

UNEP GEMS/Water


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WEATHER CLIMATE WATER



UNEP GEMS/Water and the GEMStat global water quality information system

- Established in 1978, [GEMS/Water](#) is the only UN water quality programme to collect “in situ” water quality monitoring data from Member States
- The GEMS/Water Data Centre (GWDC) maintains the [GEMStat](#) water quality information system based on the KISTERS WISKI (KiWQM) system covering about 15K monitoring locations in ~90 countries, entirely sampling data, currently providing the data through a [web portal](#) and KISTERS proprietary web services (KiQS)
- At GWDC, we spend >50% of our resources on data harmonization, mostly on cleaning missing and erroneous metadata on monitoring locations, water quality parameters and analytical methods
- UNEP wants more data (better spatial and temporal coverage, more parameters) and preferably in NRT to be able to provide up-to-date data products and support assessments
 - Wish list: sensor data, remote sensing data, CECs,
- UNEA Resolution 1/9 (2014) “8. *Invites* GEMS/Water partners to support capacity development in providing standardization efforts for water-quality-related data collection, analysis, exchange and management, such as the Open Geospatial Consortium Best Practice WaterML-WQ (OGC 14-003) and the United States Environmental Protection Agency/United States Geological Survey Water Quality Exchange (USEPA/USGS WQX) standards for the presentation and exchange of water quality data and metadata, especially in developing countries, at their request, and to coordinate those efforts with relevant ongoing initiatives; “

WMO Plan of Action for Hydrology 2022-2030

WMO Hydrology Action Plan 

 Give feedback

 0 warnings 


Auto-schedule





Share

Export 



Review changes

[Roadmap](#) [Teams](#) [Releases](#) [Dependencies report](#)

Views: Basic **EDITED** 

Hierarchy: Story  to Sub-task   1 filter applied 


SCOPE


 # Issue 

 Create issue

Fields 







Target start 

Target end 




Status

2022 2023 2024 2025 2026 2027 2028 2029 2030


  I. Water quality is known

 1  WMOHAP-113 I.1.1: WMO participates in and contributes to the World Water Quality Alliance convened by UNEP

02/Jan/22  31/Dec/23  **IN PROGRESS**

 2   WMOHAP-114 I.1.2: WHOS interconnection to GEMS/IIWQ



 01/Jan/24  31/Dec/27 **TO DO**

  WMOHAP-130 I.1.2.1 Test interconnection between WHOS and IIWQ portal

01/Jan/24  31/Dec/24  **TO DO**



  WMOHAP-131 I.1.2.2 Integrate IIWQ and WHOS


01/Jan/25  31/Dec/25  **TO DO**

  WMOHAP-132 I.1.2.3 Analyse water quality data and metadata in GEMStat



01/Jan/25  31/Dec/25  **TO DO**

  WMOHAP-133 I.1.2.4 Pilot WHOS-GEMStat integration




10/Jun/25  09/Jun/26  **TO DO**

  WMOHAP-134 I.1.2.5 Develop and operationalize APIs for WHOS-GEMStat integration



01/Jan/25  30/Jun/25  **TO DO**



  WMOHAP-135 I.1.2.6 Establish operational connection/interoperability between WHOS and GEMStat



01/Jan/27  31/Dec/27  **TO DO**

 3   WMOHAP-115 I.1.3: Supporting WaterML-WQ development

 01/Aug/22  31/Dec/27 **TO DO**

  WMOHAP-136 I.1.3.1 Conduct OGC Water Quality Interoperability Experiment



01/Aug/22  29/Dec/23  **IN PROGRESS**

  WMOHAP-137 I.1.3.2 Develop and adopt WaterML-WQ as official OGC standard


01/Jan/24  31/Dec/24  **TO DO**

  WMOHAP-138 I.1.3.3 Adopt WaterML-WQ as official WMO standard

01/Jan/25  31/Dec/25  **TO DO**

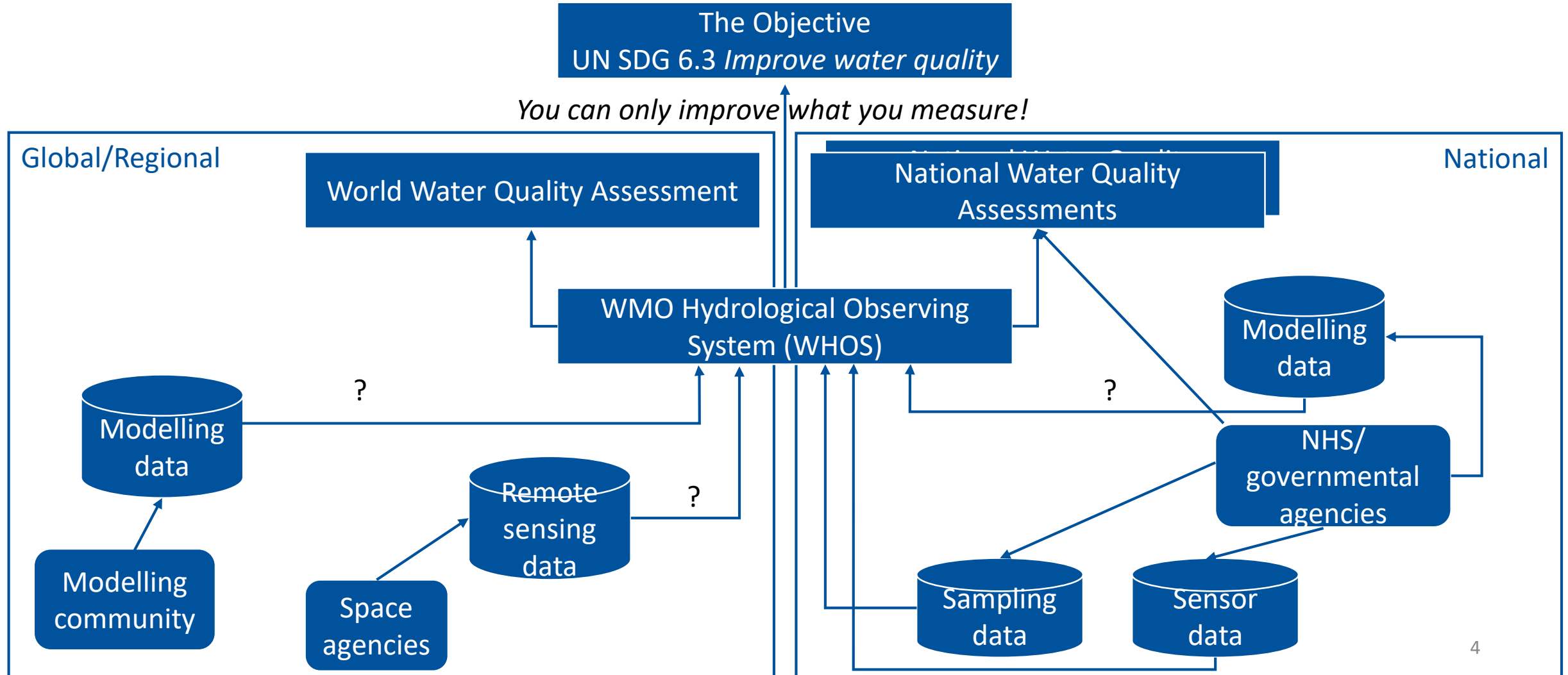
  WMOHAP-139 I.1.3.4 Train users on WaterML-WQ

01/Jan/26  31/Dec/26  **TO DO**

  WMOHAP-140 I.1.3.5 Support Member States in implementing WaterML-WQ to provide their water quality data and connect them to WHOS

01/Jan/27  31/Dec/27  **TO DO**

The Vision



Wishes for the IE

Semantic baseline

- Dereferenceable water quality vocabulary for parameters/observed properties including UoM to enable us and our data providers to map their existing vocabularies (preferably also analytical methods but that's maybe a bit ambitious)
- Linking to/aligning with [WHOS Hydrological Ontology](#) and WIGOS/WMDS parameter codes
 - Will WMO provide a WHOS testing environment?
 - What's the process to extend the hydrological ontology?

PUV-
ont?

Technical baseline

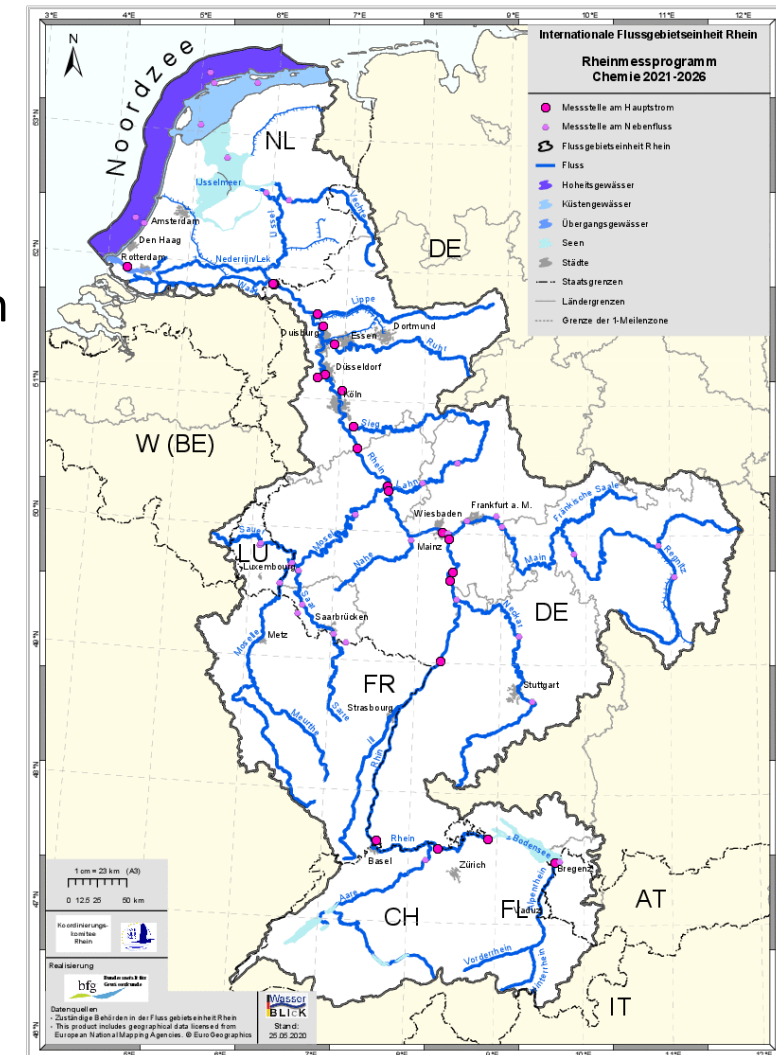
- Formats/serializations
 - Scientists want simple feature CSVs, web developers JSON
 - OMS-JSON?
- APIs
 - We have a proprietary API (KiQS) that's not RESTful
 - Often requested missing feature is „proper“ REST API for our data
 - Ideas
 - [OGC API-Features](#) for hydrology features ([Geoserver](#) + [hale](#))
 - [OGC STA](#) for sensor data ([FROST](#))
 - [OGC API-EDR](#) for remote sensing data ([xcube](#) + [pygeoapi](#))
 - Sampling data?

Use Cases for the Rhine basin (1)

- Use Case 1 – Rhine Monitoring Programme Chemistry (ICPR)

Surface water chemistry sampling data exchange

- Regular monitoring (4-13 samples/year) of a wide range of chemical parameters (220 dissolved/particulate) at 63 monitoring locations in the Rhine and tributaries to support WFD reporting
- Partially published through [ICPR download portal](#)
- Idea: Publish subset of monitoring data, maybe complement with other data from riparian countries
- Datasets:
 - Surface hydrology features: INSPIRE Hydrography datasets from all riparian countries available => can we map those to HY_Features?
 - Sampling data for 59 stations covering 1485 parameters 1953-present in GEMStat (unpublished)



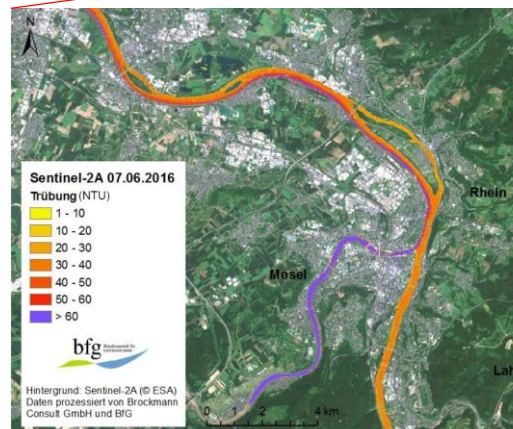
Use Cases for the Rhine basin (2)

- Use Case 2 - Rhine sediment monitoring (TBC)

Surface water sediment sampling and sensor data exchange

- Permanent suspended sediment monitoring network (~ 70 stations) of the Water and Shipping Administration (WSV) including sensor network of ~40 stations
- Turbidity remote sensing products for the Rhine (ESA S-2) calibrated using sensor data
- Idea: Publish sampling and sensor data (OGC API Features/STA/OMS) and remote sensing data (OGC API EDR)
 - Link to hydrology features (UC 1)
 - Link remote sensing with in situ data?
- Optional: Include other remote sensing resources from Copernicus LWQ 100m products and private sector

=>

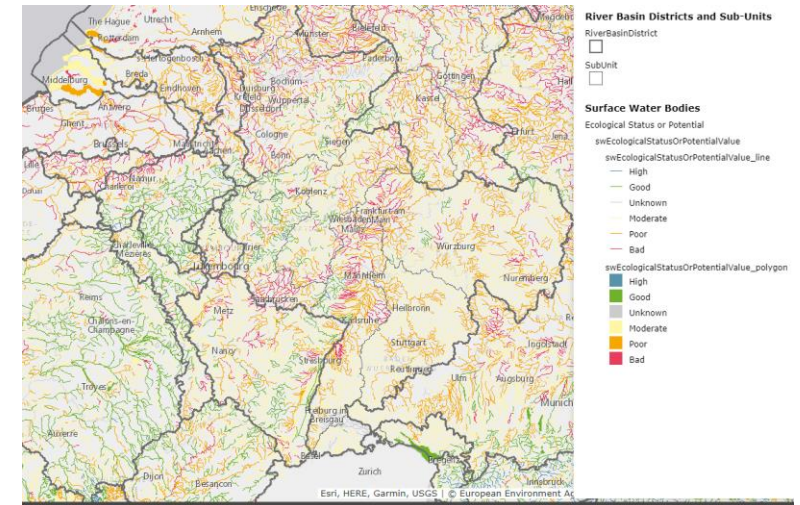


Use Cases for the Rhine basin (3)

- Use Case 3 – Rhine water quality assessment (Water Framework Directive)

Surface and groundwater quality status classification data exchange

- All EU Member States have to assess and report on the water quality status of all their surface and groundwater bodies (ecological and chemical status based on physical, chemical, biological and hydromorphological parameters (quality elements))
- Reporting data is collected and harmonized by the EEA through ReportNet
- Idea: Publish water body specific status classifications and link them to monitoring stations (UC 1)
 - [WFD](#) + [WISE EIONET](#) spatial datasets (catchments, surface + groundwater bodies) as OGC API Features services (HY-Features?)
 - WFD classification data as OMS categorical observations (through OGC API Features?) and link to hydrological features



<https://www.eea.europa.eu/data-and-maps/explore-interactive-maps/water-framework-directive-2nd-rbmp>

Thank you for your attention!

Contact:

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Head of the GEMS/Water Data Centre



International Centre
for Water Resources and Global Change
under the auspices of UNESCO



GEMStat 

<https://gemstat.org>