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Contribution by UNEP

to the CSTD 2022-2023 priority theme on "Ensuring safe water and sanitation for all: a solution by science, technology and innovation"

Inputs UNEP – 21 July 2022

1. Can you give examples of projects/policies in your organization helping countries improve the management of water and sanitation and provide access to safe water and sanitation for all? What are the main challenges confronted (including the gender dimension) while trying to implement these projects/policies?

ACT Malaysia, one of the youngest members of the Global Wastewater Initiative, has teamed up with UNEP to build the capacity of the local community on wastewater management and sanitation provision at the Lok Urai Village, Gaya Island in Sabah, Malaysia. The first phase of the project aimed at testing the feasibility of ISTP wastewater treatment technologies in a water settlement located at Sabah Marine National Park in Malaysia. The results of this project are now contributing to phase two that aims to empower local communities (with a focus on women) to stop wastewater pollution into their natural environment. By reducing wastewater pollution, better quality water can sustain marine-related economies. Ultimately, the project is expected to contribute to the development of policies for the long-term conservation of coastal water quality as well as for tackling wastewater pollution.

In Tanzania, UNEP partnered with the Bremen Overseas Research and Development Association (BORDA), another member of the Global Wastewater Initiative, to develop and disseminate the Guidelines for Application of Small-Scale, Decentralized Wastewater Treatment Systems. The collaboration with BORDA in Tanzania dates back to 2016, when a first UNEP-UN-Habitat-BORDA project triggered practical and policy action on decentralized wastewater treatment systems, which are essential to tackle the issue of lack of sanitation provision and wastewater management.

Another project, currently in its final phase of implementation, relates to the recovery of nutrients from wastewater in Delhi, India. The project assesses the best treatment technology for such purpose and aims to develop an ecosystems health report card (EHCR) for three lakes in the area of Delhi.

Past projects include EcoSan sanitation for local communities in Georgia; wastewater reuse for irrigation, afforestation and reforestation in Egypt, Morocco and across countries of West Africa.

UNEP's Science Division is currently establishing an Innovation Facility to catalyse the uptake of innovative solutions to environmental challenges. The facility will utilise science-based scanning processes to identify waste and wastewater solutions (among others). UNEP will work in partnership with governments and the private sector to increase awareness and catalyse the uptake and financing of these solutions.

As custodian agency for SDG indicator 6.3.2 on ambient water quality, UNEP provides support to countries in reporting on the indicator. This includes the definition of ambient water quality standards that are needed to manage freshwater ecosystems. The definition of these standards is complex, as natural conditions can vary regionally and even from water body to water body and monitoring data that are needed to derive long-term water quality trends are not available in many countries. In general, many countries suffer from a scarcity of data on ambient freshwater quality. UNEP provides capacity development on all aspects of ambient water quality monitoring. An example of country impact can be found here: https://www.unep.org/news-and-stories/story/how-sierra-leone-taking-water-pollution

Several Regional Seas have adopted a Land-based sources protocol which provide a legal framework for waste management, particularly terrestrial sources. The LBS protocols provide countries with the obligation to prevent, reduce and eliminate pollution in oceans. The protocols support Regional Seas countries to meet

their obligations under the United Nations Convention on the Law of the Sea (UNCLOS)[1] and the Global Plan of Action for the Protection of the Marine Environment from Land-Based Activities (GPA).[2]

In the Wider Caribbean, obligations under the LBS Protocol for wastewater are provided in ANNEX III (domestic wastewater) of the Protocol[3]. The Cartagena Convention's Protocol Concerning Pollution from Land-Based Sources and Activities (LBS) is the only legally binding regional framework for improving sanitation and reducing pollution from land-based sources and activities. The Protocol was adopted in 1999, entered into force in 2010, and has catalysed the development of sub-regional and regional projects aimed at improving water resources and wastewater management.

The ongoing projects at the Cartagena Convention Secretariat that support UNCTAD's priority theme 2 are the European Union-funded project on capacity building relating to Multilateral Environmental Agreements in African, Caribbean and Pacific States - Phase III (ACP MEAs 3) and two GEF-funded projects – Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States (IWEco) and CReW+: An integrated approach to water and wastewater management in the Wider Caribbean Region using innovative solutions and sustainable financing mechanisms.

Barcelona Convention Contracting Parties adopted COP 15 Decision IG.17/6 to progressively apply the Ecosystem Approach to the management of human activities that may affect the Mediterranean marine and coastal environment for the promotion of sustainable development. Contracting parties also adopted a list of 11 Ecological Objectives, including eutrophication, pollution and marine litter (COP 17 Decision IG.20/4) well as an Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP) (COP 19 Decision IG.22/7) to allow for regional monitoring and assessment. IMPA has developed national monitoring and centralized data collection, contributing to Quality status reports featuring, among other, food, water security and sanitation. At present, a roadmap is being implemented for the preparation of a fully-data based Quality Status Report in 2023 (2023 MED QSR).

Barcelona Convention Contracting Parties adopted the Criteria and Standards for bathing waters quality (Decision IG.20/9 - 2012) in the framework of the implementation of Article 7 of the LBS Protocol, to harmonise their legislation for generation of homogeneous data in the region.

UNEP/MAP implements a GEF-funded project "The Mediterranean Sea Programme: Enhancing Environmental Security (MedProgramme)" that aims 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. MedProgramme is an assortment of seven interconnected Child projects structured around four components: Reduction of Land Based Pollution In Priority Coastal Hotspots and measuring progress to impacts; Enhancing Sustainability and Climate Resilience in the Coastal Zone; Protecting Marine Biodiversity; and Knowledge Management and Programme Coordination. Implementation of the project is underway in 10 beneficiary countries sharing the Mediterranean Sea.

The Nairobi Convention's WIOSAP project (Implementation of the Strategic Action Programme for the protection of the Western Indian Ocean from land-based sources and activities) addresses major threats to critical coastal and marine ecosystems of the Western Indian Ocean region. One of its components is to improve water quality of coastal "receiving" waters. The component focuses on the need for the region's water quality to attain international standards by 2035. Demonstration projects ongoing in four countries –

[1] http://www.unclos.com/

[2] https://www.unep.org/explore-topics/oceans-seas/what-we-do/addressing-land-based-pollution

[3] https://wedocs.unep.org/bitstream/handle/20.500.11822/34544/LBS_Protocol-en.pdf?sequence=1&isAllowed=y

Kenya, Madagascar, Mozambique, Tanzania, Seychelles, and South Africa. In Tanzania, a demonstration project on river Rufiji will reduce impacts from land-based sources and sustainably manage critical river catchments through Environmental Flow (Eflows) Assessment. The Seychelles project will treat wastewater from a small-scale piggery and use best practices to mitigate impacts.

The recently concluded Tenth Meeting of the Conference of Parties to the Nairobi Convention (COP10) held in November 2021, adopted Decision CP.10/10 on Water Quality and Marine litter. Through this decision the contracting parties requested the secretariat to (1) establish a regional task force on water quality to support the development of a water quality monitoring framework and guidelines on national interventions, and for adoption by a meeting of national focal points before the eleventh meeting of the Contracting of Parties. (2) and partners to finalise the preparation of a regional action plan to address marine litter and plastic pollution for adoption at the eleventh meeting of the Contracting Parties.

B) What are the main challenges confronted (including the gender dimension) while trying to implement these projects/policies?

Some of the major challenges faced include:

- Lack of financial support: in many instances, wastewater management and sanitation provision is not on top of the political agenda.
- Collaboration between public and private sectors: in some cases, the returns in the wastewater sector are not as high as some private sector entities expect.
- Lack of valuable data: data is somehow missing. This is particularly true when it comes to assessing the impact of wastewater pollution towards some fragile marine and coastal ecosystems (i.e., coral reefs, mangroves).
- Implementation of developed guidelines: in some cases, we lack the means or data, or there is no feed on information from stakeholders when it comes to tracking the progress made after releasing a publication, a tool, or any other valuable material.
- Gender: in many cases, wastewater management and sanitation provision are still jobs for men. Despite huge progresses when it comes to accessing loans for the installation of toilets, or wells, the gender gap when it comes to this sector is still remarkable.
- UN system, policies, and infrastructure are not structured to facilitate partnerships with the private sector to support accelerated adoption of innovative solutions.
- Lack of national technical capacity
- Lack of political will.
- External factors resulting in changed national priorities and delayed responses from project focal points.
- Lack of internalization of financial costs to human health and the environment resulting from inadequate sanitation or poor water quality.
- Lack of awareness/advocacy from the general public.
- Lack of appropriate monitoring and assessment programmes.
- Inadequate coordination among multiple national and regional agencies.
- Sometimes the UN system, policies, and infrastructure are not structured to facilitate partnerships with the private sector to support accelerated adoption of innovative solutions.

2. Could you share specific examples that have successfully used STI, including frontier technologies (e.g., AI, drones, etc) or other forms of innovation in general in addressing the above challenges?

Apart from supporting countries on traditional, government-led in-situ monitoring of ambient water quality, UNEP is working with countries on obtaining data from alternative data sources. UNEP works for example with citizen science initiatives to promote the generation of ambient water quality data and at the same time ensuring that monitoring programmes are co-designed by communities so that information and knowledge derived from these data are meaningful and useful for communities.

In Malaysia, the project "Smart Sanitation for Water Settlements" is a project designed to tackle pollution and reverse the degradation of marine and coastal ecosystems due to lack of sanitation and wastewater treatment in the Lok Urai water village, close to the Sabah Marine National Park, Malaysia. The project has seen the installation of 10 ISTP tanks and 10 residents were trained in the installation and maintenance of the tanks. The technology brings innovation where no sanitation and wastewater treatment systems are in place, with benefits for the environment and human health. Despite the pandemic, ACT Malaysia worked closely with the local community to ensure that the tanks were properly installed, and the households trained on how to use and maintain them.

Regional Seas Conventions and Action Plans have adopted satellite-based monitoring methodologies for chlorophyll a. For example, in 2021, Northwest Pacific Region Environmental Cooperation Centre (NPEC) successfully developed 'The Global Eutrophication Watch' for mapping coastal eutrophication on a global scale using satellite remote sensing. Eutrophication is an emerging global issue associated with the increasing anthropogenic nutrient loading. The methodology applied in the Global Eutrophication Watch is part of the Common Procedure for the eutrophication assessment of the NOWPAP Special Monitoring & Coastal Environmental Assessment Regional Activity Centre (CEARAC).

CEARAC is one of the four NOWPAP Regional Activity Centres (RACs) in Toyama, Japan responsible for coordination of regional activities for assessment of the state of the marine, coastal and associated freshwater environments, including assessment of pollutants input for the purpose of comparison with the monitoring results.

In July 2020, the Group on Earth Observations (GEO) and Google Earth Engine (GEE) awarded the "Development of a Near Real-Time Monitoring System for Marine Coastal Eutrophication Using Google Earth Engine". The project is among 32 projects from 22 countries to address some of the biggest global challenges using open Earth Data. This project is led by Professor Joji Ishizaka, Institute for Space-Earth Environmental Research, Nagoya University, in collaboration with the Northwest Pacific Region Environmental Cooperation Center (NPEC), the Japan Aerospace Exploration Agency, GOOGLE, LLC, the United Nations Environment Programme (UNEP), NOWPAP, and the Japan Association for the UNEP. The project will last for two years. It will produce an interactive map of potential eutrophication area over the global ocean to help the NOWPAP Member States and countries around the world to manage eutrophication and report their progress under the 2030 UN Sustainable Development Agenda. The long-term consistent chlorophyll-a data set will help climate studies as well.

The Cartagena Convention Secretariat has developed regional reports that have addressed the technical capacity constraints at the national level including for the generation and analysis of wastewater sources and impacts. These include:

- Use of citizen science and modelling in the development of State of the Cartagena Convention report (SOCAR) on marine pollution and Regional Nutrients Pollution Reduction Strategy and Action Plan, which document the major sources and impacts of wastewater pollution.

Several innovative and targeted briefs for multiple targeted audiences were developed to address the lack of awareness, advocacy and support by the general public and senior decision makers.

- Targeted briefs, including an integrated summary on pollution and its impacts on marine habitats, were prepared for specific audiences, namely policymakers, civil society and private sector.

Regional and Sub-Regional Data and Information Management Platforms and Systems are being developed to address the challenge of intersectoral communication, and the overlap and duplication in the design and implementation of water and wastewater management programmes, projects and activities.

Other relevant initiatives with the UNEP-DHI center are:

1. Nature-based solutions for climate resilience, Somalia: modelling and analysis of NBS to mitigate flood risk, with interaction with Somali counterparts.
   See UNEP story: https://www.unep.org/news-and-stories/story/reducing-impact-flash-floods-somalia-study
2. Freshwater Ecosystems Explorer (661 app): Leverages the best available science and data to track, monitor and improve the health of freshwater ecosystems, globally, for SDG 6.6.1.
3. SECCCI: Support for Effective Cooperation and Coordination of Cross-border Initiatives in Southwest Ethiopia-Northwest Kenya, Marsabit-Borana & Dawa, and Kenya-Somalia-Ethiopia' (SECCCI): to enhance the sustainable management of the Omo-Turkana, and the Dawa-Jubba-Shabelle river basins, in collaboration with the governments and technical experts of Kenya and Somalia. Involves harvesting Earth Observation data to continually update decision-making portals, and involved training of government stakeholders.
4. Global assessment and risk warning system of macro plastics in freshwater ecosystems: state-of-the-art technology and approach.
5. Climate resilience in West Africa: Strengthened government capacity in STI: delivered training to government counterparts in use of UNEP-DHI's Flood and Drought Portal, which also relies on Earth Observation data. In partnership with Global Partnership for Sustainable Development Data.
6. WASSMO: Strengthened regional capacity. Water and Sanitation Sector Monitoring System (WASSMO), for African Ministers' Council on Water (AMCOW). Regional application for Africa. UNEP-DHI developed the system in collaboration with AMCOW, and through training and long-term partnership, AMCOW now have the capacity to maintain and update the system on a sustainable basis.
7. Global Hydrological Model (GHM): innovative use of AI and 'big data' to provide modelling data. Various applications, including in plastics risk warning system.
8. UNCCD drought Toolbox: large number of tools and data, with training courses provided.

3. Can you provide examples of policies/projects/initiatives specifically aimed at strengthening national STI capabilities to address these challenges?

Initiatives developed to strengthen national STI capabilities and address these challenges:

- The Sanitation and Wastewater Atlas of Africa (2021)
- Toolkit and catalogue on water pollution by plastics and microplastics (2020)
- Faecal sludge management in Africa: Socioeconomics aspects, human and environmental health implications (2020)
- The Guidelines for application of Small-scale, Decentralized Wastewater Treatment Systems (2018)

- SickWater+10 report (forthcoming late 2022)

Science Division's Enabling Innovation Unit develops guidance documents like 'An approach for Scanning for Innovation' and 'Environmental and Social Safeguards Standards for Assessing Innovations', which countries can utilise for identifying viable and scalable solutions to environmental challenges. As a next step, UNEP will coordinate with national governments and stakeholders for broader adoption of these tools.

- A Regional Strategic Action Plan for Governance and Building Climate Resilience in the Water Sector in the Caribbean (RSAP) was developed. A regional committee involving multiple UN and regional agencies was established to facilitate cooperation and the implementation of this Plan.

- Under GEF IWEco, an Action Framework for Integrated Water Resources Management (IWRM) for the CARICOM Region was developed to strengthen the policy, legislative and institutional mechanisms and capacity building for Integrated Water Resources Management (IWRM) and ecosystem services management, while increasing climate and disaster resilience.

- A conceptual framework was developed under GEF CReW+ to promote better incorporation of integrated water resource management into the Cartagena Convention. The main purpose of the framework is to identity strategic approaches or issues that offer the potential to create synergies for the protection of the marine environment and trigger integrated processes for joint investments and governance.

- A technical paper was developed on the management and regulation of nutrients (nitrogen and phosphorus) in domestic wastewater discharges into the Caribbean Sea. It also presents a case study for the use of reclaimed water in a water-scarce Small Island Developing State - Barbados.

- The Cartagena Convention Secretariat will be developing further assessments on the state of the marine environment of the Wider Caribbean to improve data and information management on marine pollution and marine biodiversity. Data generated from the existing reports are being incorporated into a regional pilot of the World Environment Situation Room. This regional platform will also facilitate the compilation of information from national monitoring and assessment programmes, strengthen science-policy linkages, support regional reporting on international agreements, and support the monitoring of the Regional Nutrient Pollution Reduction Strategy and Action Plan, and Regional Strategy and Action Plan for the Valuation, Protection and/or Restoration of Key Marine Habitats in the Wider Caribbean 2021 – 2030.

- The Institute of Marine Affairs in Trinidad and Tobago, one of the Regional Activity Centres for the Cartagena Convention's Protocol Concerning Pollution from Land-Based Sources and Activities (LBS), in partnership with United States National Oceanic and Atmospheric Administration (NOAA), is leading the Integrated Early Warning Systems on Oil Spills and Sargassum. In 2021, Trinidad and Tobago became the first country in the Wider Caribbean Region to set up an operational near-real-time satellite oil spill monitoring programme and started issuing reports for their Exclusive Economic Zone. Representatives from government agencies also received training from NOAA on satellite oil spill monitoring.

The following projects collectively are supporting the strengthening of STI capabilities in the Wider Caribbean Region

ACP MEAs III

This programme has facilitated partnerships with the Gulf and Caribbean Fisheries Institute and Global Water Partnership Caribbean where small grants are being offered for community-based marine litter prevention and wastewater pollution reduction projects respectively. Their focus will be on innovation, citizen science resulting in improved monitoring of water pollution sources and impacts.

GEF CReW+

This project aims to implement innovative, technical, small-scale solutions in the Wider Caribbean, using an Integrated Water and Wastewater Management (IWWM) approach and building on existing sustainable financing mechanisms.

Relevant activities include the development of:

1. National and Regional Data and Information Platforms on Water and Wastewater management
2. Use of Innovative approaches including Nature Based and Decentralized Solutions for Water and Wastewater Management
3. Publication of a Compendium of Wastewater Treatment Technologies for Sanitation with a focus on Decentralized approaches
4. Development of an online GEF CReW+ Academy to facilitate ongoing training of water and wastewater operators.

GEF IWEco

GEF IWEco is a multi-focal, regional project that builds upon the work of previous initiatives, to address water, land and biodiversity resource management, as well as climate change in ten participating countries.

- In Barbados, this project has reintroduced and encouraged the practice of planting hedgerows, establish nurseries for the Khus Khus (a.k.a. Vetiver) and lemon grass, and to reinstate hedgerow between agricultural fields, roads and gully systems as a pollution reduction measure.
- In Cuba, 60 farmers were trained to assemble and operate biodigesters for pig waste. This is expected to result in a significant reduction of waste discharge in water sources as well as reduced emissions of methane gas and nitrous oxide. The methane produced in the biodigesters will be used for cooking and lighting, thereby reducing the use of firewood and improving family health.
- In Saint Kitts and Nevis, a water harvesting and storage system was developed to supply an organic farm system, resulting in improved productivity and livelihoods. Training was provided in agriculture and water conservation practices and a solar operated pump was installed to transport water from the catchment to their plots.
- In Trinidad and Tobago, vetiver grass was used as a rehabilitation intervention to address land degradation at selected quarry sites in northeast Trinidad. Members of nearby communities were trained in land rehabilitation and sustainable planting techniques at three former quarry sites. They have also learnt how to use vetiver grass to make a variety of products, such as soaps, baskets and fragrances, thereby creating alternative livelihood opportunities.
- A partnership with UNITAR and online training was used to develop a comprehensive training programme on laboratory monitoring and analysis to address the lack of capacity for monitoring and assessment of water quality and wastewater effluent.

United Nations Jamaica Human Security Programme (concluded)

Water security was addressed under the Joint UN Jamaica Human Security programme "Strengthening human resilience in Northern Clarendon and West Kingston". The project improved water security for urban and rural communities and particularly among vulnerable groups (women, youth, persons with disabilities).

A rainwater harvesting tool titled Hello Water was developed to guide multiple users (farmers, businesses and householders) on how to choose, install and maintain water harvesting units. Three schools in Northern Clarendon, Jamaica also benefitted from rainwater harvesting systems and wastewater reuse systems.

4. Could you share case studies of regional/ international cooperation that have strengthened STI developing countries' capacities in managing water and sanitation and improve their access for all?

The Global Wastewater Initiative (GW^2I) was established to address the many challenges of wastewater management. The Initiative is a multi-stakeholder platform that brings together different organizations, from the United Nations, non-governmental organizations, the academia, the private sector, development banks, and others, to step up efforts against wastewater pollution worldwide, and change the paradigm of how wastewater is commonly seen, from simple waste to a valuable and rich resource. Besides the tools mentioned above, the projects worth recalling are with ACT Malaysia in Malaysia, with BORDA in Tanzania, as well as with Sustainable India Trust (SIT) in India.

Another case study is UNEP's work on water quality in Sierra Leone: https://www.unep.org/news-and-stories/story/how-sierra-leone-taking-water-pollution