UNESCO-Division of Water Sciences' contribution to SDG-13

SDG13: Take urgent action to combat climate change and its impacts

Through its initiatives related to address Climate Change and its impacts SDG-13, UNESCO-IHP supports countries in identifying and addressing their information gaps and needs when it becomes essential to managing the risks resulting from the changing hydrological and climatic impacts. This is achieved by strengthening global, regional and local capacities and by providing access to data for policy recommendations and for more integrated hydro-climate risk management. To that effect, UNESCO-IHP supported the development of an integrated flood and drought monitoring and forecasting system for Asia, Africa and Latin America. The system tracks hydrological conditions, including extremes (e.g. floods and droughts), in near real-time and allows medium-term and seasonal forecasting. It therefore provides monitoring capabilities for meteorological, hydrological and agricultural drought and flood conditions, which is particularly useful in developing regions where institutional capacity for monitoring and early warning is generally lacking, and access to information and technology prevents the development of such systems locally. The system has been successfully deployed in Western, Eastern and Southern Africa combined with training of experts and is being used as a complementary information system by regional institutions to monitor agro-hydro-meteorological conditions, particularly during the rainy seasons.

Similarly, UNESCO-IHP has collaborated with the Centre for Hydrometeorology and Remote Sensing (CHRS) at the University of California, Irvine, on the development of tools to provide near real-time global satellite precipitation estimates at high spatial and temporal resolutions, including the Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks-Cloud Classification System (PERSIANN-CCS). This specific system provides essential information for emergency planning and management of hydrological risks, such as floods, droughts, and other extreme weather events. For example, the Namibia Hydrological Services (NHS) uses this system to prepare daily bulletins with up-to-date information on flood and drought conditions for local communities. The system is now available through the iRain mobile application, specially designed to facilitate people's involvement in collecting local data for global precipitation monitoring (http://en.unesco.org/news/irain-new-mobile-app-promote-citizen-science-and-support-water-management). iRain allows users to visualize real-time global satellite precipitation observations, track extreme precipitation events worldwide, and report local rainfall information using a crowd-sourcing functionality to supplement these data. It also provides on-the-ground information which can improve remote sensing precipitation estimations.

Furthermore, UNESCO's IHP is supporting Member States in integrating climate change measures into national policies, strategies and planning. In particular, IHP seeks to first model the effects climate change will have on a country and then develop a strategy and an operational plan for engineering works that can be undertaken to enhance the country's resilience. The initiative includes strengthening human resources capacity on the methodology used to continue the process even after UNESCO's support is completed. This is a long term (10 years) research project for developing countries in Africa and Asia (two countries per year, one country per region).

In this context, UNESCO-IHP is also working with Member States to galvanise action to address water challenges in Caribbean Small-Island Developing States (SIDS) through raising the visibility and urgency of issues at the highest level of decision-making. UNESCO-IHP will co-organise a Ministerial Summit in October 2019 in St Kitts and Nevis, aimed at reinforcing the understanding of impacts on and challenges to water resource management and integrating scientific and traditional knowledge as the basis for decision-making. The outcome

of this Summit will be a Ministerial Declaration, which will establish a foundation to accelerate the development of sustainable and effective solutions to the region's water challenges.

IHP promotes climate-resilient water-related infrastructure, provides hydro-climate services such as data, tools and methodologies, and policy briefs to develop adaptation strategies.

UNESCO recently released a handbook for decision-making under climate uncertainty called Climate Risk-Informed Decision Analysis (CRIDA). This bottom-up approach to decision-making under climate change engages local stakeholders from the outset to identify risks and solutions. CRIDA integrates analytical and stakeholder approaches to assess impacts and risks within a quantitative framework. Decision-makers can negotiate performance trade-offs between ecological, infrastructure, and social resilience. CRIDA emphasizes a shared vision between stakeholders and decision-makers to define robust, flexible solutions. UNESCO-IHP within the framework of CRIDA has engaged with various stakeholders in different regions to design a robust Climate Stress Test using a bottom-up approach to identify uncertainty of climate projection for water resources management in cooperation and collaborations with Category II Centres and Centre of Excellences. UNESCO-IHP has undertaken case studies based on CRIDA and other citizen sciences approaches, which advocate to move away from the 'one size fits all' approach, and to pursue locally embedded solutions to the specific threats to water insecurity due to climate and other global changes (see https://unesdoc.unesco.org/ark:/48223/pf0000265895)

Within the framework of its groundwater and climate change programme (GRAPHIC) (http://en.unesco.org/graphic), UNESCO-IHP undertook an in-depth assessment of climate variability impacts on total water storage across Africa using information provided by satellite observations. Results indicate that rainfall patterns associated with El Niño Southern Oscillation (ENSO) and the North Atlantic Oscillation (NAO) are the main drivers of inter-annual water storage changes in Sub-Saharan Africa and Northern Africa, respectively. The Atlantic Multi-decadal Oscillation (AMO) plays a significant role in decadal to multi-decadal variability, particularly in the Sahel. The findings of the study provide considerable information to decision-makers to adequately prepare effective climate variability and adaptation plans both at national and transboundary level through river basin organizations.

UNESCO-IHP has been providing data, tools and methodologies to support implementation of SDGs and the Paris Agreement, including ways to enhance resilience to climate-related disasters, and address both urban and rural water needs. These include among others:

- Mega Cities Alliance for Water and Climate
- Drought observatory in Chile and Peru
- Drought Atlas in Latin America and the Caribbean (a similar one is in preparation for Africa)
- Floods and drought monitoring system deployed in Africa and Latin America and the Caribbean
- The Andean Glacier and Water Atlas: Impact of Glacier retreat on water resources https://unesdoc.unesco.org/ark:/48223/pf0000265810
- Climate Risk Informed Decision Analysis (methodology published) https://unesdoc.unesco.org/ark:/48223/pf0000265895

The aim of the Megacities Alliance for Water and Climate Change is to establish a cooperation platform of Megacities that can exchange knowledge and best practices on solutions in adapting to climate change from a water resources and services management perspective.

UNESCO-IHP engages youth and young water professionals at the United Nations Climate Change Conference of the Parties (COP) by supporting the organisation of youth-led events and organizing events that provide visibility for youth-led projects, research and innovation. This approach raises the awareness of young professionals and stakeholders about youth-led solutions for climate change, facilitates the active learning of youth as speakers and the engagement of youth as leaders who provide solutions to addressing SDGs 13 and 6. In this context, during COP 24 in Katowice, Poland, IHP organized three youth-related events. In partnership with the European Regional Centre for Ecohydrology of the Polish Academy of Sciences, UNESCO-IHP organized a session on, 'Ecohydrology for the mitigation of Climate Change effects on water-related ecosystems – Youth Perspective.' This session was held during the Conference of Youth (COY) – Global COY. The main objective of the session was to sensitize youth about Ecohydrology and promote its solutions, which contribute to achieving water security and addressing climate change. The session also allowed the youth at the forum to discuss the research projects of young scientists studying Ecohydrology. During the session, materials on Ecohydrology and the journal of Ecohydrology and Hydrobiology were distributed to encourage the youth present to further explore the discipline.

The two other youth related events organized by UNESCO-IHP at COP 24 focused on Youth-led solutions that address Water-related Climate Change Challenges. One of these events was organized with the Office of the President of Indonesia's Special Envoy on Climate Change. These three events mobilized 120 persons at COP 24 and allowed the youth to speak about their research and innovative actions that address water related climate change challenges. The sessions also looked at the opportunities available to youth for meaningful engagement in climate change negotiations and the importance of including youth from indigenous communities.

Recognising the disproportionate impacts of climate change and in particular, water insecurity on men and women, UNESCO-IHP works to integrate UNESCO's Priority Gender into its programmes. A "gender lens" is applied to UNESCO-IHP's activities to ensure that water security responses are gender sensitive, adequately consider the differing needs of women and men, and raise awareness of the important link between water and gender.

Water systems are inextricably linked and must be managed in an integrated fashion based on reliable information. However, in times of "data overwhelm" and plethora of publications, the risk of (partly) contradicting information and fragmentation often leads to unsustainable or ineffective policies. Therefore, it is critical to produce authoritative, evidence-based knowledge and sound policy recommendations to guide and assist Member States in the assessment, definition, elaboration and monitoring of sustainable water policies. The UN World Water Development Report (WWDR) series, coordinated and published by UNESCO World Water Assessment Programme (WWAP), fulfil this task by connecting and synthesizing information from competent UN entities and prominent partners through the mechanism of UN-Water. Since its first edition in 2003, WWDR has been recognized a flagship product of the UN system on freshwater. 2020 edition of the WWDR will be on Water and Climate Change.

Existing water assessments are often inadequate or incomplete for sound decision-making in balancing the different water uses and adapting to increasing climatic variability and the impacts of other global drivers. To this end, it is crucial to fill these gaps to develop or further

strengthen policies and strategies in water domain. One of the major data gaps is in terms of water and gender. WWAP has aligned itself with the gender priority of UNESCO and been leading since 2014 the pioneering initiative of Gender-responsive Water Monitoring Assessment and Reporting. As a part of this initiative, WWAP, in collaboration with experts, developed a comprehensive Toolkit (comprising a robust methodology and indicators) for the collection of sex-disaggregated data on water. The indicators and methodology has been successfully tested in selected pilot areas to verify its feasibility, applicability, impact and effective support potential to countries. In 2018, the Toolkit has been endorsed by the 23rd Inter-governmental Council of the UNESCO International Hydrological Programme. Water and Gender toolkit has recently been revised to integrate lessons learned from field tests and incorporate new indicators in line with the SDGs of the 2030 Sustainable Development Agenda, including indicators related to SDG13 and its link with water and gender.