



WMO-UNEP-UNESCO-WHO-OGC co-organized Workshop Series on Water Quality Monitoring hosted under the banner of the World Water Quality Alliance (WWQA)



2022-2023

Background

Water quality (WQ) is one of the main challenges that societies will face during the 21st century, threatening human health, limiting food production, reducing ecosystem functions, and hindering economic growth. The [2030 Agenda](#) and [Sustainable Development Goals \(SDGs\)](#) bring water quality issues to the forefront of international action by setting Goal 6 specifically aiming to “ensure availability and sustainable management of water and sanitation for all” and to improve water quality (SDG target 6.3) to respond to the pressing challenges posed by water quality issues. Water quality is also addressed under other SDGs such as the goals on health, poverty reduction, ecosystems and sustainable consumption and production, recognizing the links between water quality and the key environmental, socioeconomic and development issues. The clear focus on water quality in the SDGs demonstrates growing attention on the urgent need to improve water quality worldwide (UNESCO).

The [World Water Quality Alliance \(WWQA\)](#) was convened as a response to UNEP’s mandate to produce a World Water Quality Assessment ([UNEP/EA.3/Res.10](#)) and represents a voluntary and flexible global multi-stakeholders platform with three central aims: production of a global assessment of freshwater quality drawing on science; horizon scanning, agenda setting and investigating emerging water quality issues of key environmental and socio-economic concern; and promotion of a co-design of tailored and demand-driven services for assessing and improving water quality around the world. The WWQA explores and communicates water quality risks in global regional, national and local contexts with the aim of pointing towards solutions for maintaining and restoring ecosystem and human health and well-being, with an aim to serve countries throughout the lifetime of the 2030 Agenda for Sustainable Development and beyond.

The World Water Quality Assessment will be produced drawing on a scientific approach based on triangulation of water quality data and hence there is a need for. The 2022-2023 workshop series on Water Quality Monitoring hosted under the banner of the World Water Quality Alliance feeds into several processes taking place in the coming years, eventually building up the development and launch of the World Water Quality Assessment at the sixth session of United Nations Environment Assembly (UNEA) in 2023.

The proposed series of workshops (see Annex I) aims at addressing the broad spectrum of water quality monitoring, including modelling, earth observation, citizen sciences etc., with the goal to foster development and operationalization of innovative solutions for water quality monitoring, improve data harmonization and interoperability, and arrive at a common road map for strengthened cooperation on water quality monitoring across the various institutions and data streams to enable a better global view on water quality and achievement of SDG 6.3.2.

Reliable, comprehensive and up-to-date monitoring data on water quality is a prerequisite to provide decision makers with the information they require to ensure the availability and sustainable management of water resources for both human uses and maintaining aquatic ecosystems. However, water quality monitoring is technically and financially demanding, and, in many countries, it has not yet become a priority due to limited resources. Moreover, in some countries, there is still a lack of coordination and integration among the various actors in the area of water quality. These challenges were highlighted during the recent, UNEP-led round of data collection for SDG indicator 6.3.2 on ambient water quality. Despite information on SDG 6.3.2 now being available for almost 100 countries, large data gaps remain ([2021 SDG 6.3.2 Progress Report on Ambient Water Quality](#)).

In addition, there is also an increasing need for consistent and interoperable integration of various earth observation datasets, including water quality data, that are provided by different organizations. Interoperability of water quality data depends on the use of common models, schemas and vocabularies. At the same time, there are no internationally agreed standards for exchanging water quality sampling data. Furthermore, sharing of water quality data is limited – likely due to the variety of responsibilities distributions at national scale in the field of water quality.

As a consequence, it seems that the scarcity of water quality data, even in major water bodies (surface and underground), does not allow to perform the environmental baseline studies required for Environmental Impact Assessment and Environmental Management Programmes of engineering projects and the lack of in-situ data has been identified as a key challenge for the development of a comprehensive World Water Quality Assessment¹. Finally, the unavailability of water quality data limits the applicability and enforcement of relevant environmental policies and regulations of industrial/domestic effluents.

The UN's Role in Working with Member States on Water Quality

In many countries, National Hydrological Services (NHSs), Basin Organizations and other relevant agencies have a mandate to monitor and assess water quality, but often lack know-how and/or resources to fulfill this mandate. In view of supporting these institutions in WQ monitoring and assessment as well as improving the coordination of the water quality activities among various actors, WMO has a mandate to assist its Members in this field, especially in terms of regulatory and guidance material.

The United Nations Environment Assembly Resolution 1/9 reaffirms the mandate of UNEP's Global Environment Monitoring System/Water Programme (GEMS/Water) in its capacity-building and data management role on the topic of ambient water quality. In recognition of how essential water from terrestrial, coastal and marine sources is for human health, well-being and livelihoods, ecosystem functioning and services, and the survival of all living species, UNEA at its third session in December 2017 also adopted resolution 3/10 "Addressing water pollution to protect and restore water-related ecosystems" ([UNEP/EA.3/Res.10](#)) which requests the UN Environment Programme (UNEP) to develop a World Water Quality Assessment for UNEA's consideration.

World Health Organization (WHO) works on water quality monitoring, normative guidance and associated capacity building where it is critical for human health through: Drinking-water quality monitoring via the WHO/UNICEF Joint Monitoring Programme (JMP) for SDG 6.1 and SDG 6.2; WHO Guideline on drinking-water quality and WHO Guidelines on recreational water quality and associated capacity building on establishing national health based standards and regulations as well as preventive risk management through water safety plans (WSP) and recreational water safety plans (RWSP). WHO coordinates aspects environmental surveillance of specific pathogens and risk factors to compliment public health surveillance (e.g. polio, COVID and antimicrobial resistance).

The United Nations Educational, Scientific and Cultural Organization (UNESCO) promotes science and innovation for peace and sustainable development. With this mandate, the International Initiative on Water Quality (IIWQ) of UNESCO's Intergovernmental Hydrological Programme (IHP) promotes research, knowledge sharing and innovative approaches to water quality monitoring with the aim to strengthen national capacities, enhance information on world's freshwater resources and support science-based policy-making for sustainable water management.

UNESCO supports the Lake Chad Basin Commission (LCBC) and Intergovernmental Coordinating Committee (CIC) of La Plata Basin countries by developing the UNESCO World Water Quality Portal for operational water quality monitoring in Lake Chad and La Plata basins through satellite Earth Observation combined with in-situ monitoring. UNESCO also promotes research, knowledge sharing and capacity development on emerging pollutants and microplastics in freshwater, including their monitoring and assessment.

Leveraging on the substantial knowledge, experience and existing cooperation between UNEP, UNESCO and WHO in water quality areas, WMO is seeking to effectively contribute to these efforts in view of enhancing the availability of water quality information at global level and increasing the effectivity of development activities. In 2019, the World Meteorological Congress approved [eight Long-Term Ambitions](#) guiding the development of WMO water-related activities. One of these ambitions is dedicated to water quality and is defined as:

"Water quality is known: Surface and groundwater quality should be permanently monitored as a necessary step to ensure water quality in accordance with different requirements for society and ecosystems, and corrective actions should be applied when necessary. A new partnership will be needed to support this ambition, including existing links to the Global Environment Monitoring System-Water (United Nations Environment Programme), the United Nations Educational, Scientific and Cultural Organization and other relevant stakeholders."

Opening Workshop

29, 30 & 31 March 2022 (Virtual)

The Opening Workshop is the first of a series of workshops taking place during 2022-2023. It intends to contribute to WMO's Water Quality Long-Term ambition through the following and feeds into various activities from the key partners such as GEMS/Water revision and strategic reorientation, the WWQ-Assessment, etc.:

- **Identifying** potential synergies and mutual contributions between WMO-UNEP-WHO-UNESCO on in-situ water quality data observations, management and sharing.
- **Defining** a WMO-UNEP-WHO-UNESCO coordination mechanism on in-situ water quality data observations, management and sharing.
- **Identifying** the steps for the development of a joint WMO-UNEP-WHO-UNESCO work plan for regulatory and guidance material related to in-situ monitoring systems, from data collection to data sharing and use.
- **Identifying** the way of interconnecting WHOS with GEMStat and other existing in-situ water quality data platforms and systems and how to connect these to the World Water Quality Assessment under development.
- **Identifying** how to support the WaterML development in the domain of Water Quality: updating OGC WaterML-WQ Best Practice document with regards to evolutions in OGC APIs, and taxonomies/ontologies since 2014 and endorse an international standard on Water Quality data exchange.
- **Defining** the Roadmap for an international [OGC Interoperability Experiment on Water Quality data](#) with pilot use cases (e.g., Lake Victoria, Lake Chad).

ANNEX I: Proposed series of workshops in 2022-2023

This annex details the proposed workshops to run through 2022-2023 serving the following purposes:

- Support Members in getting up to a basic level of implementing existing global guidance.
- Following up on WMO's role and commitment within the recently approved Hydrology Action Plan.
- Foster innovation for water quality monitoring.
- GEMS/Water's revision strategy development.
- Contribute to the World Water Quality Alliance (WWQA) and World Water Quality Assessment process.
 - The Assessment Workstream should become a critical part of this process and the respective workstreams dealing with Modelling, Earth Observation (EO), Citizen Science (CS) etc. should be brought in throughout the process where applicable.
- At the end of the workshop series, a synthesis workshop is foreseen that can bring together the different groups and key messages/outputs/etc. to see how the water quality monitoring community including its various stakeholders convened under the banner of the WWQA can overall enhance WQ monitoring from a holistic perspective – this can certainly feed directly into the Assessment process, if organized and structured properly.

The following table summarizes a selection of the 2022-2023 proposed workshops. These are based on the topics identified as most relevant and of interest in the context of Water Quality Monitoring. The list of proposed workshops is a starting point for agreement at the Opening Workshop, with a prioritization exercise to be carried out to identify the most relevant and urgently needed workshops.

| Thematic | Lead agencies | Key topics |
|---|---|---|
| Interoperability of EO and RS data | University of Stirling (tbc) | <ul style="list-style-type: none"> - Parameters that can be measured by EO – calibration and validation using in-situ data - Databases and satellite systems - Water ForCE roadmap implementation potential |
| Interoperability of modelling data | Deltares or Wageningen University (tbc) | |
| Needs and requirements of Member States in the area of WQ monitoring | WMO & UNEP | <ul style="list-style-type: none"> - Understand operational challenges and needs of NMHSs and other monitoring agencies in water quality monitoring |
| Complementary data sources for tracking SDG 6.3.2: citizen science and other local level monitoring | JRC & Earthwatch (tbc) | |
| Triangulation approach for obtaining an overview on water quality | UFZ (tbc) | <ul style="list-style-type: none"> - Review the WWQA Use Case approach for triangulation - Bring together the different groups and key messages/outputs/etc. to see how the water quality monitoring community including its various stakeholders convened under the banner of the WWQA can overall enhance WQ monitoring from a holistic perspective |
| Innovation in Water Quality Monitoring | WMO, UNEP & UNESCO | <ul style="list-style-type: none"> - Understand operational challenges and needs in water quality monitoring - Identify and promote new approaches and technologies - Support private sector (solution providers) to tailor their solutions to operational realities - Help academia to direct research towards more pertinent topics |
| WQ data Interoperability Experiment | WMO & OGC | <ul style="list-style-type: none"> - Update on the Interoperability Experiment progress, gather feedback and present lessons learnt |
| Assessing surface and ground water quality using drinking water quality data | WHO | <ul style="list-style-type: none"> - The workshop could look at data sets held by the JMP on drinking water quality from surface and ground water sources to infer status of ambient water sources |

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| Thematic | Lead agencies | Key topics |
|--|----------------|---|
| Water quality frameworks – setting health based national standards and implementing preventive risk management for drinking-water and recreational water quality | WHO | <ul style="list-style-type: none"> - Clarify priority health-based targets for national standards and regulations - Describe and unpack preventive risk-based approaches for water quality management and communication |
| Capacity development for water quality monitoring using approaches mentioned above | UCC / UN-Water | <ul style="list-style-type: none"> - Charting the capacities needed for monitoring water quality data - CDC and WWQA CDCm as tools to help meet capacity building needs in low income countries - UN-Water CDI |
| Monitoring emerging pollutants and microplastics | UNESCO & WHO | <ul style="list-style-type: none"> - Discussing challenges and needs for monitoring and assessment of emerging pollutants and microplastics in water |