# HELP

## Hydrology for the Environment, Life and Policy

**HELP is a joint UNESCO IHP-WMO initiative and is a cross-cutting programme of the Sixth Phase of the International Hydrological Programme of UNESCO**

# NEWSLETTER

Issue No4
August 2006

**Message from Mike Bonell, Global Co-ordinator of HELP**

Dear HELPers,

In this issue we outline progress in the planning of the 2nd International HELP Symposium: “Local Solutions to Global Water Problems- Lessons from the South” which will be hosted by the Government of South Africa, Pretoria, November 4-9 2007, led by the Department of Water Affairs and Forestry, DWAF and IWMI in collaboration with several South African institutions. I was able to meet the Local Organising Committee within the DWAF, Pretoria in May 2006 and I was very impressed by their enthusiasm and professional approach. The International Symposium Committee ( ISSC) has set itself an ambitious extra-budgetary fund raising target with the aim of attracting at least one representative from each of the 67 HELP basins within the existing global network. A sub-committee of the ISSC for fund raising will meet in UNESCO Headquarters , October 2006 to review progress.

Other items to mention include the approval at the 17th Session of the UNESCO IHP-Intergovernmental Council held in Paris, 3-7 July 2006, for proposing the establishment of a second HELP Centre provisionally entitled "International Water Centre for Food Security under the auspices of UNESCO IHP", at Charles Sturt University in Australia. This Centre, linked with the Murrumbidgee HELP basin in Australia, has already had strong links with IWMI in Sri Lanka and aims to foster closer working links with FAO following my meeting with the Land and Water Development Division in October 2003. The next step will be a Feasibility Study which is required before the Centre can go before the UNESCO Executive Board for consideration and approval

In the meantime, as part of the collaboration between UNESCO and WMO, a report I provided on the IHP-HELP contribution towards the WMO-led " Pristine basins" initiative was approved by the 12th Session of he CHy ( Commission of Hydrology), WMO, Geneva, October 2004

As indicated in the previous Newsletter, HELP is essentially implementing the IHP in a field-setting and in a more integrative manner. An example is included from the ecohydrology project which provides a report on recent workshop entitled “Managing Land-Water-Habitat Interactions through an Ecosystem Approach". Also linked with ecohydrology is a short description of a three-way Twinbasin Agreement between two basins in the developed world with the Naivasha/Malea in Kenya. These basin are also part of ecohydrology demonstration group of basins.

Finally I have to mention that this will be my last message as I have reached the statutory age of retirement within the UN. However I certainly have not retired from professional life, and I hope to maintain my links with the HELP network but this time within the sphere of implementation rather than co-ordination. I have found the HELP network a wonderful network to deal with and I would sincerely like to thank you all for your support. I wish my successor well during the next phase of HELP global co-ordination.

**HELP in ACTION**

## In this issue:

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Hydrology for the Environment, Life and Policy

## Follow-up to the International Symposium Steering Committee meeting

The Members of the International Symposium Steering Committee (ISSC) held their second planning session in Mexico City 15-17 March, 2006 prior to the Fourth World Water Forum.

The purpose of the planning session was to gain clear understanding of the Symposium objectives, structure, venue and the responsibilities of the various actors that will be involved in planning and implementing the HELP Southern Symposium in 2007. The Committee nominated Shahbaz Khan (Australia) and Patricia Wouters (UK) as rapporteurs.

The Committee then reviewed the results of the last ISSC meeting in Paris, 30 August - 2 September, 2005. Since that time, the subcommittee for selecting the venues of the Symposium has met and has recommended that South Africa be the site of the symposium. Kevin Pietersen (SA Water Affairs) then presented a business plan for HELP Southern Symposium as an addendum to the original meeting proposal document.

The committe agreed that the Symposium will be held in South Africa, presumably in Pretoria, 4-9 November 2007. The Symposium will be articulated around six main themes:

- Actions on the ground: methods and approaches
- Implementing HELP in basins with limited resources and technical capacity
- New Integrating Science being developed under HELP
- Connecting environment, economy, social and cultural impacts
- Institutional and legal lessons for successful HELP implementation
- Indicators of HELP successes

Plenary sessions, breakouts, field trip, working groups and Poster sessions will allow all participants to learn and exchange on these different topics.

The International Symposium Steering Committee

**First row from left to right:** Mike Bonell (Global HELP coordinator), Pilar Cornejo (HELP S America), Kevin Pietersen (SA Water Affairs), Patricia Wouters (HELP Europe), Andrew Fenemor (New-Zealand), Halmy Sally (IWMI SA).

**Second row from left to right:** Jiebin Zhang (China), Stefan Uhlembrook (UNESCO-IHE), David Moody (Chairman), Henrique Chavez (Brazil) and Shahbaz Khan (HELP Asia Pacific)

## Pristine Basins: Sentinels for Global Climate Change

Future climate change will likely produce changes in the distribution and fluxes of freshwater in the biosphere, affecting water supplies for domestic use, irrigation, recreation as well as a host of ecological needs. A large body of research in recent years has addressed the issue of historic and future trends in streamflow. Most historic work has focused on large systems that have more extensive records available. In addition to examining trends at a single station, it is equally important to examine spatial or regional trends in streamflow in the context of regional climatic change. To date, no dedicated global set of hydrological stations exist for the purpose of detecting climatic trends in hydrological regimes. Some developed countries have defined hydroclimatic-gauging stations including Canada, US and the UK.

Globally, basins considered "pristine" are quickly becoming rare and are most likely associated with headwater streams, so it is particularly important to focus on these systems. Headwater streams are the most abundant and widespread water resource found around the Earth. They are relatively young geologically and are located at the terrestrial-aquatic interface. Hence, they have a strong hydrologic connection to the adjacent riparian and terrestrial ecosystems.

### A Pristine Basin Network Partnership

A new pristine basin initiative is currently being led by the World Climate Programme-Water (WCP-Water), which is a joint partnership of WMO/CHy and UNESCO-IHP. The goal of this new initiative is to establish a global hydrological network of pristine basins for the evaluation of hydroclimatological variability and trends. The establishment of a global network will require a broad-based cooperative effort involving international, national, local agencies and research programmes. Though large and complex in dimension, this effort has exciting potential to add to our understanding of hydrological-climate linkages during this dynamic and historic time of climate change and variability. It is important to see this effort not as a data "mining" exercise but a cooperative endeavour where collaborators are true partners in furthering understanding hydrological response to global climate change. This synergistic partnership is critical to the success of the project.

Project Objectives

The following are four suggested objectives of a pristine basin network programme. The first two objectives are expected to be completed over the next two years, with further work dependant on their findings, and institutional commitments of time and resources.

1. Inventory of current global flow monitoring activities in pristine basins.

A critical first step in investigating changes in global streamflow is inventorying historical flow data and current flow measurement activities. The development of a catalogue of current pristine basins will fall under the auspices of the World Climate Programme-Water (WCP-Water), a joint partnership of WMO/CHy and UNESCO-IHP. Each agency will be responsible for a portion of the domain of pristine basins that reflects their respective strengths (see Figure). WMO will be responsible for soliciting participation from national hydrologic services. In contrast, the IHP-Hydrology for the Environment, Life and Policy (HELP) will solicit stations from generally small, headwater experimental basins that may have "fallen under the radar" of the national services. Given IHP's decentralized and diverse global activities, this agency is the appropriate entity to make these contacts. This task can potentially be an immense undertaking because these groups are widely dispersed around the world, and have disparate missions and research foci. As a first step, IHP-HELP has recently made an initial solicitation to HELP basins that may be currently conducting hydrological measurements in relatively undisturbed basins. Some of these candidate sites are embedded within the Man and the Biosphere (MAB) reserves.

2. Analysis of trends in available records

Once the inventory described above is completed, a careful screening of the available data sets will be performed before a decision to proceed with any trends analysis. This will entail consideration of quality control measures, length of record, data gaps, ancillary metadata, geographic coverage and frequency of the data. Analysis approaches to examine hydrologic regimes within and across sites, and at different temporal scales, will be applied.

3. Identify current gaps in geographic coverage and define what spatial coverage is needed/required (statistical design). Ultimately, the goal of this effort is to determine whether or not the hydrological systems found in pristine basins are responding to climate change, the magnitude of that response, and the global geo-spatial distribution of that hydrological response. Beyond "best efforts", in which data are gleaned from existing programmes that generally have other objectives in mind, what proactive steps can be taken towards the design and implementation of a pristine network program, whose benefits may not be realized for years to come? Once the current inventory of active pristine basins is mapped (Objective 1), how might the mosaic be completed to properly characterize how global surface water flows are responding to climatic change and variability? Most likely, the active pristine basins are not evenly distributed globally, requiring the need to search for future candidate sites. This raises the question of whether we know where the pristine basins of the world are located, i.e. the population of pristine basins, irrespective of whether they are currently being monitored or not? How many pristine basins are associated with 1st, 2nd, 3rd order streams, where are they located, and what basin characteristic information is available? This may be (relatively) easy for areas such as the US, but other areas of the world do not have this readily available spatial information.

The second part of the objective focuses on the question "What spatial density of pristine basins is required to sufficiently monitor a response to climate change and variability?" This question is particularly difficult without *a priori* knowledge of the magnitude, extent and spatial pattern of hydrological change. Prediction models such as GCM climate maps might act as guidance for strategic station placement.

4 .Establishment of the global pristine basin network.

The full implementation of a pristine basin network will require large commitment from international, national and local agencies, institutions and associated staff. It truly needs to be a collaborative effort and will require a strong steering committee and administrative guidance to coordinate and oversee activities. Components of this network include data acquisition and blending, data analysis, dissemination and archiving.

**A Pristine Basin Workshop- Working Towards a Global Network**

Before serious consideration can be given to a basin network programme (and many of the other proposed activities above), it would be appropriate to hold a comprehensive but focused workshop, bringing scientists together from WMO-CHy, UNESCO-IHP, national hydrometric agencies, experimental basin organizations and other hydro-climatic researchers together to chart a course for this important initiative. Only through such a collective effort can a comprehensive understanding of climate variability and change in basin hydrology be realized. The IHP, specifically HELP, can play a critical role in this effort. The cross-cutting component of this programme has demonstrated the ability to link interdisciplinary scientists and programs.

The objective of this workshop will be to examine the state of science with respect to historic, current and future hydrological trends, identify important processes, pathways and storages of catchment hydrology with respect to climate forcing and design a framework for the implementation of a pristine basin network. It is proposed to be hold this workshop in late 2006 or 2007, and will be co-sponsored by UNESCO-IHP and WMO-CHy; currently, no location or specific date has been decided.

Please contact Mike Bonell (m.bonell@unesco.org) or Steven Greb (Steven.Greb@dnr.state.wi.us) if you are interested in attending this workshop and/or have a collaborative interest in this issue.

By Steven R. Greb
Wisconsin Dept of Natural Resources. USA

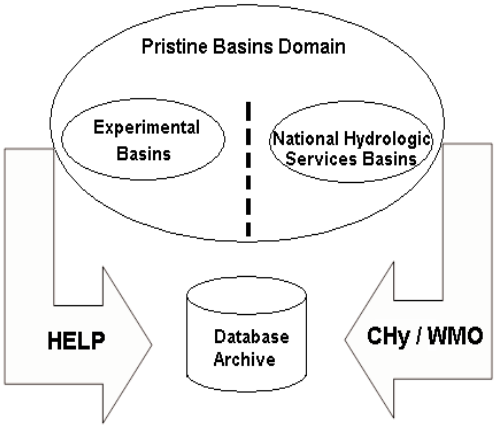



Figure. Conceptual approach to project data retrieval.

# Hydrology for the Environment, Life and Policy

## Managing Land-Water-Habitat Interactions through an Ecosystem Approach

The consultative workshop on integrating social and cultural aspects into ecohydrology was held at UNESCO Headquarters in December 2005. This workshop was organized as part of the joint programme of work of UNESCO's International Hydrological Programme (IHP) and the Man and the Biosphere (MAB) Programme on "Managing Land-Water-Habitat Interactions through an Ecosystem Approach" for the biennia 2004 - 2005 and 2006 - 2007, in the broader context of IHP-VI (2002 - 2007).

The aim of the workshop was to strengthen emphasis placed on social and cultural aspects of activities conducted under the ecohydrology theme. The main objectives of the workshop were:

-- to review efforts taking place world-wide within the field of ecohydrology towards integrating social, human and cultural aspects into sustainable management of water resources, and identify gaps, priorities and opportunities;

-- to discuss how social and cultural components can be incorporated into the implementation of ecohydrology activities during 2006 - 2007, including demonstration projects, some of which overlap with HELP basins.

The workshop was chaired by Ms Carmen Revenga (The Nature Conservancy) and Mr Jorge Recharte (The Mountain Institute), and was attended by ten experts from Africa, Asia, Europe, North America and Latin America.

It was made clear through the expert presentations and discussions of the workshop that much work is required to realize the goal of moving ecohydrology forward as a truly integrated science. While ecohydrology holds great potential to promote a paradigmatic shift in water management by integrating engineering and biological sciences, it has for the most part ignored the critical contribution of the social and policy sciences to the understanding of water use and management at diverse scales of governance. In consequence, fundamental aspects of social, cultural, political and economic interactions affecting water use and conservation have been virtually absent from ecohydrology. In order for this ecosystemic approach to hydrological processes to reach its potential, the need to integrate the social sciences should be recognized and activities organized to increase communication and cooperation to promote broader interdisciplinarity.

The major outputs of the workshop were:

-- clarification of the relationship between Integrated Water Resource Management and ecohydrology;

-- development of a framework for addressing what ecohydrology can do for biodiversity and society;

-- articulation of some priorities and methodological approaches for integrating social sciences into ecohydrology; and

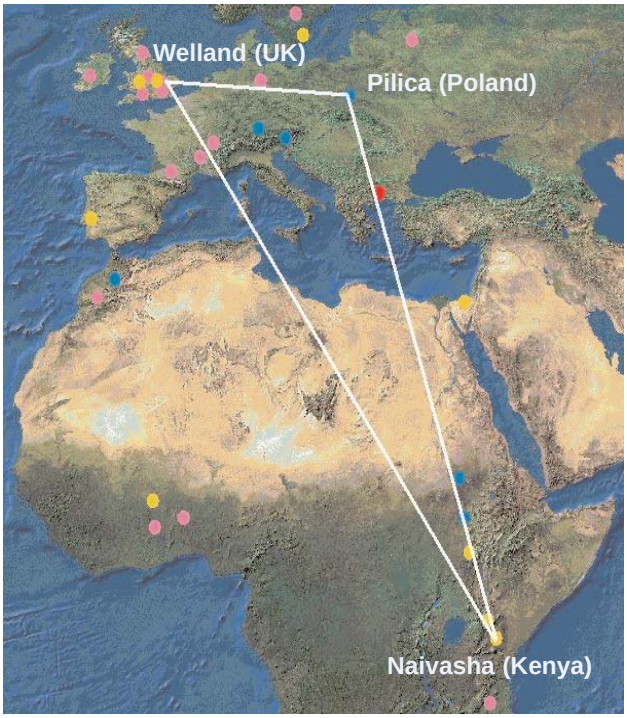
-- recommendations of some future steps to be taken in order to move the agenda forward.

The following HELP basins include demonstration ecohydrology sites: Guadiana River (Portugal), Lake Naivasha (Kenya) and Pilica River (Poland). This provides opportunities for joint implementation of the workshop recommendations. A detailed report of the workshop is located on the HELP website.

For more information on the workshop and on ecohydrology activities, please contact Ms Lisa Hiwasaki at: l.hiwasaki@unesco.org.

By Lisa Hiwasaki
UNESCO IHP

# More Twinnings in the HELP network




A three-way Twinbasin agreement between HELP river basins Welland (UK), Pilica (Poland) and Naivasha/Malewa (Kenya) will enable exchange of personnel and ideas between the three basins. All three river basins are primarily agricultural and have ongoing programmes developing means of mitigating diffuse pollution from arable land to rivers and large water bodies. The agreement brings together organizations such as the University of Lodz which is developing the application ecohydrology approaches to river basin management in Poland, and the Game Conservancy Trust's Allerton Project, a research and demonstration farm combining farming with wildlife conservation and diffuse pollution control in the UK. The University of Leicester Biology Department applies research expertise in phosphorus in aquatic ecosystems to both Welland and Navaisha river basins, the latter in collaboration with the Lake Naivasha Riparian Association.

By Chris Stoate
Allerton Trust, UK

## The HELP international network

If you wish to join the HELP network, you might not want to wait for the next Global Call (2008). You can be a member of the HELP network right now by sending us the completed HELP proposal, available from the website http://www.unesco.org/water/ihp/help (You and HELP). You will be immediately registered as a candidate HELP basin and your proposal will be automatically evaluated at the next Global Call. The evaluation is performed by a selected team composed of scientists, water managers and lawyers in order to enter your basin into one of the HELP basin category (Demonstration, Operational, Evolving or Proposed basin)

Being part of the HELP network allows the possibility of sharing experiences in the implementation of integrated water resources management. Experience sharing, data and knowledge transfer can also be used for the data poor basin wishing to implement the HELP philosophy.

Advice on how to dialogue with stakeholders can be provided through the HELP basins experience. Further, the HELP programme provides activities to increase the dialogue between several "water-related" communities in order to better integrate land-water resources management (i.e scientists, lawyers, managers, economists, stakeholders). Some of the HELP basins are implementing IWRM on the ground for more than 4 years and can offer experiences and guidelines on how to do it.

# HELP

## Hydrology for the Environment, Life and Policy

### The Motueka HELP basin, New Zealand

The 2170 km$^2$ Motueka catchment in New Zealand's South Island is a HELP Demonstration Basin from a hydrologically temperate zone. The Motueka catchment is home to New Zealand's Integrated Catchment Management (ICM) research programme, a government-funded research partnership between Landcare Research (terrestrial, hydrological and social science), Cawthron Institute (freshwater and marine science),and Tasman District Council (environmental policy and management).

This ICM HELP programme, begun in 2000 (http://icm.landcareresearch.co.nz/) aims to develop and demonstrate methods and processes - including collaborative learning processes - that guide sustainable management of land and water resources at small to large catchment scales. This includes catchment impacts on the adjacent coast. Examples of research and management successes include:

--its synthesis of existing knowledge to identify knowledge gaps about the catchment,

--the WATYIELD DSS for modelling of effects of catchment land cover on water yield,

--the setting of water allocation limits using groundwater flow modelling in conjunction with instream flow needs assessments,

--bridging of dairy cattle stream crossings following research on water quality degradation,

--engagement of catchment communities in the research, such as through development of an Influence Matrix to identify factors affecting future sustainability of the Motueka catchment, and

--modelling of effects on marine productivity of fresh water, nutrients and sediment discharged by the Motueka River.

The hydrological diversity of the Motueka is illustrated by its elevation range from 1600 m to sea level, its annual precipitation ranging from 1000 to over 3500 mm, its contribution of 62% of the freshwater flow to Tasman Bay (mean flow of 82 m$^3$/s), and Motueka town being one of the sunniest places in New Zealand (Basher *et al*, 2003). Since the Maori arrived around 1350 AD and European settlers in the 1800s, 60% of the catchment has been cleared of forest, with roughly 25% now in exotic conifer forest and 35% in dryland pasture, crops or irrigated horticulture (apples, kiwifruit, berry fruit, hops and - historically - tobacco). Vineyards, marine farming, arts and tourism are adding to the diversity and productivity of the local economy.

The catchment is sparsely populated, with less than one person per km$^2$ and a population of only 12,000, including the town of Motueka. However, population growth is among the highest in New Zealand at about 2% per annum. New Zealand's Treaty of Waitangi (1840) defines the governance relationship between Maori and European settlers. Maori groups are active in commercial horticulture and tourism in the catchment and local tribes (iwi) Te Atiawa, Ngati Rarua and Ngati Tama advocate strongly their kaitiakitanga philosophy of guardianship over the regions' land and water resources.

The Motueka catchment is representative of many of New Zealand's water and land management issues. Some water resources are "fully allocated" yet there is continuing unmet demand for water. Water quality and habitat have declined over time, particularly in the lower catchment, with land use change and intensification the main cause. Fish numbers in the internationally renowned brown trout fishery declined 70% between 1985 and 1995 but are recovering. Forest establishment and clearing can modify annual streamflows and groundwater recharge by up to 50%. The Motueka River plume provides both nutrition and smothering sediment affecting aquaculture and shell fishery productivity in Tasman Bay, where the allocation of sea space for mussel and scallop shellfish harvesting is a contentious legal issue. The HELP challenge here is to introduce a more integrated approach to these types of issues involving environmental and social scientists, council policy-makers and community, all taking a proactive collaborative approach to plan and managing the catchment sustainably rather than reacting once problems arise.

The Motueka ICM research programme aims to break the HELP 'paradigm lock' through ongoing dialogue among researchers, policy-makers and stakeholders. Methods used include:

--a public Annual Meeting and field trip about science and policy in the catchment,

--a Motueka ICM website where research is regularly updated without having to wait for formal publication,
--a Community Reference Group of catchment residents who meet 4 times per year
--the Travelling River art-science collaboration mentioned above, which wove together community stories and environmental science about the catchment in an exhibition visited by around 3000 people.
--a Collaborative Learning Group of mainly researchers and policy-makers, currently debating the impacts of fine sediment movement down the catchment
--linking ICM research into policy priorities in the Tasman Resource Management Plan (Tasman District Council, 2001)

In the Motueka, ICM research encompasses knowledge management, social learning processes, comparing indigenous and western science, developing understanding of catchment hydrology, nutrient, sediment and contaminant fluxes. Methods to reduce the impacts of land and water use are being developed, as are scenario-based models to explore economic and social consequences - alongside environmental ones - of major catchment changes in land use, population and climate.

Elements of a successful ICM or HELP process are to identify the major catchment-scale environmental/social/economic sustainability issues with key people in the catchment, understand the policy and legal context for addressing these, find out what research has already been done and summarise that knowledge. Then work collaboratively on filling information gaps, planning ahead and putting science into action with landowner 'champions' in the catchment. Only with information, awareness and commitment will change occur, whether it is at agency policy level or though the actions of individuals in the catchment. Our key suggestion is for scientists and policy-makers to find ways in their work to collaborate with people in the catchment. 'Walking alongside' people as the science is done will demonstrate its validity and will build commitment to use it to achieve more sustainable land and water management.

By Andrew Fenemor
Landcare Research, New Zealand

View of the Motueka HELP basin, New Zealand.

Design: G Narnio