United Nations
Educational, Scientific and
Cultural Organization

International
Hydrological
Programme

IHP-VIII Thematic Area 1

Water-Related Disasters and Hydrological Changes

Activities and Outcomes 2014-2015

International Hydrological Programme
Division of Water Sciences

THE CONTEXT

Water-related hazards or hydrohazards are the result of complex interactions between the ocean, atmosphere and land. Climate change is expected to cause an increase in floods and droughts. A surge in hydrohazards, increased frequency and magnitude, unplanned urbanization, degradation of ecosystem services, vulnerable livelihoods and inaccurate public perception of risk lead to higher loss of human lives, increased material damage and resulting costs. The challenge is to identify appropriate and timely measures to anticipate hydrohazards and alleviate their impacts in a continuously changing environment.
Major research gaps remain, including: an incomplete understanding of hydrological processes and links between the atmosphere, biosphere and human society; appropriate techniques for data integration and/or assimilation; issues of scale and heterogeneity of both statistical and real life situations; capabilities to predict hydrological processes and their interactions with socio-ecological systems; and uncertainty with regards to estimation, communication and incorporation into adaptive resource management decision-making.

Knowledge needs to be shared more actively with policy-makers to ensure that decisions take into account the best available information. IHP's objectives include furthering research and developing early warning systems, supporting cooperation to develop further vulnerability studies and adaptive actions related to climate change, and promoting innovative approaches to education and capacity building.
"Water-related disasters and hydrological changes" is the first of six themes that define 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 1 revolves around five different focal areas:

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.

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

Earth Observation Responses

The Increasing Resilience through Earth Observation (IncREO) project was coordinated by UNESCO within a European Consortium to develop Earth Observation (EO)-based solutions to improve preparedness and mitigation planning. Two main hot spots were selected as case studies: the Alpago mountain area located in Veneto, Italy, which is prone to earthquakes, floods and landslides; and the area of Lake Shkodra in Albania, which is prone to floods.

A Flood Information Service

The FLOODIS project (2013-2015) developed a platform to alert the population (professional users and citizens) of an impending disaster and subsequently provide them with regular updates and additional resources, such as geographical information (map layers via a mobile mapping application) concerning the disaster. Under this project, the disaster alert and information was focused on flood events, but the system could be extended to other types of disasters.

Flood Risk Management and Mitigation in the Sava Countries

The International Workshop on “Flood Risk Management Measures and Links to the EU Water Framework Directive” in Zagreb, Croatia,11-12 November 2015, was co-organized with IHP, the International Sava River Commission, the International Commission for the Protection of the Danube River and the World Meteorological Organisation. About 100 experts and officers from the Sava River Basin countries (Slovenia, Croatia, Montenegro, Bosnia and Herzegovina and Serbia) benefited from this capacity-building activity, which led to the development of ideas for further regional actionon flood risk management and mitigation.

The Snow and Ice Initiative

The Snow and Ice initiative organized the seminar on “Climate Change Impacts on Snow, Glacier and Water Resources: Multidisciplinary Network for Adaptation Strategies” from 6-7 November 2014in Koblenz, Germany.Together with the University of Albany (USA), IHP finalized a manual on Mass Glacier Balance. Four background papers were finalized for publication: Climate change impacts on water resources in the tropical Andes; Climate change impacts on water resources in the tropical Andes; Climate Change Adaptation local practices in the Andean Region; and Existing Climate Change Adaptation policies and challenges and opportunities for their implementation.

Advances in Global Water Resources Management

The International Centre for Integrated Water Resources Management (ICIWaRM) organized a session on Advances in Global Water Resources Management through IHP (December 2015) during the AGU in San Francisco, USA.

Increasing Resilience to Emergencies

The Regional Workshop on “Increasing Resilience to Emergencies through Earth Observation, Crowdsourcing, and Satellite Navigation Systems” was held in October 2015 at UNESCO Paris to disseminate the results of the project.

Related UNESCO Chairs and Category 2 Centres in the region

- UNESCO Chair on Water-Related Disaster Risk Reduction at the University of Ljubljana, Slovenia
- UNESCO Chair on the Prevention and Sustainable Management of Geo-hydrological Hazards at the University of Florence, Italy
- UNESCO Chair on Integrated River Research and Management, University of Natural Resources and Life Sciences, Vienna, Austria
- International Centre on Water Resources and Adaptation to Global Change (ICWRGC), Germany
- Centre for Water for Sustainable Development and Adaptation to Climate Change (WSDAC), Serbia
- International Centre for Integrated Water Resources Management (ICIWaRM)

Latin America and the Caribbean

Glacier Retreat in the Andes

The Impact of Glacier Retreat in the Andes: International Multidisciplinary Network for Adaptation Strategies project has established a multidisciplinary network to develop adaptation strategies in order to mitigate the impact of climate change on glaciers in the Andean region. The network develops strategies and policy advice based on sound scientific knowledge. Maps detailing the vulnerability of water resources to global changes in the Andean Region were produced, indicating the area of influence and the average and maximum glacier melt contribution to river flow in the region, as well as assessing the impact on water usage and demand.

Resilience to Natural Hazards

With the financial support of the Flemish Government, IHP implemented the ENHANS project,“Increasing Resilience to Natural Hazards in South America”,with the aim of developing and implementing methods and tools to address vulnerability and risk, and to train a critical mass of experts in the use and further development of tools.

Urban Areas and Flood Management

On14-17 October 2014, a workshop entitled “Flood Risk Management in Urban Areas” was held in La Plata, Argentina, jointly organized by IHP, the Category 2 Centre HidroEx and the National Water Institute (INA) of Argentina.

Disaster Risk Management in the Caribbean Islands

A regional Workshop entitled “Comprehensive Water-related Disaster Risk Management in the Caribbean Islands” was organized in Havana, Cuba on 26-27 November 2015.It focused on the scientific and technical aspects related to hydrometeorological extremes and risks as well as the sociological and psychological aspects associated with risk management.

Regional Hydrological Extremes

The Hydrological Maximum joint initiative, implemented as part of the International Flood Initiative (IFI) and the Flood Regimes from International Experimental and Network Data (FRIEND) of IHP, held a meeting in Panama City on 28-30 April 2015. It was aimed at discussing and developing a work plan to analyze the overall behaviour of regional hydrological extremes, using data on past rainfalls and flows in the Latin American and Caribbean region.

Climate Change Impacts on Mountain Regions of the World

The exhibition “Climate Change Impacts on Mountain Regions of the World” was developed as a contribution to the International Year of Water Cooperation (2013). The exhibition was first displayed on the exterior fences of UNESCO’s Headquarters in Paris, France during the 37th session of UNESCO’s General Conference (November 2014). It was subsequently displayed in Cusipata Square in Cusco, Peru in May 2014 as part of the World Mountain Forum 2014 before moving to Lima, Peru during the UN Climate Change Conference of the Parties (COP-20). It was created with the support of the Japan Aerospace Exploration Agency (JAXA), the European Space Agency (ESA), the United States Geological Survey (USGS) and Planet Action.

Related UNESCO Chairs and Category 2 Centres in the region

- UNESCO Chair on Hydrometeorological Hazards (University of Puebla, Mexico)
- Water Centre for Arid and Semi-Arid Zones of Latin America and the Caribbean (CAZALAC), Chile

Asia and the Pacific

Flood Forecasting in the Lower Indus Region

The Strategic Strengthening of Flood Warning and Management Capacity of Pakistan – Phases 1 & 2 project started in Pakistan in March 2015 with several key aims: to enhance technical capacity building and human resource development in flood management, forecasting, early warning and flood hazard analysis; to promote strengthening of cooperation with Indus river basin countries for transboundary flood management and transboundary data sharing; and to reduce flood risk at the local level through capacity building and education on the Indus River catchment and Eastern rivers (Jhelum, Chenab, Ravi and Sutlej) in Pakistan.

Sediment Planning

The International Sediment Initiative (ISI) Programme Planning Workshop was held over three days in May 2015 in Beijing, China. The workshop convened members of the ISI advisory and expert groups, representatives of UNESCO Category 2 Centres and other partner organizations.

High Elevation International Geophysical Expedition

The 3rd Pamir's High Elevation International Geophysical Expedition (HEIGE) project aims to assess the impact of natural and human activity on the mountainous Pamir region, an important water supplier for Central Asia. IHP and the International Geoscience Programme (IGCP), along with other partners, are evaluating the future of Pamir's water resources in a changing climate. The project is led by an international group of recognized scientific experts in glaciology and climate change research from academic institutions in the United States, Germany, Japan and France. In April 2015, UNESCO hosted the Working Group Meeting of the HEIGE project at its Headquarters in Paris to create a dialogue between the different stakeholders –including scientific experts in glaciology and climate change research as well as several other partners – to ensure the results of the project will be translated into concrete plans of action.

Drought Institutional Support

The International Drought Initiative (IDI) Expert Group meeting was held in Tehran in June 2015 to provide expert knowledge, advice and help in networking and institutional support for implementing IDI's activities.

Some additional workshops and events were successfully conducted in the region, including: the workshop "South-South Cooperation for Modelling and Managing Hydro Hazards", in Jakarta, Indonesia; the international seminar "Enhancing Resilience against Multi-Hazards through Effective Mitigation Systems and Adaptive Strategies", Philippines; and a Summer School on Glacier Mass Balance for young researchers from CA, Afghanistan and Iran held in Kyrgyzstan in cooperation with Fribourg University, Switzerland and CAIAG.

Related UNESCO Chairs and Category 2 Centres in the region

- International Centre for Water Hazard and Risk Management (ICHARM), Japan
- Central Asian Regional Glaciological Centre (CARGC), Kazakhstan
- Regional Water Research Centre on Hydrology of Headwater Catchments (RWRC-COMSATS), Pakistan
- International Centre for the Integrated Management of Watershed and Bio-Resources in Arid and Semi-Arid Regions (IMWBRA), Iran
- International Research and Training Centre on Erosion and Sedimentation (IRTCES), China
- Regional Centre for Water Management Research in Arid Zones (RCWMRIAZ)

Africa

Drought Monitoring and Forecast Systems

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 build capacity to help reduce the impact of drought across Africa. The African Drought Monitor is currently operational in Niger and Kenya.One important tool in such information gathering, the Namibia Flood Dashboard, uses precipitation estimates from the G-WADI PERSIANN-CCS GeoServer to produce daily flood bulletins and other relevant information.

The African Drought Early Warning System Expansion to Southern Africa (SADC Region)

The African Drought Early Warning System expanded to the SADC region in 2015 with the support of SIDA, in cooperation with UNESCO networks and partners. The project establishes and upgrades the African Drought Monitoring System in SADC countries to provide near real-time updates of the state of drought and hydrological information (e.g. precipitation, evapotranspiration, runoff, stream flow) for the African continent, with seasonal six-monthly forecasts of these variables. The system collects state-of-the-art observational data sources from satellite remote sensing and predictions from climate and hydrological modelling technologies. It also incorporates available on-the-ground observations from gauges to provide a comprehensive and consistent view of drought conditions.

The Inception Workshop “African Drought Early Warning System in Southern Africa” was organized in May 2015 (Windhoek, Namibia). One of the major outcomes of the workshop was the development of a set of recommendations, training sessions and a plan of action for drought monitoring in Southern Africa.

Strengthening Capacity to Combat Drought

Two case studies on sediment dynamics were prepared and presented for dissemination during the International Conference on African Large River Basin Hydrology held in Tunisia on 26-30 October 2015.

A training Workshop on the “Seasonal Forecast of Floods within the IGAD Region” was co-organized in partnership with ICPAC, with the support of a hydrological expert from AGRHYMET. Fifteen hydrological experts from Ethiopia, Djibouti, Uganda, Sudan, South Sudan, Kenya, Somalia, Burundi and Rwanda participated in the training. The consolidation of the different models led to the development of the first seasonal floods forecast in the region.

Related UNESCO Chairs and Category 2 Centres in the region

- African Centre for Global Change and Water Research in South Africa (RC-IRBM)
- Regional Centre for Integrated River Basin Management (ACGCWR), Nigeria

Arab States

Water scarcity is the most significant challenge facing the Arab region. IHP has provided support in the region with an emphasis on developing water resource policies, educational frameworks and action plans to enableMember States to address water scarcity issues associated with the potential impact of climate change.

A Regional Training Workshop on “Assessing Climate Change Impacts on Biosphere Reserves in Socotra Island” was organized in Yemen, in joint collaboration with the UNESCO Man and Biosphere Programme (MAB).

Related UNESCO Chairs and Category 2 Centres

- Regional Centre for Training and Water Studies of Arid and Semi-Arid Zones (RTCWS)
- Regional Centre for Shared Aquifer Resources Management (RCSARM)

Global Initiatives

Addressing Water Security Climate Impacts and Adaptation Responses in Africa, Americas and Asia

Supported by the Flanders Government, this project carries out vulnerability assessments based on case studies from different regions impacted by climate change, in order to enhance future water security.The project is focused on vulnerable regions such as mountains, and arid and semi-arid regions.

Exhibition

The Exhibition “Mountains: Early Warning Systems for Climate Change” was developed by IHP and MAB. It aimed to raise awareness on the impact of climate change in mountains, develop potential solutions and disseminate scientific data to policy- and decision-makers, diplomats and the general public during the Paris Climate Conference (COP21). It was displayed on the gates of UNESCO and later at the Cité Universitaire of Paris in November and December 2015.

IHP Lunch Talk

During the 38th General Conference, IHP organized a Lunch Talk, “Addressing Water Security Under Climate Change”.The aim of the meeting was to raise awareness of the challenges presented by climate change and to enhance collaboration between science and policy-makers.

Raising Awareness of Climate Change

The outreach event “Raising Awareness of Climate Change: Key Findings of the IPCC 5th Assessment Report” was jointly organized by the Intergovernmental Panel on Climate Change (IPCC) and IHP on 7 December 2015 at UNESCO Headquarters. The event focused on translating science into practical solutions and on the potential of education and raising awareness as powerful drivers for change. The programme included: a Media Workshop; the presentation of AR5 findings by the lead or coordinating lead authors; a Science/Policy Dialogue with the participation of policy-makers and distinguished scientists; and a Seminar on Education and Climate Change.

Our Common Future under Climate Change

The International Scientific Conference “Our Common Future under Climate Change” convened more than 1,000 scientists to review the current state of research and discussed measures to mitigate and adapt to climate change. Five parallel sessions were organized by UNESCO and IHP in collaboration with other partners and three additional sessions were organized on the state of freshwater, shaping the future and facing climate change in Africa.

Glacier App for Mobile Devices

A Glacier App for mobile devices was launched in collaboration with WGMS during the COP21 in December 2015.

Integrated Water Resources Management

During the Third UN World Conference on Disaster Risk Reduction (WCDRR) held in March 2015 in Sendai, Japan, IHP – in collaboration with the World Meteorological Organization (WMO) – organized a Working Session on “Integrated Water Resources Management (IWRM)”. The outcome of this meeting included political messages and guidance to implement the post-2015 vision.

Strengthening Resilience to Climate and Disaster Risks

IHP and related partners provided technical contributions to the session “Managing change: strengthening resilience to climate and disaster risks” during the Stockholm Water Week 2015.

Mountains of Our Future Earth

IHP also contributed to the international conference: the “Mountains of Our Future Earth” in Perth, Scotland, 2015.

Hydrological Sciences and Water Security

The 11th Kovacs Colloquium on “Hydrological Sciences and Water Security: Past, Present and Future” was jointly organized by IHP and IAHS. The event took place at UNESCO’s Paris Headquarters prior to the 21st Session of the Intergovernmental Council of IHP in June 2014. The Colloquium comprised several invited lecturers, an interactive panel session and a poster session.

Launch of Hydrology Publications

The papers Hydrological Science and Water Security: Past, Present and Future and Hydrology in a Changing World were published. The publications included the outcome of the 11th Kovacs Colloquium, which addressed the emergence and development of water security concepts over the past decades, current thinking and perspectives, and likely developments in the future.


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


GRAPHIC
INTERNATIONAL CLIMATE NEGOTIATIONS – NEED FOR MORE EXPLICIT DISCUSSIONS REGARDING GROUNDWATER
GRAPHIC
GROUNDWATER AND CLIMATE CHANGE
Mitigating the Global Groundwater Crisis and Adapting to Climate Change
Groundwater provides drinking water to at least 50% of the world's population and 43% of all the water used for irrigation.
Groundwater sustains the base flow of rivers and important aquatic systems.
Sustainable groundwater is an issue of national and international security.
Groundwater systems are highly vulnerable on Small Island Developing States (SIDS).
ROLE OF GROUNDW IN ADAPTATION TO CLIMATE CHAN
GROUNDWATER MANAGEMENT STRATEGIES TO RE VULNERABILITIES
300%


PRÉPARATION
CRISES
REPAREDNESS


SLOVENIE


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.”

International Hydrological Programme
Division of Water Sciences
UNESCO
7, Place de Fontenoy
75352 Paris 07 SP France
Tel: (+33) 1 45 68 40 01
E-mail: ihp@unesco.org
www.unesco.org/water

Photographs:
Cover :©Department of Foreign Affairs and Trade/CC BY (Flickr);page 6 : ©Oxfam International/CC BY (Flickr); page 7 : © Heinrich Böll Stiftung/ CC BY (Flickr);page 10 : © UNESCO