



## **International Hydrological Programme**

41<sup>st</sup> session of the IHP Bureau  
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# **RESULTS OF IHP-VI IMPLEMENTATION SINCE THE 17<sup>TH</sup> SESSION OF THE IHP INTERGOVERNMENTAL COUNCIL**

Item 7.1 of the provisional agenda

### Summary

This document presents a consolidated report on progress and results achieved in the implementation of the Sixth Phase of IHP since the 17<sup>th</sup> session of the IHP Intergovernmental Council, covering the period from June 2006 to 31 December 2007. Given that the IHP-VI completed as of 31 December 2007, the report also highlights major achievements of Themes for the entire period of IHP-VI.

The Bureau may wish to express its views on the implementation of IHP-VI activities and to comment thereon. No decision required.

## INTRODUCTION

This document presents a consolidated report on progress and results achieved in the implementation of the Sixth Phase of IHP (IHP-VI) since the 17<sup>th</sup> session of the IHP Intergovernmental Council (Paris, June 2006) until the end of the IHP-VI, covering the period from June 2006 to 31 December 2007. The results of IHP-VI activities during the final phase of IHP-VI are summarized below under relevant Themes and Focal Areas. The progress and results achieved in the first four and half years of IHP-VI were reported to the previous sessions of the IHP Bureau and Intergovernmental Council, as contained in documents IHP/Bur-XL/9 and IHP/IC-XVII/Inf.6. Given that IHP-VI completed as of 31 December 2007, this report focuses on the final stage of the implementation of IHP-VI activities and cross-cutting programmes. Major achievements of Themes during the entire period of IHP-VI are also highlighted.

The present report contains only regular programme activities, contributing to the implementation of IHP-VI. IHP-related extrabudgetary activities implemented by the IHP and Field Offices are reported in document IHP/Bur-XLI/14. This report is complemented by the following documents: IHP-related extrabudgetary activities (IHP/Bur-XLI/14); Progress report on recent IHP initiatives and programmes (IHP/Bur-XLI/17); UNESCO-IHP involvement in the 5<sup>th</sup> World Water Forum (IHP/Bur-XLI/20); and IHP's role in the International Decade for Action - "Water for Life" (2005-2015) (IHP/Bur-XLI/21). A glossary of acronyms is annexed to the report.

The documents on progress and results of IHP-VI implementation presented to the 17<sup>th</sup> session of IHP Intergovernmental Council and the 40<sup>th</sup> session of IHP Bureau are available online at: <http://unesdoc.unesco.org/images/0015/001532/153289E.pdf> and <http://unesdoc.unesco.org/images/0014/001463/146358E.pdf> ]

## THEME 1: GLOBAL CHANGES AND WATER RESOURCES

Within this Theme, IHP activities focused on the impact of climate change and climate variability on water resources. The assessment of snow glacier and water resources emerged as an active sub-topic, and scientific knowledge on impacts of climate variability and change on snow and glacier resources was enhanced through the relevant studies and capacity building activities, which brought together decision-makers, professionals and other stake-holders and informed them on the relevance of the development to water resources in the region. Climate variability and land cover change were investigated, looking at the impact on hydrological extremes such as floods and low lows at various scales.

### Progress and results achieved from June 2006 to 31 December 2007

#### ***Focal Area 1.1: Global Estimation of Resources: Water Supply and Water Quality***

#### ***Focal Area 1.2: Global Estimation of Water Withdrawals and Consumption***

- IHP supported the preparation of sections on groundwater and the use of remote sensing of the WMO/UNESCO Manual for Water Resources Assessment in preparation. As a joint UNESCO-IHP/WMO effort, the methodology proposed in the "Manual for the Assessment of National Capacities for the Evaluation of Water Resources" (UNESCO/WMO, 1998) was reviewed and updated for the Latin America (2006) and the Caribbean (2007) region.
- Under cooperation between World Water Assessment Programme (WWAP) and IHP, the PR China and RO Korea carried out case studies on Yellow River Basin and Han River Basin respectively, which outcomes are being integrated in the 3rd World Water

- Development Report (WWDR).
- UNESCO Office Beijing, as a leading agency for water in cooperation with UNICEF, FAO and UNEP, contributed to a project proposal for a UN joint programme on “China Climate Change Partnership”, supported by Spanish MDG Funds. The proposal was developed in 2007 and the project will start with an inception workshop in 2008.
  - Water resources management capacity in Cook Islands was enhanced through Aitutaki Water Supply project, implemented by the Pacific Islands Applied Geoscience Commission (SOPAC) in cooperation with the Department of Water Works in Rarotonga and with funding support from UNESCO. The Department of Water Works developed a GIS database of the water supply infrastructure on Aitutaki, Cook Islands, through a climate adaptation project funded by the Canadian International Development Agency (CIDA). Training of local professionals in its use was carried out through Pacific Hydrological Training Courses, facilitated by SOPAC in collaboration with UNESCO Office in Apia and World Meteorological Organization (WMO) and funded by New Zealand's International Aid & Development Agency (NZAID). Also, new monitoring equipment has been purchased within the framework of a monitoring capacity development component of the project.
  - IHP supported the utilization of modern tools such as Remote Sensing for monitoring and assessment of water resources and building capacity to apply these, especially in the framework of TIGER Africa Programme – an initiative led by the European Space Agency (ESA) on the use of space technology for water resource management in Africa. A short course on “Remote Sensing for Integrated Management of Water Resources” was organized for participants from the SADC countries by the UNESCO Chair on Geohydrology at the University of the Western Cape in South Africa in November 2006. The workshop reviewed the intermediate results of TIGER projects, demonstrating tailored Earth Observation based information services to support African water authorities. UNESCO Nairobi office has hosted the TIGER Executive Bureau from March 2007 onwards. Technical manual “Remote sensing applications to groundwater”, prepared in cooperation with the International Institute for Geo-Information Science and Earth Observation, was published as a contribution to TIGER and distributed with emphasis on Africa and centres in developing countries.

### ***Focal Area 1.3: Integrated Assessment of Water Resources in the Context of Global Landbased Activities and Climate Change***

- Awareness raising of decision-makers, professionals and other stake-holders on climate change impacts on glaciers, snow and water resources in the LAC and Asia regions was enhanced through regional workshops and training activities. These workshops and training courses also contributed to the improvement of scientific understanding of snow and glacier dynamics of mountainous areas and their role in runoff formation.
- A regional workshop on “Assessment of Snow-Glacier and Water Resources in Asia” was organized in Almaty, Kazakhstan from 28-30 November 2006. The workshop, organized by UNESCO Almaty Office, brought together experts, academicians, government representatives and international organizations from Asia, Europe and North America to discuss glacier retreat and its impact on water resources in Asia.
- UNESCO New Delhi Office conducted a study on “Climate variability in the region and its influence on water resources in Sri Lanka”. This study is followed up by a study focusing on drought in the Walawe Basin with an aim to ascertain short and long-term water availability and socio-economic influence due to the climate change.
- The first phase of a study on flood and drainage management in Kelani Ganga, Kalu Ganga and Bolgoda Basins in Sri Lanka has been completed by UNESCO New Delhi Office. Negotiations on the modality of execution and extra-budgetary fundraising are currently underway.

- A case study on climate change and its impact on glacier dependent communities of Gangotri glacier was carried out by UNESCO New Delhi Office.
- UNESCO Accra Office contributed to the International Conference on ‘Climate Change and Its Impacts on the West African Sub-region’, organized by the United Nations Economic Commission for Africa (UNECA) and Permanent Interstate Committee for Drought Control in the Sahel (CILSS), and was selected in the core task team for the preparation of the West Africa Action Plan on Climate Change. Technical and scientific support was provided for the preparation of five technical and scientific synthesis papers on adaptation strategies for water resources management in West African basins in the context of climate change during a workshop organized by ENDA-environment and Energy Department (Senegal, February 2007).
- With support of the Water Research Institute of Ghana, UNESCO Accra Office conducted a study on the current state of water resources (quantity and quality monitoring) in Greater Accra region and organized a national validation workshop in October 2007. As follow-up action, a project proposal for the monitoring and assessment of water resources in Greater Accra was prepared and submitted for fundraising.
- XXIII Conference of Danubian Countries on the Hydrological Forecasting and Hydrological Bases of Water Management was held in Belgrade, Serbia, on 28-31 August 2006. The proceedings will be published in the IHP Technical Document in Hydrology series.
- As a contribution to the International Polar Year, UNESCO Venice Office contributed to the translation into English and Spanish and the dissemination of the book ‘Caves of Sky’, published by the La Venta Exploration Team, with the aim of encouraging all UNESCO partners to give new impetus to monitoring, research and dissemination efforts in the field of glacial hydrology and the assessment of climate change effects on the hydrological cycle, and more generally in the search for sustainability.
- Integrated assessment of water resources in the Arab region was enhanced through several activities, organized by UNESCO Cairo Office in cooperation with the Arab Water Council and other partners, such as the Arab Water Council Meeting and Third Arab Water Regional Conference (Cairo, Egypt, December 2006), expert group meeting on IWRM in the Arab Region (Manama, Bahrain, March 2007), and expert group meeting on the Impact of Climate Change on Water Resources in the Arab region, jointly organized with ALECSO (Al-Ain, United Arab Emirates, November 2007).

**Major Achievements of Theme 1 in IHP-VI (2002-2007):**

- IHP has become a strong and effective contributor to the World Water Development Report of WWAP, providing scientific input in a number of key topics, including the assessment of the resource, both surface and groundwater; the formulation of appropriate indicators and the management of shared waters.
- IHP actively participated in the international and regional efforts addressing the impacts of climate change on water resources through its various programmes and initiatives: including International Flood Initiative (IFI) and FRIEND dealing with hydrological extreme events; Groundwater Resources Assessment under the Pressures of Humanity and Climate Changes (GRAPHIC); and regional initiatives addressing glacier mass decline and potential effects on water resources in Asia and South America. IHP also contributed to major events such as in the International Conference on ‘Climate Change and Its Impacts on the West African Sub-region’ (Senegal, February 2007), in which IHP was selected in the core task team for the preparation of the West Africa Action Plan on Climate Change.
- Training material and courses in specific fields of hydrology were developed in collaboration with other international organizations, such as training on isotope hydrology with IAEA, the ‘Manual for Water Resources Assessment’ with WMO, and on remote sensing applied to water resources with the European Space Agency (ESA).

- The capabilities of the international hydrological community were strengthened through the establishment and implementation of the inter-agency programme Joint International Isotopes in Hydrology Programme (JIHP) under the auspices of the IAEA in cooperation with UNESCO.

## **THEME 2: INTEGRATED WATERSHED AND AQUIFER DYNAMICS**

Activities during the reporting period aimed, mainly, at: the establishment of flood control and disaster reduction cooperation; the development of a joint vision, principles and practice for a more efficient management of water resources; and the establishment of avenues for groundwater reference data collection and dissemination. A focus was also placed on enhanced management of transboundary aquifers and promoting the exchange of data and knowledge in international river basins and aquifers.

### **Progress and results achieved from June 2006 to 31 December 2007**

#### ***Focal Area 2.1: Extreme Events in Land and Water Resources Management***

- Knowledge sharing on water resources management in Asia and the Pacific was supported through the 3rd Asia Pacific Association for Hydrology and Water Resources Conference on “Wise Water Resources Management towards Sustainable Growth and Poverty Reduction”, organized in conjunction with the 14th IHP Regional Steering Committee (IHP-RSC) Meeting for Southeast Asia and the Pacific and International Symposium on Managing Water Supply for Growing Demand (Thailand, October 2006).
- Cooperation and knowledge sharing was promoted through the International Conference on Hydrology and Water Resources Management for Hazard Reduction and Sustainable Development (the Philippines, November 2007), organized in conjunction with the 15th IHP-RSC Meeting for Southeast Asia and the Pacific. Support for participation was provided to thirteen scientists. Proceedings on the conference were published in 2007.
- Collaboration and networking among UNESCO water centres was enhanced through the Asia Pacific Meeting of UNESCO category 2 water centres (Thailand, September 2007). The meeting agreed on actions to be carried out to develop a mechanism for cooperation between category 2 centers and UNESCO Field Offices in ASPAC.
- Within the UNESCO-IMET project on “Water Programme for Environmental Sustainability (WPA II): towards Adaptation Measures to Human and Climate Change Impacts”, two drafts project proposals are being developed in LAC; one in the Caribbean with two sub-components (Jamaica, and Trinidad and Tobago), and the other in Brazil (two sites).
- Mapping of the IHP flood activities was carried out, together with the production of a compendium of extreme floods events in cooperation with IAHS.
- IFI-LAC component was launched in Mexico in October 2007, with the support of many institutions from the region, and a regional working group was established.
- The UNESCO New Delhi Office completed the first phase of the study on flood and drainage management in Kelani Ganga, Kalu Ganga and Bolgoda Basins in Sri Lanka and prepared a white paper on floods in South Asia (January 2007).
- The International Centre for Water Hazard and Risk Management (ICCHARM), under the auspices of UNESCO, designed a new Masters course program on flood related disaster mitigation for young professionals, in cooperation with the National Graduate Institute for Policy Studies and the Japan International Cooperation Agency.
- UNESCO New Delhi Office organized a workshop on flood management during the International Conference on Environmental Education in India, November 2007.
- Within the framework of the IHP Groundwater for Emergency Situations (GWES) project,

a methodological guide for the management, protection and use of groundwater resources was published and several case studies were compiled. Three GWES workshops were organized in Tokyo, Tehran and Paris in 2007 and the relevant publications were made available on the UNESCO-IHP website. A case study on “The Emergency Water Supply in Beijing for Coping with the Consecutive Drought” was carried out by the China Institute for Geo-Environmental Monitoring and Beijing Geo-Environmental Monitoring Station and the report of the study has been adopted by the UN Theme Group on Disaster Risk Management in China.

### ***Focal Area 2.2: International River Basins and Aquifers***

- Within the framework of the IHP programme on Internationally Shared Aquifers Resources Management (ISARM), the inventory and assessment of transboundary aquifers were finalized in the Americas and South Eastern Europe (SEE) and were initiated in Africa and in Asia. The ISARM website, hosted by the International Groundwater Resources Assessment Center (IGRAC), has been developed. The UNESCO Chair at the International Network of Water-Environment Centres in the Balkans (INWEB) in Thessaloniki, Greece, completed the review of existing data on transboundary aquifers in the SEE and set up a database on transboundary karst on a web-GIS platform. A full-size GEF Project on the “Management of Dinaric Karst Transboundary Aquifer Systems” (DiKTAS) is being prepared in cooperation with GEF/UNDP. With the aim of setting up a sub-regional network in Caucasus and Central Asia, a workshop was organized in cooperation with UNECE and OSCE (Kazakhstan, May 31 to 1 June 2007). The UNESCO Chair at INWEB, jointly with United Nations Economic and Social Commission for Western Asia (UNESCWA), set up the database for the UN project on capacity building for sustainable utilization, management and protections of internationally shared groundwater in the Mediterranean region.
- The results of the first phase of the ISARM Americas were published and the second phase of ISARM Americas, focusing on legal and institutional aspects of transboundary aquifers, was initiated in 2007. The publication of results of the second phase is foreseen in 2008. Brainstorming meeting for the launching of the third phase of ISARM Americas, which focuses on integrating social, economic and ecohydrological criteria in transboundary aquifers diagnosis and management, was organized (USA, June 2007).
- The ISARM-Southern Africa network of experts and decision-makers on transboundary aquifers was established in close cooperation with the University of Western Cape, the IHP National Committee of South Africa and the IGRAC, and the first ISARM West Africa experts meeting was organized in Cotonou, Benin, from 30 May to 01 June 2007. Data and information on transboundary aquifers in the sub-region have been collected and a sub-regional network for mapping the transboundary aquifers in West Africa was established. Contributions from the ISARM activities were presented at the GEF partner’s meeting for the preparation of a GEF medium-sized project (MSP) on the Development of Methodologies for GEF Transboundary Waters Assessment programme (Bonn, September 2007), and it was agreed that UNESCO-IHP/IGRAC/WC Chair would be in charge of the project component on methodologies for the transboundary aquifers.
- UNESCO Nairobi Office organized a side event on groundwater during the African Ministers’ Council on Water (AMCOW) Conference (Kampala, Uganda, October 2006) and the workshop on “Protecting and Managing Groundwater Resources”, a follow-up to AMCOW Conference recommendations.
- The preparation of the brief of a MSP project on Joint Management of Coastal Aquifer System of the Gulf of Guinea was finalized and will be submitted to GEF in 2008.
- With a view of starting ISARM-Asia, a special session on “Transboundary Aquifers in Asia with Special Emphasis on China” was organized during the 34th Congress of International Association of Hydrogeologists in November 2006. A pilot project in the

Heilongjiang-Amur River Basin was implemented by the Chinese government partners and the first inventory and assessment of transboundary Aquifers in Asia with special reference to China was published in 2007.

- A UNESCO Chair on Sustainable Groundwater Management was established at the Institute of Geo-ecology of the Mongolian Academy of Sciences in cooperation with the University of Tsukuba, Japan.
- Several seminars on legal and institutional aspects of transboundary aquifer systems were organized by IHP in cooperation with the United Nations International Law Commission (UNILC).
- With support of the German Geological Survey, a Worldwide Hydrological Mapping Assessment Programme (WHYMAP) map at the 1:25,000,000 scale was finalized (to be published in 2008). A WHYMAP of transboundary aquifers was published in 2006.
- Within the Demonstration Project on “Water Quality Estimation and Surface Water Monitoring in the Pripjat River Basin”, UNESCO Moscow Office set up a network of reference sites as a step to implement the EU Water Framework Directive (WFD), and presented the project results at the International Workshop on Methodology Framework of Environmental Assessment, held in Budapest, Hungary, January 2007.
- Information and knowledge on the status of groundwater management and protection in the Arab region enhanced through conferences and training workshops, including the Regional Conference on Groundwater Protection, organized by UNESCO Cairo Office in cooperation with ALECSO and ISESCO (Libya, November 2006), the Steering Committee Meeting of the Groundwater Protection Network (Bahrain, March 2007) and the 11th Regional Groundwater Protection Training Workshop (Egypt, June 2007).

### ***Focal Area 2.3: Endorheic Basins***

- IHP, through the Water Center for Arid and Semi-Arid Zones in Latin America and the Caribbean (CAZALAC), under the auspices of UNESCO, provided support to activities on endorheic basins in arid zones, specifically in La Puna wetlands area. A project proposal on sustainable management of threatened areas is being developed.

### ***Focal Area 2.4: Methodologies for Integrated River Basin Management***

- Within the framework of the International Sediment Initiative (ISI), a concept of the Global Evaluation of Sediment Transport (GEST) was developed, and available relevant case studies and data will be linked with GEST project. The case studies include: the Volga River (completed), the Yellow River (completed), Nile River (to be finalized in 2008), Mississippi River (a draft report available), Rio Bermej/Parana (expected to be completed in 2008), Rhine River (final editing of the report expected in June 2008). The State of the Art in Sediment Research has been completed and will be published in IHP Technical Document in Hydrology.
- The ISI has taken a lead in the preparation of the sub-section on erosion and sedimentation of the 3rd WWDR Chapter on “State of the Resources”
- The ISI Conference was organized in Khartoum, Sudan, on 11-15 November 2006, in conjunction with the 5th ISI Steering Committee meeting.
- The International Conference on “Erosion and Torrent Control as a Factor in Sustainable River Basin Management” was held in Belgrade, Serbia, from 25-28 September 2007.
- The project on Sediment Balance for the Danube River – a major ISI initiative in Europe – was launched in 2007 with the aim of formulating a roadmap for sediment management in the Danube EU WFD River Basin Management Plan. The plan is expected to be finalized by the end of 2009. UNESCO Venice Office, with Italian contributions, will deliver the results of the IHP Danube Cooperation to ICPDR.
- UNESCO center “International Research and Training Center for Erosion and

Sedimentation” (IRTCES) – the host of the ISI Secretariat – carried out several activities, including: a pilot project on “Integrated Physical and Ecological Management of Rivers-with Particular Reference to the East River”; the organization of the 10th International Symposium on River Sedimentation, Moscow, Russian Federation, in August 2007; the establishment of the ISI Information System database; and the organization of the Advanced Training Workshop on Reservoir Sedimentation Management in Beijing, China in May 2007.

- UNESCO LAC Regional Office organized several itinerary courses on integrated water resources management (IWRM) at the National University of Asuncion (Asuncion, Paraguay, 25-29 July 2006); the Cuban Institute of Meteorology (Havana, Cuba, 23-25 November 2006); Quisqueya University (Port-au Prince, Haiti, January 2008).
- UNESCO Office in Nairobi organized a training course on Remote Sensing (Abidjan, Côte d'Ivoire, May 2006), and launched the project “ATTO”, aiming at developing new hydrogeological and geological methodologies through the use of remote sensing.
- The workshop on Comprehensive Detailed Assessment of the Vulnerability of Water Resources to Environmental Change in Africa, Asia Pacific and Latin America using a river basin approach was organized by UNESCO Nairobi Office in collaboration with UNEP and START (IHDP, IGBP, WRCP) in Nairobi, Kenya, on 3-5 May 2006.
- The State-of-the-art review on IWRM implementation in Basins, Sub-basins and Aquifers (BSA) was finalized and is ready for publication and the second expert group meeting was held in June 2007 in order to further develop the preparation of a publication on Practice Guidelines on IWRM-BSA. In addition, a major book on water systems analysis is in the process of being published.
- Capacity building on methodologies for integrated river basin management in the Arab region improved and best practices exchanged through the organization of the International Sediment Initiative Conference (ISIC) and the International Sediment Initiative Steering Committee (ISI-SC) Meeting (Khartoum, Sudan, November 2006).

**Major Achievements of Theme 2 in IHP-VI (2002-2007):**

- The multi-agency (UNESCO, WMO, UNU, ISDR, IASH) initiative “International Flood Initiative” (IFI) addressing extreme events was launched and a framework for the implementation of IFI was developed, including expected outputs related to research, education and training, information networking agenda and technical assistance. Its implementation was significantly enhanced with the establishment of ICHARM in Tsukuba, Japan, which became the focal point of IFI. The regional IFI-LAC component was launched.
- The International Sediment Initiative (ISI) was launched with its Secretariat hosted at IRTCES in Beijing, China. Within the framework of the ISI, the concept of GEST was developed and available case studies and database will be linked with it.
- The IHP initiative on Internationally Shared Aquifers Resources Management (ISARM) was consolidated and expanded with vigorous regional components; the inventory and assessment of transboundary aquifers were finalized in the Americas and SEE and were initiated in Africa and in Asia. Technical support and scientific advice was provided to the United Nations International Law Commission in the preparatory aspects of an international instrument on transboundary aquifers.
- State-of-the-art and Practice Guidelines for IWRM implementation in Basins, Sub-basins and Aquifers was developed and two major publications on water resources systems analysis were produced

### **THEME 3: LAND HABITAT HYDROLOGY**

The activities under this Theme addressed issues relating to water resources management in various environments such as drylands, mountain areas, wetlands, urban settlements and rural areas. Activities on hydrology and water management in drylands focused on sharing and dissemination of information and knowledge. IHP activities on wetlands were strengthened at the regional level through IHP Ecohydrology components in LAC and SEE. Knowledge base of sustainable urban water management was significantly enhanced through IHP-VI projects addressing various aspects of urban water management, which produced a series of technical publications. A focus was also placed on strengthening capacities of groundwater resources management in coastal zones.

#### **Progress and results achieved from June 2006 to 31 December 2007**

##### ***Focal Area 3.1: Drylands***

- The Global Network for Water and Development Information for Arid Lands (G-WADI) hydrometeorology module was upgraded by adding free access through G-WADI website to real-time, dynamically updated global high resolution (0.04°) precipitation imagery. The web-based information resources were developed by adding more case studies of application of chemical tracers and isotopes. The dissemination of arid-areas focused global water news was continued.
- The Cold and Arid Regions Environmental and Engineering Research Institute of Chinese Academy of Science, which now hosts the G-WADI Asia Secretariat for three years, has established an Asian G-WADI website for information sharing and developed brochures and posters.
- The G-WADI Asian regional network of representative basins for joint activities and sharing local management experience was expanded, and scientific investigations were undertaken on some G-WADI basins, including Heihe (China), Jaisamand (India) and Krishna Godavari (India) basins, with support of national partners. The G-WADI Asia regional meeting and an international workshop on Groundwater Modeling for Arid and Semi-arid Areas were organized in Lanzhou, China, in June 2007. The workshop reviewed state of the art techniques for modeling groundwater with the focus on arid areas, which resulted in development of training material (book and CD), and a book of scientific articles is forth-coming.
- A G-WADI workshop on was held in Aleppo, Syria, in November 2006 bringing together experts from several countries in Near-East and Asia with long histories of traditional techniques of rainwater conservation, as well as international agencies, to share experience on techniques of rainwater conservation.
- A side event on hydrological changes in the Mediterranean was organized, in collaboration with Institut de Recherche pour le Développement (IRD) in the framework of G-WADI, during the International Conference on 'Future of Drylands' (Tunis, June 19-21, 2006). The side event had led to the publication of a Special Section in the Hydrological Sciences Journal in December 2007.
- UNESCO, in collaboration with ISESCO, ALESCO and UNEP, organized the workshop on "Efficient Water Demand Management in the Arid Region", held from 17-21 September 2006 in Sharm El Sheikh, Egypt, where a concept paper was discussed and country papers focusing on the water demand management were presented by experts from the Arab region. The 26th International Postgraduate Training Course on "Environmental Hydrology for Arid and Semi-Arid Regions" was held in Delta, Barrage, Egypt, from 22 May to 6 July 2006, with the participation of more than 28 regional and national experts and completion of 26 Modules.
- Two major publications, "Hydrological Modelling in Arid and Semi-Arid Areas"

(IHP/Cambridge University Press International Hydrology Series, 2008) and “G-WADI Asia” (Oxford & IBH Publishing, 2007) were issued.

- Numerous international and regional research, capacity building and training activities organized by CAZALAC and supported by IHP contributed to enhanced capacity building. Involvement of LAC region in the global G-WADI initiative is being promoted and coordinated with CAZALAC. A webpage is being developed for the Working Group on Water Augmentation Techniques to promote information exchange and dissemination in the LAC region.

### ***Focal Area 3.2: Wetlands***

The implementation of ecohydrology activities is reported under this Focal Area.

- A new mission statement and strategy for IHP’s Ecohydrology Programme was developed by the Scientific Advisory Committee (SAC) on Ecohydrology at its meeting at La Plata, Argentina in March 2007. Task Forces (TFs) on: (i) Coastal Zones (ii) Assessing Impacts of Global Change on Aquatic Ecosystems (iii) Social Sciences (iv) Education and Capacity-building (v) Demonstration Projects were launched in June 2006.
- Support for nine demonstration projects, which highlight research that validates and quantifies the effectiveness of the ecohydrology approach on the ground in different circumstances around the world, was continued.
- Brochures and posters on ecohydrology were published, and information-dissemination efforts took place at various occasions, such as at the Stockholm Water Week (August 2007) and the River Symposium, Brisbane, Australia (September 2007). A special section of the Elsevier Estuarine Coastal and Shelf Science was dedicated to "Applying the ecohydrology approach to the Guadiana estuary and coastal areas: lessons learned from dam impacted ecosystems".
- The regional component on ecohydrology in LAC was significantly strengthened as a result of various activities that took place in the region, such as: the SAC meeting in La Plata, Argentina, mentioned above; review of two demonstration projects in the region; holding of the joint meeting of the SAC and the TFs in December 2007; and launching of the Brazilian Ecohydrology Programme in December 2007. Continued support was provided to the Master of Science programme on “Environmental Evaluation of Hydrologic Systems – Ecohydrology” at the National University of La Plata, Argentina. Ecohydrology activities relating to IWRM are described under Focal Area 2.4.
- The regional component in SEE has focused on coastal zone ecohydrology. A regional Workshop on “Ecohydrology and Sustainable Development in Deltas, Estuaries and Lagoons” was organized in October 2006 in Tulcea (Danube Delta), Romania.
- Transborder scientific cooperation in the Polesie region was enhanced through continued implementation of the Japanese Funds-in-Trust project on conservation of water resources and biological diversity in the wetland of Polesie (Belarus, Poland and Ukraine). Achievements made in the period include: submission of a joint Nomination Form for the WP-TBR to the UNESCO MAB Bureau in September 2007; and joint submission of an activity report for the year 2007.

### ***Focal Area 3.3: Mountains***

- The 6th Workshop of the IHP-LAC Snow and Ice Working Group took place together with the 2nd Course on Glaciers Observation Methods in Mexico, from 14-20 May, 2007.
- Results of the relevant activities undertaken by the UNESCO Regional Office in LAC were presented in the Regional Conference on “Climate Change and Shrinking of Glaciers in the Andean Region: Consequence for Water Resources Management” (Ecuador, October 2006).

### ***Focal Area 3.4: Small Islands and Coastal Zones***

- UNESCO Regional Office in the LAC initiated the implementation of Groundwater Resources Assessment under the Pressures of Humanity and Climate Changes (GRAPHIC) activities in the LAC region and agreed to carry out a global/regional case study in the Bahamas to assess climate variability and global change effects on groundwater in SIDS.
- Contribution by the IHP to the ongoing GEF initiatives in small islands was explored at the Scientific and Technical Advisory Panel of the GEF (GEF/STAP) workshop on “SIDS, Groundwater and Interlinkages” (Trinidad & Tobago, November 2006).
- IHP prepared a GEF project proposal on the vulnerability of coastal aquifers in the Mediterranean (GEF-MED-MAP). Case studies were identified in the Mediterranean Region, and cooperation with the Ministries of Environment and Water Resources of Mediterranean countries was established. The project has been approved and activities to be executed by UNESCO should start in September 2008.
- Capacities for groundwater resources management in coastal areas enhanced and methodologies to address salt water intrusion threats in coastal aquifers compiled as a result of the 1st SWIM-SWICA International meeting on Saltwater Intrusion, organized in cooperation with IAH (Cagliari, Italy, September 2006). Regional case studies on groundwater discharge to the ocean identified in the Mediterranean region and in Argentina. Groundwater studies and training material were published and training courses were organized. Two regional workshops on the protection of groundwater-dependent ecosystems, with emphasis on wetlands, were organized.
- Conference on Coastal Zone Environment and Sustainable Development was held in New Delhi, India, February 2007.
- The book on “Water and Ecosystems: Managing Water in Diverse Ecosystems to Ensure Human Well-Being” was published, representing the outcome of a UNU/UNESCO seminar that reviewed the capacity of countries to manage water resources in specific ecosystems to improve living conditions for the populations concerned. It was a joint IHP-MAB cooperation activity.
- The 3rd Course of the Hydrology Training Programme was organized by UNESCO and SOPAC for participants from high volcanic island countries and atoll and high limestone island countries in June 2006. The course contributed to enhancement of capacity building for hydrologists and hydrological technicians from all Pacific island countries.
- An ongoing project on the “Groundwater Monitoring, Management and Legislation in Niue” was implemented by the UNESCO Apia Office with the aim to: assist in enforcing the Water Resources Act of 1996; and to develop effective education and awareness programmes for communities in protecting the island’s water resources and include these in school curricula.

### ***Focal Area 3.5 Urban Areas and Rural Settlements***

- The IHP Urban Water Management Programme has completed the nine projects, designed to implement IHP-VI activities relating to urban water. These projects addressed hydrological, environmental, health and socio-economic aspects of urban water management. During the reporting period, four expert meetings were held.
- A major publication initiative, the UNESCO-IHP Urban Water Series was launched in September 2007. The series represents major deliverables of the IHP-VI urban water projects and include more than ten books, addressing different aspects of urban water management and integrated urban water management in different climates. The first three books have been published and the others are in review and print stages.
- UNESCO Symposium on New Directions in Urban Water Management was organized in Paris, September 2007. The Symposium’s objectives were to wrap-up and present the

results of IHP urban water projects and to define the new directions for IHP-VII urban water activities. The Symposium concluded with the adoption of Paris-2007 Statement on New Directions in Urban Water Management, which has been mainstreamed into the preparation of the Political Process of the 5th World Water Forum (WWF5).

- The agreement between UNESCO and the Government of Colombia for the establishment of the Regional Center on Urban Water Management for LAC in Colombia, under the auspices of UNESCO, was signed in September 2007.
- An IHP monograph on “Urban Water Conflicts: An analysis on the origins and nature of water-related unrest and conflicts in the urban context” was published and launched at the World Urban Forum in Vancouver in June 2006.
- The UNESCO/UNEP project on “Assessment of Pollution Status and Vulnerability of Water Supply Aquifers of African Cities” was carried out in 11 selected African cities, concluding that pollution of groundwater sources had reached critical levels. Based on the project, the book “Groundwater Pollution in Africa” was published. A project proposal on capacity building towards risks awareness, management and protection of groundwater in Africa, targeting 20 Sub-Saharan countries was prepared for AMCOW and was submitted to AfDB for funding.
- A Training of Trainers Manual on Integrated Urban Water Management was finalized in collaboration the Regional Centre on Urban Water Management (RCUWM-Tehran), a UNESCO category 2 centre, with support of UNESCO Offices in Tehran and New Delhi.
- The UNESCO New Delhi Office implemented case-studies on “Value of Groundwater in New Delhi” and “Wastewater Management in the National Capital Region of India”, and organized a Youth Conference on Wastewater Management in January 2007 and a series of workshops on wastewater management across India. A publication on “Traditional Spouts of Katmandu Valley” is in final stages of publication.
- UNESCO Beijing Office, in collaboration with Beijing Normal University, implemented a pilot study in Shenzhen City on “Urban Rain Water Harvesting”, aiming at developing urban hydrological cycle model in order to prevent the flooding during peak rainfall season and reduce water shortage during dry season by harvesting rainwater.
- RCUWM actively contributed to UNESCO’s relevant programmes through various projects, conferences, courses and workshops. The major events organized by RCUWM include: “International Workshop on Flash Floods in Urban Areas and Risk Management” (Oman, September 2006); International Conference on "Water Resources Management in the Islamic Countries" (Iran, February 2007); and the International Workshop on “Demand Management in Urban Areas, in the Light of Tourism Development and needs for Water in Arid Areas” (Oman, August 2007).

#### **Major Achievements of Theme 3 in IHP-VI (2002-2007):**

- The global network G-WADI on Water and Development Information for Arid Zones was launched and significantly expanded and strengthened through: high-level technical workshops that resulted in the development of web-based, free-access information resources (data, tools, case studies) to support sustainable water resources management in arid and semi-arid areas; and emerging networks on hydrology and water issues specific to arid areas for sharing and exchanging experience, knowledge and data in the regions. The Water Centre for Arid and Semiarid Zones of Latin America and the Caribbean (CAZALAC) was established in La Serena, Chile.
- Ecohydrology was further developed as an interdisciplinary approach at landform/land use scale. The framework and organizational structure of the IHP ecohydrology programme were reviewed; the Scientific Advisory Committee was reconstituted, and the Task Forces and demonstration projects on ecohydrology were officially launched. The social dimension was incorporated into a new mission statement and strategy. Regional activities on ecohydrology continued to be implemented in LAC and SEE. The European Regional Centre on Ecohydrology (ERCE) was established in May 2006.

- Improved monitoring approaches for mountain biosphere reserves were developed in cooperation with the MAB programme; glacier mass decline was addressed regionally in South America and Asia in Andes Mountains and the Hindu-Kush-Himalayas regions.
- Submarine aquifer discharge along coastal zones was examined through an IOC-IHP project. Significant regional activities involving the potential of desalinization of sea water in LAC and studies on coastal zone water resources management the Indian subcontinent were carried out. Methodologies for the protection and management of coastal aquifers and groundwater dependent ecosystems in the Mediterranean were developed as a contribution to the regional component of a GEF-UNEP/MED/MAP project.
- The Urban Water Management Programme of IHP was implemented through nine projects that gave comprehensive coverage to the subject, culminating in an international symposium (Paris, September 2007). The knowledge base towards sustainable urban water management was enhanced through the deliverables of these projects, including the launching of the UNESCO-IHP Urban Water Series. The series addresses technological, environmental, health, socioeconomic and institutional aspects of urban water management, as well as integrated urban water management in different climates. IHP's action in this area was reinforced through the establishment of the Regional Centre on Urban Water Management (RCUWM-Tehran) in 2002.

#### **THEME 4: WATER AND SOCIETY**

During the reporting period, activities within this Theme focused on enhancing the knowledge base and promoting awareness on socio-cultural interrelations between water and society, targeting water practitioners, the informed public and postgraduate students. A new initiative on water and culture was launched with the aim of integrating the cultural dimension of water into water management. Multi-level and interdisciplinary dialogues were facilitated between various user groups of shared water resources. Cooperation on the management of shared water resources was encouraged through the development of educational material and applied research. New training materials were developed and the geographical scope of the actions expanded. These activities brought together groups of users and professionals that are otherwise usually confined to their disciplinary or geographical boundaries.

#### **Progress and results achieved from June 2006 to 31 December 2007**

##### ***Focal Area 4.1: Water Civilization and Ethics***

- The research and educational capacity was increased and the knowledge base expanded in the field of historical water interactions through the continued preparation of the History of Water and Civilization (HWC) book series, and support was provided to the international preparatory symposium for the volume "Water and Humanity", held during the meeting of the Society for American Archaeology (USA, April 2007), and to the International Conference "Past and Futures of Water" (Tampere, Finland, June 2007). Both meetings contributed to HWC book. The publication of the first volume of HWC, initially foreseen for December 2007, has been delayed due to the lack of extrabudgetary funding - need for which was recognized by IHP IC-XV. Fund-raising efforts for this purpose are being continued. Two volumes of the series, including one on "Water and Humanity", are expected to be published in 2009.
- The first international postgraduate Short Course on the World History of Water Management, developed in cooperation with the International Water History Association and UNESCO-IHE, was delivered at UNESCO-IHE in September 2007. It provides an

interdisciplinary understanding of historical water interactions for students of water engineering and management studies.

- The knowledge base and awareness on traditional knowledge and social and natural water sciences, in particular about ancient cultures and present ethnic group practices relating to water management, was enhanced through the second preparatory phase of the Atlas of Water Cultures for LAC, developed by IHP-LAC. The project promoted the participation and involvement of minority groups in the development of water science and management.
- The awareness of global indigenous knowledge was promoted through the publication of book “Water and Indigenous Peoples” (in Spanish), launched during the VI Inter-American Dialogue on Water Management (Guatemala, August 2007).
- The recognition of gender as a cross-cutting issue in IWRM in the LAC region has been advanced and knowledge about the issue was increased, through the first phase of the IHP-LAC Working Group “Water and Gender for Latin America”. Requests for the expansion of the working group to involve representative from other countries were received, namely from Haiti and Mexico.
- The role of culture in better water management for development and peace was promoted among various stakeholders from Cote d’Ivoire, Ghana, Togo and Benin through a symposium on water and culture organized in Accra with the active support of the UNESCO Accra Office.
- An interdisciplinary project on Water and Cultural Diversity was launched by IHP in summer 2007. More information on this project can be found in document IHP/Bur-XLI/17 on Progress report on recent IHP initiatives and programmes.
- The booklet “Ethics of Groundwater” was translated into Spanish and Portuguese and its electronic version was disseminated.
- IHP started collaboration with the National Science Museum of Thailand and the Asia-Pacific Water Forum with the aim of establishing the regional Asia-Pacific Water Museum (APWM) to be hosted in Thailand. The concept of the APWM was announced at the Asia-Pacific Water Summit (Japan, December 2007), which endorsed the concept.
- A strategy document on water use ethics in the Arab Region was published and networking in water use ethics fostered and promoted through the establishment of the Arab Network on Water Use Ethics and the organization of the Environmental Ethics Expert Group Meeting (Tripoli, Libya, June 2007).

#### ***Focal Area 4.2: Value of Water***

- Knowledge of cultural values of water in North and Sub-Saharan Africa for water resources development was enhanced through contributing with learning material developed by IHP to the preparation of postgraduate courses on development at the University of Bamako, Mali (in contribution to the Project “River Niger”, run by the France-UNESCO Convention).
- The theoretical and applied knowledge base was expanded through the study on “Virtual Water as a tool for Water Resources Management” in Argentina and Uruguay, carried out by IHP-LAC.
- Understanding and knowledge of the value of water was enhanced through case studies on “Value of groundwater in New Delhi, India” and on “Wastewater Management in the National Capital Region of India” carried out by UNESCO New Delhi Office. The case study reports were prepared and disseminated.

#### ***Focal Area 4.3: Water Conflicts – Prevention and Resolution***

- IHP’s Potential Conflict to Co-operation Potential (PCCP) strengthened stakeholder capacity to prevent and resolve water related conflicts by developing educational

materials and expertise on “Conflict Prevention and Cooperation in International Water Resources”. Courses on the topic have been offered in Sub-Saharan Africa since 2002, in Latin America and Southeast Europe since 2006.

- IHP-LAC offered support for improving the capacity of decision makers, experts, and trainers and launching of a transition process from PCCP among countries, sharing water resources through the development of an educational kit on “Conflict Prevention and Cooperation in Water Management in Latin America”. It also supported various related workshops and organized a pilot course to evaluate the educational kit, which was consequently improved and printed to be re-used by local universities.
- A similar activity was implemented through the organization of a pilot-course on Cooperation and Prevention of Conflicts in the Management of Transboundary Waters in South East Europe (Thessaloniki, Greece, October 2006), involving participants from almost all the South-eastern European countries, forming a multidisciplinary group. The participants’ feedback was used to improve the related PCCP’s educational materials.
- In order to communicate the results of the Lake Titicaca case study, originally written in Spanish, PCCP undertook its translation and publication in English. The publication of the case study in English provides opportunities for dialogue, access to data and information.
- An international multi-disciplinary group of experts assessed PCCP’s achievements since its launch in 2001 and made recommendations to set the stage for its future activities.
- Support was provided to the workshop on the discussion of a Rural Water Law Project for Chile (Santiago, Chile, September 2006) and to a “Training of Trainers” course for the Catamayo-Chira Basin Integrated Management Project (Loja, Ecuador, December 2006). A course in Venezuela, in collaboration with the Universidad Católica Andres Bello, is planned to take place in the first trimester of 2008.
- A new case study on water conflict prevention and cooperation in transboundary aquifers management in the LAC region is being initiated on the Ostua-Metapan Aquifer, shared by Guatemala and El Salvador. This case study links PCCP to the activities developed under the ISARM Americas Programme.
- Progress was achieved in the creation of Masters degree programme at UNESCO-IHE, covering the fields of water policy, law, science and water, prepared jointly with UNESCO-IHE and Centre for Water Law, Policy and Science at the University of Dundee. A Memorandum of Understanding between UNESCO and Centre for Water Law, Policy and Science at the University of Dundee is in the course of being finalized.
- IHP provided financial and technical support to the development and dissemination of a computer game “Climate Quest”, produced by Games Factory Online and other partners, that raises awareness about climate change and co-operation around shared water.
- Training material on water negotiations and conflict resolution for the Arab region was developed. It includes role plays and case studies from the Jordan, the Nile, and the West Bank Aquifer. The training material is complemented by an instructor manual. It was tested and evaluated in a small workshop held February 2008 with 20 participants from Egypt, Sudan, Jordan, Iraq, Syria, Lebanon, and Palestine. It is now in the course of being improved following the feedback by the participants and their evaluation.

#### ***Focal Area 4.4: Human Security in Water-Related Disasters and Degrading Environments***

- The activities reported under the Focal Area 2.1, essentially from IFI and GWES, contributed also to this Focal Area.
- The project “Towards an assessment of Rivers Kura-Araks Basin Radioactivity”, implemented by UNESCO Moscow Office, has contributed to improved data availability on radionuclide and heavy metal contents in the environment of each of the three South

Caucasian countries, namely in Armenia, Azerbaijan and Georgia. A new regional monitoring project was developed with the relevant countries.

- Access to safe drinking water was enhanced in schools for underprivileged children in India by distributing water purification units.
- The IHP-LAC has co-established, together with UNESCO's Division of Basic and Engineering Sciences, a consultative group on natural disasters to assist decision-makers in the region. The first meeting of the consultative group was held in 2007, and the second meeting is planned in Uruguay in March 2008. Within framework of this activity, a national exercise will be conducted in Uruguay in support to the One UN process.

#### ***Focal Area 4.5: Public Awareness Raising on Water Interactions***

- IHP disseminated results of its work through all relevant audiences and using a variety of channels. This included the development of a corporate image for all of UNESCO's water activities, printed publications and the dissemination of the newsletter to now more than 16.000 addressees. The public awareness of technical, scientific, socio-cultural and historical water interactions was continuously enhanced.
- The Inter-American Water Resources Network (IAWRN) was enhanced to work as a network of networks for building and strengthening water resources partnerships among nations, organizations, and individuals. To this end, IHP-LAC participated in the Eighth Water Information Summit (WIS-8) - Linking and Strengthening Information Networks for Water and the Environment (Brasilia, June 2006) and in the VI Inter-American Dialogue in Water Management (Guatemala, August 2007). IHP-LAC hosts the IWRN Secretariat since 2006, a responsibility shared with Organization of American States OAS and Florida Center for Environmental Studies (CES), University of Florida.
- The project on "Enhancement of Environmental Awareness on Freshwater Management among Youth", implemented by UNESCO Moscow Office, resulted in improved awareness among young people through the preparation and dissemination of illustrative posters, booklets, handouts in Armenia, Azerbaijan, and Georgia, as well as through the organization of workshops. Networking among young people is being promoted and follow-up actions are being developed through a newly established working group.
- Awareness on water scarcity was raised through events organized in India (New Delhi and Mumbai) and Sri Lanka on World Water Day 2007. Sound water resource management was promoted through initiating a Water Awards for Excellence with the Water Digest. Awareness of young people was raised through a conference on Wastewater Management targeting youth in a side event of the New Delhi Sustainable Development Summit. Promotional standees were produced highlighting various aspects of IHP operations in the cluster countries (Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka).
- Awareness of various stakeholders improved on the place of culture for a better management of water resources for development and peace in the cluster countries (Cote d'Ivoire, Ghana, Togo and Benin) during a symposium on Water and Culture organized in Accra in February 2007 and opened by the Director-General of UNESCO.
- Networking, regional cooperation and experience exchange fostered by the project "Linking Indigenous and Scientific Knowledge: Improving Peoples' Lives" in the Kavango Region, implemented by UNESCO Windhoek Office. The project resulted in a holistic approach to integrated water resources management across the Okavango River Basin. Within the project, a workshop on the role of science and indigenous knowledge in sustainable rural development was organized for participants from Angola, Botswana and Namibia. The workshop results were published in a "best practices" volume.
- Awareness raising efforts for equitable and sustainable water resources management in the Olushandja Sub-basin in Namibia were initiated, bringing together local stakeholders

to form a basin management committee to facilitate the decision-making process regarding their common water resources.

- Awareness on societal water interactions in the Congo basin was raised through IHP and the UNESCO Africa Department joint contribution to the book “Congo River”.
- UNESCO Accra Office contributed to awareness raising of various stakeholders and policy makers in the region on interactions between climate variability and change and water through events such as the Conference on Climate Change and Its Impacts, organized jointly by UNECA and CILSS (Ouagadougou, January 2007), and the Regional Conference on Climate Variability and Extremes, co-organized with the Ministry of Environment of Benin in June 2007.
- Awareness of the scientists and teachers of the University of Lomé was raised for the interactions between climate variability and change and water in the sub-region during a presentation provided in the framework of the organization of scientific days (5-6 July 2007) the University of Lomé.
- Public awareness on health aspects of water resources promoted in the Arab region through the 2nd International Conference on “Healthy Water Right for All: Healthy Water for Healthy Citizens” (Egypt, June 2007), organized by UNESCO Cairo Office.

#### **Major Achievements of Theme 4 in IHP-VI (2002-2007):**

- IHP enhanced the knowledge base and awareness on socio-cultural interrelations between water and society and the importance of the historical and cultural dimensions of water, including indigenous knowledge, and gender equality. Several high-level international conferences and symposia on water history fostered research and dialogue. In cooperation with COMEST, IHP provided ethical guidance on water management through publication of twelve thematic volumes on Water Ethics and a booklet on ethics and water governance.
- IHP enhanced general understanding of related issues through publications and awareness-raising events such as World Water Day 2006 on “Water and Culture”, a short course on water history at UNESCO-IHE, and sessions on water and cultural diversity at previous two World Water Fora.
- The theoretical and applied knowledge base on “virtual water” in water management was enhanced, and the concept was introduced in the Inter-American Dialogue in Water Management. The understanding of the value of water was enhanced by case studies in Africa, LAC and India addressing cultural value of water, virtual water and value of groundwater, and several projects on the impact of water related extreme events and water pollutants were carried out, notably in Asia, and in collaboration with ISI and IFI.
- IHP’s PCCP initiative contributed to enhancing capacities of governmental and institutional stakeholders worldwide to prevent and resolve water related conflicts, and promoted the understanding of water as a catalyst for peaceful cooperation. The project produced and disseminated numerous case studies, educational material and course programmes, and provided access to training in shared international surface and groundwater. PCCP maintains an extensive network of experts and institutions, including partnerships with UNESCO-IHE and the Centre for Law, Policy and Science at University of Dundee, UK, under the auspices of UNESCO.
- IHP disseminated results of its work through all relevant audiences and using a variety of channels, and, significantly contributed to raising global awareness on the importance of sustainable water resources management. IHP developed a corporate image for all of UNESCO’s water activities. UNESCO-IHP, in collaboration with UN DESA, spearheaded in 2003 the campaign for the International Year of Freshwater, mainly through multilingual online resources. IHP produces and maintains a newsletter in English, French and Spanish to more than 16.000 subscribers, and disseminated numerous publications both in print and electronic formats, increasing the outreach of IHP’s actions.

## **THEME 5: WATER EDUCATION AND CAPACITY BUILDING**

During the reporting period, water education techniques were improved and educational materials were developed in order to strengthen stakeholders understanding of water issues and behaviors towards resources. Several seminars and training courses were delivered as a contribution to the development of Member States' capacities to address freshwater issues. UNESCO-IHP established itself as the lead partner for the water education programme of the United Nations Decade of Education for Sustainable Development (DESD). A comprehensive UNESCO Water Education Working Group was established under the lead of IHP and a work plan for water education at all levels was developed for the DESD. The networking between IHP, UNESCO-IHE, the water-related Centres under the auspices of UNESCO, and the water-related UNESCO Chairs was strengthened by the development of new strategies for these water-related entities.

### **Progress and results achieved from June 2006 to 31 December 2007**

#### ***Focal Area 5.1: Teaching Techniques and Material Development***

- A "Water and Education Guide for Educators from the Americas and the Caribbean" was published and a strategy for a joint UNESCO-WET (Water Education for Teachers) educational kit on water for children was developed by UNESCO Montevideo. A "Water and Education: Workshop for the selection of educational proposals for the Guide for Educators from the Americas" took place in Mexico in August 2006. The publication of the Spanish version of this Guide in March 2007 constitutes the first joint publication of the UNESCO/WET programme for Water Education. The Second Regional Coordination Meeting of the UNESCO-WET Programme for the Americas and the Caribbean took place in Miami, from 11-13 September 2006. The meeting constituted an important benchmark in the evolution of the joint programme, which yielded as results the definition of the vision, mission and strategic plan of this initiative. A "Workshop for Selection of Water Education Proposals for the English Speaking Caribbean" took place in Kingston, Jamaica, on 25-26 June 2007.
- Water education materials for DESD were produced and distributed in Brazil by UNESCO Office in Brasilia.
- A water education initiative, "Blue Planet", with an associated manual, was developed in Spanish with the support of the Israel National Commission for UNESCO. A first workshop to present this initiative was held in Mar del Plata, Argentina, in October 2007.
- A programme on the enhancement of environmental awareness, targeting effective water and wetlands ecosystems management of the Volga Delta, was implemented by UNESCO Office in Moscow with support from the private sector. A toolkit with information and methodological materials aimed at fostering better awareness and valuation of biodiversity resources of the Lower Volga wetlands was developed, published and disseminated. A working group on "The Union for Conservation of the Lower Volga heritage" was established.
- The development of educational and learning materials on water issues addressing school children in China was initiated through a UNESCO proposal under the bilateral agreement between the governments of Italy and China on Sustainable Water Integrated Management (SWIM).
- UNESCO Office in Doha has established an expert team to develop a water education kit in collaboration with the Qatar Scientific Club.

#### ***Focal Area 5.2: Continuing Education and Training for Selected Target Groups***

- The capacities of Southeast Asia scientists were strengthened through a seminar on

aquifer recharge and training courses on: the use of isotope methods in hydrology; urban stormwater management; numerical prediction of high-impact weather systems; and oceanography basics, jointly organized by UNESCO Jakarta and various partners in the region, including the Humid Tropics Centre in Kuala Lumpur.

- With the support and coordination of IHP, the capacities to manage water resources were improved by: training on environmental flows in 10 SADC countries; training on monitoring techniques of groundwater resources in two communities, within UNDAF framework in Namibia; and training on remote sensing for IWRM, in collaboration with University of the Western Cape.
- A national training course for capacity building on groundwater hydrology and groundwater management in Mongolia was organized in June 2006 by the Mongolian IHP National Committee, in cooperation with UNESCO Beijing and Japanese IHP National Committee.
- Training materials for government resource persons on water management were developed by UNESCO Islamabad and partners.
- Support was provided to African and Asian scientists by UNESCO Field Offices and IHP to participate in international and regional conference and meetings in the field of hydrology and water sciences.
- IHP-LAC provided support to several experts and professionals from the region to participate in international and regional training and capacity building activities.
- Study grants were provided by UNESCO Office in Nairobi to seven African students. Research grants were provided to two African postgraduate students. Additional support was provided to students of the Kenya Water Institute, the Institute for Meteorological Training and Research in Nairobi, the University of Nairobi, and the Université Cheikh Anta Diop, Senegal.
- Capacity of human resources in the water sector in the Arab region was enhanced through a series of postgraduate training courses on “Environmental Hydrology for Arid and Semi-Arid regions”, organized by UNESCO Cairo Office.

### ***Focal Area 5.3: Crossing the Digital Divide***

- Further development and expansion of the UNESCO Water Portal were undertaken in order that it may better serve as an effective modality for knowledge dissemination, diffusion and exchange on UNESCO’s water activities and water-related programmes.
- Annual events “Water Information Summit”, aimed at bringing together key water stakeholders of the Americas to improve information knowledge and exchange, were co-organized by UNESCO Office in Montevideo (Brasilia, 2006; West Palm Beach, 2007).
- Two e-learning courses were developed by UNESCO Office in Montevideo, jointly with CAZALAC; one on water resources conservation for basic education teachers, and the other on rainwater harvesting for professionals.
- The establishment of an International Centre on Hydroinformatics in Itaipu Binational, under the auspices of UNESCO, was approved by the 34th session of the UNESCO General Conference.

### ***Focal Area 5.4: Institutional Development and Networking for WET***

- The institutional framework for water education was strengthened by the inclusion of a thematic area on Education for Sustainable Water Development in the Action Plan for the DESD. A work plan for 2008-2014 for the thematic area and a detailed implementation plan were prepared. A UNESCO Working Group on Water Education and Capacity Building for Sustainable Development was established under the leadership of IHP, bringing together experts from all regions and representatives of different UNESCO Sectors. Linkages with WWAP, the Secretariat of the International

- Decade for Action “Water for Life”, and other United Nations bodies were established.
- Institutional cooperation was promoted at the national level in the Americas within the UNESCO-WET project and the “Blue Planet” initiative.
  - IHP has contributed to the water education component of the International Experts Meeting on Corporate Social Responsibility and Education for Sustainable Development (Germany, 6-7 November 2007), organized by InWEnt (Bonn), in partnership with UNESCO-UNEVOC and the DESD Secretariat.
  - Networking between IHP, UNESCO-IHE, and the water-related Centres under the auspices of UNESCO was strengthened by the adoption of a new common strategy, developed by the Directors of the water-related Institutes and Centres. Networking and the institutional aspects of water-related UNESCO Chairs was improved by the review of the Chairs, and the contribution of IHP to the development of new common strategies for the Chairs for the UNESCO Science Sector and University Twinning and Networking Scheme (UNITWIN).
  - IHP regional consultation and governance in the Arab region enhanced through the organization of the 12th Regional Meeting of the Arab IHP National Committees.

**Major Achievements of Theme 5 in IHP-VI (2002-2007):**

- UNESCO-IHE Institute for Water Education (Delft, the Netherlands), a leading institute in this field at the global level, was established as a UNESCO category 1 Institute, raising the capacities of UNESCO in the field of freshwater education. UNESCO-IHP assumed the responsibility of lead partner for the water education programme of the United Nations Decade of Education for Sustainable Development. A UNESCO Water Education Working Group was established under the lead of IHP and a work plan for water education at all levels was developed for the DESD.
- IHP’s networking, capacity development and training capabilities were greatly strengthened by the establishment of eight UNESCO category 2 water-related centres during the period 2002-2006. The 34th session of the UNESCO General Conference in 2007 approved the creation of five additional centres.
- Five new water-related UNESCO Chairs and a UNITWIN Network were established, focusing on: environment and water resources; water resources sustainability; hydrogeology, sustainable water management; sustainable groundwater management; and sustainable management of water and conflict resolution.
- Water education materials and courses were developed within the framework of the first four IHP-VI themes, both at headquarters and all regions, buttressing and feeding the efforts within Theme five.
- The launching of the UNESCO Water Portal was a major milestone in IHP’s communication strategy, reinforcing capacities of Member States in the area of water information management and serving as a powerful tool to narrow the digital divide.

**CROSS-CUTTING PROGRAMME: FRIEND - Flow Regimes from International Experimental and Network Data**

The Flow Regimes from International Experimental and Network Data (FRIEND) programme is an international collaborative study intended to develop knowledge and techniques at a regional level and a better understanding of hydrological variability and similarity across time and space. The advanced knowledge of hydrological processes and flow regimes gained through FRIEND helps to improve methods applicable in water resources planning and management. The key objective of the programme is to improve the scientific understanding of hydrological processes and variability across time and space in various geographical regions, in particular: (i) to develop analytical tools and databases; (ii) to develop new cross-disciplinary networks; and (iii) to extend the global coverage of FRIEND. The Programme

established eight regional subgroups, covering more than 140 countries, and addressed a large variety of water related issues across the five major themes of IHP VI.

### **Progress and results achieved from June 2006 to 31 December 2007**

- Education and training activities in water resources management, low flow and droughts were implemented in African, Latin American and Asian countries. Training courses on data collection and database management were carried out for institutions in LAC and Mediterranean countries.
- Technical documents and reports in the field of water resources management, extreme events and climate change were published for researchers, general public and policy makers and were made available online on new FRIEND website. A Guideline for flood design and emergency procedures for policy makers in Asian countries was developed.
- Following the 5th FRIEND World Conference (Cuba, November 2006), cross disciplinary networks within the FRIEND community on specific issues such as droughts, floods or basin sedimentation were enlarged and new contacts with institutions and researchers in Central Asia and Africa were established for an increased network coverage. A group was established to link up with IAHS-PUB on regionalization and estimation of uncertainties. A thematic link between the different FRIEND groups has been established. The Hindu Kush- Himalayan FRIEND (HKH-FRIEND) has restructured its research agenda and the group has been expanded to Central Asia.
- A single processor server to host the FRIEND Latin America and the Caribbean Database system, provided by the Joint Research Unit on Water Sciences in Montpellier (the international coordination of the UNESCO FRIEND AMHY), was made available.

#### **Major Achievements of FRIEND in IHP-VI (2002-2007):**

- In cooperation with WMO, a state of the art manual for estimating, predicting and forecasting low river flows at sites with and without observational data was produced. The manual is intended to provide practical guidance for a wide range of applications, including national and regional water resources planning, abstraction management, public water supply design and setting in-stream flows.
- A global FRIEND report, summarizing the major achievements of the eight regional FRIEND groups in the past 4 years and a research strategy for the upcoming years, was published.
- The establishment of European Drought Center (EDC), which is a virtual centre of European drought research and management organizations aiming to coordinate drought related research and capacity building activities and to promote collaboration between scientists and the user community, was established.
- Education and training activities in water resources management, low flow and droughts were carried out in Africa, LAC and Asia. Training course on data collection and database management were also carried out to establish a common database and web interface for Latin America, Caribbean and Mediterranean countries institutions.

### **CROSS-CUTTING PROGRAMME: HELP - Hydrology for the Environment, Life and Policy**

IHP initiative on Hydrology for the Environment, Life and Policy (HELP), established in 1999, is a cross-cutting programme designed to create a new approach to integrated basins management. The Programme, since its establishment, has established a global network of 67 catchments in 56 different countries. The HELP programme aims to contribute social, legal, economic and environmental benefits to communities through sustainable and appropriate use of water resources by deploying hydrological science in support of improved

integrated catchment management. The HELP programme seeks to address the most critical policy and management issues at water-basin level and to strengthen experimental hydrology and science-policy research in basin management, particularly: (i) to increase the number of basins in the network; (ii) to support twinning/clustering of HELP basins, water managers, water policy-makers and water resource lawyers involved; and (iii) to establish water centers on specific water related issues.

### **Progress and results achieved from June 2006 to 31 December 2007**

- Transboundary basin twinning of the San Pedro HELP basin (Mexico) and the Mestos/Nestos HELP Basin (Greece and Bulgaria) was approved by the International Network of Basin Organizations (INBO).
- A twin basin network and exchange of stakeholders between the Murrumbidgee (Australia) and the Davao (Philippines) HELP catchments was established.
- UNESCO Apia Office, in collaboration with Landcare Research, Ltd., published the Proceedings of the Pacific HELP Symposium held in 2007, comprising a booklet containing the Framework for Action and a CD-Rom with all presentations. The document will be used as the basis of two major water resources projects now under implementation in the region: the Integrated Water Resources Management project; and the Pacific-HYCOS project – a regional initiative within the WMO's World Hydrological Cycle Observing System (WHYCOS).
- Several capacity building courses on various topics such as biological monitoring using benthic macro invertebrates, sustainability index, climate change (long-term predictions), early warning system for droughts, and prediction of humid season and flows were organized. The latter was organized jointly with the International Research Institute for Climate and Society, Columbia University, and CAZALAC.
- An interagency cooperation agreement has been signed and basin management activities have been initiated at the Gagas River Basin in Uttranchal, India. This programme is being launched under HELP and Forest Hydrology programme.

### **Major Achievements of HELP in IHP-VI (2002-2007):**

- HELP has been expanded and consolidated during 2002-2007 and has focused its research agenda on four major themes: climate change impacts on water resources management strategies; wetlands; participatory modeling and community involvement; and water quality and the implementation of the EU WFD.
- The IHP-HELP International Center on Water Law, Policy and Science was established at the University of Dundee, UK in 2006.
- UNESCO's role in enhancing water sciences was strengthened through major conferences such as the HELP Southern Symposium on "Local Solutions to Global Water Problems – Lessons from the South" (South Africa, 2007) and Conference on "Integrated Assessment of Water Resources and Global Change: A North-South Analysis", organized jointly with GWSP, GLOWA and other agencies (Bonn, 2005). Both conferences promoted the implementation of HELP principles and interdisciplinary research, focusing on interfacing science, land-water management, water policy, water law, and the social, cultural and economic aspects of water use. Several regional events were organized, including the Pacific HELP Symposium in New Zealand, which resulted in the Pacific Regional Action Plan for Sustainable Water Management.
- Best practices in watershed management were promoted through training courses on the implementation of the Watershed Sustainability Index, developed the Brazilian HELP basin and based on hydrological, environmental, social and political factors.
- Capacities for technical data collection and exchange were improved through training courses and the development of standards for biological data.

ANNEX

**ABBREVIATIONS AND ACRONYMS**

AMCOW	African Ministers' Council on Water
CAZALAC	Water Center for Arid and Semi-Arid Zones in Latin America and the Caribbean (UNESCO category 2 centre)
CIDA	Canadian International Development Agency
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
DESD	UN Decade on Education for Sustainable Development
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FRIEND	Flow Regimes from International Experimental and Network Data
GEF	Global Environmental Facility
GEF/STAP	Scientific and Technical Advisory Panel of the Global Environmental Facility
GIS	Geographic Information System
GRAPHIC	Groundwater Resources Assessment under the Pressures of Humanity and Climate Changes
G-WADI	Global Network – Water and Development Information for Arid Lands
GWES	Groundwater in Emergency Situations
HELP	Hydrology for the Environment, Life and Policy
IAH	International Association of Hydrogeologists
IAHS	International Association of Hydrological Sciences
IAWRN	Inter-American Water Resources Network
ICHARM	International Centre for Water Hazard and Risk Management.
IFI	International Flood Initiative
IGRAC	International Groundwater Resources Assessment Centre
IHP	International Hydrological Programme
INWEB	International Network of Water-Environment Centres in the Balkans
IRTCES	International Research and Training Centre on Sedimentation and Erosion (UNESCO category 2 centre)
ISARM	Internationally Shared Aquifers Resources Management
ISI	International Sedimentation Initiative
IWRM	Integrated water resources management
LAC	Latin America and the Caribbean (region)
MAB	Man and the Biosphere (UNESCO programme)
OAS	Organization of American States
PCCP	From Potential Conflict to Co-operation Potential
PUB	Prediction in Ungauged Basins
SADC	Southern African Development Community
SEE	South Eastern Europe
TIGER	Initiative led by the European Space Agency on the use of space technology for water resource management in Africa
UN	United Nations
UNDAF	United Nations Development Assistance Framework
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

UNESCO-IHE	UNESCO-IHE Water Education Institute
UNESCO-WET	Water Education for Teachers (UNESCO programme)
UNESCWA	United Nations Economic and Social Commission for Western Asia
UNILC	United Nations International Law Commission
UNITWIN	University Twinning and Networking Scheme
UNU	United Nations University
WFD	EU Water Framework Directive
WHYMAP	Worldwide Hydrological Mapping Assessment Programme
WMO	World Meteorological Organization
WWAP	World Water Assessment Programme
WWDR	World Water Development Report
WWF5	Fifth World Water Forum (to be held in Istanbul, Turkey, in 2009)