups. There is also a range of projects that are transboundary in nature to better coordinate knowledge and actions across the basin. This is especially important in light of the wide cultural diversity in language, political history and perceptions/management of the Danube.

6.2. Mapping citizen engagement and literacy activities

The main citizen engagement and literacy activities identified as relevant to the Mission objectives in this lighthouse were recorded in an Excel database, as described in step 1 of the methodology.

6.2.1. Overview

For the Danube lighthouse, a total of 35 initiatives were collected in the database.

Activity categories: activities and projects in the Danube basin can be assigned to a range of different categories. The following overview of distribution of activities (Figure 156) is based on the activities listed in the database. There are several projects per category, with the majority in literacy networks and education. The citizen science projects identified are local and limited in their scope and impact.

Other forms of directly engaging citizens (citizen involvement), which are open to all ages (e.g. citizen cells or assemblies) are not advanced in the Danube. One example of a well-organised citizen engagement activity is worth highlighting: a citizens' assembly on climate that took place in Austria in 2022 (*Klimarat Österreich*⁵⁴⁸), where randomly selected citizens could discuss and prioritise aspects of climate change (effects) and give recommendations. Similar formats could be possible to engage citizens in the Danube area in the future.

Only projects with teaching on water literacy were included in the database. However, work on other tasks in this project and some insights from the interviews revealed many (technical, engineering, restoration) projects in the Danube River basin that are in line with the Mission targets and have a small communication or awareness-raising component. Together, the small components of many projects contribute indirectly to increased knowledge of the Danube.

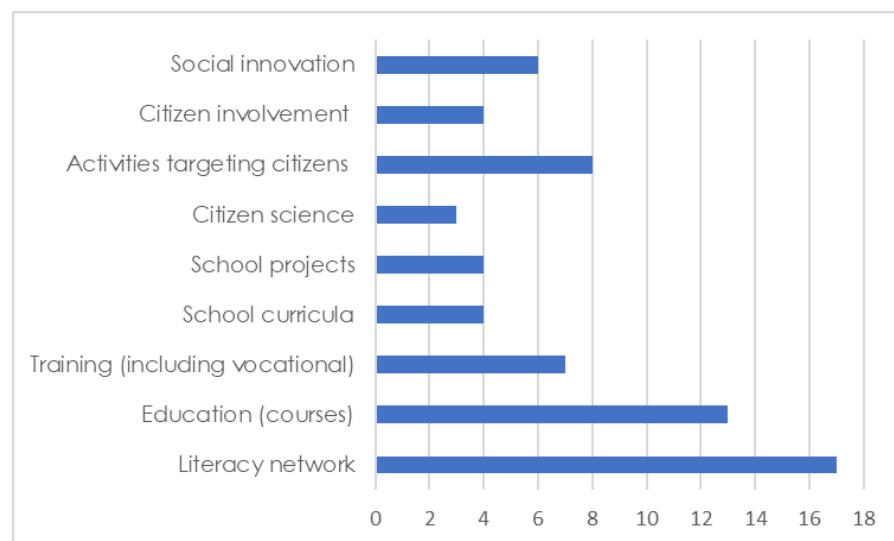


Figure 156 Number of activities per category in the Danube lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Topics of activities: these are focused on freshwater (river, lake, wetland, delta) and a combination of freshwater and marine (e.g. water cycle) activities (Figure 157). However, many of the projects also address aspects of climate change (mitigation), ecosystem restoration and water pollution. No projects solely on marine topics were identified.

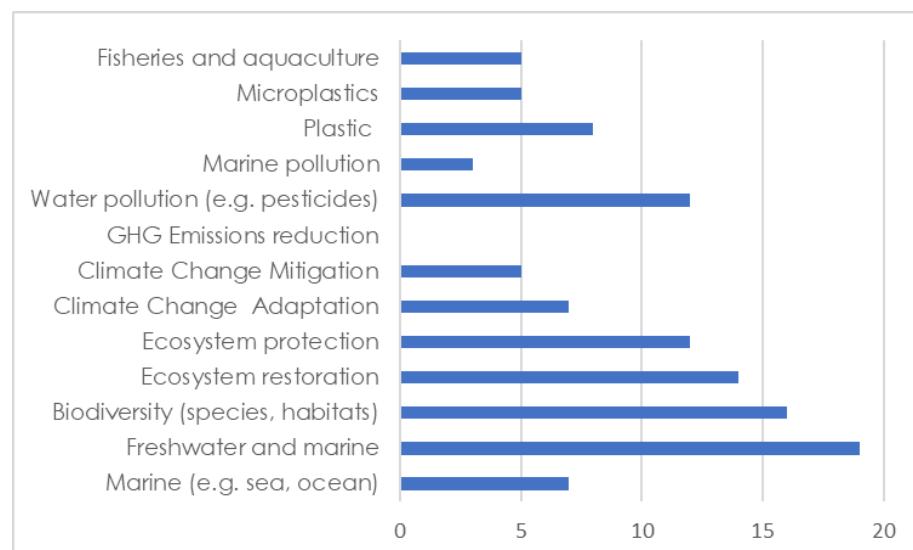


Figure 157 Number of activities per category in the Danube lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

548 The *Klimarat* goal is to build a healthy climate until 2040, <https://klimarat.org/>

Geographical scope: many of the initiatives identified in the Danube basin cover a wide geographical scope (Figure 158 below). This is linked to the engaging nature of some of the projects (competitions, Danube Day, school projects) that can be offered across different countries. One interview partner indicated a move towards more online activities since the COVID-19 pandemic, which provides an opportunity to widen the scope.

Many initiatives are more local (e.g. Romanian Water Clean-up Robot, Danube Bank Budapest, Austrian Danube Training for National Park rangers).

Financing source: the initiatives and projects on water literacy are based on various, mainly public funding sources (Figure 158). The EU programmes LIFE, LIFE+ and Interreg support some of the programmes with a fixed budget that is usually complemented with budgets of the respective organisations running the project. Other funding sources are the Dam Removal Europe Initiative⁵⁴⁹ and the endangered landscapes programme⁵⁵⁰, where the planners of a project apply for partial funding or grants that secure several months/years of funding. These types of combined funding schemes are useful to accumulate enough funding for a project to be rolled out, but require more resources to apply, accommodate and maintain oversight of the funding mix.

Some of the projects are supported by funds that are not project-specific but, rather, support the organisations organising the projects and it is hard to distinguish which project budget finances which project (e.g. Danube Innovation Lab+, Croatian Water Museum, Danube Water Programme). This means that projects rely on their general funding pool or need to make additional efforts to top-up the funding from their pool with some external funding sources.

For projects whose focus is technical and restoration work, the component on communication is often used to show the progress and outreach capacity of the projects and the organisers dedicate some resources to this specifically.

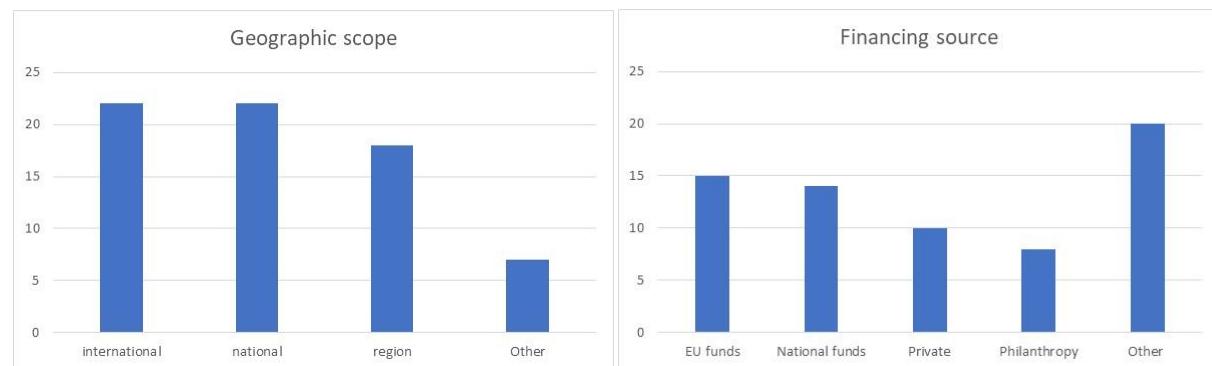


Figure 158 Geographical scope and financing sources of activities in the Danube lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Organisers of activities (type of organisations): most of the organisers (main organisers) of the initiatives are NGOs, but some are intergovernmental organisations or universities. Very few are businesses. Most of the projects are run by one organisation and implemented with partners or cooperating organisations.

⁵⁴⁹ The Dam Removal Europe Initiative aims to support the removal of dams and other obsolete barriers across Europe, together with partners, with the goal to restore rivers in Europe to their natural and cultural value (<https://damremoval.eu/>).

⁵⁵⁰ The Endangered Landscapes Programme funds the restoration of rivers, floodplains and natural landscapes in Europe (<https://www.endangeredlandscapes.org/>).

Type of organisation	No of relevant activities
University/research	2
NGO	15
Government	2
Intergovernmental	4
Museum	1
National park	2
Project	2
Company	3
Individual	1

Table 79 Organisers of activities in the Danube lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Target groups: these vary strongly, ranging from art projects for primary schools to technical training for staff of water utilities (Figure 159). Some of the projects have a main target group (e.g. staff of water suppliers), and additionally reach a wider audience (target group 2) through different communication activities.

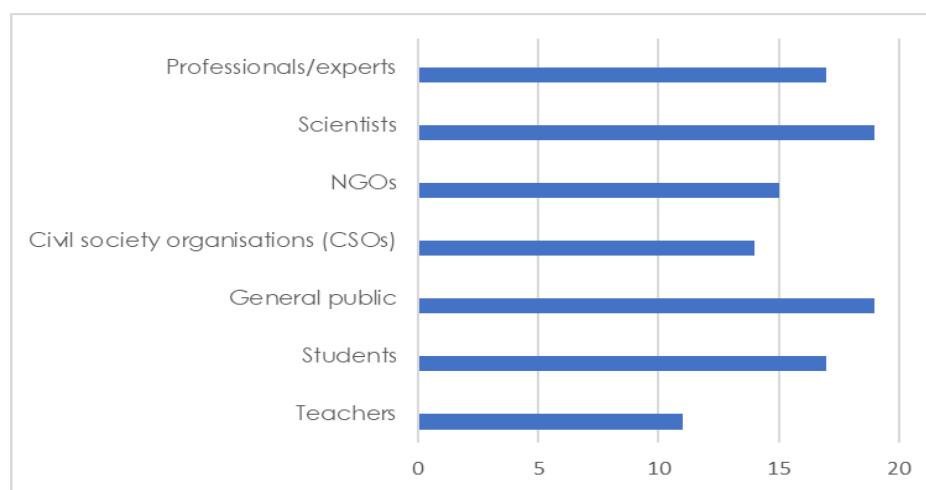


Figure 159 Number of projects for target groups in Danube projects on water literacy

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

Means and tools for citizen engagement

The means of engagement in the Danube basin span from the production of booklets to the delivery of training that run for multiple days (Figure 160). The most common tools of engagement are:

- Events, workshops and webinars;
- Social media activity or media campaigns, where the projects report for or actively engages an audience;
- Resource libraries (e.g. a website with resources, reading material for educational settings or exhibitions created by participants of a project for a wider audience).

Some of the projects go beyond the categories provided in the database, such as clean-up activities, encouragement for better waste management, and social experiences such as a swimming club ('discover the Danube as a public space', Schwimmverein Donaukanal⁵⁵¹), or a summer school with anthropological mapping of a city by the Danube ('The city and the river', Spolka⁵⁵²). These projects actively engage citizens and also reach those citizens that are less likely to join water literacy projects, due to limited resources or interest. Their wider and different audience is valuable, even if they are not strictly tied to the Mission targets and have more of a social focus.

⁵⁵¹ Schwimmverein Donaukanal, 2022, <https://schwimmvereindonaukanal.org/>

⁵⁵² Spolka, 2022, <https://spolka.cc/en/nevernever19>

Some project formats have an enabling function for participants, rather than engaging them through specific means. By providing direct funding for the participants' project ideas, participants have an enhanced sense of agency and ownership in implementing their respective projects under the umbrella of the enabling organisation (e.g. Danube Innovation Lab+). In this case, it is up to the participants to decide on the means of expression or engagement (and topic).

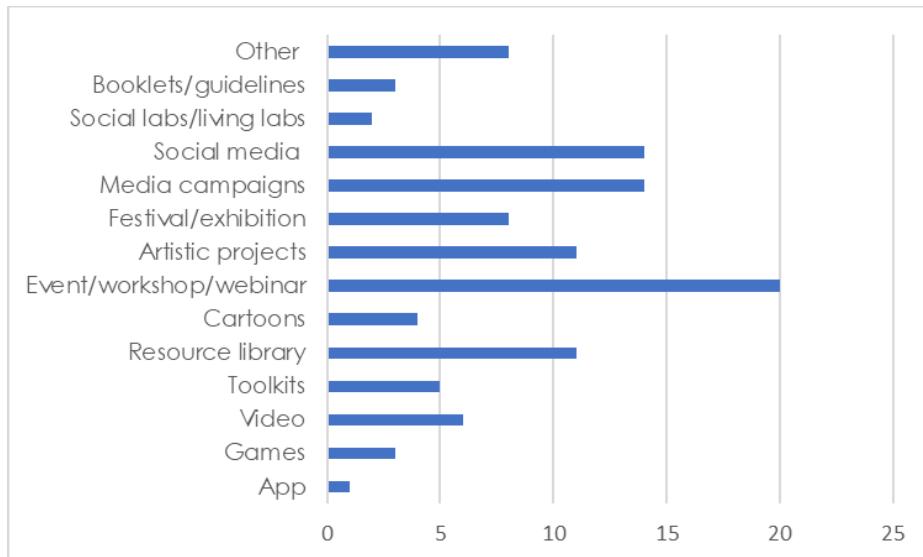


Figure 160 Tools and means of engagement for activities in the Danube lighthouse

Source: Information from Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

The following section describes the main citizen engagement and ocean and water literacy activities that were mapped as relevant to the Mission objectives for the Danube lighthouse. For further details, see Deliverable 8 database of citizen engagement and literacy activities in the Atlantic/Arctic, Mediterranean and Danube lighthouses.

6.2.2. Literacy initiatives and networks

International scope

Water Innovation Lab Danube +

<http://ddni.ro/wps/international-projects/>

Waterlution's Water Innovation Labs (WILs) are annual leadership skill development programmes for people aged between 18-35. They aim to scale-up solutions that are developed in experimental/pilot phase and have the potential to be innovative when applied. The funding comes from three organisations: Waterlution International, Our Future First, and the Media Education Centre, all of which collaborate on WIL implementation. The first time the Danube Innovation Lab+ was run, all costs were covered by the organisers in order to make it accessible for all participants and to ensure a successful pilot that could be the basis for future funders. No participation fee applied to the three-day workshop.

Rewilding Danube Delta

<https://rewilding-danube-delta.com/>

Rewilding Danube Delta plans and implements different activities in the Danube Delta (Romania, Moldova, Ukraine), including engagement and river literacy, as well as active restoration work. The technical work and educational activities take place throughout the year, mainly in Ukraine and Romania, with a funding mix from LIFE, the Arcadia Fund, Endangered Landscapes Programme and Dam Removal Europe. The project continued in the first half of 2022, despite the war in Ukraine, albeit with fewer activities.

European ocean literacy coalition (EU4Ocean)

<https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1482>

<https://ec.europa.eu/ocean-literacy/youth4ocean>

EU4Ocean was set up by the European Commission to bring together all European groups and organisations active in ocean sustainability and ocean literacy. The coalition combines EU-wide activities with actions dedicated to the Arctic Ocean, the Atlantic Ocean (including the North Sea), the Baltic Sea, the Black Sea, the Mediterranean Sea and the global ocean. EU4Ocean consists of three major communities: a members' platform of professional organisations, the Youth4Ocean forum, and a Network of European Blue Schools. Members of the EU4Ocean Platform exchange expertise, knowledge and best practices in ocean literacy, leading to synergies and new collective initiatives that can reach broader audiences and generate larger impact. The Youth4Ocean forum provides young changemakers with opportunities to speak up for their generation, share their ideas and interests, present projects related to marine issues, and connect and network with like-minded young people and experts all over Europe on marine topics. It targets young people aged 16-30. (See section 5.2 2 for a description of the Network of European Blue Schools). Sources of financing are EU funds (EMFAF).

National scope

Assemblies of Solidarity (Romania)

<https://citizenstakeover.eu/blog/citizens-gather-romania-environmental/>

This small-scale activity aims to bring together local people from different age groups and perspectives to discuss their vision of the environment, energy and poverty in Constanta, Romania. Organised by the Rewilding Europe team, in cooperation with local partners ([Eco Dobrogea](#) and [2 Celsius](#)), and funded by Citizens Takeover Europe, it took place once in 2021.

6.2.3. Training and education (including courses, school curricula)

International scope

EU4Ocean - Network of European Blue Schools

<https://ec.europa.eu/ocean-literacy/blue-schools>

The Network of European Blue Schools is one of the communities of the EU4Ocean coalition that connects diverse organisations, projects and people on ocean literacy and the sustainable management of the ocean (see section 5.2). The Network of Blue Schools aims to inspire teachers, school directors and staff of education services to challenge their students (ranging from kindergarten, primary, lower and upper secondary, as well as technical or vocational schools) to develop a 'Find the blue' project that links them to the ocean. To become a blue school, schools need to identify an ocean-based topic that is relevant to their students and collaborate with their pupils to create a school project. A handbook is available to assist teachers and students to develop their project⁵⁵³. The aim is to make the ocean a relevant part of the school curriculum through project-based learning. By successfully completing the project and sharing their results, schools receive the European Blue School certification and become part of the Network. Interested schools can apply through a biannual application cycle. As part of the wider EU4Ocean coalition, the Network is financed through European funds (EMFAF). European Blue Schools in the Danube basin are presented in the European Atlas of the Seas (two in Austria, two in Serbia, 18 in Romania, nine in Turkey, with a specific focus on Black Sea)⁵⁵⁴.

Danube AgriFood Master's Joint Degree

<https://boku.ac.at/international/themen/boku-students-going-international/englische-internationale-masterprogramme/erasmus-mundus/danube-agrifood-master>, <http://agrifoodmaster.eu/index.html>

This Master's Programme (in English) allows students to study across three areas - Sustainability in Agriculture, Food Production, and Food Technology. Each year, the programme admits students with a suitable Bachelor's degree. The main objective of the Master's is to train students to manage and integrate

⁵⁵³ https://webgate.ec.europa.eu/maritimeforum/sites/default/files/handbook_eueopean_blue_schools_220221.pdf

⁵⁵⁴ <https://webgate.ec.europa.eu/maritimeforum/en/node/5916>

different fields of work connected to the Danube. The field visits help to shape students' knowledge and can lead to collaboration on projects or employment matches on completion of the study. The course is offered by four technical universities in Austria, Slovakia, Czechia and Hungary, and is financed by the Erasmus 2027 Fund and enrolment fees.

4 Elements 4 Kids

<https://keep.eu/projects/25966/4-Elements-4-Kids-from-cros-EN/>

Organised by the NGO *Dječji vrtić Cvrčak Virovitica*, children in pre-school are taught about different water-related thematic areas. The activity is implemented in Croatia and Hungary. The activity also features training for teachers, with several new joint teaching materials developed for use in all participating schools. It is financed by the ERDF.

Danube Art Master

<https://www.gwp.org/en/GWP-CEE/WE-ACT/Projects/Danube-Art-Master/danube-art-master-2021/>

This project encourages school students to carry out art projects showing what the Danube means to them. It takes place once each year, across different art disciplines, and children/teens can participate individually or in teams. This project is financed by a budget from the ICPDR for GWP CEE that is offered through a service contract.

National scope

Marine Education Centre Croatia

<https://www.timeout.com/croatia/museums/marine-education-centre>

The Centre promotes conservation issues throughout the Croatian Adriatic. Although it pays particular attention to the bottlenose dolphin colony off the Lošinj coast, it also touches on the Danube. It is financed and run by the Blue World/*Plavi Svijet* Institute and is open to the public for limited periods.

Ranger Training Course (Austria)

<https://www.donauauen.at/aktuelles/news/botschafter-der-natur-rangerlehrgang-abgeschlossen>

Organised by a National Park in Austria (*Nationalpark Donau-Auen und Nationalpark Neusiedler See – Seewinkel*), this is a two-year, 42-66-day programme to gain certification as a nature ranger and teacher. The certification scheme starts once each year and is funded by the National Park and participation fees. Graduates of the programme can work in the National Park, which is the geographical focus of this initiative.

The city and the river- Never Never School (Slovakia)

<https://spolka.cc/en/nevernever19>

This is a summer school for anthropologists, social scientists and designers, where they discover the perception and occupation of space, and create visions for the river and city, or climate change in the city. Organised by the NGO Spolka, it takes place once each year in Slovakia. The format and interaction with the Danube depend on the participants. The financing of the project is not specified.

6.2.4. Citizen science

National scope

Sustainable use of biological resources: citizen science and invasive alien species in the Danube Region (Bulgaria)

http://esenias.org/index.php?option=com_content&view=article&id=563:alien-csi-5&catid=91:alien-csi-bulgaria-news&Itemid=88

This so-called 'green academy' is organised by the East and South European Network for Invasive Alien Species. It consists of academy-style workshops for initial exchanges on opportunities to involve citizens in spotting alien species in the Danube. The target audience is university students. Additionally, other stakeholders are involved by the University of Forestry through public lectures and an online newsletter. The funding sources are not specified.

6.2.5. Other activities targeting citizens (e.g. volunteer networks, artistic initiatives, public festivals)

International scope

Danube Day

<http://www.danubeday.org/>

Danube Day is on 29 June 29 and consists of a celebration of the Danube through different activities across the 14 Danube countries (water quality experiments with primary school children, theatre plays, distribution of material and merchandise). These activities are coordinated by the ICPDR with various governmental, intergovernmental, educational and municipal partners. The project activities and content vary depending on the implementing organization. It is funded through a mix of Interreg and national funds.

Living Danube, including living Danube Tour

<https://www.wwfcee.org/news/celebrating-danube-day-2021-the-living-danube-partnership-has-brought-wetlands-back-to-life>

This initiative is implemented by the WWF and financially supported by the Coca-Cola Foundation. The focus is on restoration measure for the Danube, which are reported through narrated online videos and engagement activities for citizens to see and understand the changes that restoration measures can bring for ecosystems. Various activities (wetland, forest, swamp restoration) were implemented in the past, along with a broad focus on communication materials.

Drinkable Rivers Danube

<https://www.scishops.eu/measuring-the-quality-of-the-danube-bay-zoltan-science-shop-joins-the-drinkable-rivers-initiative/>

The Bay Zoltán Science Shop aims is to bring research closer to the community by involving citizens in scientific activities. This Science Shop joined 'Drinkable Rivers Danube' (an initiative and foundation from the Netherlands). This is an awareness-raising campaign and tool where citizens and organizations can approach the Science Shop and help with measurements. Citizens, especially school pupils, typically help to measure water quality. The activity is financed through the budget of the Drinkable Rivers Danube foundation.

Clean Rivers Operation - joint action for the elimination of illegal waste deposits in five cross-border rivers of Hungary and Romania

http://www.huro-cbc.eu/en/project_info/870

This project ran from 2011-2012 and is now complete. Past activities helped municipalities to develop and implement waste management action plans. It was organised by Ecocaritas (*Nemzetközi Karitatív Környezetvédelmi Közhasznú*) Egyesület to implement clean-up actions at municipal level and secured ERDF support (HURO/0802): EUR 715 541.90. No follow-up project has yet taken place.

Connect2BlackSea

<http://connect2blacksea.org/outreach/>

The group of Black Sea Young Ambassadors features a communication toolkit and a one-stop-shop format, as well as different resources. The financing source is not specified.

Rivers of Europe (RIVE) (2014 tour)

<http://www.riversofeurope.org/>

This artistic, civic and educational initiative was a 'floating venue' ship that travelled across Europe to teach and raise awareness about rivers, mainly through art and performance. The Danube was the focus of the activity, as well as the travel path (ship travels along the Danube). It was organized by Pro Progressione and supported through the EU Cultural Programme, Visegrad Fund and City of Warsaw. It took place in the summer of 2014.

Clean Danube

<https://www.cleandanube.org/>

This is a swimming challenge organised by former swimming champion, Andreas Fath, who swims the length of the Danube to raise awareness of pollution. It is a two-month long initiative, where he swims along the Danube, alone or with others, with accompanying activities at the different stops. The activity is supported by the *Baden-Württemberg Stiftung* and *der Deutsche Postcode Lotterie*.

Sturgeons in the Danube Basin

<https://www.icpdr.org/main/activities-projects/sturgeons-danube-basin>

This programme protects the sturgeon as a flagship species. It includes educational activities organised by the Danube Sturgeon Task Force, a network of national and international public entities, NGOs and academic institutions, of which ICPDR is a member. The project has various target groups and features a range of activities for all Danube countries. It is implemented through specific projects, each funded from the relevant sources for those individual projects.

National scope

Accessible Danube shore, leisure areas and programmes for the city's river banks (Hungary)

<http://valyo.hu/?fbclid=IwAR332D96sfenFbLc2eDGlhjgLZ2sAYBVFRkeFoHhmGIVickpSCBBTVDO1hQ>

This initiative aims to encourage public space along the Danube banks in urban areas, mainly in Budapest, by building pop-up spaces and encouraging citizens to use the shoreline to explore the Danube. The small projects within the project are run by the Hungarian NGO Valyo and the funding is not specified.

Donaukanal Schwimmverein (Austria)

<https://schwimmvereindonaukanal.org/>

This swimming club invites people to swim in the Danube channel to reclaim public space in the Danube channels of Vienna. Additional activities, such as small food meet-ups or water talks (e.g. on Danube water quality) are scheduled around the swimming sessions. It is implemented by students of the Master's Degree in Social Design in Vienna, supported by KUNST HAUS Wien – Museum Hundertwasser, KanalWAL TU Wien, Kollektiv Kaorle/Alsergarten, SPURSE, Flourish LAB and Block Ecology, KEX/WUK. It has a small budget from the Social Design Studio of *Universität für angewandte Kunst Wien*.

Administration of the Danube Delta Biosphere Reserve (Romania)

<https://deims.org/cdf8ba96-4a30-4eb7-96cc-1c81e8320989>

<https://www.icr.ro/pagini/the-danube-delta-biosphere-reserve-ddbr>

The Administration of the Danube Delta Biosphere Reserve (DDBR) manages different areas. The total surface area of 5 800 km² is divided into strictly protected areas (506 km²), buffer zones (2 233 km²) and economic areas (3 061 km²) and includes a 150 km² area of ecological reconstruction. Romanian Law no. 454/2001 established the entire surface area of the Delta is an official biosphere reserve. The project and institute are funded by EU and national funding. It has different outreach and engagement activities for the Romanian part of the Danube but does not yet cooperate with other countries.

Improving Quality Management of Cross-Border Rivers: Criş (Körös), Mures (Maros) and Tisa (Tisza) (Hungary, Romania)

<https://keep.eu/projects/22638/Improving-Quality-Management-EN/>

The aim of the project is to develop the operation of six wastewater treatment plants in three river sections: Cris, Mures and Tisa (two plants on each river), while raising awareness about the natural sites and ecosystems. It is implemented by *Compania de Apa Arad*. This is a six-year project in Hungary and Romania, with different stages (2018-2023). It is supported by EU and national funds.

National Parks *Thayatal und Podyjí*

[Správa národního parku Podyjí \(nppodyji.cz\) Nationalpark Thayatal/Tal der Vielfalt \(np-thayatal.at\)](http://Správa národního parku Podyjí (nppodyji.cz) Nationalpark Thayatal/Tal der Vielfalt (np-thayatal.at))

The National Parks *Thayatal und Podyjí* provide an important space for nature to unfold as it is. The technical project scope is the restoration of bogs and swamps, as well as rewilding corridors and supporting biodiversity through different measures. Several activities target park visitors and the general public (website, information centre, reports).

Save the Blue Heart of Europe

<https://www.balkanrivers.net/en>

The Save the Blue Heart of Europe campaign uses the voices of citizens and celebrities across the Balkan peninsula to raise awareness of one of the only areas in Europe where river systems are not modified, in order to protect them from potential hydropower dam construction. The campaign was set up after a hydromorphological assessment, using videos, social media posts and a presence at EU-wide events on river protection, such as the European Rivers Summit.

6.2.6. Activities bringing businesses and citizens together

International scope

Danube Participation Day

<https://capacitycooperation.danube-region.eu/participation-day/danube-participation-day/#:~:text=The%20Danube%20Participation%20Day%20is,%E2%80%9CInstitutional%20Capacity%20and%20Cooperation%E2%80%9D>

Danube Participation Day is an annual conference on digitalisation and participation for the Danube area. It is organised by the Danube Civil Society Forum (DCSF) and Foster Europe and is directed at professionals. The content is not closely tied to the objectives of the Mission, but the conference theme changes every year. The conference is funded by the DCSF, the Baden-Württemberg Foundation, and Priority Area 10 'Institutional Capacity and Cooperation'.

Danube Civil Society Forum (DCSF)

<https://dcsf.danubestrategy.eu/>

The DCSF is the platform for civil society dialogue and networking in the Danube basin under the EU Strategy for the Danube Region (EUSDR). While the DCSF acted in close cooperation and in consensus with the responsible EU institutions, it is a self-organised and independent NGO structure. Founded in 2011, the DCSF is foreseen in the fourth pillar of the Action Plan of the EU Commission for the EU Strategy for the Danube Region, 'Strengthening the Danube Region', as the platform for civil society cooperation, opinion and capacity-building, as well as networking in the Danube Region.

Joint Danube Survey (JDS)

<http://www.danubesurvey.org/jds4/>

The key purpose of the JDS is to produce information on elements of water quality for the length of the Danube River and to raise awareness of the quality of the Danube waters and ongoing protection and restoration efforts. Participants and the wider public learn about the Danube from completing the survey. This project happens every six years for all Danube countries. It is organised by the ICPDR, with the help of national ministries/agencies and the private sector. The last survey was conducted in 2019 and the next one is due to take place in 2025.

DAREnet: A Practitioner Network to Strengthen Flood Resilience in the Danube Region

darenetwork.eu

This project is a network to strengthen flood resilience in the Danube Region: It is a five-year coordination and support action, funded by the European Commission, for the coordination of practitioners of flood management in the Danube Region (2019-2022).

Danube Water Programme

iawd.at

The project targets staff of water utilities (wastewater treatment and drinking water facilities) through courses and implementation of measures, mainly in the water utilities area. It is complemented by the International Association of Water Service Companies in the Danube RiverCatchment Area (IAWD)’s Danube Learning Partnership and the IAWD Voice of the Danube. It is funded by the World Bank, IAWD funding from the World Bank and Member States’ participation fees.

Danube Business Talks

<https://www.danubebusinesstalks.org/>

An international sector event and business platform on navigation, business and innovation in the Danube area. The 2022 motto is ‘Green Deal – Green Danube’. The business platform happens once each year, organised by viadonau. It is financed through participant contributions and - possibly - national funds (not specified).

6.3. In-depth exploration of selected initiatives

Five projects were selected for in-depth analysis through interviews.

- 1) **Water Innovation Lab Danube+** seems to be well run and is very relevant for Mission targets. It is an interesting mix of an international organisations’ professional programme with local implementation. There is potential to run the programme more frequently.
- 2) **Rewilding Danube Delta** is an established project that is well-embedded in overall regional culture. It contains a broad range of activities and is an interesting mix of technical and ecosystem-oriented rewilding and personal stories on why nature matters in the Danube Delta. The activity involves integration of rewilding with local businesses and culture in the region.
- 3) **Danube Art Master** engages pupils’ attention in a familiar setting and invites them to consider the topic of Danube and river protection more generally. The project is easily implemented and could engage pupils with the work of their peers in other countries.

- 4) **Danube Water Programme** for utilities staff targets learning from one another through courses and implementation of measures, mainly in the water utilities area. It is complemented by the IAWD Danube Learning Partnership and the IAWD Voice of the Danube.
- 5) **Joint Danube Survey (JDS)** is a monitoring survey that assesses the water quality and other habitat-relevant parameters in the Danube every six years. Scientists undertake a hydromorphological, biological and chemical assessment and the results are disseminated to different target audiences.

Fact Sheet 1: Water Innovation Lab Danube+

1. Name of activity
<u>Water Innovation Lab+</u> https://waterlution.org/wil-danube/
2. Introduction and context
a) <u>Short general description to introduce the activity</u> Waterlution's Water Innovation Labs (WILs) are leadership skill development programmes for people aged between 18-35 that aim to scale-up solutions developed in experimental/pilot phases and have the potential to be innovative in practice. b) <u>Location/geographical scope</u> Austria, Bulgaria, Bosnia and Herzegovina, Croatia, Czechia, Germany, Hungary, Montenegro, Serbia, Slovakia, Slovenia, Romania. Current focus is: Bosnia, Serbia and Croatia. c) <u>Activity category</u> Literacy, social innovation. d) <u>Frequency of activity</u> Once per year. It was first run in 2021 (remotely) and is now planned to be expanded to a one-year mentorship programme, potentially starting in 2022.
3. Focus/topic of activity
Integrating social innovation and business aspects with freshwater learning and information on the water cycle. This programme has an enabling function, with students' deciding the scope and content of the projects created in their WIL.
4. Main objectives of the activity
<ul style="list-style-type: none">– Bring young people together, understand the challenges, share knowledge with one another, and articulate the kinds of projects that can be developed collectively;– Potential expansion of the programme to a one-year mentorship programme to create longer-lasting change.
5. Key actors leading the activity
<u>Organiser(s)/coordinator</u> Main coordinator: Our Future First (mediation and design engagement consultancy). <u>Supporting partners</u> Media Education Centre (also runs 'Danube for Peace' and other initiatives). Waterlution (this organisation developed the model originally in Canada) but now coordinates projects in different countries. The roles are not separated clearly, with organisers working together to accommodate the region's needs.
6. Target groups
University students or recent graduates (18-35-year-olds). Although mainly young people from the Danube region, others from outside are also welcomed to apply.

7. Specific tools/means used
The tools comprise different methods to empower young people to create and implement a vision for a broad range of environmental projects in the Danube Region.
8. Implementation successes and challenges
<p>What is working well:</p> <p>The in-person format was very high impact and Our Future First will continue this type of (financial) personal empowerment.</p> <p>What is not working so well:</p> <p>Participants feel inspired and develop many ideas during the innovation lab, but that inspiration fades when they go back to their countries, where there is less direct contact to discuss implementation options and progress.</p>
9. Financing source
No participation fee for the three-day workshop. Instead, all costs were paid by the three organisations in order to engage participants in a full pilot to demonstrate viability to future funders.
10. Impact of activity
<p><i>Quantitative:</i> no. of participants reached - 45; no. of events/campaigns - 8;</p> <p><i>Qualitative:</i> Measuring the amount of partnerships and events and activities, the amount of people that are reached.</p>
11. Future plans
<ul style="list-style-type: none"> - The project has taken place once so far but the organisers hope that it can be developed every year, preferably with community mentors from the region (decentralised approach), potentially with the water youth network. In order to ensure that students obtain a more holistic understanding of the environment, the organisation has targeted alignment with the EU Water Framework Directive (WFD) and the priorities of the high-level political forum and other important decisions/discussions. - Establishment of new project: expand to a one-year programme, starting in June 2022, pending funding. The idea is to bring together young people in person to engage in field work and understand needs. They would then return to their home countries for a month and have an incubation phase to work together in cross-ethnic groups to solve some of the issues. Then there would be a one-year phase of membership during which projects are implemented and capacity built further into communities.
12. Networking
<ul style="list-style-type: none"> - The project developed various relationships with universities, professors and staff to engage their students to work with some of the UNDP bodies; - The Media Education Centre has a robust network in Serbia and the Danube Region, with another partner organization in Novi Sad that carries out agricultural stakeholder research; <p>A basis in the community is very important, as are community leaders to adopt the projects. People in the region ideally take charge themselves.</p>
13. Conclusions and lessons
<ul style="list-style-type: none"> - The financial leadership potential was helpful for engaging participants and keeping people active. This was also found in the Balkan youth environmental assembly (partially funded through UNTCY, the major group for children and youth). It consisted of a very small grant, shared among the core organisers (selection based on participants of previous workshops). The inputs of participants with respect to a green new deal for the Balkans were very well articulated;

- It was very difficult to engage rural youth. The organisation would like to focus on this demographic through better online engagement tools and lowering barriers (e.g. students would drop out last minute because they are too shy to speak in English during the workshop);

It is very important to build space for the future and have a longer timeframe, e.g. three horizons method and vision practice.

14. Contact information

Available at:

<https://waterlution.org/wil-danube/>

Factsheet 2: Rewilding Danube Delta

1. Name of activity
Rewilding Danube Delta https://rewilding-danube-delta.com/
2. Introduction and context
a) <u>Short general description to introduce the activity</u> Rewilding Danube Delta aims to restore and rewild the lower Danube area. The approach is process-based, rather than target restoration. It looks at restoring the fundamental processes of nature, such as flooding, migration of animals, existence of keystone species, so that they create the habitats for the rest of the wilderness (trophic chains in the delta, landscapes for deer, while also using proxies, such as farrow, cattle or water buffalo to replace the species that are going extinct. b) <u>Location/geographical scope</u> Lower Danube Area: Moldova, Romania, Ukraine. c) <u>Activity category</u> Water literacy. d) <u>Frequency of activity</u> Ongoing, constant support and maintenance of existing projects.
3. Focus/topic of activity
The project focus is on rewilding the lower Danube area to restore ecosystems, especially wetlands, to accommodate species. While this project focuses on rewilding, it also actively engages its audience with river restoration and rewilding, including through its Twitter account (https://twitter.com/rewildingdd?lang=de). The main activity related to water literacy is the development of a landscape business plan, which links knowledge on restoring the lower Danube to the potential benefits for businesses. The organisation looks at the current economic landscape to identify the current state and gaps. It looks at how best to support and replicate projects that work well. One way to do this is through EU loans, and the organisation therefore gave a loan to the Romanian (but not Ukrainian) partners. A report is due to be published soon, but has been delayed by the war in Ukraine. According to the main organiser, the business plan is part of investigations and support for nature-based economies, which provide (or can provide) benefits for the wider economy.
4. Main objectives of the activity
The organisers refer to themselves as a long-term initiative rather than a project. The main objectives are: <ul style="list-style-type: none">– Recovery of aquatic and terrestrial ecosystems and habitats, particularly through flooding and connectivity aspects;– Restoring key stone species;– Building up economies that are dependent on nature to provide wider benefits for communities and societies. There are a number of mechanisms in place, such as establishing joint companies, providing business plans.
5. Key actors leading the activity
<u>Organiser(s)/coordinator</u> Rewilding Danube Team (as Part of Rewilding Europe work, selected as one of the flagship projects of the UN Ecosystem restoration decade).

Supporting partners

The Rewilding Danube Delta team has limited partnerships with different local businesses, depending on the location. Rewilding is done through joint ventures, with financial contributions to the rewilding projects.

The Rewilding Danube Delta team works closely with WWF Romania on shared projects and wetland restoration.

6. Target groups

Category of key target group: professionals/ experts.

Target group is clearly defined as water suppliers and wastewater treatment utilities.

7. Specific tools/means used

1. Analytical advisory;
2. Capacity-building;
3. Benchmarking;
4. Knowledge sharing.

The Danube learning partnership was established as a separate project by the IAWD. It was initially funded from the Danube water programme and continued after the completion of the Danube water programme.

8. Implementation successes and challenges

To what extent is the activity achieving its objectives?

The activities achieve their objectives well. The main value lies in the network they built to work towards rewilding and creating a more natural area.

What works well:

- A strong link has been established with local communities and businesses in some areas.
- Many of the rewilding efforts have led to re-naturalisation of the area.

What does not work so well:

The differences between countries is challenging: Ukraine does not have CAP subsidies, which provides a lot more opportunities, including concessions. Essentially, farmers are not afraid to lose their CAP subsidy when they rewild their area. In these areas it is possible to observe and monitor how nature heals itself and species return. That additional interest means more tourism development and more income.

9. Financing source

- The challenge is to absorb the budget and deliver in practice;
- Private funding is not very active in eastern Europe. There is some interest from companies, but generally Rewilding Danube relies very much on public funds;
- As of 2022, Ukraine is eligible for LIFE funding;
- Being part of Rewilding Europe has the potential to access funding opportunities, including private funding;
- Wildlife funding, European Dam Removal programme, Endangered Landscapes programme – there is a number of instruments that they can use.

10. Impact of activity

Monitoring: The monitoring is done by researchers in the field and consultants, with some research grants given for this. One project with the University of Cambridge has just been completed.

Restoring degraded agricultural arable land and allowing it to be natural grasslands encourages quantifiable carbon storage, as well as so-called 'biodiversity uplifting'. This must then be linked to nature-based solutions. COVID-19 provided an opportunity to explore and recognise the benefits of rewilding.

11. Future plans
Rewilding Danube Delta is looking for other wetland restoration projects in the Danube Delta. These projects are usually bigger and longer term, with restoration and media campaigns planned from the early stages.
12. Networking
No information.
13. Conclusions and lessons
<p>Lesson 1: Rewilding instead of restoration</p> <ul style="list-style-type: none"> – Working in very different contexts and very different economic and political landscapes, e.g. on the Ukrainian side; – Restoration previously drew the question of ‘What do you want to achieve?’ because it was considered vague. By contrast, ‘rewilding’ is more positive and engaging. It is future-focused rather than looking to the past; – Wilderness is economically important to communities and this needs to be communicated clearly. <p>Lesson 2: Mind difference between EU countries and non- EU countries</p> <p>Ukraine does not have CAP subsidies, which creates more opportunities, including concessions. Essentially, farmers are not afraid to lose their CAP subsidy when they rewild their area. In these areas, it is possible to observe and monitor nature healing and species returning, which has an impact on tourism interest and community incomes.</p> <p>Rewilding and restoration is a good way to capture carbon and get biodiversity credits</p>
14. Contact information
https://rewilding-danube-delta.com/who-we-are/

Factsheet 3: Danube Art Master

1. Name of activity
Danube Art Master
https://www.gwp.org/en/GWP-CEE/WE-ACT/Projects/Danube-Art-Master/danube-art-master-2021/
2. Introduction and context
a) <u>Short general description to introduce the activity</u> This project encourages school students to do art projects that show what the Danube means to them. It is a competition for the students at national and international level.
b) <u>Location/geographical scope</u> Submissions from the entire Danube Basin (in and across 14 countries: Germany, Austria, Czechia, Slovakia, Hungary, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Romania, Bulgaria, Moldova and Ukraine).
c) <u>Activity category</u> Education, school projects.
d) <u>Frequency of activity</u> Implemented once per year since 2011.
3. Focus/topic of activity
This project is an annual art competition for children and teenagers (<18) to develop and submit an art project individually or in groups. Each year has a different topic, inspiring and enabling young people to engage with the Danube by creating their own art or mapping project. The competition takes place at national and international level. The former is carried out in each country by the coordinating country organisations. The jury consists of different members selected by the ICPDR. While the theme of each year (this year and previously: Discover Danube) suggests a direction, the pupils decide what they want to depict.
4. Main objectives of the activity
Engage children and young people with the Danube in order to appreciate the river and understand the challenges it faces.
5. Key actors leading the activity
<u>Organiser(s)/coordinator</u> The Global Water Partnership, CEE, is contracted by the ICPDR to implement this project every year since 2011. The GWP CEE is responsible for planning and implementing the project (announcements, distributing budget (also to country organisations) and reporting, processing entries).
<u>Supporting partners</u> The country organisations are 14 partner organisations (one per country), which are responsible for promoting the competition and collecting submissions. These can be GWP partners or schools. They usually remain the same from year to year, but if one organisation no longer wants to be involved, a new organisation is found. The ICPDR functions as an umbrella organisation and has a contract with GWP CEE for the project each year.
6. Target groups
Children and teenagers: each year, submissions can be handed in (and are judged) for two age groups: Juniors: age 6-11 and Teens: age 12-18. The competition is for children from all schools, NGOs, clubs, day care centres or associations for children in the Danube Basin. Wider public: the project engages a wider target group by inviting the public to vote on submissions on different social media channels.

7. Specific tools/means used
Artistic projects, festival/ exhibition.
8. Implementation successes and challenges
The activity achieves its objective by engaging hundreds of pupils every year to think about what the Danube means to them and expressing it artistically.
What is working well:
<ul style="list-style-type: none"> – The project continued during the COVID-19 pandemic; – There is a lot of recognition for the project and it is frequently used as an example of good involvement of young people;
What is not working so well:
<ul style="list-style-type: none"> – As with most projects of such scale, timely responses from national focal points tend to be an issue. It is being mitigated by tight supervision and open communication;
9. Financing source
This project is financed by a budget from the ICPDR for GWP CEE that is offered through a service contract. Spending is reported to the ICPDR.
A financial and narrative report is put together every year for the ICPDR (not public), but also for the ICPDR to show project activities to the donors and funders of the ICPDR
10. Impact of activity
There are no means to conduct an in-depth impact assessment or monitor activities. However, every year a financial report and a narrative report is submitted to the ICPDR to show what has been done in the Danube Art Master Project that year.
<i>Quantitative:</i> the project received over 600 submissions in 2021, reduced slightly from other years (likely due to COVID-19).
<i>Qualitative:</i> the activity is welcomed by teachers and students and students involved in the Danube Art Master may go on to join other GWP CEE activities.
11. Future plans
<ul style="list-style-type: none"> – The project is planned to be continued in the coming years. – There may be edits to the themes and categories (e.g. mapping was added as a category two years ago) but the general format will remain the same.
12. Networking
<ul style="list-style-type: none"> – There are no plans to expand the project or involve more organisations. – If a national partner (national organisation) does not want to continue, they are replaced by a new organisation.
13. Conclusions and lessons
<ul style="list-style-type: none"> – There is a need for quite strict management and supervision of country organisations (deadlines, etc.) to make the project run smoothly; – Need to streamline the entire process.
14. Contact information
<p>Available at: https://www.gwp.org/en/GWP-CEE/WE-ACT/Projects/Danube-Art-Master/danube-art-master-2021/</p>

Factsheet 4: Danube Water Programme

1. Name of activity
Danube Water Programme https://www.danube-water-program.org/pages/about.php
2. Introduction and context
<p>a) <u>Short general description to introduce the activity</u></p> <p>The Danube Water Programme targets strong utilities, smart policies and sustainable services in a sector serving 80 million customers in the Danube region.</p> <p>b) <u>Location/geographical scope</u></p> <p>All Danube Basin countries, including some neighbouring countries.</p> <p><u>Activity category</u></p> <p>Water literacy.</p> <p>Education (courses), training, networking.</p> <p>c) <u>Frequency of activity</u></p> <p>Ongoing, constant support and maintenance of existing projects.</p>
3. Focus/topic of activity
Project initially planned (phase 1 focus) to offer training and qualifications to water suppliers and wastewater treatment utilities. The Danube states (participating countries) include Albania (not included in ICPDR Danube River Basin).
4. Main objectives of the activity
Enable the countries' municipalities and utilities to build and maintain know-how to advance, manage and cooperate on their respective water sectors.
5. Key actors leading the activity
<p><u>Organiser(s)/coordinator</u></p> <p>Cooperation between World Bank and IAWD is divided into tasks:</p> <p>World Bank works with the ministries and regulators (where they exist), including developing federal-level water sector reforms, which indirectly means some (limited) contact with national utilities;</p> <p>The IAWD works with its members and other water utilities in the region on capacity development to a) advance technological knowledge and b) management know-how on managing water supply and sanitation facilities, and to ensure that water services meet consumers' needs.</p> <p>The main tasks of the IAWD (technical lead) are:</p> <ul style="list-style-type: none">– Capacity-building <p>Established and developed over the past nine years, the Danube learning partnership brings together national water utilities associations (<i>Wasserverbände</i>). It aims to create a Danube regional portfolio of regional training, coordinated by IAWD, and delivered nationally through a train-the-trainer approach. The associations receive initial funding for rolling out the training nationally. Training is in participants' mother tongue, ensuring that capacity is developed in each country and maintaining know-how among businesses and associations. Part of the participation fee goes back to the IAWD to finance programme updates and train the trainers. Its partnership nature is difficult to sustain and maintain.</p>

Three phases are complete, with a fourth scheduled to start in January 2022 and run until 2025 (waiting for the proposal to be granted).

The scope has shifted towards water security in times of water scarcity

- Communication, outreach, management, knowledge activities

Main activities include Danube water conferences (first held in 2013), which alternates with the Danube water forum in the region.

Regional forums include all stakeholders - utilities, utility associations, regulators, owners of the assets, municipalities and their associations, ministries.

Supporting partners

World Bank

Analytical advisory services

Main output: state of the sector report, a milestone document that detailed the real state of the water sector in the Danube area. There was also a report on the state of the water sector for each country. Other documents have also been produced.

IAWD and World Bank: Benchmarking activities at national and utility level.

6. Target groups

Category of key target group: professionals/experts.

Target group is clearly defined as water suppliers and wastewater treatment utilities.

7. Specific tools/means used

1. Analytical advisory;
2. Capacity-building;
3. Benchmarking;
4. Knowledge sharing.

The Danube learning partnership was set up under the IAWD but separate from it, with initial funding from the Danube water programme. It will continue as such after completion of the Danube water programme.

8. Implementation successes and challenges

To what extent is the activity achieving its objectives?

The activities have achieved their objectives. This is due to close technical monitoring by trained local staff, but also because the programme is built to be sustainable.

What works well:

- Focus on maintenance and sustainability of programmes;
- Communication across Member States.

What does not work so well:

- Lack of English language skills in many utility sectors and need to deliver programmes in native languages;
- The region is extremely challenging culturally, historically and politically, with organisers needing to choose neutral training venues, for example;
- When there are new elections, the staff leading the municipalities and/or utilities change, disrupting the flow of knowledge and experience.

9. Financing source

The Danube Water Programme is funded by the Ministry of Finance of Austria, which pays into a World Bank trust fund that is then used to realise its part of the work (component 1) and to finance the IAWD, based on a grant agreement.

Initially the trust fund was set up to be a multi-donor trust fund, with some contributions from GIZ and SECO. They are no longer contributing to the trust fund, but there is some support from additional donors for specific programme parts (e.g. a so-called 'water safety planning and management hub' was launched in Kosovo, where the big regional water companies are trained and receive seed funding from the World Bank (component 1), the Kosovo water companies and the IAWD, through a regional capacity network (RCDN), which is a cooperation between GIZ and SECO). Similarly, other hubs in other countries receive an individual funding mix. The initial training sessions require a lot of effort (training of trainers, technical partners that develop the programmes and do the initial monitoring to verify suitability), which adds cost.

Attendance fees were always expected to be difficult, complicated further by the COVID-19 pandemic and the energy crisis (utilities are unable to pay their gas bills), which has reduced both willingness and ability to pay.

The fourth phase will be the last with the IAWD, but the Austrian Government may continue its ties with the World Bank for parts of the projects.

10. Impact of activity

Quantitative:

- Close ties are established across the Danube.

Qualitative:

- Before 2013 there was little to no communication within countries (despite their extremely close proximity, partially all of the ministries, regulators and ministries are only 800 metres away from each other) and across states;
- Benchmarking and data collection are now accepted and discussions centre only on optimisation and how to establish consistent and realistic benchmarking;

Quality assurance is carried out by technical advisors to check fitness of local trainers at the beginning of the set-up of hubs.

11. Future plans

- Water suppliers and the wastewater management sector are the clear focus, but from 2019-2021 two new projects were also started, on top of five already running programmes: utility management training and access to financing programme;
- The focus is to sustain the existing programmes and make them last. More e-learning online formats (e.g. webinars) have been added and will be assessed for their sustainability and cost. It is clear goal that a level/set-up must be reached during this fourth phase that enables the IAWD to maintain the work;
- Ensure that the project is set-up in a way that it can continue to run (sustainability) after 2025, including securing additional funding from other sources;
- Carry out the fourth phase (Jan 2022-2025) once approved;
- The scope has shifted towards water security in times of water scarcity.

12. Networking

The Danube Water Programme is exploring funding options at national level, while different countries have investment projects (World Bank, KFW, EBRD). All of these projects have a technical assistance component, usually engaging consultants from western countries to do capacity-building. The IAWD tries to enable the national utility associations to work through the partnership and the Programme's regional knowledge in order to build capacity nationally. Currently, the Danube Water Programme is intensively

checking with different World Bank projects (projects running in Bosnia, Albania, Croatia) and projects financed by SECO (North Macedonia) and some financed by GIZ and KFW. Some of these conversations are held by IAWD and some directly through the national associations.

13. Conclusions and lessons

- Before 2013 there was little to no communication within and between countries (despite their very close proximity, partially all of the ministries, regulators and ministries are only 800 metres away from each other, i.e. Bosnia and Herzegovina);
- Benchmarking and data collection are now accepted, with discussions centring on their optimisation and consistent measurement;
- The region is very challenging culturally, historically and politically (e.g. trainers have to choose neutral training venues);
- Elections mean changes to the top staff of municipalities and/or utilities, disrupting knowledge flow and experience.

14. Contact information

<https://www.danube-water-program.org/pages/contact.php>

Factsheet 5: Joint Danube Survey

1. Name of activity
Joint Danube Survey (JDS) http://www.danubesurvey.org/jds4/
2. Introduction and context
a) <u>Short general description to introduce the activity</u> This project is a thorough water quality assessment run every six years for the entire Danube basin and organised by the ICPDR. The process harmonises the monitoring and saving of water data in line with the WFD. b) <u>Location/geographical scope</u> All 14 DRB countries. c) <u>Activity category</u> From categories: literacy network, training. d) <u>Frequency of activity</u> The activity takes place every six years, most recently in 2019.
3. Focus/topic of activity
The key purpose of the JDS is to gather vital data on carefully selected elements of water status across the entire length of the Danube and its major tributaries. The project harmonises water monitoring practices across the Danube countries, in line with the WFD, committing Member States to achieving good water status.
4. Main objectives of the activity
<ul style="list-style-type: none">– Collect data on special parameters not normally analysed;– Collect all of these data in a way that is readily comparable across the region's countries;– Raise awareness of the Danube's water quality and ongoing protection efforts;– Close the gaps in WFD implementation.
5. Key actors leading the activity
<u>Organiser(s)/coordinator</u> Coordination by ICPDR. <u>Supporting partners</u> The contracting partners for the survey are all 14 DRB countries. Different laboratories, institutes and scientific consultants in the DRB, who have usually been part of previous assessments (see http://www.danubesurvey.org/jds4/jds4_files/nodes/documents/icdpr_jds4_flyer2019_reprint_web.pdf).
6. Target groups
Scientists: training for the assessment is tailored for people experienced in water quality monitoring; National authorities: since 2019, training has been added for national authority staff members in order to give them more responsibility in the monitoring process; Wider public: by disseminating the results widely and encouraging participants to communicate the work, information on the process and the results of the JDS spreads more readily.
7. Specific tools/means used
Events, workshops, webinars, media campaigns, social media.

8. Implementation successes and challenges
What is working well:
<ul style="list-style-type: none"> – Every Danube survey has a range of accompanying material (e.g. pamphlets), as well as a scientific report and a public report to disseminate the findings to different audiences. The public report of 2019 is 23 pages long and is user-friendly (e.g. includes visuals, question-and-answer sections). Since 2019, water literacy reach has been extended to be more international, more locally sensitive, and more educational for different audiences; – Depending on the survey results, the needs for the upcoming survey are assessed carefully. For instance, between the 2013 and 2019 survey the approach was changed to enable national authorities to use the most suitable approach while remaining comparable with all other countries and the WFD framework; – The 2019 assessment included different monitoring datasets that went beyond the usual assessments, including ad-hoc tests for: <ul style="list-style-type: none"> a) Effect-based monitoring/non-target screening (chemistry): b) Environmental DNA (eDNA) testing c) Microplastics.
9. Financing source
This project receives funding from the LIFE programme, the German Federal Environmental Agency (UBA) the Austrian Federal Ministry for Agriculture, Regions and Tourism, as well as private commercial partners: viadonau, Coca-Cola Hellenic Bottling Company, Patagonia, Pure Water for Generations (for 2019 survey). The share of the financial contributions is not specified.
10. Impact of activity
As the main focus of the project is to gather scientific data, this is similarly the focus of the impact measuring. Every six years, the results are shared in qualitative and quantitative terms for the hydromorphological, biological and chemical parameters of the Danube. The quantitative and qualitative impact of the dissemination of the JDS is not specified.
11. Future plans
Collecting more data that enable research on the link between the state of the Danube and climate change effects.
12. Conclusions and lessons
Continuation of the regular survey is necessary to keep a record of the state of the Danube and provide scientific evidence for measures that enhance the quality of the Danube water: <ul style="list-style-type: none"> – About 50-90 % of the sites did not meet the ecological requirements of the WFD for fish; – Invasive alien species continue to have an impact on native wildlife, such as alien fish depleting the habitat of native Danube fish. No lessons are described for communication of the JDS.
13. Contact information
International Commission for the Protection of the Danube River (ICPDR), jds4@icpdr.org

6.4. Main conclusions

The past decade has seen **progress** in citizen engagement for the protection of the Danube (across ministries, sectors and countries), aided by research and projects. This success can also be linked to the **various initiatives on the ground that increase awareness** among citizens, train utility staff, and educate the public about the value of the Danube River basin. **Different networks were formed** to collaborate on a professional level, as well as to celebrate the natural and recreational functions of the Danube.

With respect to the Mission targets, the **activities on water and ocean literacy have already established many important formats and content**. However, the Danube lighthouse area shows **a gap in citizen engagement activities using citizen science**. The citizen science projects identified are very local and do not have sufficient scale to support the Mission lighthouse targets.

There are **different traditions and backgrounds** within the Danube lighthouse area. To accommodate these differences, the **initiatives, projects and programmes in place address the challenges** (e.g. selecting neutral spaces for workshops when participants with different political views must participate), but also **seize the opportunity it presents** (e.g. enabling stakeholders to transfer their knowledge and experience in transboundary projects).

The Danube lighthouse **projects rely primarily on public funds**. However, in the implementation phase and with smaller, local projects, the budgets of organisations themselves are also used to finance the activities. It is difficult to distinguish funding specifically for projects on water literacy in projects where water literacy is a side component of other, more technical activities. **Some of the projects struggle with different frameworks in the countries in which they operate** (e.g. Ukraine as a non-EU country until February 2022 was not eligible for EU funds⁵⁵⁵, but also had more freedom for restoration because CAP framework does not apply in the area), while others struggle with governments' reluctance to co-finance non-priority activities.

6.5. Recommendations

Recommendation 1. Build on existing activities: For future activities on citizen engagement and literacy, the Mission Secretariat should build on and expand existing activities in place for different target groups. For example, technical knowledge and training for water suppliers and wastewater treatment has been facilitated by the Danube Water Programme, which formed a network of companies and government actors over the past nine years, with the aim of continuing after project funding ends. Similarly, the Water Innovation Danube + project enables young people to create their own innovative projects on Danube topics, while various projects initiated by the ICPDR (e.g. the Danube Art Master, organised by GWP EEC) encourage young people to get active in Danube protection projects. While some projects plan to continue at their current scope (e.g. Danube Water Partnership), others have ambitions to increase their scope (e.g. Danube Innovation Lab+).

Recommendation 2. Spread knowledge beyond urban areas:

- 1) Ways of delivering water and ocean literacy and knowledge to rural settings should be developed. Currently, water literacy and its delivery are very much focused on the urban sphere and the projects struggle to find mechanisms (outside of schools) to reach the rural population.
- 2) An increase of online formats since the COVID-19 pandemic presents an opportunity (where suitable) to deliver more online courses and training. This e-learning component facilitates reaching the rural population and can save cost (according to some project leaders).
- 3) Social media could be extended across existing and future projects. It could play a bigger role in sharing information and engaging citizens in water literacy in rural and urban settings and across countries.

Recommendation 3. Integration of source-to-sea approaches and across countries:

- 1) Future literacy projects should emphasise the linkage between the Danube, its tributaries and the Black Sea to a broader extent. Upper Danube citizens, in particular, and all target groups generally, need to understand this link better. Engagement can take place through source-to-sea approaches and by facilitating a more holistic understanding of the Danube-Black Sea relationship, including literacy projects on its tributaries.
- 2) Transboundary projects should be encouraged, given the transboundary nature of the river and the increased chance for cooperation. Initiatives by the ICPCR, as well as individual actions by Rivers of Europe (RIVE) or Rewilding Danube Delta, are good examples of existing transboundary initiatives that could be replicated.

⁵⁵⁵ The non-applicability of neighbouring EU countries is expected to change (Access2Markets EU-Ukraine Deep and Comprehensive Free Trade Area (europa.eu). It is not clear how this will affect river restoration efforts in the respective countries.

Recommendation 4. Exploring funding schemes together: Secure funding through grants properly enables innovation and enables people to build projects for the longer term, improving maintenance, sustainability and networking. Interviewees repeatedly noted that this also holds when project participants receive a small grant to continue or implement their project (e.g. Water Innovation Danube+). The need for funding, paired with a need for good overview and monitoring for successful project implementation (GWP CEE), makes funding schemes such as the one-stop-shop principle⁵⁵⁶ a good mechanism for all partners involved.

Recommendation 5. Being aware of countries' frameworks: Not all countries in the Danube basin are EU Member States. There is a need to address country differences in terms of culture and politics (e.g. finding neutral spaces to deliver training for people with different political perspectives). Other differences arise where a project has both non-EU and EU countries, particularly access to funding and CAP scheme presence/absence. If the differences between countries are limiting the objectives of a project, ways need to be found to overcome those differences.

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This baseline study for the Mission Restore our Ocean and Waters aims to provide a comprehensive basis for the development and piloting, and the future deployment and upscaling of three Mission lighthouses: the Atlantic and Arctic Sea basin, the Danube River basin, and the Mediterranean Sea basin. The preparation of the baseline entailed mapping the situation in the lighthouse areas in 2021-22 with respect to the Mission objectives, targets and activities.

The study proposes a draft set of indicators for measuring Mission progress towards its targets in these specific lighthouses. Moreover, the study mapped major stakeholders and networks relevant for the implementation of the Mission objectives, including a comprehensive mapping of past, ongoing and future key EU and national projects. The study also produced an analysis of the Smart Specialisation Strategies (S3s) and other regional strategies in the lighthouses, mapped current governance structures and mechanisms and their alignment with Mission objectives and investigated activities to support citizen engagement and literacy in areas relevant to the Mission objectives. Finally, the study offers recommendations for future implementation of the Mission, presented in the form of a Strategic Note.

Studies and reports

