

IHP-VIII

WATER SECURITY

Responses to Regional
and Global Challenges
(2014-2021)





THE CONTEXT

WATER: A VITAL RESOURCE

Freshwater is a key resource for human health, prosperity and security. It is essential for poverty eradication, gender equality, food security, and the preservation of ecosystems.

Yet billions of people worldwide are confronted with serious freshwater challenges, from water scarcity, poor quality, lack of sanitation facilities, to water-related disasters such as floods and droughts. Almost half of the world's population will be living in areas with high water stress by 2030.

The UN General Assembly declared access to clean water and sanitation a human right in July 2010. But lack of access to drinking water of adequate quality and quantity remains one of the largest human health problems globally. Although the Millennium Development Goal (MDG) target on water supply was met in 2010, more than 700 million people still lack access to safe drinking water, nearly half are living in sub-Saharan Africa. The MDG target on sanitation was not met; at least 2.5 billion people do not have access to basic sanitation facilities, a large majority of those from rural areas.

Water resources are under increasingly severe pressure from climate change and other global drivers. Climate change alters rainfall patterns, soil moisture, humidity, glacier-mass balance and river flow, and also causes changes to underground water sources. At the same time, floods or droughts are rising in frequency and intensity. Population growth and rapid urbanization will create further pressures on water resources and will have a tremendous impact on the natural environment. Urban populations are projected to increase to a total of 6.3 billion by 2050. Deteriorating water infrastructure in many parts of the world will impact public health and the environment.

Given these challenges, the need to manage freshwater properly is essential. Sustainable water management is enshrined in the 2030 sustainable development agenda, with water-specific goals explicitly linked to other goals and climate-related issues.

IHP: UNESCO'S PROGRAMME IN HYDROLOGY

The International Hydrological Programme (IHP) is the only intergovernmental programme of the UN system devoted to the scientific, educational and capacity building aspects of hydrology. UNESCO has long recognized the importance of hydrology for the rational utilization of water resources. Since its inception in 1975, IHP has evolved from an internationally coordinated hydrological research programme into a comprehensive programme to facilitate education and capacity building, and enhance water resources management and governance. Originally implemented in six-year phases and now in eight-year phases since 2014, IHP stimulates and encourages hydrological research, and assists Member States in research and training activities. IHP facilitates an interdisciplinary and integrated approach to watershed and aquifer management, which incorporates the social dimension of water resources, and promotes and develops international research in hydrological and freshwater sciences.

IHP-VIII: WATER SECURITY

A KEY CHALLENGE FOR THE 21ST CENTURY

Putting Science into Action

Our fate is intrinsically bound to the fate of our water resources. To build the future we want, we need to harness the contributions of science and innovation for water security. Based on the needs and priorities of Member States, the eighth phase of IHP (IHP-VIII) focuses on six thematic areas: (i) water-related disasters and hydrological changes; (ii) groundwater in a changing environment; (iii) addressing water scarcity and quality; (iv) water and human settlements of the future; (v) ecohydrology, engineering harmony for a sustainable world; and (vi) water education, key to water security. The role of human behaviour, cultural beliefs and attitudes to water, and socioeconomic research to better understand and develop tools to adapt to changing water availability are some of the issues to be addressed.

IHP-VIII will bring multidisciplinary, environmentally-sound, innovative methods, tools and approaches into play by capitalizing on advances in water sciences, as well as build competences to meet today's global water challenges. National Committees, UNESCO centres and chairs will play an important role in this process.

IHP-VIII AT A GLANCE

THEMES AND FOCAL AREAS

THEME 1: WATER-RELATED DISASTERS AND HYDROLOGICAL CHANGES

Focal Area 1.1 – Risk management as adaptation to global changes

Focal Area 1.2 – Understanding coupled human and natural processes

Focal Area 1.3 – Benefiting from global and local earth observation systems

Focal Area 1.4 – Addressing uncertainty and improving its communication

Focal Area 1.5 – Improving the scientific basis for hydrology and water sciences for preparation and response to extreme hydrological events

THEME 2: GROUNDWATER IN A CHANGING ENVIRONMENT

Focal Area 2.1 – Enhancing sustainable groundwater resources management

Focal Area 2.2 – Addressing strategies for management of aquifer recharge

Focal Area 2.3 – Adapting to the impacts of climate change on aquifer systems

Focal Area 2.4 – Promoting groundwater quality protection

Focal Area 2.5 – Promoting management of transboundary aquifers

THEME 3: ADDRESSING WATER SCARCITY AND QUALITY

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 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 safety of water supplies and controlling pollution

THEME 4: WATER AND HUMAN SETTLEMENTS OF THE FUTURE

Focal Area 4.1 – Game-changing approaches and technologies

Focal Area 4.2 – System-wide changes for integrated management approaches

Focal Area 4.3 – Institution and leadership for beneficitation and integration

Focal Area 4.4 – Opportunities in emerging cities in developing countries

Focal Area 4.5 – Integrated development in rural human settlements

AXIS 3
Developing institutional and human capacities for water security and sustainability

WATER-RELATED DISASTERS AND HYDROLOGICAL CHANGE



GROUNDWATER IN A CHANGING ENVIRONMENT



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THEME 5: ECOHYDROLOGY – ENGINEERING HARMONY FOR A SUSTAINABLE WORLD

Focal Area 5.1 – Hydrological dimension of a catchment – identification of potential threats and opportunities for sustainable development

Focal Area 5.2 – Shaping of the catchment ecological structure for ecosystem potential enhancement – biological productivity and biodiversity

Focal Area 5.3 – Ecohydrology system solution and ecological engineering for the enhancement of water and ecosystem resilience and ecosystem services

Focal Area 5.4 – Urban Ecohydrology – storm water purification and retention in the city landscape, potential for improvement of health and quality of life

Focal Area 5.5 – Ecohydrological regulation for sustaining and restoring continental to coastal connectivity and ecosystem functioning

THEME 6: WATER EDUCATION – KEY FOR WATER SECURITY

Focal Area 6.1 – Enhancing tertiary water education and professional capabilities in the water sector

Focal Area 6.2 – Addressing vocational education and training of water technicians

Focal Area 6.3 – Water education for children and youth

Focal Area 6.4 – Promoting awareness of water issues through informal water education

Focal Area 6.5 – Education for transboundary water cooperation and governance

EDUCATION, TRAINING AND CAPACITY BUILDING ACTIVITIES ARE DEVELOPED ACROSS ALL THEMES

AXIS 1

Mobilizing international cooperation to improve knowledge and innovation to address water security challenges

ADDRESSING WATER SCARCITY AND WATER QUALITY

WATER AND HUMAN SETTLEMENTS OF THE FUTURE

ECOHYDROLOGY – ENGINEERING HARMONY FOR A SUSTAINABLE WORLD

EDUCATION – KEY TO WATER SECURITY



ADDRESSING LOCAL, REGIONAL AND GLOBAL CHALLENGES >>>

AXIS 2

Strengthening the science-policy interface to reach water security at local, national, regional, and global levels

IHP-VIII PROGRAMMES

+ FRIEND-Water (Flow Regimes from International Experimental and Network Data) An international collaborative network of experts that aims to generate new understanding about regional hydrology and multi-scale water cycle processes.

+ GRAPHIC (Groundwater Resources Assessment under the Pressures of Humanity and Climate Change) A UNESCO-led project seeking to improve our understanding of how groundwater interacts within the global water cycle, how it supports human activity and ecosystems, and how it responds to the complex dual pressures of human activity and climate change.

+ G-WADI (Global Network on Water and Development Information in Arid Lands) A global network on water resources management in arid and semi-arid zones whose primary aim is to build an effective global community to promote international and regional cooperation.

+ HELP (Hydrology for the Environment, Life and Policy) A new approach to integrated catchment management by building a framework for water law and policy experts, water resource managers and water scientists to work together on water-related problems.

+ IDI (International Drought Initiative) An initiative to develop, coordinate and implement drought-related research and capacity building.

+ IFI (International Flood Initiative) An inter-agency initiative promoting an integrated approach to flood management which takes advantage of the benefits of floods and the use of flood plains, while reducing social, environmental and economic risks.

+ IIWQ (International Initiative on Water Quality) An international platform to strengthen knowledge, research and policy, and develop innovative approaches to tackle water quality challenges.

+ ISARM (Internationally Shared Aquifer Resources Management) An initiative to set up a network of specialists and experts to compile a world inventory of transboundary aquifers and develop wise practices and guidance tools concerning shared groundwater resources management.

+ ISI (International Sediment Initiative) An initiative to assess erosion and sediment transport to marine, lake or reservoir environments aimed at the creation of a holistic approach for the remediation and conservation of surface waters, closely linking science with policy and management needs.

+ IWRM (Integrated Water Resources Management) Implementing IWRM at the river basin level is an essential element to managing water resources more sustainably, leading to long-term social, economic and environmental benefits.

+ JIIHP (Joint International Isotope Hydrology Programme) A programme facilitating the integration of isotopes in hydrological practices through the development of tools, inclusion of isotope hydrology in university curricula and support to programmes in water resources using isotope techniques.

+ MAR (Managing Aquifer Recharge) A programme that aims to expand water resources and improve water quality with the adoption of improved practices for management of aquifer recharge (storage and recovery).

+ PCCP (From Potential Conflict to Cooperation Potential) A project facilitating multi-level and interdisciplinary dialogues in order to foster peace, cooperation and development related to the management of shared water resources.

+ UWMP (Urban Water Management Programme) A programme that generates approaches, tools and guidelines allowing cities to improve their knowledge, as well as analysis of the urban water situation to draw up more effective urban water management strategies.

+ WHYMAP (World Hydrogeological Map) An initiative to collect, collate and visualize hydrogeological information at the global scale to convey groundwater-related information appropriately for global discussion on water issues.

IHP-VIII THEMES

THEME 1:

WATER-RELATED DISASTERS AND HYDROLOGICAL CHANGES

Water-related hazards or hydrohazards are the results of complex interactions in the ocean-atmosphere-land process cascade. Floods and droughts are expected to increase due to global warming. Increased hydrohazard impacts and costs are attributable to such factors as increased frequency and magnitude, unplanned urbanization, degradation of ecosystem services, vulnerable livelihoods, and inaccurate public perception of risk. The challenge is to identify appropriate and timely adaptation measures in a continuously changing environment.

Major research gaps remain including an incomplete understanding of hydrological processes and links with atmosphere/biosphere/human society; appropriate techniques for data integration and/or assimilation; scaling and heterogeneity issues; capabilities to predict hydrological processes and their interactions and feedbacks with socio-ecological systems; and uncertainty estimation, communication, and incorporation into adaptive resource management decision-making. Knowledge needs to be transferred more actively to policy makers to ensure that decisions take into account the best available information. Objectives include furthering research and developing early warning systems, supporting cooperation to advance vulnerability studies and adaptation actions related to climate change, and promoting innovative approaches to education and capacity building.

BOX THEME 1:

DROUGHT MONITORING AND PREDICTION FOR SUB-SAHARAN AFRICA

Drought is one of the leading impediments to development in Africa. Much of the continent is dependent on rain-fed agriculture, which makes it particularly susceptible to climate variability. Alleviating the impacts of drought requires a transition from drought crisis



management to drought risk management, including the development of national drought policies, increasing coping capacity and adapting to likely future changes at local levels. A key element in managing drought risk is the provision of early warning of drought conditions and impacts. Such information can provide governments with the lead-time necessary to implement drought management policies and reduce impacts at all levels.

In collaboration with IHP, Princeton University has developed an experimental drought monitoring and forecast system for sub-Saharan Africa which merges climate predictions, hydrological models and remote sensing data to provide timely and useful information on drought. The implementation of this system is a key step forward in building capacity through technology and knowledge transfer and has the potential to reduce the impacts of drought across Africa. The African Drought Monitor is currently operational in Niger and in Kenya.



THEME 2:

GROUNDWATER IN A CHANGING ENVIRONMENT

Groundwater represents 98% of the world's unfrozen freshwater. It drives many geological and geochemical processes and sustains various ecological functions and services. The use of groundwater has increased significantly over the past 50 years due to its high reliability during drought seasons, good quality and generally modest development costs. We know more about groundwater and aquifers from work completed during previous IHP phases, but we need to learn more about the complexity of aquifer systems, the increasing global risk to groundwater depletion, quality deterioration and pollution, and the resilience of communities and populations dependent on groundwater sources.

Objectives include promoting measures addressing the principles of sustainable management of groundwater resources, addressing methods for the sound development, exploitation and protection of groundwater

resources, developing new groundwater resource maps, and strengthening groundwater governance policy and water user rights in emergency situations. These challenges call for comprehensive research, implementation of new science-based methodologies and the endorsement of principles of integrated management, and environmentally-sound protection of groundwater resources.

BOX THEME 2:

ISARM: INTERNATIONALLY SHARED AQUIFER RESOURCES MANAGEMENT PROGRAMME

Groundwater is critical for the livelihoods of approximately 1.5 billion rural households in the poorer regions of Africa and Asia. It is also necessary for domestic supplies of a large share of the world's population elsewhere. ISARM focuses on improving the understanding of scientific, socio-economic, legal, institutional and environmental issues related to the management of transboundary aquifers. Grounded in a multidisciplinary approach, the programme addresses the challenges and opportunities related to shared water resources.

When it comes to considering regional and global water policy issues, the physical status and quality trends of groundwater resources have yet to be taken into account adequately. Because geological formations have no regard for water catchments or national boundaries, resources in many aquifers are shared by adjacent states and require transboundary management. ISARM creates tools such as detailed technical guidelines, examples of legal and other institutional frameworks, mappings, and a fully referenced database, as well as assessments and case studies.

THEME 3:

ADDRESSING WATER SCARCITY AND QUALITY

For many countries, water scarcity represents the most pressing challenge to socio-economic and human development at large. 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 addressed in an integrated manner. Investment in programmes that protect the natural environment, conserve water and use water efficiently is critical.

Objectives include promoting catchment-based water resources planning and decision-making, and good water governance practices, as well as supporting a policy shift towards water demand management and good water governance practices.

Water quality degradation is becoming one of the greatest threats to freshwater sustainability and availability, in addition to its negative health and environmental impacts. This is a serious and neglected aspect of water resources management. Poor water quality negatively affects human health and ecosystems in multiple ways. It reduces water availability, making the water 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 strengthening the knowledge base on the quality of the world's freshwater resources, integrating quality-quantity management and science-based decision-making, enhancing legal, policy and

▲ IIWQ: A RENEWED FOCUS ON WATER QUALITY

In response to the continuing degradation of the world's water resources and the need to provide clean drinking water and adequate sanitation for sustainable development, especially in developing countries, the IHP Intergovernmental Council adopted a resolution to establish the International Initiative on Water Quality (IIWQ) which promotes scientific knowledge, research and policy to address water quality challenges.

The Initiative's goals are to:

- address the challenge of access to water and sanitation in developing countries;
- advance scientific knowledge on new and emerging pollutants in water and develop effective ways to remove them from wastewater;
- improve wastewater management and promote wastewater (re)use as a resource;
- promote innovative scientific, technological and policy approaches to water quality and wastewater management.

institutional frameworks for improved water quality management, and promoting new innovative tools for water quality management and pollution control.

BOX THEME 3:

G-WADI – PROVIDING DATA AND SERVICES TO MEMBER STATES

Through its G-WADI (Global Network on Water and Development Information in Arid Lands) programme, IHP supports Member States by strengthening global capacity to manage water resources in arid and semi-arid areas and by providing data through a network of global and regional cooperation. The G-WADI network aims to improve the understanding of hydrological systems in arid regions through capacity building, dissemination of information, data sharing and experiences, raising awareness of advanced technologies for data provision and analysis, and promoting integrated basin management and the use of appropriate decision support tools.

IHP, in collaboration with the Center for Hydrometeorology and Remote Sensing (CHRS), University of California, Irvine, has been working on the development of tools to provide access to global satellite estimates of precipitation at high spatial and temporal resolutions. The Geo-Server database is a contribution to the Global

Framework of Climate Services (GFCS). The Namibian Hydrological Services provides a daily flood/hydrological drought bulletin based on the Geo-Server database.

THEME 4:

WATER AND HUMAN SETTLEMENTS OF THE FUTURE

Cities around the world are facing a range of pressures resulting from population growth, climate change and deterioration of urban infrastructure systems. As water demand continues to increase in the future, an increasing number of cities will face challenges of managing scarcer and less reliable water resources in an efficient way. Realities on the ground and the challenges of future pressures have made it obvious that business as usual is not the way forward.

Objectives include: exploring new approaches, technologies and system-wide changes towards integrated urban water management such as flexible and adaptive urban water systems, water sensitive urban design, and water (beneficiation) in urban areas; promoting effective governance and institutional structures of urban water management; and identifying and disseminating best practices for different economic and geographic settings in developed and developing countries.

Water issues in emerging cities and rural settlements in developing countries merit a

special emphasis, including the special needs and problems in slums or peri-urban areas that are often the most deprived.

New approaches for water management in the city of the future have to be developed. Strategies to build resilient urban water systems must adopt a broader perspective that recognizes the interdependence of the different water systems. Game-changing approaches and technologies that allow optimization of water quality, quantity, and the water and energy footprint in cities need to be explored.

BOX THEME 4:

TRANSITIONING TO SUSTAINABLE AND INTEGRATED URBAN WATER MANAGEMENT

The traditional model of water management in most cities around the world is compartmentalized into three highly centralized, yet separately managed and financed, systems: (1) drinking water supply, (2) wastewater treatment and (3) urban drainage and flood control. Although this traditional urban water management approach has endured for nearly a century in developed countries, it remains inadequate to address the challenges of sustainability in the face of rapid urbanization and population growth, especially in emerging cities in developing countries where most population growth will occur. These traditional models of urban water systems rely on large imports of water and energy and are inadequate on technical, environmental, economic, and social levels to keep pace with



the current rate of population growth and urbanization.

There is a need for a paradigm shift in how water resources are used and managed in urban areas towards a holistic approach to managing all components of the urban water cycle in an integrated, participatory, and forward-looking manner. Based on viewing water sources, wastewater and stormwater, and their interactions with the natural environment with its diverse aquatic habitats, land use and energy as integral elements of a single water cycle, but within a wider basin context, the concept of the urban water cycle developed and promoted by IHP has emerged as a sustainable alternative to traditional urban water management. Therefore, transitioning to sustainable urban water management requires integrated, participatory approaches throughout the entire urban water cycle. The UNESCO-IHP Urban Water Series, including eight books, addresses fundamental issues related to the role of water in cities and the effects of urbanization on the hydrological cycle and water resources, focusing on integrated approaches to sustainable urban water management.

THEME 5:

ECOHYDROLOGY – ENGINEERING HARMONY FOR A SUSTAINABLE WORLD

In the face of increasing climate instability, demographic growth and human migration, there is an urgent need to reverse the degradation of water resources and stop

further decline in biodiversity. Ecohydrology uses the understanding of relationships between hydrological and biological processes at different scales to improve water security, enhance biodiversity and further opportunities for sustainable development by lessening ecological threats and maximizing greater harmony within catchment processes.

The Ecohydrology programme aims to advance the integration of social, ecological and hydrological research, and to generate outcomes that enable the development of effective policies and practices for integrated water resources management. IHP supports research, networking and capacity building initiatives aimed at improving the understanding of the interlinkages of ecohydrological processes at the catchment scale.

Objectives include improving the understanding of the role of different types of terrestrial and wetland ecosystems, sharing knowledge on the integration of ecohydrological technologies with good agricultural and environmental practices, promoting model development to reduce hydropeaking impacts on ecosystems by integrating specific environmental science knowledge, and developing catchment scale ecohydrological early warning systems.

Guidelines will be developed for the integration of various types of biological and hydrological regulations to improve water quality, biodiversity and freshwater systems. Regional ecohydrological solutions on the impact of global changes on hydrologic cycles and coastal ecosystems to address the increasing vulnerability of aquatic resources will be shared and improved.

BOX THEME 5:

DEMONSTRATION PROJECTS – ECOHYDROLOGY IN ACTION

Better knowledge of the biological and hydrological interrelationships in aquatic ecosystems can promote the long-term sustainable carrying capacity of ecosystems and thus contribute to more cost-effective and environmental-friendly water management. The Ecohydrology programme recognizes sites where sustainable, innovative and





transdisciplinary water management practices based on ecohydrological principles are implemented. In 2011, over 30 demonstration projects were included in the programme to showcase the application of the ecohydrological approach in solving issues surrounding water, the environment and people. Two of these demonstration projects are described below.

Developing ecohydrological methods in the Pilica River basin, Poland

The key issues addressed were the ecological and health hazards resulting from eutrophication of the river reservoir system and toxic cyanobacterial blooms. A range of ecological and technological measures were planned and implemented to mitigate high nutrient loads, which had rendered a downstream reservoir unfit for human consumption. The project is currently working on reducing nitrogen and phosphorus fluxes to reservoirs and the Baltic Sea, towards the implementation of the European Union's Water Framework Directive.

Developing tools for water planning, Australia

Critical water reforms in Australia are implemented mainly through catchment-based water plans. This project worked with communities and the government to take up the challenges posed by the planning process in South Australia, Queensland and the Northern Territory within diverse hydrological, ecological, social and cultural contexts. Challenges that were addressed included building community confidence in the planning process; providing effective methodologies for identifying indigenous values in water; and integrating socio-economic, cultural and ecological

considerations in water allocation decisions. Tools developed through the process include participatory groundwater visualization models addressing specific community needs and innovative agent-based models that identified environmental, social and economic values in wetlands through visual methods.

THEME 6:

WATER EDUCATION – KEY FOR WATER SECURITY

Water education at all levels needs to be improved if the challenges identified in the previous themes are to be met. Water education must go beyond the teaching of hydrological sciences, and be both multidisciplinary and interdisciplinary. This approach would include advancing scientific knowledge through the training of scientists as well as increasing knowledge on water issues through courses aimed at water professionals and decision-makers. Water education should also reach out to media professionals so that they can communicate water issues accurately and effectively. The work will include community education strategies to promote community-wide water conservation, as well as enhance skills in local co-management of water resources. Efforts will be made to make water a significant component of the K-12 curriculum.

Objectives include supporting the enhancement of tertiary water education capacities, particularly in developing countries, promoting the continuous professional development of water scientists, engineers, managers and



policy makers in the water sectors, as well as developing guidelines, briefing papers, prototype professional development programmes and case studies connected with water education for water security.

UNESCO-IHE Institute for Water Education and water-related centres will play an important role in this endeavour, in addition to the network of universities, institutes and research facilities linked to IHP's other programmes. Case studies of leading practices in sustainable water management will be developed to maintain and expand the training of technicians in water-related fields. UNESCO's Education Sector will continue to be a partner in the development of water-related materials and activities aimed at the K-12 curriculum.

BOX THEME 5:

WATER EDUCATION – KEY FOR WATER SECURITY

IHP will further strengthen freshwater education through an interdisciplinary approach, with a special emphasis on Africa and gender equality. Through a life-long learning perspective, the focus is on higher education for water scientists, engineers, managers, decision makers and other specialised professionals, as well as the training of water sector technicians.

Water education for children, youth and communities focuses on the values, knowledge and skills required for water security, via curricular revisions, the production of pedagogical materials for demonstration projects, and international activities to further motivate schools, youth and children. IHP

▲ PCCP: FROM POTENTIAL CONFLICT TO COOPERATION POTENTIAL

More than 90% of the world's population live in countries which share their water resources with neighbouring countries. Competition over water becomes even more acute considering the extent to which some countries are dependent on others for their water. These challenges have become increasingly important as water availability is further threatened by global changes. There is an urgent need to develop sustainable and equitable ways of managing water cooperatively.

PCCP promotes water cooperation by facilitating multi-level and interdisciplinary dialogues, which in turn foster peace and development. PCCP aims to enhance water security by strengthening the capacity of stakeholders in anticipating, preventing and managing water conflicts.

PCCP is active in three areas:

- **Education and training:** the programme has developed a range of region-specific as well as global educational materials and organized multidisciplinary training courses for the benefit of several hundred water professionals and decision-makers from around the world;
- **Research:** it focuses on examples of cooperation over transboundary waters, the causes of water conflicts, best practices, and innovative management techniques;
- **Support of cooperation processes:** it provides parties facing difficulty in the joint management of their transboundary water resources with fora in which to establish dialogue and exchange knowledge, as well as experiences related to water management and security.

is coordinating this work with UNESCO-IHE Institute for Water Education, water centres under the auspices of UNESCO, water-related UNESCO chairs, other UNESCO sectors and external partners.

Today, 33 UNESCO Chairs and UNITWIN Networks are established in the field of water resources and sustainability, mostly in developing countries. These chairs actively contribute to the capacities of Member States and have a significant impact in key development domains such as water management, water sustainability, access to water in arid zones, and water and gender equality issues. They also build bridges between academia, the professional world and local communities as well as between research outcomes and decision-making related to water use and management.

IHP-VIII UNESCO'S WATER NETWORK

UNESCO works to build the scientific knowledge base to help countries manage their water resources sustainably through IHP, the World Water Assessment Programme (WWAP), the UNESCO-IHE Institute for Water Education, affiliated research centres on water around the world and water-related chairs. UNESCO's water network operates as a global network that works together to implement the organization's strategic goals.

The **International Hydrological Programme (IHP)** is UNESCO's intergovernmental scientific cooperation program on water. It was created in 1975, becoming the first and only intergovernmental freshwater initiative institutionalized in the UN system. IHP is governed by an Intergovernmental Council, which constitutes a subsidiary body of UNESCO's General Conference. IHP is implemented in phases developed through a comprehensive consultative process with its 169 IHP National Committees, international scientific associations and other UN bodies, ensuring IHP's continuous relevance and its overall institutional coordination.

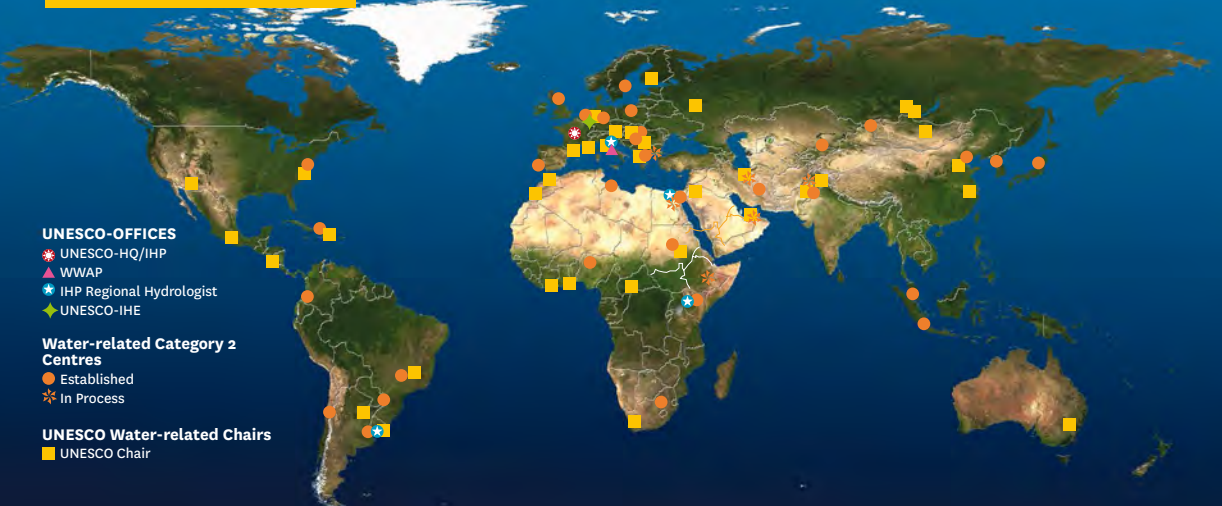
UNESCO-IHE Institute for Water Education, located in Delft, The Netherlands, is formally part of UNESCO since 2003. UNESCO-IHE is the largest postgraduate water education facility in the world. The Institute confers fully accredited Master's degrees and promotes PhDs. Since 1957, UNESCO-IHE has provided graduate education to more than 14,500 water professionals from over 160 countries, the vast majority from the developing world.

The **World Water Assessment Programme (WWAP)**, located in Perugia, Italy, is housed, administered and led by UNESCO. The secretariat coordinates the production of the World Water Development Report (WWDR), produced in collaboration with 31 UN agencies brought together through UN-Water. WWAP produces annual WWDRs on different strategic issues, in addition to a five-year global synthesis report.

The network of 31 established **water-related centres** under the auspices of UNESCO (category 2 institutes and centres) contributes to the implementation of IHP at the international and regional level.

The 33 water-related **UNESCO Chairs and UNITWIN networks** promote intellectual cooperation through twinning and other linking arrangements among institutions and academics to foster access to and sharing of knowledge.

The UNESCO Water Network





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