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**International environmental policy and
governance issues**

**Progress in the implementation of resolution 3/10 on addressing
water pollution to protect and restore water-related ecosystems**

Report of the Executive Director

Introduction

1. In its resolution 3/10 on addressing water pollution to protect and restore water-related ecosystems, the United Nations Environment Assembly of the United Nations Environment Programme (UNEP) requested the Executive Director of UNEP, within the scope of available resources, to cooperate with other relevant organizations, including through UN-Water, to develop a world water quality assessment for consideration by the Environment Assembly at its fifth session. The present report contains an update on progress in the implementation of the resolution, in particular with regard to the workstreams of the water quality assessment and the World Water Quality Alliance.
2. In order to address the broad scope of the comprehensive water quality assessment as outlined in the UN-Water analytical brief entitled “Towards a Worldwide Assessment of Freshwater Quality”,¹ and building on the findings of its initial assessment, *A Snapshot of the World’s Water Quality: Towards a Global Assessment* (2016),² UNEP engaged a wide community of practice, comprising UN-Water members and other experts from the scientific community, the private sector and civil society. The World Water Quality Alliance, which emerged from that process, has brought together expert consortia to deliver a world water quality assessment, addressing current and emerging issues inherent in the global water quality challenge across the Sustainable Development Goals, with a strong focus on the health nexus and the mobilization of resources to implement the mandate set out in resolution 3/10. The development of the assessment and the work of the Alliance are embedded in subprogramme 7, Environment under review, of the UNEP programme of work.

* In accordance with the decisions taken at the meeting of the Bureau of the United Nations Environment Assembly held on 8 October 2020 and at the joint meeting of the Bureaux of the United Nations Environment Assembly and the Committee of Permanent Representatives held on 1 December 2020, the fifth session of the Assembly is expected to adjourn on 23 February 2021 and resume as an in-person meeting in February 2022.

** UNEP/EA.5/1/Rev.1.

¹ Available at www.unwater.org/publications/towards-worldwide-assessment-freshwater-quality/.

² Available at https://uneplive.unep.org/media/docs/assessments/unep_wwqa_report_web.pdf.

I. Progress in the implementation of resolution 3/10

A. World water quality assessment and the establishment of the World Water Quality Alliance

3. In direct response to the request contained in paragraph 16 (e) of resolution 3/10, UNEP called for expressions of interest from members of UN-Water, partners and relevant stakeholders, including from the private sector, for contributions to the next world water quality assessment. More than 50 organizations expressed interest in collaborating with UNEP, leading to the formation of the World Water Quality Alliance. UNEP, along with the Joint Research Centre of the European Commission, launched the Alliance in September 2019, convening a range of expertise from the United Nations, research institutes, space agencies and earth observation services, the private sector and civil society.

4. The world water quality assessment represents a major workstream and deliverable of the Alliance. The purpose of this interdisciplinary assessment is to review the state of freshwater quality and the potential impacts of water pollution on health, food security and ecosystems, illustrating causal-chain cases, from drivers to impacts, and responding to the scarcity of water quality data in many areas.³ In order to cover these nexus dimensions, the interdisciplinary assessment addresses interlinkages across several Sustainable Development Goals and employs an innovative data fusion approach aimed at combining on-the-ground data monitoring, modelling, and remote sensing with a focus on satellite observation. A project on assessing key environmental issues and providing focused outlooks to strengthen science-based policy and decision-making, also carried out under subprogramme 7, contributed to the implementation of the resolution.

5. The Alliance also focuses on current and emerging water quality challenges. As a community of practice on water quality-related science, technology and innovation, it provides governments and other stakeholders with evidence-based assessments, information, scenarios and solutions.

6. Convened by UNEP, the Alliance receives its core funding from Switzerland. The Swiss Agency for Development and Cooperation is providing \$1,818,000 in funding for a period of four years (to October 2023) to support the operations and innovation workstreams of the Alliance. In addition, the Government of Switzerland has provided \$401,207 to start the work of the global assessment, as well as three use-case projects for testing a multi-agency approach to bottom-up, demand-driven joint design of water quality products in three locations in Africa.

7. A declaration regarding the World Water Quality Alliance was signed by the Executive Director of UNEP in January 2020 and is open for signature by Alliance members. The Alliance has selected members and Chairs for its main governing bodies: the Strategic Advisory Committee⁴ and the Technical Advisory Committee.⁵ The initial workplan⁶ is being implemented despite delays related to the coronavirus disease (COVID-19) pandemic, including activities for the world water quality assessment and the use-case projects in Africa. In response to the COVID-19 situation, the Alliance reviewed relevant activities across partners and identified potential areas of collaboration. UNEP, as convener of the Alliance, works closely with the Joint Research Centre of the European Commission in the context of wastewater monitoring for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA.

8. To implement the world water quality assessment, Alliance partners established three working groups on the following data sources: (a) water quality modelling to provide data for the envisaged fusion (Delft, Netherlands, January 2020), (b) remote sensing with a focus on satellite observation and products (Leipzig, Germany, January 2020), and (c) on-the-ground monitoring (virtual meeting, April 2020). These three data sources are being reviewed, and merging is being tested for a global water quality appraisal and, on the scale of water bodies (lakes and rivers), to put emphasis on causal chains, that is, narratives to illustrate water quality impacts on health, food security and ecosystems. The

³ Ibid.

⁴ See

<https://communities.unep.org/display/WWQA/Governance?preview=/32407633/42270885/WWQA%20Strategic%20Advisory%20Committee.pdf>.

⁵ See

<https://communities.unep.org/display/WWQA/Governance?preview=/32407633/42270886/WWQA%20Technical%20Advisory%20Committee.pdf>.

⁶ See

<https://communities.unep.org/display/WWQA/Governance?preview=/32407633/38306612/WWQA%20Work%20Plan.pdf>.

Driving Forces-Pressures-State-Impact-Responses framework underpins the approach. Alliance partners support the project by mobilizing cash and in-kind contributions for the necessary research and development, testing and upscaling, including to establish a technology support platform for global water quality assessment that will continue beyond the project lifetime (supported by the Government of Germany and in kind by the more than 15 working group members). Initial global and thematic data products and a demonstration of the world water quality assessment outline will be presented at the fifth session of the United Nations Environment Assembly as an annex to an information document. In parallel, contributing to the assessment, the fusion of readily available data was tested in defined water quality challenge locations in Africa.

9. The assessment is underpinned by the Global Water Quality and Analysis Platform (GlobeWQ),⁷ which is being developed as a web-based infrastructure for hosting, visualizing and analysing data on water quality and its drivers and for integrating in situ (on-site) and remote sensing-based observations, and modelling. One of the first goals is to compile a model inventory illustrating the current status of water quality, globally or for selected continents, using several variables, such as nutrients, salinity parameters, pathogens and toxic substances. The content and functionality of the platform will be tailored to user needs, to be identified in workshops with local stakeholders.

10. The data-scarce environment in which the world water quality assessment is being conducted necessitates a complex exercise of combining and synthesizing various data and information sources. Establishing the partnerships necessary for this process requires time, and such work is expected to continue until 2023. Results and demonstration products will be featured on the World Environment Situation Room platform, as well as at full scale in an information document being prepared for the fifth session of the Environment Assembly. Three major components of the assessment will continue to be developed: (a) a baseline assessment of the state of water quality worldwide in surface and groundwater bodies, (b) a scenario analysis of future pathways of water quality in the freshwater system and its compartments, and (c) an initial analysis of options for protecting and restoring water quality. World Water Quality Alliance members will provide updates for the fifth session of Environment Assembly. The full assessment, to be completed in time for the sixth session of the Assembly, will follow. Both the assessment and other work streams of the Alliance will feed into the midterm review of the International Decade for Action, “Water for Sustainable Development”, 2018-2028, and the related conference to be held in 2023, in particular with regard to progress in achieving Sustainable Development Goal 6 and the review of the implementation of the 2030 Agenda for Sustainable Development at a high-level political forum on sustainable development also scheduled for 2023. They represent a key contribution to the global acceleration framework for Sustainable Development Goal 6, launched by UN-Water members in 2020 to promote the achievement of water-related targets.⁸

B. Use cases, assessment and product development

11. The use-case projects in Africa combine data assimilation with transdisciplinary engagement and joint design of water quality products for operational use. Integral to the projects is a moderated, in-country, stakeholder-driven process to identify and address local needs (local solutions to global problems). Following a formal invitation from the Water Resources Commission and the Ministry of Sanitation and Water Resources of Ghana, in February 2020 the Alliance held a workshop in Accra on the Volta System, which attracted academics and government representatives from Ghana and Burkina Faso, and representatives of non-governmental and intergovernmental organizations, the United Nations and project partners. Participants discussed the Volta Basin water quality hotspots and water quality products and services. After the dispatch of letters requesting collaboration by the Alliance to the Commission and the Ministry, the social engagement process to develop water quality products for testing began. The COVID-19 situation prevented in-country follow-up, but two water quality product options are being explored: the National Disaster Management Organisation of Ghana is exploring a tool to determine the percentage of the population vulnerable to poor water quality, based on a fusion of data from a water quality index and on vulnerability, and the University of Fada N’Gourma in Burkina Faso is exploring a groundwater quality assessment based on remote sensing.

12. The concept for the Lake Victoria use case was presented at the African Great Lakes Stakeholder Network workshop held in November 2019. Alliance partners and local fisheries organizations shared relevant modelling and observation data. Potential water quality products and services that could be jointly designed included: (a) an assessment of coastal eutrophication, including

⁷ See www.globe-wq.info.

⁸ See www.unwater.org/un-water-launch-the-sdg-6-global-acceleration-framework/.

total phosphorus sources and loads, and the ranking of sub-basin loadings based on the three data sources mentioned above, and (b) validation of water temperature and stratification dynamics modelling. In addition, Alliance partners offered to collaborate with the Kenya Marine and Fisheries Research Institute on a joint assessment of sediment nutrient release linked to algae blooms in Kenya and Uganda.

13. The Cape Town aquifer use case comprises various aquifers in and around Cape Town that are earmarked for water supply to the city. The Cape Flats aquifer underlying most of the city is highly vulnerable to pollution from land-use activities, including small-scale agriculture and sand mining, and from landfill sites, cemeteries, industrial areas and informal settlements without proper sanitation. This has led to salinization and contamination with nutrients, microbiological and industrial contaminants, hydrocarbons and, possibly, contaminants of emerging concern. Extensive in situ monitoring data and remote-sensing (Earth observation) data, detailing land use and identifying pollution sources, and geographic information system-based vulnerability and flow modelling were used in the assessment. Feeding into stakeholder engagement, groundwater protection zones were proposed as a potential assessment product. The high variability of natural groundwater quality and the lack of historic water quality data had prevented assessments of the current state of deterioration. Nonetheless, the findings can be extrapolated to other urban centres with similar geological settings.

C. Support for a capacity-development consortium

14. Fostering water quality capacity development is a critical country demand. Based on expressions of interest from more than 30 Alliance members, in March 2020 the Global Environment Monitoring System/Water Programme (GEMS/Water) Capacity Development Centre proposed a concept for a capacity-development consortium. Between 2015 and 2020, the Centre had identified needs for capacity development globally, including to support the achievement of Sustainable Development Goal 6. Countries indicated that their priorities were: training on monitoring design, data management, groundwater monitoring, field training, and innovation monitoring, for example, biological monitoring and remote sensing. Areas of expertise, and existing and potential capacity development products, that could be shared by or developed within a consortium were evaluated through a questionnaire returned by 27 Alliance organizations. Based on those responses, draft criteria for consortium membership and terms of reference were prepared. These were to be discussed and agreed upon during the meeting of the Alliance capacity-development group in November 2020. The nomination of approximately 10 core consortium members is envisioned. The long-term goal is to secure Alliance support for GEMS/Water and the consortium in providing tailored capacity development beyond 2023.

D. Other Alliance workstreams

1. Social engagement and groundwater

15. Since its launch, the World Water Quality Alliance has promoted the strengthened implementation of the 2030 Agenda by bridging local solutions to global pressures through municipality engagement. A social engagement platform for water quality and related challenges and solutions was presented at the World Water Week organized by the Stockholm International Water Institute. A work plan for 2021–2023 was approved, focused on stakeholder engagement, and with an emphasis on the “knowledge to action” approach and the “renaissance” approach to science-culture-sustainability diplomacy,⁹ the translation of complex systems into simple language, and the creation of a best practice repository. The following actions are currently being taken: (a) translation, into local languages, of a municipality recruitment leaflet aimed at local and regional politicians, representatives of intermunicipal and interregional organizations, such as municipal associations; (b) recruitment of the first five lead municipalities from five continents; (c) initial approaches to relevant supranational entities, such as the European Commission (a preliminary meeting was held with the European Commissioner for the Environment on 2 October 2020); (d) enhanced networking for the Alliance and the social engagement platform; and (e) exploration of funding opportunities, primarily through the European Green Deal call and future clusters of Horizon Europe.

16. “Friends of Groundwater”, which formed in the context of the Alliance and comprises representatives from 20 organizations particularly concerned with groundwater, is developing a global perspective paper on the assessment of groundwater quality. The paper will highlight the importance

⁹ See Bernd Manfred Gawlik and others, “The scientist, the politician, the artist and the citizen: how water united them”, *Environmental Sciences Europe*, vol. 30, article 12 (2018).

of groundwater, the threats to groundwater quality from natural contaminants and human activities, and the special challenges to monitoring and assessing groundwater quality that arise from the three-dimensional nature of the resource, the long timescales involved in contaminant transport, and the overall scarcity of data. In the paper, the group will review existing sources of data, including field observations, Earth observation and models. The group is preparing a proposal for a global groundwater quality assessment, and to that end is compiling a contaminant inventory and providing a central information hub.

2. Water quality and health

17. Wastewater has emerged as a reliable indicator of the presence of SARS-CoV-2 in a population but is not itself a source of infection. The ability to detect RNA fragments of SARS-CoV-2 in wastewater is increasingly and independently being reported by research groups in nearly all European Union member States and beyond. When it became apparent that there was widespread interest in creating a “sentinel system”, a virtual town hall event was held under the umbrella of the World Water Quality Alliance to define the criteria for representative use cases. Related pressures include increased abstraction, the volume of plastic litter related to the COVID-19 response (masks and gloves), security issues regarding the supply chain for critical water treatment chemicals, and wastewater treatment infrastructure as a source of compounds of growing concern (for example, because of antimicrobial resistance).

18. Knowledge gaps are still widening, particularly with regard to the impact of emerging water pollutants, such as nitrogen and microplastics, and antimicrobial resistance. Antimicrobial resistance is a fast-growing threat caused by the overuse of antibiotics and subsequent exposure to, including through indirect consumption of, antibiotics through waterways. In 2015, 34.8 billion defined daily doses of antibiotics were consumed, with 30 to 90 per cent of them excreted into the environment as active substances. Some 700,000 people die from drug-resistant infections every year – seven times the number of deaths from cholera. If no action is taken, this number could reach 10 million by 2050 and generate economic losses of up to \$100 trillion. Against this backdrop, the World Economic Forum, in collaboration with the Swiss Agency for Cooperation and Development, commissioned a report on the impact of antimicrobial resistance spread through waterways. The report explores social, environmental and financial risks that antimicrobial resistance poses to businesses and society at large, including the impacts of an antimicrobial resistance-driven epidemic scenario; outlines potential opportunities for action to mitigate such risks; and emphasizes the importance of greater exchange and collaboration among public and private entities, including research institutions. The report builds on the latest science and the expertise emerging from existing initiatives. It aims to contribute to the ongoing work of the Alliance to raise awareness and identify key gaps and opportunities for further research.

19. As part of the Knowledge to Practice project linking water quality to health, funded by the Bill and Melinda Gates Foundation, an international research group developed a model-driven pathogen flow and mapping tool.¹⁰ Soon to be available through the World Environment Situation Room, the tool maps emissions of pathogens from sanitation systems to surface water. The potential impact of changes in population growth, access to improved sanitation facilities, and increased conveyance and treatment of wastewater and faecal sludge are further considered. The pathogen flow and mapping model builds on a wealth of available data on, among other things, population, sanitation (from the Joint Monitoring Programme for Water Supply and Sanitation of the World Health Organization and the United Nations Children’s Fund (UNICEF)) and disease prevalence. Users can apply default global data to simulate the pathogen emissions in their area or develop their own baseline and future scenarios. The maps provide an understanding of areas with emission hotspots and allow for comparison of scenarios.

3. Ecosystems and plastics

20. An expert group of Alliance members formed a task force focusing on ecosystems and has drafted a concept note and raised awareness of water quality in the context of ecosystem restoration. Network-building activities to foster collaboration were held; participating entities included the African Center for Aquatic Research and Education, the International Institute for Sustainable Development, the Africa Centre of Excellence in Aquaculture and Fisheries, the Lilongwe University of Agriculture and Natural Resources, the Research Centre for Limnology based in Indonesia, the Ministry of the Environment of Chile, and the Kenyan Marine and Fisheries Research Institute. Online courses to support ecosystem restoration were also held. The group’s work is closely linked with the

¹⁰ Available at <https://tools.waterpathogens.org/maps>.

Alliance use cases, and the group will produce a white paper in 2021 calling for coordinated action to restore ecosystems, which is particularly relevant in the context of the upcoming United Nations Decade on Ecosystem Restoration.

21. Through the Alliance, UNEP is finalizing a publication containing guidelines for the harmonization of methodologies for monitoring plastics in rivers and lakes to provide recommendations for harmonized monitoring and reporting and support the development and implementation of plastic debris monitoring programmes in freshwater systems.

II. Lessons learned

22. Tackling the global water quality crisis and focusing on the water, environment and health nexus, pursuant to resolution 3/10 and the complex, broad mandate given to UNEP therein, require a transdisciplinary partnership. The World Water Quality Alliance has enabled such a partnership by identifying and selecting highly qualified experts from the United Nations system (e.g., members of UN-Water) and elsewhere (e.g., members of the scientific community and other major stakeholder groups). The key motivator for partners to engage and act collectively to achieve shared objectives lies in the convening power of UNEP and its position as a successful liaison for global scientific and stakeholder communities. UN-Water therefore recognized the Alliance in the launch of the global acceleration framework for Sustainable Development Goal 6.

23. The work portfolio generated by the Alliance in little more than a year and the world water quality assessment innovation and demonstration outputs are both relevant to and useful for the science-policy interface of the UNEP Foresight¹¹ work and the World Environment Situation Room.

24. Ensuring appropriate delivery of the work requested under the mandate established by the Environment Assembly required additional resources. The World Water Quality Alliance, while taking an approach based, in principle, on voluntary commitment, has, in parallel, established branding that allows for cash and in-kind support to be generated from and by multiple partners. This includes a commitment by working group members to contributing to the global assessment. Multi-year support from the Government of Switzerland has played a fundamental role in securing Alliance operations and water-quality-related innovations to address key socio-environmental concerns.

25. The goal is for the world water quality assessment to be carried out at two scales: (a) globally, to provide a consistent context regarding the state of water quality and to identify water bodies at risk; and (b) at the water-body-to-river-basin scale, with the engagement of stakeholders, in order to identify and address their information and operational needs, thus supporting implementation of the 2030 Agenda on the ground (the use-case approach). Initial support from the Government of Switzerland for this pilot approach has been valuable, in particular with regard to testing the combination of the data-driven assessment of water quality hotspots (based on available information) with a social engagement process to foster the joint design of operational water quality products for application. While the pilot has been more successful in some places than in others, the key is to bring the right sector actors to the table, and initial experience with engaging resident coordinators has been promising. The COVID-19 pandemic has partially stalled some thematic work streams, such as in-country engagement.

26. In terms of capacity development, GEMS/Water – which is also the UNEP operational mechanism for monitoring and reporting on ambient water quality (Sustainable Development indicator 6.3.2) – has received multiple support requests from countries. GEMS/Water in its current format and with its current funding will not be able to respond fully to those requests. Financial support from the Government of Ireland will expire after 2023. However, drawing on the work of the World Water Quality Alliance, GEMS/Water is making progress in establishing a capacity development consortium of partners for the joint development and delivery of coherent, high-level, tailored capacity development initiatives and in broadening the resource base.

27. The European Union umbrella project addressing SARS-CoV-2, coordinated by the Joint Research Centre, illustrates a renaissance of interest in the relationship between health and environment, providing insight into the COVID-19 crisis and its links to the quality and availability of water. Perspectives on analytical methodology and innovation evolve dynamically, including with regard to sewer surveillance, which has been used successfully for SARS-CoV-2 monitoring in wastewater and sewer systems, and possible assessments. This may relieve some of the monitoring pressure on health systems. The COVID-19 crisis has aggravated the already precarious situation

¹¹ See <https://environmentlive.unep.org/foresight>.

regarding water, sanitation and hygiene for all, in particular in conditions of extreme poverty and in conflict areas.

28. The Alliance has, in just over a year, attracted various expert groups developing work streams focusing on water quality, including in relation to health.

III. Recommendations and suggested actions

29. The Environment Assembly may wish:

(a) To invite Member States to engage in and support the World Water Quality Alliance; its monitoring and assessment work; its efforts to foster collaboration between Member States and UNEP in the area of data, information and sharing, including the development of open consensus-based standards to foster citizen science; its stakeholder engagement-based, solution-oriented work streams; and its science and policy processes, including the health nexus, by, for example, identifying partners and resources for achieving Sustainable Development Goal 6 and its related targets;

(b) To invite Member States to provide additional support to GEMS/Water through the general trust fund to provide support to GEMS/Water and to promote its activities in order to better and sustainably meet countries' demand for water quality monitoring, data management and analysis, and capacity development beyond 2023, including innovative online training, as the COVID-19 pandemic continues to reduce options for in-country capacity development.
