

# GERMAN NATIONAL REPORT ON IHP-RELATED ACTIVITIES

## 1 ACTIVITIES UNDERTAKEN IN THE PERIOD SEPTEMBER 2004 - JUNE 2006

### 1.1 Meetings of the IHP National Committee

#### 1.1.1 Decisions regarding the composition of the IHP National Committee

No changes

#### 1.1.2 Status of IHP-VI activities

All projects have been accomplished according to plan.

#### 1.1.3 Decisions regarding contribution to/participation in IHP-VII

University representatives involved in hydrological issues were invited to Koblenz for consultation. During this one-day meeting the workshop participants discussed which main fields of research of the individual universities could be integrated into which IHP and HWRP projects. This would produce synergies, foster institutional cooperation and promote interdisciplinary research and studies. With the establishment of a national network the following activities are to be carried out:

- register of existing research activities
- foundation of a working group on e-learning
- input of the proposals from the network into the preparation of Phase VII of the IHP
- set-up of an e-mailing list for information exchange
- list of Master and PhD study courses in Germany, conducted in English

In particular it was discussed which research topics were to be considered relevant for Phase VII of the IHP (2008-13). Topic proposals were: water and food; water and megacities; water and health; data issues; knowledge development, management and transfer. The suggestions agreed upon for Phase VII of the IHP were passed on to the UNESCO IHP Secretariat.

A working group consisting of university representatives has been established to identify the research themes that Germany could contribute to the IHP programme.

### 1.2 Activities at national level in the framework of the IHP

#### 1.2.1 National/local scientific and technical meetings

*National workshop with university representatives*  
11 February 2004, Koblenz, Germany

One of the functions of the IHP/HWRP Secretariat is to make national contributions to the two worldwide hydrology programmes IHP and HWRP. For this purpose the collaboration already well established between the German IHP/HWRP and the German universities has been strengthened and expanded.

*National workshop with representatives of water-related ministries and federal scientific institutions*

9 December 2004, Koblenz, Germany

Germany's commitment to support the two significant water programmes IHP and HWRP of the UN specialised agencies UNESCO and WMO with national contributions leads to a great need for information on current and planned national research programmes. In order to meet these requirements the IHP/HWRP Secretariat needs to have knowledge about the existing resources in the field of hydrological research in Germany. Possible approaches to a transparent flow of information were discussed at a national workshop held in Koblenz with representatives of water-related ministries and federal scientific institutions. The establishment of a research information platform (FIP = **F**orschungs-**I**nformations-**P**lattform) was considered a suitable instrument. Such a research information platform will prove to be extremely useful not only for the IHP/HWRP Secretariat but also for all the institutions involved in FIP. The objectives of FIP are:

- utilisation of national programmes and projects for the IHP and HWRP
- enhancement of information exchange between partners
- transparency and synergy effects for national programmes and projects.

*National workshop with university representatives*

12 July 2005, Koblenz, Germany

*IHP Phase VII*

For the further planning of IHP Phase VII a national working group was commissioned to consider the hitherto proposed themes and, if necessary, to draft complementary proposals. The working group then identified focal points of the themes that could be developed jointly by a group of German universities.

As a further development a research concept for a selected focal point will be worked out, which it is hoped will be funded by national institutions. The concept is based on the cooperation of a consortium of universities with the aim of incorporating the research results into the IHP and HWRP.

*Education and training*

E-learning modules for Bachelor and Master study courses are offered on the Internet by various German universities. There also exists an exchange service for e-learning modules. This is of particular interest to those from IHP member countries.

The proposal was made to establish a theme pool for training courses abroad at the IHP/HWRP Secretariat, allowing those interested to select themes from the pool. The setting-up of a summer school in Germany or at one of the international UNESCO centres concentrating on a certain subject area was also suggested and is now in preparation.

The IHP/HWRP Secretariat distributed a list of international Bachelor (BSc), Master (MSc) and Doctorate (PhD) programmes for water and water-related subjects in Germany to all IHP National Committees. The Ministry of Foreign Affairs distributed it further to all its diplomatic missions.

## 1.2.2 Participation in IHP Steering Committees/Working Groups

### *Cooperation in international steering committees and expert panels*

Various German scientists were nominated to the expert panels of IHP and HWRP with the result that contributions were made on behalf of Germany to FRIEND, WWAP<sup>1</sup> and the Guide to Hydrological Practices of WMO. The concept of a WMO Manual on the Estimation of Design Floods will also be implemented under the guidance of German university representatives.

At the 16<sup>th</sup> Session of the Intergovernmental Council (IC) the Director of the IHP/HWRP Secretariat was elected to be one of the four vice-chairmen of the IC and is thus a member of the IHP Bureau. The Bureau supports the IHP Secretariat in Paris, assists the International Task Force and prepares the biennial IC sessions. In this way German suggestions can be brought up directly in the steering committees of IHP. The IHP Bureau has asked Mr Demuth to represent the IHP in the steering committee of the International Flood Initiative (WMO/UNESCO).

The HWRP is the responsibility of the Commission for Hydrology (CHy), which meets every four years. In the inter-sessional periods the content of the programme is controlled by an Advisory Working Group (AWG). The Director of the IHP/HWRP Secretariat was voted member of this group and coordinates the subject area Disaster Mitigation – Floods and Droughts. The tasks include coordination for the preparation of a manual on the estimation of design floods and a manual on the estimation and prediction of low flows.

## 1.2.3 Research/applied projects supported or sponsored

See 1.5 Publications

## 1.2.4 Collaboration with other national and international organizations and/or programmes

Asian Institute of Technology, Bangkok, Thailand; Humid Tropics Centre, Kuala Lumpur, Malaysia; IHP-Danube Regional Cooperation Danube; International Commission for the Hydrology of the Rhine Basin; IHP National Committees of the Netherlands, Norway and UK.

## 1.2.5 Other initiatives

# 1.3 Educational and training courses

## 1.3.1 Contribution to IHP courses

## 1.3.2 Organization of specific courses

*International study course Hydrogeology in Arid Catchment Areas*  
27 September 2004 to 8 October 2004, La Serena, Chile

The study course Hydrogeology in Arid Catchment Areas was organised by the UNESCO Centre of Water in the Arid and Semi-arid Zones of South America and the

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<sup>1</sup> World Water Assessment Programme

Caribbean CAZALAC (Centro del Agua para Zonas Áridas y Semiáridas de América Latina y El Caribe), by the Ruhr University of Bochum and the University of La Serena. The German IHP/HWRP Secretariat financially supported the course as part of its programme for education and training. Altogether 32 participants from Argentina, Bolivia, Chile, Germany, Paraguay and Peru completed the training course.

The thematic content of the course was intended for students shortly before completion of their studies (major field of study: hydrogeology, applied geology, water resources management) and for professionals working for institutions and organisations dealing with water resources management in Latin-American countries. The objective of the course was to impart basic knowledge for the study of groundwater resources. Particular importance was attached to the practical application of fieldwork methods and the evaluation of their results, with the help of which problems concerning the quality and quantity of water can be clarified.

*International Training Course on Hydrological Droughts and Low Flows*  
26 – 30 September 2005, Kuala Lumpur, Malaysia

The rapid growth of population in the last 100 years has had a massive impact on all natural resources and on water in particular. There is no doubt that the continuing population growth will have a huge impact on the use and distribution of water as a resource. The impact will be greatest when the quantity of water is reduced, that is during periods of low flow and drought. The sustainable management of water resources is vital. Drought is a natural phenomenon with serious consequences. About 280,000 people died and damage amounting to several tens of millions of dollars occurred between 1991 and 2000 as a result of drought. For the sustainable management of water resources, especially during periods of low flow, it is necessary to estimate the spatial and temporal variability of drought. This requires an understanding of the hydrological processes and the application of appropriate assessment methods. These include frequency analysis, time series analysis, simulation, modelling and procedures for ungauged catchment areas.

Against this background the international training course on Hydrological Droughts and Low Flows was held at the Regional Humid Tropics Hydrology and Water Resources Centre (HTC), Kuala Lumpur, Malaysia from 26 to 30 September 2005. The objective of the course was to teach techniques for the analysis of hydrological droughts. The participants came from hydrological services and universities of Thailand, Malaysia, the Philippines, China, Laos, Vietnam, Sri Lanka, India, Indonesia and New Zealand.

The qualitative, conceptual understanding of the characteristics and processes of drought, the detailed presentation of assessment methods and tools, and practical examples formed the focal point of the course. The assessment methods and tools were demonstrated by means of sample datasets and made available on a CD. The CD includes a global, a regional and a local dataset, and the methods are presented as self-guided tours. The phenomenon drought and its worldwide diversity was shown by means of a global dataset of discharge series, whereby regional and local aspects were explained by the combination of hydrological time series and information on the individual catchment areas. The anthropogenic impact on drought, ecological issues and examples of procedures for the design and implementation of water resources management plans were discussed. Not only were established procedures and methods

presented but also the latest results of research on drought. Some course participants presented case studies on low flow and drought from their own countries. The combination of theory and practical examples stimulated a lively exchange of opinion and knowledge which was reflected in the positive comments made by all the participants in their final evaluation of the course.

The main topics of the course were drought and hydro-climatology, spatial and temporal variability, origin of drought, characteristics of drought, frequency analysis, regionalisation and anthropogenic impacts. Using regional datasets from Malaysia one group of participants concentrated on the practical application of frequency analysis and another on model simulation of anthropogenic impacts on the processes.

Each participant was given the textbook *Hydrological Drought, Processes and Estimation Methods for Groundwater and Streamflow*. With the help of this textbook, the accompanying CD and the exercises carried out during the course, it will be possible for the participants to introduce the new procedures into the operational work of their national hydrological services.

The course material was based on the results of the long intensive international cooperation of the Northern European FRIEND Low Flow group, that elaborated teaching modules on the analysis of hydrological drought. The lecturers, who all have many years' experience in the field of drought research and teaching, came from the United Kingdom, Norway, the Netherlands and Germany.

The international training course *Hydrological Droughts and Low Flows* was jointly organised by the German IHP/HWRP National Committee, UNESCO Jakarta Regional Science Bureau for Asia and the Pacific, WMO and UNESCO and the Regional Humid Tropics Hydrology and Water Resources Centre (HTC), Kuala Lumpur, Malaysia.

### 1.3.3 Participation in IHP courses

## **1.4 Cooperation with the UNESCO-IHE Institute for Water Education and/or international/regional water centres under the auspices of UNESCO**

## **1.5 Publications**

The papers presented and the highlights of the discussions at the international workshop *Value of Water – Different Approaches in Transboundary Water Management* have been published as Heft 3 of the IHP/HWRP-Berichte series. A case study titled *Runoff from Nepalese Headwater Catchments – Measurements and Modelling* has been published as Heft 4 of the IHP/HWRP-Berichte series.

Information on the latest events from international programmes and projects is regularly posted on the website of the IHP/HWRP Secretariat. The webpage 'Did you know?' has been extended further. It gives information based on the World Water Assessment Report on worldwide water supply, water scarcity, the competitive demand on water, extreme events, ecosystems and important water resources of the earth.

## 1.6 Participation in international scientific meetings

### 1.6.1 Meetings hosted by the country

*International conference Hydrology of Mountain Environments*  
27 September to 1 October 2004, Berchtesgaden, Germany

The aim of the conference was to point out the ecohydrological needs of mountainous environments, to assist in revealing deficits and defining future requirements for regional study concepts for the mountains of the world with respect to regional infrastructure and existing scientific potential.

The conference was divided into three main thematic sessions. The first was concerned on the one hand with instrumentation, data collection and processing, networks, methods and modelling, and on the other hand with regional aspects of mountain hydrology. The papers ranged on a spatial scale from the hydrology of mountain slopes to studies of the whole Himalayan region. As regards content a bow was drawn from the estimation of precipitation to tracer hydrology procedures and comprehensive modelling of a catchment area. Numerous case studies, especially on the impacts of climate change, completed this session.

The second session dealt with atmospheric, hydrological and ecohydrological interactions, the role of snow and ice, and the hazards of water-induced geomorphic processes. A wide spectrum of papers covered, amongst others, the impact of beaver colonies on runoff conditions, studies of glacier retreat on various continents and reports on extreme slides of mud and scree in Japan and Nepal.

The last session was concerned with integrated model-based studies including those of socio-economic issues and their implementation in biosphere reserves. Although several interesting approaches concerning hydrology, ecology, and land use and environmental changes were presented, the attempt to integrate social economy was rare.

A volume with selected papers was published in 2005.

*Value of Water – Different Approaches in Transboundary Water Management*  
10 – 11 March 2005, Koblenz, Germany

The international workshop Value of Water – Different Approaches in Transboundary Water Management was held in Koblenz from 10 to 11 March 2005. The aim of the workshop was to identify the various assessments, perceptions and management approaches to transboundary water management in different culture groups.

The value of water encompasses the complex interactions between human beings and water as a natural resource. The value of water has different meanings for people with different societal, cultural and religious backgrounds. The varying approaches to valuing water are particularly apparent in conflict prevention and transboundary water management cooperation. As a result of overexploitation, pollution and mismanagement, water is becoming scarcer in many regions of the world. Its various uses, such as irrigation, process water, water for industrial and domestic uses, and drinking water, compete with each other and this can often be the cause of conflict.

### *Value of water in different societies*

The modern western approach to water resources management often clashes, when transferred to less developed regions and societies, with the traditional concepts of the value of water held in these communities. Whereas a technocratic, utilitarian and market-oriented approach is adopted in modern states, traditional societies consider the value of water holistically, not only in a social context but also from a cultural and spiritual perspective. For them the economic value of water is of less importance.

Water figures prominently in all the major religions of the world. It is considered a sacred gift of god and the religious rules greatly influence endeavours for a rational water resources management. The religious dimension of the value of water in many societies is often underestimated.

Amongst the stakeholders in a transboundary catchment, there are, apart from the local and regional parties involved, often stakeholders from international non-governmental organisations. Their knowledge and also their funds can curb or promote developments. Their activities focus on ecological and environmental aspects for a sustainable development.

### *Value of water in transboundary basins in different regions*

Two case studies, one of Lake Constance in Europe and one of the Okavango basin in central southern Africa, describe the procedures and endeavours made for the joint management of the transboundary water resources. Based on the historical development in both regions, access, use and various stakeholders were analysed. The development of joint decision-making bodies and the implementation of decisions from conviction lead to conflict-free cooperation and hence to sustainable management.

In many places groundwater is available as a significant natural resource. Many aquifers extend across several states and the coordination of transboundary management is necessary to avoid irreparable damage such as overexploitation, salinisation and contamination. Especially in arid zones the boundaries of groundwater catchment areas differ considerably to those of surface watersheds.

### *Value of water under stress conditions*

Stress situations can have either quantitative reasons, e.g. flood or drought, or qualitative reasons such as salinisation, nutrient input, rise of temperature, etc.. The value of water is shown by how far qualitative pollution in form of, for example, nutrient inputs is minimised or completely prevented. For the assessment and analysis of interests of the different kinds of water use both the physical and socio-economic conditions in the catchment area have to be adequately recorded and taken into account. Risk assessment and risk prevention such as quantitative stress conditions are part of management strategies and serve to optimise the system. Based on a case study in the Netherlands an attempt was made to quantify the economic, ecological and social consequences.

The political process, which can be considerably facilitated by economic analysis, reciprocal compensation and indication of win-win situations, is decisive for transboundary cooperation. Emphasis is on cost analysis for the joint use of the water and on service improvement for all those involved. Case studies in Africa show that

environmental and social aspects are rarely considered and most approaches are sector-oriented. Shared use and mutual benefits make an optimal water use possible.

*Cooperation despite differing perceptions of the value of water*

Case studies from different regions, river basins in Namibia, the Danube in Europe and the Mekong in South-east Asia, illustrated the approaches to cooperation both within a state and between states. Problems between local communities and central governments have an impact on international relations; and international agreements have an impact on the local level. A variety of users from industry, agriculture and the environment have to be involved and they in turn are active internationally, bilaterally and intra-nationally. Conflict resolution depends on reliable datasets, the transparent flow of information and the involvement of the general public in the decision-making process. Interest in the joint use of one and the same resource is always maintained when all parties are able to participate in its evaluation.

The workshop was jointly organised by the IHP/HWRP National Committees of Germany and the Netherlands, together with the Bonn International Center for Conversion (BICC), UNESCO and WMO.

*International conference on Integrated assessment of water resources and global change: A north-south analysis*  
23 – 25 February 2005, Bonn, Germany

The main objective of the conference Integrated assessment of water resources and global change: A north-south analysis was to analyse the challenges that are encountered in the integrated assessment and management of water resources in large river basins in the context of global change. Scientists and managers from north and south were given the opportunity to discuss international research efforts concerning water-related issues and their translation into more practical methods and coherent approaches.

Professor Malin Falkenmark from the Stockholm International Water Institute opened the conference with a keynote address. She pointed out the necessity for a shift in thinking to solve the ever-increasing problem of hunger in the 21<sup>st</sup> century. In this context she called for the focus of water resources management to be moved from "blue" to "green" water. Blue water comprises the 30-year-old mission to secure adequate water supply and sanitation. Green water serves to ensure the production of food. 70 times more water is needed to produce food for one person than for domestic consumption.

The main themes of the conference were: water science and policy interactions, international water programmes, stakeholder perspectives, water resources data, scaling, and integration.

*Water science and policy interactions*

Managers of large international water programmes, lawyers, social scientists and water resources managers showed how science influences policy at regional, national and global levels. It was revealed how relevant scientific information in appropriate form can be accessed by decision-makers.



### *International water programmes*

Representatives of nine international programmes for which water plays a significant role presented their views on the approaches of integrated water resources management in river basins. Even though the various programme objectives such as agricultural irrigation, drinking water and health, or sanitation are different, it was evident that there is a certain amount of overlapping as far as databases and programme implementation are concerned. The main outcome of this session was therefore the demand for better cooperation between the programme coordinators.

### *Stakeholder perspectives*

Case studies from Europe, North America and Africa were presented, showing very different procedures to involve stakeholders in the decision-making process. A general request was made that the results of pilot projects be transferred to other and larger schemes. The requirements for this were considered to be the creation of learning partnerships and the monitoring of projects by persons who accept to become mentors over a long period.

### *Water resources data*

Apart from a few case studies, which presented examples for the possibilities of applying hydrological water resources data in models and data information systems, the more general papers pointed out the necessity of strengthening input in databases as a basis for all future water resources projects. The importance for solving global problems of storing data in global data centres was stressed. Here reference was made to the WMO resolutions for the free exchange of hydrological and climatological data. Finally, greater efforts in collecting socio-scientific and economic information in future were called for.

### *Scaling*

Various model approaches for spatial and temporal upscaling and downscaling of hydrological model parameters were presented. The first approaches of upscaling in socio-economic models were also shown.

### *Integration*

Case studies from the northern and southern hemispheres showed very different approaches to the integration of social and physical components in models of water resources management, due to great differences in bio-geographical regions and societies. The introduction of indicators was propagated by economic scientists as a possible solution for simplifying complex relationships. A linking of socio-economic models with scientific models was also proposed. However, it was pointed out that it would be a long time before this kind of model could be used to help decision-makers.

In the ensuing discussion it was agreed that balancing the demands made on water by both humans and nature is a major challenge. A new approach in the form of water resources management will not suffice alone to mask the lack of interdisciplinary cooperation in the past. A paradigm shift between the groups always needs to be created in order to bridge the gap between social and natural scientists.

Also the lack of knowledge transfer between the northern and southern hemispheres is still considerable and especially the ability to apply science and its results is often inadequate. Well-qualified scientists returning to their home country frequently find themselves in an unreceptive political environment.

Generally, scientists should play the role of moderator, presenting scientific results to keep local decision-makers informed, not to enforce political decisions. This would improve the dialogue between scientists and politicians. Conveying uncertainties in the results is particularly difficult.

The conference was organised by the Global Water System Project (GWSP), the secretariat of which is located in Bonn, Germany. The German IHP/HWRP National Committee was involved, as regards funding, content and personnel, in the planning and carrying out of the conference, as were also several other national and international institutions.

The results of the conference will be published by Springer in their Water Resources Management series.

#### 1.6.2 Participation in meetings abroad

*Water as a good and a service: decision-making methods and tools for regional water management with respect to uncertainties*  
*International workshop, 28 and 29 January 2005, Wageningen, Netherlands*

The value of water encompasses the complex interactions between human beings and water as a natural resource. Water itself, even drinking water, is not a product in the real sense, also not a normal article of trade, but a heritage and an element of the water cycle. The European Water Framework Directive (WFD) views the introduction of the recovery of costs for water services as an important factor for the sustainable use of water. There is ample scope in the proposals for the realisation of these aims. It is, however, important that the price of water should be based on comprehensive economic analyses. This means the inclusion of costs for the conservation of the environment, for the economy and for the resource itself.

##### *Water as a good*

Different standards of water quality lead to varying costs and benefits. The political setting of definite threshold values is extremely important. For example, water from the river Rhine is used through bank filtration as drinking water by approx. 12 million people and by varied branches of industry as process water. Despite the effective treatment of used water in sewage plants, additional substances such as endocrine substances (pharmaceuticals, etc.) or biologically non-degradable substances (viruses, bacteria) are fed into the river water. The aim of the WFD is not only to preserve the usability of the water and the functional characteristics associated with this, but also to improve the ecological quality of water.

##### *Uncertainties*

For the quantitative assessment of the components of the hydrological cycle and the calculation of the available water, uncertainties have to be assumed, be it for epistemic, scientific or technical reasons. Uncertainties also arise from projections of population growth, water demand and climate variability. To this are added factors of a subjective nature, such as psychological and hypothetical considerations or plausible reasons. A sound prediction is complicated by such boundary conditions.

##### *Planning aspects*

Requirements for the use of water for recreation differ from those for industrial or agricultural purposes. The supplier of drinking water makes again quite other demands

on the quality and quantity of water. There is no absolute value for water; the various uses compete with each other. Water is a means of existence just as much for flora and fauna, a requirement that needs to be respected by humans, but it can be monetarised or subjected to a cost-benefit analysis only under certain conditions. Land-use planning with respect to water has to be based on the interactions between the water and regional demands made on it.

*The supply of water as a service?*

Does the price of water cover all economic costs and all costs incurred for the protection of water as a resource? Water cannot only be considered as a public good, but has also to be regarded as a natural resource that is traded regionally and nationally and thus has its price. The challenge is to recognise and record the socio-economic, physical-geographical and ecological interactions. Furthermore, it is necessary to constantly reflect on the measures taken during the management of water as a resource.

The workshop was organised jointly by the IHP/HWRP National Committees of the Netherlands and Germany.

## **1.7 Other activities at regional level**

1.7.1 Institutional relations/cooperation

1.7.2 Completed and ongoing scientific projects

See 1.5 Publications.

Report on forest hydrology in cooperation with the Valdai Branch of the State Hydrological Institute of Russia

Report on irrigation control: towards a new solution of an old problem.

## **2 FUTURE ACTIVITIES**

### **2.1 Activities planned until December 2007**

International workshop on value of water  
International workshop on megacities

### **2.2 Activities foreseen for 2008-2009**

### **2.3 Activities envisaged in the long term**

In the process of planning.