United Nations
Educational, Scientific and
Cultural Organization

International
Hydrological
Programme

IHP-VIII Thematic Area 5

Ecohydrology, Engineering Harmony for a Sustainable World

Activities and Outcomes 2014-2015

International Hydrological Programme
Division of Water Sciences

THE CONTEXT

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 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.

Objectives include improving knowledge of the role of different types of water-related ecosystems (such as wetlands and estuaries) and sharing knowledge on the use and integration of innovative ecohydrological technologies. Regional ecohydrological solutions possibly reducing the impact of global changes on hydrological and nutrient cycles will be shared and improved to address the increasing vulnerability of aquatic resources.

“Ecohydrology, Engineering Harmony for a Sustainable World” is the fifth of the six themes that structure IHP-VIII (2014-2021), which focuses on “Water Security: Responses to Local, Regional and Global Challenges”.

Theme 5 covers five different focal areas:

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

The first two years of IHP-VIII coincided with the 2014-2016 biennium of UNESCO. During this period, the International Hydrological Programme (IHP) implemented several activities and projects in different regions of the world to support adaptation to hydrohazards in a changing environment.

HIGHLIGHTS FROM KEY IHP ACTIVITIES (2014-2015)

North America and Europe

The first meeting with the Scientific Advisory Committee (SAC) was held in Paris, France, on 20-21 May 2014. It included presentations from UNESCO Category 1 and 2 Water Centres and discussions on cooperation with related international programmes. Addressing common issues (e.g. natural/ constructed wetlands regulation processes) using ecohydrology as a transdisciplinary, scientific approach can achieve water quality improvement and biodiversity enhancement by applying cost-effective technologies. One of the main objectives of this meeting was to develop partnerships and synergies to implement projects with other organizations/partners (Ramsar, IAH, EU, IGRAC, IPBES).

The second meeting was held in Faro, Portugal, on 18-19 September 2014 to encourage countries with appropriate scientific knowledge to disseminate ecohydrology on web-based platforms. It was also agreed that Member States' ecohydrological principles should be implemented in their natural resources master plans as an important component of the integrated water resources management approach, with the development of local solutions for water quality and quantity for sustainable ecosystem management.

The third SAC meeting was held in Paris on 29 May 2015. Its main objective was to discuss the ongoing preparation of the Ecohydrology Web Platform project. Establishing a user-friendly sharing tool for ecohydrology is part of the initiative's dissemination strategy. For example, creating a demonstration site proposal in the form of cards for each project seemed attractive both in order to standardize information on the demonstration sites and to facilitate understanding of the activities and ecohydrological solutions implemented on the project (fig.1). Twenty three such demonstration cards were designed for the first generation of ecohydrology demonstration sites.

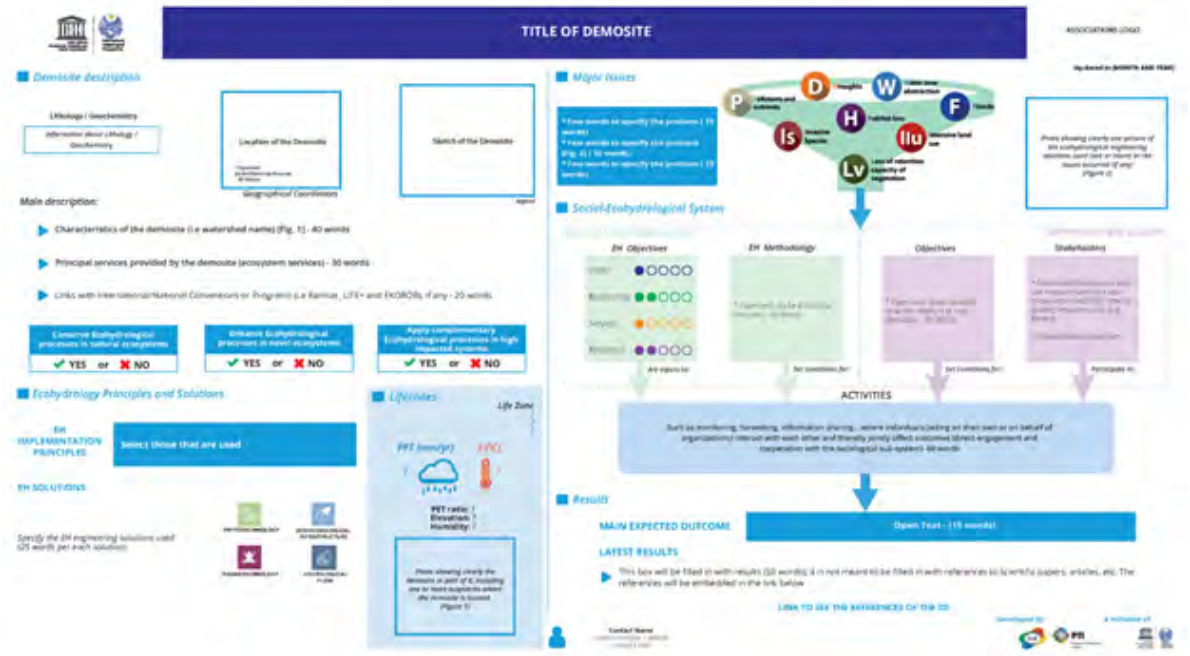

Figure 1: Template of a demonstration site card

The Ecohydrology 2015 Conference - Measuring, Modelling and Managing of the natural processes related to water flows, social values of the linked ecosystem services - was held in Lyon, France on 21-23 September 2015. The conference brought together leading international researchers and practitioners from diverse disciplines to present the latest advances in knowledge and practice, and to promote dialogue and collaboration between these disciplines. One of the main goals of the workshop was to share the current developments and achievements in solution-oriented methodologies among participants. The results of the meeting are expected to promote further cooperation among the demonstration sites and disseminate the acquired information to UNESCO's Member States and the general public.

Currently, the Ecohydrology Programme has eight demonstration projects (Croatia, Germany, Italy, three in Poland, one in Portugal, one in Sweden) focused on a range of issues, such as point-source or diffuse pollution, lack of coastal areas management and urban issues.

The Erasmus Mundus Master of Science (MSc) on Ecohydrology was started in Faro in 2014 with AECID (Agencia Española de Cooperación Internacional para el Desarrollo) and CODIA (Conferencia de Directores Iberoamericanos Del Agua). The MSc programme is run jointly by the University of Algarve (Portugal) Coordinating Institution, University of Kiel (Germany), University of Lodz (Poland), University of la Plata (Argentina) and UNESCO-IHE Institute for Water Education (The Netherlands). The programme trains highly specialized professionals in the area of Integrated Management of Aquatic Ecosystems and Resources. Based on the ecohydrology approach and principles, it generates applications, models and tests of the relationships between ecosystem functions and stressful factors impacting aquatic ecosystems.

Related UNESCO Chairs and Category 2 Centres in the region

- European Regional Centre for Ecohydrology, Lodz, Poland
- International Centre on Coastal Ecohydrology, Faro, Portugal
- UNESCO Chair on Water Resources Management and Ecohydrology, the Water Problem Institute of the Russian Academy of Sciences, Russian Federation
- UNESCO Chair in Water for Ecologically Sustainable Development, the University of Belgrade, Serbia

Latin America and the Caribbean

In collaboration with the Centre of Hydroinformatics of Itaipu in Brazil, the IHP Ecohydrology team developed a website that would disseminate the ecohydrology initiative using demonstration sites The web platform consolidates the guidelines for ecohydrology projects, UNESCO publications, demonstration site cards and their associated references.

Currently, IHP has three ongoing projects in Argentina (Lacar lake), Costa Rica (on a national scale) and the Bahamas (Victoria Pond, Great Exuma).

Second Regional Workshop on Environmental Flows (Panama City, 24-27 March 2015) organized together with the National Environmental Authority (ANAM) of Panama, through the Directorate of

Integrated Watershed Management. The workshop conducted a review of regional experiences and evaluated the initiatives in Panama, as well as providing capacity building in the implementation of environmental flows for water resources management.

First Training Workshop on Coastal Ecohydrology for the Caribbean region jointly organized by the Bahamas' National Commission for UNESCO and the Water and Sewerage Corporation of the Bahamas. It aimed to provide an understanding of the main ecological and hydrological processes that occur in the river basin, as well as their interactions with human activities and climate change (Exuma, The Bahamas, 22-25 June 2015).

Together with UN International Union of Telecommunication, IHP is leading the collection of existing national, regional and international information on smart water management initiatives.

Related UNESCO Chairs and Category 2 Centres in the region

- International Centre on Hydroinformatics for Integrated Water Resources Management (ICHIWRM)

Asia and the Pacific

In collaboration with the Asia Pacific Centre for Ecohydrology (UNESCO Category 2 Water Centre), the UNESCO's Jakarta office organized a conference in Yogyakarta, Indonesia on 8-14 November 2014 with the theme "Ecohydrology Approaches for Facing the Global Water Environment Challenges". The event aimed to address issues related to critical water environment systems and to explore how ecohydrology and ecotechnology can provide low-cost, environmentally-sound technology for sustainable water management, especially in the Asia-Pacific region.

The conference resulted in the Yogyakarta Sustainable Water Actions Statement. The sixteen actions in this Statement address various needs and issues for the implementation and promotion of ecohydrology by strengthening Water Centres and establishing twin pilot programmes and demonstration sites. These actions not only address global and regional problems, but also consolidate efforts to solve the local water problem in Yogyakarta, where the tourism industry's rapid development significantly reduces water quantity and quality for the local community.

The 22nd IHP-Regional Steering Committee for Southeast Asia and the Pacific (IHP-RSC SEAP) held on 13-14 November 2014 provided a platform for a hydrological network in the region to implement IHP regional and local activities such as Asia Pacific HELP.

The 23rd IHP-RSC SEAP took place 19-20 October 2015 in Medan, Indonesia. There a Memorandum of Understanding was proposed between GRDC (Global Runoff Data Centre) and IHP-RSC SEAP (the IHP Regional Steering Committee for Southeast Asia and the Pacific). Country reports were sent by thirteen member states (Australia, China, Indonesia, Japan, Malaysia, Mongolia, Myanmar, New Zealand, Papua New Guinea, Philippines, Republic of Korea, Thailand and Vietnam) along with an observer country (Pakistan) and three UNESCO Category 2 Centres: the Asia Pacific Centre for Ecohydrology (APCE), the Humid Tropical Centre (HTC) in Kuala Lumpur and the International Centre for Water Hazard and Risk Management (ICHARM). The reports covered IHP-related activities implemented in each country respectively.

A special commemoration for the 50 years of the IHP and International Hydrology Decade took place on 20 October 2015 to distribute the IHP-RSC SEAP awards to ten individuals in the region for their outstanding contributions to IHP over the years. The regional group presented the book entitled "Celebrating 50 years of Water Leadership in Asia and the Pacific, Success Stories from the Field" on this occasion.

Back-to-back to 23rd IHP-RSC SEAP, and in collaboration with the University of Sumatera Utara, UNESCO's Jakarta office organized an International Symposium on ''Integrated Actions for Global Water and Environmental Sustainability'' 21-22 October 2015, Medan, Indonesia, including a field trip to Sibolangit Spring Water as a part of UNESCO's water-sensitive urban design project entitled "Securing Medan Water Future 2030". This symposium aimed to develop a common understanding of sustainable development using integrated actions, as well as demonstrating UNESCO's approach to sustainability science among policy makers, decision makers, researchers, universities and governmental institutions in the Asia-Pacific region.

The 23rd IHP Training Course at the Kyoto University "Ecohydrology for River Basin Management under Climate Change" on 2-13 December 2013 trained participants from the Asia-Pacific region as a part of the Japanese contribution to IHP. The course consisted of a series of lectures, practice sessions and field surveys along the Kizu River.

The training course on "Ecohydrology: A Tool for IWRM Implementation at River Basin Level" (8-9 November 2014, Yogyakarta, Indonesia) was the first event of the international conference "Ecohydrology Approaches for Facing the Global Water Environment Challenges". Professors and practitioners from international and regional Water Centres shared knowledge, best practices and challenges. The training course provided capacity building on the use of the dual regulation of water and ecosystems. The participants agreed on further collaboration with the Asia-Pacific University network on ecohydrology with a special focus on Indonesia.

The International workshop on the "Tools for Customizing IWRM Guidelines for Water Security in Asia and the Pacific: Challenges and Opportunities for HELP and Ecohydrology" (11-12 March 2015 Jakarta, Indonesia) documented tools for successful implementation of IWRM Guidelines for

water security in the Asia-Pacific region, as well as identifying challenges, solutions and constraints. Representatives from UNESCO Chairs, the Network of Asian River Basin Organizations (NARBO), the International Drought Initiatives (IDI), and the International Flood Initiatives (IFI) shared their experience on customizing IWRM Guidelines. Participants discussed case studies on implementing IWRM guidelines for drought management and how to use ecohydrology for applying IWRM guidelines in case of extreme hydrological events. Two special sessions were conducted focusing on case studies from the region: the Thematic Session for SMART implementation of IWRM and Regional Process on Water and Cities.

Another key achievement of this workshop was the signature of three Memoranda of Understanding (MoU) to promote collaboration, cooperation and networking among three of UNESCO's Category 2 Water Centres, namely the Humid Tropical Centre (HTC) Kuala Lumpur, the Regional Centre on Urban Water Management (RCUWM Tehran), and the Asia-Pacific Centre for Ecohydrology (APCE). The 17th International River Symposium was held in Canberra, Australia in the Murray-Darling Basin (an IHP HELP river basin and part of Ecohydrology Programme) on 15-18 September 2014. The overarching theme of the symposium was 'Large River Basins'. The conference and specialist workshops culminated in a statement on integrated river basin management aimed at forging a stronger global agenda for coordinated action.

In the Asia and Pacific Region, the Ecohydrology intitiative currently has six demonstration site on the map and built info cards for them: two in Australia, two in China, one in Malaysia and one in the Philippines.

Related UNESCO Chairs and Category 2 Centres in the region

- Asia-Pacific Centre for Ecohydrology, Cibinong, Indonesia
- Humid Tropical Centre (HTC) Kuala Lumpur, Malaysia
- International Centre for Water Hazard and Risk Management (ICHARM), Tsukuba, Japan
- UNESCO Chair in Hydroinformatics for Ecohydrology, the Capital Normal University, China
- UNESCO Chair on Knowledge Systems for Integrated Water Resources Management, the COMSATS Institute of Information Technology, Pakistan

Africa

A feasibility study was completed for the designation of the African Regional Centre for Ecohydrology (ARCE) as a Category 2 Centre under the auspices of UNESCO. The 21st session of the IHP Inter-governmental Council (18-20 June 2014) approved the establishment of ARCE as a Category 2 Centre under the auspices of UNESCO in Addis Ababa, Ethiopia.

The proposal defined ARCE as a platform for Africa where joint studies by specialists of different fields allow for mutual cooperation as well as the exchange of information and identification of synergies among different systems within the framework of the Ministry of Water, Irrigation and Energy of Ethiopia.

The feasibility study concluded that ARCE had the potential to support regional and national efforts to mainstream ecological approaches in water resources management plans by helping build the capacity of professionals and institutions. ARCE could also contribute to ecohydrology capacity building in Africa by developing a network of demonstration sites to create positive socio-economic feedback and provide relevant ecosystem services, as well as by implementing the Water Related Framework Directive of the African Countries, and other environment-related legal regulations.

Currently, the ecohydrology network in Africa features three demonstration projects, two in Ethiopia and one in Kenya, working on innovative ecotechnologies, phytoremediation and restoration of riparian ecosystems.

Related UNESCO Chairs and Category 2 Centres in the region

- African Regional Centre for Ecohydrology, Addis Ababa, Ethiopia
- UNESCO Chair in Water Management, University of Bangui, Central African Republic

Arab States

UNESCO is conducting two technical studies on gender mainstreaming in the implementation of IWRM in rural areas, including agriculture, sanitation and water reuse in Morocco and Tunisia, with the support of the UNESCO-Chair on Water, Women and Decision-Making in Morocco, and Center of Arab Women for Training and Research (CAWTAR) in Tunisia. In addition, UNESCO is preparing the Arab Non-Conventional Water Resources Initiative in partnership with the Arab League of States and the Arab Water Council.

IHP supported the organization of a “Regional training workshop on assessing climate change

impacts on Biosphere Reserves in Socotra Island" in Yemen in collaboration with the UNESCO Man and Biosphere (MAB) programme.


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


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


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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