**CONCEPT NOTE  
Conserve and sustainably use the oceans, seas and marine resources for sustainable development** (SDG 14: Life Below Water)

**Concept of the Project**

**sustainable Development Goal 14** (**Goal 14** or **SDG 14**) is about "Life below water" and is one of the 17 [Sustainable Development Goals](https://en.wikipedia.org/wiki/Sustainable_Development_Goals" \o "Sustainable Development Goals) established by the [United Nations](https://en.wikipedia.org/wiki/United_Nations" \o "United Nations) in 2015. The official wording is to **"Conserve and sustainably use the oceans, seas and marine resources for sustainable development"**. The Goal has ten targets to be achieved by 2030. Progress towards each target is being measured with one indicator each.

The first seven targets are *outcome targets*:

1. Reduce [marine pollution](https://en.wikipedia.org/wiki/Marine_pollution" \o "Marine pollution).
2. Protect and restore [ecosystems](https://en.wikipedia.org/wiki/Ecosystem" \o "Ecosystem).
3. Reduce [ocean acidification](https://en.wikipedia.org/wiki/Ocean_acidification" \o "Ocean acidification).
4. [Sustainable fishing](https://en.wikipedia.org/wiki/Sustainable_fishery" \o "Sustainable fishery).
5. [Conserve](https://en.wikipedia.org/wiki/Marine_conservation" \o "Marine conservation) coastal and marine areas.
6. End subsidies contributing to [overfishing](https://en.wikipedia.org/wiki/Overfishing" \o "Overfishing).
7. Increase the economic benefits from sustainable use of marine resources.

The last three targets are *means of implementation targets:*

1. To increase scientific knowledge, research and technology for ocean health
2. Support [small scale fishers](https://en.wikipedia.org/wiki/Artisanal_fishing" \o "Artisanal fishing)
3. Implement and enforce international [sea law](https://en.wikipedia.org/wiki/Law_of_the_sea" \o "Law of the sea).

**Problem Statement**

The oceans cover more than 70 per cent of the surface of our planet and play a key role in supporting life on earth. They are the most diverse and important ecosystem, contributing to global and regional elemental cycling, and regulating the climate. The ocean provides natural resources including food, materials, substances, and energy.  
Marine Protected Areas contribute to poverty reduction by increasing fish catches and income, creating new jobs, improving health, and empowering women. Increasing levels of debris in the world’s seas and oceans is having a major and growing economic impact. Oceans, seas and other marine resources are essential to human well-being and social and economic development worldwide. Their conservation and sustainable use are central to achieving the 2030 Agenda, especially for small island developing States. However, oceans and coastal areas are extremely vulnerable to environmental degradation, overfishing, climate change and pollution.

**Objective of the Project**

The UN has defined 10 targets and 10 indicators for SDG 14 that include preventing and reducing [marine pollution](https://en.wikipedia.org/wiki/Marine_pollution" \o "Marine pollution) and [ocean acidification](https://en.wikipedia.org/wiki/Ocean_acidification" \o "Ocean acidification), protecting marine and [coastal ecosystems](https://en.wikipedia.org/wiki/Coastal_ecosystem" \o "Coastal ecosystem), and [regulating fishing](https://en.wikipedia.org/wiki/Fishing_regulation" \o "Fishing regulation). The targets also call for an increase in scientific knowledge of the oceans. Some targets have a target year of 2020, some have a target year of 2025 and some have no end year.

The ten targets include reducing marine pollution (14.1), protecting and restoring ecosystems (14.2), reducing ocean acidification (14.3), [sustainable fishing](https://en.wikipedia.org/wiki/Sustainable_fishery" \o "Sustainable fishery) (14.4), conserving coastal and marine areas (14.5), ending subsidies contributing to [overfishing](https://en.wikipedia.org/wiki/Overfishing" \o "Overfishing) (14.6), increase the economic benefits from sustainable use of marine resources (14.7), increase scientific knowledge (14.a), supporting [small scale fishers](https://en.wikipedia.org/wiki/Artisanal_fishing" \o "Artisanal fishing) (14.b) and implementing and enforcing [international sea law](https://en.wikipedia.org/wiki/Law_of_the_sea" \o "Law of the sea) (14.c).Most SDG 14 targets are not measurable in quantitative terms because the data is not available yet; only target 14.5 is quantifiable.

**Data Sources Used**

The project will use air quality datasets from the following sources:

* **Our World in Data** : Various datasets resources are available on Our World in Data, such as the "**[Chlorophyll-a deviation from the global average](https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average" \t "https://ourworldindata.org/sdgs/_blank)**["](https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average" \t "https://ourworldindata.org/sdgs/_blank)[and "](https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average" \t "https://ourworldindata.org/sdgs/_blank) **[Countries using ecosystem-based management of marine areas](https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average" \t "https://ourworldindata.org/sdgs/_blank)** ["](https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average" \t "https://ourworldindata.org/sdgs/_blank)**[.](https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average" \t "https://ourworldindata.org/sdgs/_blank)**
* **[Kaggle](https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average" \t "https://ourworldindata.org/sdgs/_blank)**[: Various water quality datasets are available on Kaggle, such as the "water Quality classification" and "Water probability".](https://ourworldindata.org/grapher/chlorophyll-a-deviation-from-the-global-average" \t "https://ourworldindata.org/sdgs/_blank)
* **UNESCO** : Datasets from UNESCO science report like research trends by income group.
* **UN Environment:** An policy brief that aggregates water quality data and marine pollution from government and research-grade sources worldwide.

**Features**

The key features of the dataset will include:

* Location: Geographic coordinates of the monitoring stations.
* Pollution: Preventing and reducing Total coliform and [ocean acidification](https://en.wikipedia.org/wiki/Ocean_acidification" \o "Ocean acidification).
* Acidification: Reduction in the [pH](https://www.britannica.com/science/pH) of [seawater](https://www.britannica.com/science/seawater) .
* Source Identification: Information on potential sources of pollutants (e.g., industrial, vehicular, residential).

**Tool for Analysis**

The following tools and technologies will be used for data analysis:

1. Python: For data cleaning, analysis, and visualization, using libraries such as Pandas, NumPy, Matplotlib, and Seaborn.
2. Jupyter Notebooks: For documenting the analysis process and visualizations.
3. Scikit-learn: For developing predictive models and machine learning algorithms.
4. QGIS: For spatial analysis and creating geographic visualizations of water quality data.

**Hypothesis**

Implementing comprehensive marine conservation policies and sustainable management practices will lead to significant improvements in the health and biodiversity of ocean ecosystems, thereby enhancing their resilience and productivity, which will contribute to economic growth and food security for coastal and marine-dependent communities.

**Methodology**

The project will be conducted in the following phases:

Data Collection:

* Gather marine data from the aforementioned sources.
* Compile weather and other relevant data to support the analysis.

Data Cleaning and Preprocessing:

* Handle missing values, outliers, and inconsistencies in the data.
* Standardize data formats and integrate datasets from different sources.

Exploratory Data Analysis (EDA):

* Perform descriptive statistical analysis to understand the distribution and variability of pollutants in the marine.
* Visualize temporal trends (daily, monthly, seasonal) and spatial distributions using charts and maps.

Source Identification:

* Use correlation analysis and regression models to identify potential sources of pollutants to the ocean.
* Analyze the impact of different factors (e.g. industrial activity) on pollution levels.

Predictive Modeling:

* Develop machine learning models (e.g., linear regression, random forest) to predict future pollution levels based on historical data.
* Validate and test the models using appropriate metrics.

Reporting and Presentation:

* Compile the findings into a comprehensive report.
* Create visualizations and interactive dashboards to present the results.
* Develop policy briefs and recommendations for stakeholders.

**Probable Outcome**

The expected outcomes of the project are:

1. Reduce Marine Pollution

* **Outcome:** Significant reduction in marine pollution, especially from land-based activities.
* **Indicator:** Decrease in the amount of marine debris, particularly plastics, in the ocean.

### 2. Protect Marine and Coastal Ecosystems

* **Outcome:** Enhanced resilience of marine and coastal ecosystems.
* **Indicator:** Increase in the area of marine and coastal ecosystems that are protected and effectively managed.

### 3. Address Ocean Acidification

* **Outcome:** Reduced rate of ocean acidification.
* **Indicator:** Improved pH levels in ocean waters.

### 4.Protect Coastal and Marine Areas

* **Outcome:** Expansion of marine protected areas (MPAs).
* **Indicator:** Increase in the percentage of coastal and marine areas designated as MPAs.

5.Comprehensive Analysis: A detailed analysis of water quality data identifying key sources and trends of marine pollution.

6.Predictive Models: Reliable models for predicting future pollution levels and assessing the impact of potential interventions.

7.Actionable Solutions: Data-driven solutions and policy recommendations to reduce urban pollution.

The overall outcome of an SDG 14 project aimed at conserving and sustainably using the oceans, seas, and marine resources is multifaceted, encompassing environmental, social, and economic dimensions. Here is a comprehensive outline of the expected overall outcomes: