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International
Hydrological
Programme

IHP-VIII Thematic Area 3

Addressing Water Scarcity and Quality

Activities and Outcomes 2014-2015

International Hydrological Programme
Division of Water Sciences

THE CONTEXT

For many countries, water scarcity represents the most pressing challenge to socio-economic and human development. Water scarcity can be exacerbated by climate change, especially in arid and semi-arid zones which are already water-stressed. Protection of the world's freshwater resources requires that the human impact on the earth's environment and climate be collectively addressed. Investment in programmes that protect the natural environment, conserve water and use water efficiently is critical.

Water quality degradation is becoming one of the greatest threats to freshwater sustainability and availability, in addition to its negative health and environmental impacts. Poor water quality negatively affects human health and ecosystems in multiple ways, reducing water availability and making it unfit for different uses. Rapid urbanization, high population densities, intensive use of fertilizers and pesticides in agriculture, land degradation, and inadequate wastewater and waste management are the primary causes of water pollution. Water and wastewater treatment is expensive and a challenge to developing countries. Action is needed to improve water quality and wastewater management.

Objectives include promoting catchment based water resources planning and decision-making, as well as supporting a policy shift towards water demand management and good water governance practices. There is also a need to strengthen the knowledge base on the quality of the world's freshwater resources, integrate quality-quantity management and science-based decision-making, enhance legal, policy and institutional frameworks for improved water quality management, and promote new and innovative tools for water quality management and pollution control.

"Addressing Water Scarcity and Quality" is the third of the six themes that structure the Eighth Phase of the International Hydrological Programme (IHP-VIII, 2014-2021), which focuses on "Water Security: Responses to Local, Regional and Global Challenges".

Theme 3 revolves around five different focal areas:

Focal Area 3.1 – Improving governance, planning, management, allocation and efficient use of water resources

Focal Area 3.2 – Dealing with present water scarcity and developing the foresight to prevent undesirable trends

Focal Area 3.3 – Promoting tools for stakeholder involvement and awareness, and conflict resolution

Focal Area 3.4 – Addressing water quality and pollution issues within an IWRM framework, improving legal, policy, institutional and human capacity

Focal Area 3.5 – Promoting innovative tools for the safety of water supplies and controlling pollution.

The first two years of IHP-VIII coincided with the 2014-2016 biennium of UNESCO. During this period, IHP implemented several activities and projects in the different regions of the world to address water scarcity and quality.

HIGHLIGHTS FROM KEY IHP ACTIVITIES (2014-2015)

North America and Europe

Providing real-time precipitation data: The RainMapper App

UNESCO's Programme for Water and Development Information for Arid Lands - a Global Network (G-WADI), in cooperation with the University of California-Irvine's Centre for Hydrometeorology, developed a GeoServer for Remote Sensing accessible on-line (CHRS; http://chrs.web.uci.edu/), to provide real-time precipitation data. The GeoServer is a tool that harnesses remotely sensed information to observe, monitor and analyze extreme weather events as they occur. A G-WADI PERSIANN-CCS App for iOS and Android devices,RainMapper, was developed in 2015 and can be freely downloaded from the Apple Store and Google Play.

AG-WADI network for South East Europe

IHP, the International Drought Initiative (IDI) and Water for Sustainable Development and Adaptation to Climate Change (WSDAC) organized a meeting on 17-18 December 2014 entitled «Water for Sustainable Development and Adaptation to Climate Change», hosted by the Institute for the Development of Water Resources (JaroslavČerni) in Belgrade, Serbia. Attended by representatives and experts from the region, the meeting launched the South East European secretariat for the G-WADI Programme. G-WADI South East Europe (SEE) brings together drought-prone countries in the region to enhance cooperation among regional institutions – such as the University of Thessaloniki, the WSDAC-Belgrade, and DMC-Ljubljana – to better support adaptation to climate change in the SEE region.

Supporting the implementation of SDGs: Water quality and wastewater

As the Academia Stakeholder Coordinator, UNESCO convened four Academia Stakeholder sessions during the UN-Water Annual International Zaragoza Conference on Water and Sustainable Development, bringing together approximately 20 researchers from different regions. These sessions focused on four main topics:water and sanitation; water quality; water resources management in a changing context; and risk management and water monitoring for the SDGs. Through these sessions, UNESCO promoted the sharing of state-of-the-art scientific and research information supporting the implementation of different SDG water targets, particularly those on water quality and wastewater.

Addressing water quality issues in Europe

The UNESCO International Initiative on Water Quality (IIWQ) Regional Meeting on "Water Quality in Europe: Challenges and Best Practices" was organized in Koblenz, Germany, in December 2015. The meeting brought together about 46 experts from European countries, representing academia, government organizations, regional water organizations, international and UN organizations, water utilities, the private sector and NGOs. The meeting focused on water quality issues in Europe from a strategic perspective to identify key issues and challenges and to exchange and promote best practices on solving water quality problems through the sharing of state-of-the-art technological solutions, policy approaches and successful case studies.

Capacity development in the region

UNESCO organized three scientific sessions on the nexus approach to water quality management at the Dresden Nexus Conference 2015 (DNC2015), "Advancing a Nexus Approach to the Sustainable

Management of Water, Soil and Waste: Global changes - SDGs - Nexus approach", held in Dresden, Germany, on 25-27 March 2015. The sessions focused on: "The Water Quality Dimension of the Water-Soil-Waste Nexus"; "Promoting Safe and Sustainable Wastewater Use in Agriculture – Formal and Informal Approaches"; and "The Nexus Approach to Urban Water Management". These scientific meetings resulted in a greater understanding of the nexus between water quality, energy, food, waste and soil and the promotion of new, innovative nexus-based approaches to water quality and wastewater management and reuse.

The UNESCO IIWQ Regional Workshop on "Water Quality in the Americas" was organized in Irvine, United States, in September 2015. This workshop focused on important water quality issues in the Americas, such as the growing degradation in water quality, natural contamination of water resources and water pollution from mining. Important water quality management solutions were proposed to improve the present state of water resources in the region.

Related UNESCO Chairs and Category 2 Centres in the region

- International Centre on Water Resources and adaptation to Global Change (ICWRGC),Germany
- International Centre for Integrated Water Resources Management (ICIWaRM), USA
- Centre for Water for Sustainable Development and Adaptation to Climate Change (WSDAC), Serbia

Latin America and the Caribbean

Managing Water Resources in Semi-Arid Regions of Latin America and the Caribbean

The project was launched in 2012 to provide the tools required to tackle current water resource challenges in semi-arid regions. Thanks to financial support from the Flemish Government and the Flanders UNESCO Science Trust Fund (FUST), the project engaged with more than 22 local and

international partners from 11 different countries. This international collaboration has resulted in very concrete initiatives being implemented in 26 countries in the Latin American and Caribbean (LAC) region:

- A set of pilot national drought observatories were developed in Chile, Peru, Uruguay and Honduras.
- At the regional level, the Latin American and Caribbean Flood and Drought Monitor was launched to identify current and future drought and flood hazards in the LAC region. In 2016, five pilot countries (Chile, Peru, Ecuador, Bolivia and Uruguay) will be trained to adopt the platform for use as a national flood early warning system.
- The Chilean Agroclimatic Observatory was launched in 2013 to train partners on the use of the CDL and the creation of map-rooms. In 2015, 17 basic and advanced training sessions were organized to capacitate more than 650 end-users requiring agroclimatic information for decision making.
- The implementation of The Peruvian Drought Observatory was confirmed by the Peruvian National Water Authority in 2014. A special map-room is dedicated to the observations, analysis and predictions of the ENSO (El Niño Southern Oscillation).
- The Latin American and Caribbean Drought Atlas identifies the variability of rainfall deficits in countries in the LAC region. The Drought Atlas was developed using rainfall information from the following countries: Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Panama, Paraguay, Peru, Dominican Republic, Uruguay and Venezuela.
- A manual on water and soil fertilization application for quinoa production systems was developed using agro-climatic information in the Bolivian Altiplano.
- A Community of Practice (CoP) was created to support the development and use of drought information tools. A set of recommendations and key messages were presented in the Santiago Declaration on Drought Management Tools .
- The Latin American School of Soil Physics (ELAFIS) was originally launched in 1986 in several Latin American Countries (Peru, Brazil, Cuba, Argentina, Colombia, Venezuela, Chile, México and Ecuador). In 2015, ELAFIS focused specifically on “Applications for Precision Agriculture, Land Degradation and Extreme Climate Events (Drought, Frost) Assessment”.

The programme was held in February 2015 in Ayacucho, Peru.

Related UNESCO Chairs and Category 2 Centres in the region

- Water Centre for Arid and Semi-Arid Zones of Latin America and the Caribbean (CAZALAC), Chile

Aisa and the Pacific

Asian G-WADI

The G-WADI project in Asia and the Pacific was established in March 2005 by representatives from Afghanistan, China, India, Kyrgyzstan, Mongolia, Pakistan, Tajikistan and Uzbekistan to confront the urgent need for increased regional cooperation on the sustainable development of arid and semi-arid zones. Over more than a decade, numerous workshops and training courses were organized to facilitate cooperation, information exchange and capacity building, including periodic, competitive scholarships. The current secretariat is based at the Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences in Lanzhou, Gansu, China.

International Initiative on Water Quality (IIWQ)

The IIWQ Experts Advisory Group was established with the aim of providing state-of-the-art technical and expert advice on water quality challenges and priorities, as well as on the future direction of IIWQ. The objectives of the Group also include facilitating scientific exchange and promoting collaboration in this area to support IIWQ activities. In addition, it aims to support countries in the implementation of the 2030 SDG (Sustainable Development Goals) Agenda targets on water quality and wastewater. The Group brings together water quality specialists from a variety of governmental and non-governmental organizations, research institutions and academia from different regions. The First Meeting of the IIWQ Experts Advisory Group was held in Kyoto in July 2015, bringing together over 20 water quality experts and specialists from all regions of the world.

Capacity development in the region

Several courses and workshops have been held in the region to boost capacity and knowledge-sharing, including:

- The UNESCO Regional Capacity Development Workshop on "Ensuring Water Security in Changing Environment Scenario" for water professionals from South Asian countries, Mumbai, 2015.
- "Capacity building and networking at different levels for sustainable water management with focus on CA region" side event at the "Water for Life" Dushanbe Conference, Tajikistan, 2015.
- In 2014, the National Integrated Water Resource Management (IWRM) training workshop was jointly organized with the National Statistical Office's Data Dissemination Laboratory in Ulaanbaatar, Mongolia. More than 40 technical participants from 12 different organizations collaborated to develop a draft decision model for the Tuul River Basin.

Related UNESCO Chairs and Category 2 Centres in the region

- Regional Centre for Water Management Research in Arid Zones (RCWMRIAZ), Pakistan
- Regional Water Research Centre on Hydrology of Headwater Catchments (RWRC-COMSAT), Pakistan

Africa

African G-WADI

Sub-Saharan Africa, including the Sahel, has a G-WADI secretariat, established in 2010 at the AGRHYMET Centre in Niamey, Niger.

The Namibia Drought Hydrological Services circulates a daily flood/hydrological drought bulletin to provide information on weather conditions based on IHP-supported G-WADI's Precipitation Estimates (among others) in their Daily Flood Bulletin. As one important tool for information gathering, the Namibia Hydrological Services of the Ministry of Agriculture, Water and Forestry uses precipitation estimates from the G-WADI PERSIANN-CCS GeoServer. It displays this information even in remote areas and over oceans where observations are limited.

Capacity development in the region

A G-WADI Expert Group meeting took place in Namibia on May 2015. The two-day meeting introduced the drought monitoring system to stakeholders from the region, identifying needs and

gaps to enhance cooperation mechanisms with local experts and institutions.
Various events raised awareness on addressing water security challenges in Africa and the need to adopt science-based tools and guidelines for sustainable water resources management. These events included the Third China Africa Water Conference, held in Cape Town in August 2015; and the Second NASAC-IANAS Water Workshop, held in Nairobi in 2015.

UNESCO convened five technical sessions on "Wastewater Management and Water Quality" during the Fifth Africa Water Week in Senegal, 2014. With a special focus on Africa, these UNESCO-led sessions served as a multi-stakeholder platform to assist African countries in addressing water quality and wastewater management challenges and priorities by sharing best practices and experience on monitoring, technological, economic, financing, and policy responses, as well as promoting the science-policy interface for better policy-making. These sessions also aimed to promote scientific cooperation among African countries to address water quality issues through the sharing of scientific knowledge and information on water quality and wastewater management. About 30-50 technical experts and policy-makers from African countries attended each session, with about 20-30 percent of participants and 50 percent of experts/speakers being women.

Related UNESCO Chairs and Category 2 Centres in the region

- African Centre for global change and water research in South Africa (ACGCWR)
- Regional Centre for Integrated River Basin Management (RC-IRBM), Nigeria
- Regional Centre for Groundwater resources Education, Training and Research in East Africa, Kenya

Arab States

Arab G-WADI

The G-WADI Asian network established its secretariat at the Sultanate of Oman in 2011 to improve the national policies for groundwater management in the Arab region, towards water security and risk reduction, as well as finding appropriate solutions for the challenge of water scarcity in arid and semi-arid countries. More than 17 participants attended the meeting representing ten Arab countries, namely: Egypt, Sudan, Saudi Arabia, Bahrain, Lebanon, Morocco, Jordan, United Arab Emirates, Yemen and Oman. Currently, 20 key water institutions from the Arab region are involved in the network.
The Global G-WADI Advisory Group meet in Khartoum, Sudan in February 2016 to prepare the G-WADI Global Conference, "Water and sustainable development for arid region river basins", organized in September 2016 in Beijing, China.

Capacity development in the region

- Regional Workshop on "Moving from Climate Change Impact Assessment to Socio-Economic Vulnerability Assessment in the Arab Region" in Lebanon, 8-10 June 2015
- Meeting of the Second Steering Committee of the Arab G-WADI, with the participation of Oman, Sudan, Morocco, Egypt, Bahrain, Saudi Arabia and the Arab Water Council, in Oman,

3-4 June 2015

- National Consultation and Scientific Conference “Coping With Water Scarcity” towards an Action Plan to support of water scarcity preparedness in Lebanon, in cooperation with the Hariri foundation, 14-16 December 2015.
- Publication of Training Manual on the «Formulation of National Water Resources Management Strategies and Action Plans Taking into Consideration Climate Change Mainstreaming»
- A partnership was established with ISESCO, ALECSO, GIZ, LAS and AWC for the launch of the Arab G-WADI Network capacity development project on «Capacity building for water security in response to water scarcity of the Arab region and adapting to climate change and climate variability».

Global Initiatives

Emerging Pollutants in Wastewater Reuse in Developing Countries

UNESCO developed and launched the project “Emerging Pollutants in Wastewater Reuse in Developing Countries”, funded by Sweden (3.9 million SEK) and implemented under IIWQ to build on the success of IHP’s activities on emerging pollutants. The project aims to support UNESCO Member States in strengthening their scientific, technical and policy capacities to manage human health and environmental risks caused by emerging pollutants in water and wastewater. The project helps countries to improve water quality and wastewater management, promotes safe reuse of wastewater and ultimately contributes to enhancing water and food security. The project was officially launched at the Stockholm World Water Week in August 2015.

Under the project, IHP is developing 16 IIWQ technical and policy case studies on emerging pollutants. These case studies address a wide range of issues such as the hydrological modelling of the fate of emerging pollutants, potential ecological and human health risks, monitoring and regulatory frameworks, removal technologies and pollution control approaches, and related socio-economic issues. The case studies include the following countries: Australia, Brazil, Canada, China, Ethiopia, India, Kenya, Kuwait, Mexico, Mongolia, Nigeria, Norway, Rwanda, Saint Lucia, Tanzania, Thailand, Tunisia, Ukraine and Vietnam.

Data Tools and Methodologies to address Water Resources Challenges

The Latin American and Caribbean Drought Atlas was launched in April 2015 at the World Water Forum in Daegu, South Korea.

During the Water and Climate Day organized by IHP within the COP21, the session “Data Tools and Methodologies to address Water Resources Challenges” presented several methodologies developed by IHP in cooperation with Category 2 Centres and scientific institutions. During the session, drought monitoring methodologies, the G-WADI Geoserver and the Glaciers Monitoring App were presented.

Water quality monitoring for the post-2015 SDGs

UNESCO coordinated Theme 1.1 “Enough Safe Water for All”, as well as Science and Technology Main Focus 2 “Resource Recovery from Water and Wastewater Management” during the Seventh World Water Forum (Korea, 2015). Under Theme 1.1, “Enough Safe Water for All”, UNESCO organized seven thematic sessions on issues such as access to safe drinking water for all, improving water quality for enhanced water security, augmenting water supplies through non-conventional water resources, and water quality monitoring for the post-2015 SDGs, bringing together 300 participants from 54 organizations. Under the Science and Technology Main Focus 2, “Resource

Recovery from Water and Wastewater Management", UNESCO conducted six sessions on safe water and wastewater reuse for productive uses, including desalination and resource recovery, bringing together over 300 participants from 45 organizations. Furthermore, UNESCO contributed to the sessions of Theme 1.2 "Sanitation for All" and Science and Technology Main Focus 4 "Smart technology for water". During these 15 sessions at the Seventh World Water Forum, UNESCO promoted innovative scientific, technological and policy approaches to improve the quality of world's freshwater resources, wastewater management and safe water reuse.

The conference "Monitoring in the Post-2015 SDGs Framework" was successfully organized in Kyoto, in 2015. Jointly organized by IHP in cooperation with Kyoto University and Lake Biwa Environmental Research Institute (LBERI) of Japan, this very successful major international conference mobilized experts and facilitated the sharing and dissemination of state-of-the-art scientific knowledge, technologies, policy approaches and best practices to address water quality challenges. It also aimed to support the implementation of the 2030 Agenda and SDG targets related to water quality. The IIWQ Symposium, which brought together about 50 leading experts from around the world, greatly contributed to the strengthening of scientific knowledge on water quality monitoring and enhanced water quality monitoring capacities for the SDGs at both national and global level.
UNESCO organized IIWQ Regional Consultation Meetings on Water Quality in all regions of the world, including Africa, Asia and Arab States. These meetings and workshops served as milestones to assess key priorities and challenges on water quality under the framework of the 2030 Agenda and SDGs.

International Initiative on Water Quality

Established by the endorsement of the IHP Intergovernmental Council of UNESCO at its 20th session in 2012 (Resolution XX-4), IIWQ aims to support Member States in protecting and sustainably managing the quality of freshwater resources in making progress towards the SDGs by mobilizing scientific and policy-relevant expertise and knowledge sharing to address water quality challenges. IIWQ is a project aimed at promoting scientific collaboration to address water quality issues in a holistic manner through: joint research activities; knowledge generation and dissemination; and sharing of effective solutions, technologies, policy approaches and best practices among researchers, practitioners and policy-makers as well as other stakeholders in both developing and developed countries.

Related UNESCO Chairs and Category 2 Centres in the region

- Regional Centre for Training and Water Studies of Arid and Semi-arid Zones (RCTWS), Egypt
- Central Laboratory for Environmental Quality Monitoring (KISR), Kuwait
- Regional Centre on Capacity Development and Research in Water Harvesting (RCWH), Sudan


WATER
PEOPLE AND COOPERATION
50 YEARS OF WATER PROGRAMMES FOR SUSTAINABLE DEVELOPMENT AT UNESCO


GRAPHIC
GRAPHIC
GROUNDWATER AND CLIMATE CHANGE
INTERNATIONAL CLIMATE NEGOTIATIONS
– NEED FOR MORE EXPLICIT DISCUSSIONS REGARDING GROUNDWATER


PRÉPARATION


50 YEARS OF WATER PROGRAMMES FOR SUSTAINABLE DEVELOPMENT AT UNESCO
UNESCO
02:00

IHP is the only intergovernmental programme of the United Nations system devoted to water research and water resources management, as well as education and capacity building. Since its inception in 1975, the programme has evolved from an internationally coordinated hydrological research programme into an all-encompassing, holistic programme to: mobilize international cooperation in order to improve knowledge and innovation to address the challenges related to water security; strengthen the science-policy interface to achieve water security at the local, national, regional and global levels; and facilitate education and capacity development to improve the management and governance of water resources. Today, IHP facilitates an interdisciplinary and integrated approach to sustainable watershed and aquifer management, including the social and economic dimensions of water. As part of the current Eighth Phase of IHP (IHP-VIII) centred on "Water Security: Responses to Local, Regional and Global Challenges", IHP defined Water Security as: "The capacity of a population to safeguard access to adequate quantities of water of acceptable quality for sustaining human and ecosystem health on a watershed basis, and to ensure efficient protection of life and property against water-related hazards – floods, landslides, land subsidence and droughts."

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