IAHS Newsletter

NL101 December 2011

Storage, Flows and Transformations in the Hydrological Cycle – Synthesizing Synergies between FRIEND, HELP and PUB

Kovacs Colloquium 2012, date to be confirmed, see p.12

Hydrometeorological Projects – summary of what is ongoing

Eleanor Blyth (UK) was invited to provide the IAHS Bureau with an overview of Hydrometeorology and its role in Hydrological Sciences, and to assess the need for an IAHS Working Group on this subject (the previous one was disbanded in 2007). The overview that she prepared is reproduced here because, as she states, whilst there have been no recent officially co-ordinated Hydrometeorological activities under IAHS, several others have taken place that are of interest to the hydrological community. Her report comments on GEWEX, GLASS, WATCH, Benchmarking and Regional Studies. Eleanor is a member of the Science Steering Committee and of the GLASS (Global Land/Atmosphere System Study) panel. *See page 4.*

Ecosystem Services of Wetlands

Water cattle in the Usangu wetlands, Tanzania (photo M. C. Acreman)

Cover detail from the *Hydrological Sciences Journal* Special Issue edited by Mike Acreman on Ecosystem Services of Wetlands, which comes out in December (*HSJ* 56(8)). *See page 10.*

Introducing the new IAHS Commission on Statistical Hydrology

Statistical methods for hydrological analyses have a long history and continue to be an intense research topic. Such tools have proved to be pivotal in numerous applications and procedures. The success of statistical descriptions of hydrological processes underlines the enormous complexity of hydrological systems, and makes purely deterministic description ineffective.

Recently, the number of available tools, approaches and procedures in several statistical sub-topics has been increasing faster than before. The correct application of new and old updated methods is fundamental for hydrological applications. In the literature there are more than 100 international journals on statistics and more than 40 journals that accept contributions on statistical hydrology. Many software and routines are available in several languages (S, R, C++, Fortran, etc.) either commercial or freeware. For a specific hydrological problem many potential statistical approaches are available. *See page 6.*

CONTENTS

Message from the President	2
Completion of PUB Decade	3
Hydrometeorological Projects	4
Congratulations	5
News from IAHS Commissions: ICSH, ICWQ	6
Changes in Flood Risk in Europe	8
Floods – from Risk to Opportunity	10
Course in Flood Risk Management	10
Ecosystem Services of Wetlands	10/14
Additional reports from Melbourne Assembly	11
Kovacs Colloquium	12
HydroPredict conference	13
Meetings calendar	15
IAHS Contacts	16

FLOOD RISK IN EUROPE

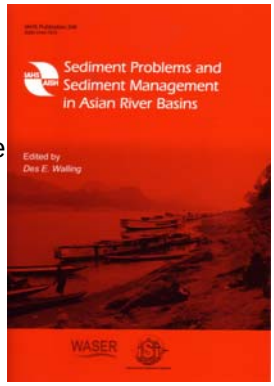
Floods are the most prevalent natural hazard in Europe, despite a long history of flood defence measures. Has flood risk increased in Europe? How, where, and why? Are climate change impacts apparent? Do socio-economic trends and associated land-use change contribute to risk? The next title in the IAHS Special Publication Series: *Changes in Flood Risk in Europe*, edited by Zbigniew Kundzewicz, addresses these questions. Prof. Kundzewicz explains the background to the volume, and summarises the content. *See page 8.*

Sediment Problems and Sediment Management in Asian River Basins

edited by *Des Walling*

Now available from IAHS

See page 16



Message from the President

gordonyoung_wwap@yahoo.com

Retrospective

Two remarkable men who had great influence on hydrological sciences and on the development of our Association passed away in the last few months. Ivan Johnson and Terence O'Donnell were very different individuals but they shared several traits in common – a great love for the science, dedication as teachers and mentors of younger colleagues, and devotion to the excellence and development of IAHS.

From the 1960s through the 1990s Ivan Johnson played key roles as an officer of IAHS. As a groundwater expert he was Vice President of the International Commission on Groundwater from 1967 to 1971 and then President from 1971 to 1975. From 1975 to 1979 he was Vice President of the Association. In the early 1980s, Ivan promoted the potential of remote sensing at a time when such techniques were not well known or well accepted by the hydrological community. Due to his efforts, the International Committee for Remote Sensing and Data Transmission (ICRSDT) was established within IAHS and Ivan became its first President. In the mid-1990s – again due to Ivan's activities – the committee was transformed into the International Commission on Remote Sensing (ICRS). In 1987 Ivan was elected to the position of Honorary President – which he held for 24 years. (Obituary at A. I. Johnson 1919–2011).

Terence O'Donnell contributed a great deal to the advancement of the science with his innovative development of mathematical models during the 1970s and 1980s. Terence is equally well-remembered for his outstanding contribution as Editor of *Hydrological Sciences Journal* from 1983 to 1997. The Journal developed remarkably during that period as he not only maintained high scientific standards, but he also adopted a diplomatic approach to discussions with authors and co-editors alike. In the 1960s, as Secretary of the newly formed IAHS Deterministic Hydrology Committee, Terence organized a number of key meetings which led to the formation of the International Commission on Water Resources Systems. (Obituary at T. E. O'Donnell 1927–2011).

It is clear that Ivan Johnson and Terence O'Donnell played critical roles in the development of the Association. We remember them with great respect as influencing the development of IAHS as a strong organization.

Prospective

Earlier this year we benefitted from the symposia and workshops during the Scientific Assembly of IUGG in Australia. We now look forward to important events in the next two years for which we need to be prepared well in advance.

The decade on Prediction in Ungauged Basins (PUB) is in its final biennium with two major events to bring it to a close. The next Kovacs colloquium, to be held at UNESCO, Paris at the end of May/early June 2012 (exact date to be confirmed soon) will have a three-part focus, on PUB, the FRIEND (Flow Regimes from International Experimental and Network Data) and HELP (Hydrology for the Environment, Life and Policy) programmes supported by UNESCO; the synergies between these three elements will be highlighted. On 23–24 October 2012, at Delft, The Netherlands, during celebrations of the 90th anniversary of the founding of IAHS, PUB will again be highlighted with a symposium to bring the decade to an end. This will be a major event that will likely attract some hundreds of participants.

In parallel to bringing the PUB decade to a close, we are actively considering the focus of a new scientific initiative to run during the next decade. To this end, Alberto Montanari has constituted a small core group of a Task Force (TF) that will be active until the next scientific initiative commences. Alberto is now putting together a larger group of individuals interested in actively contributing to the discussions and the TF. The discussion will be hosted online, in the form of a moderated blog that will be open to contributions from the public, with the aim to involve all interested persons from the IAHS community. The blog will be made available from 15 December 2011

IAHS Newsletter © IAHS Press 2011

Published by IAHS Press, Centre for Ecology and Hydrology, Wallingford, OX10 8BB, UK

Edited by Cate Gardner

The Newsletter is provided free of charge to members of IAHS. This Newsletter and previous issues may be downloaded from: *www.iahs.info*

Articles from IAHS members on all aspects of hydrology and related topics are welcomed for publication in the Newsletter. They should be sent to the IAHS Secretary General, Christophe Cudennec: *cudennec@agrocampus-ouest.fr*, or to:
IAHS, UMR SAS, Agrocampus Ouest,
CS 84215, 35042 Rennes Cedex, France

Advertisements may be placed in the Newsletter, at the discretion of the IAHS Secretary General. Contact: *cate@iahs.demon.co.uk*

The next Newsletter will be published in April 2012; copy deadline: 15 March 2012.

and will be reachable via a link from the home page of the IAHS web site. It is envisaged that the TF will meet for important discussions at Nanjing, China, at the invitation of IAHS Vice President Liliang Ren, during May 2012. Another crucial workshop will be held immediately after the PUB Symposium in Delft on 25 October 2012, to hopefully finalize the concepts for the scientific initiative with a decade of activities to commence in July 2013, during the next IAHS Assembly.

In July 2013, IAHS will hold its next Scientific Assembly in Gothenburg, Sweden. It will be held jointly with two of our sister Associations – IAPSO (International Association of Physical Sciences of the Ocean) and IASPEI (International Association of Seismology and Physics of the Earth's Interior). An event of this magnitude and complexity (involving a great deal of joint organization not only within IAHS but also between the three associations) needs long-term planning. Preparations have already been started by Vice President Liliang Ren and Secretary General Christophe Cudennec.

One of the side events at Gothenburg will be a meeting of representatives of National Hydrological Associations as a follow-up to the initial successful meeting of NHAs in Melbourne (see IAHS Newsletter 100). Past-President Arthur Askew, who has led this whole process, is promoting discussion with NHAs to make the event a great success.

More details of the Kovacs Colloquium and PUB events are provided in this newsletter. All members of IAHS are encouraged to participate – we have much work to do and preparations must go ahead without delay. I hope that you will be in contact with the event organizers to make your own views known.

Gordon Young

New IAHS National Representatives

Several new appointments have been made in the last six months:

Canada, R. Dan Moore/Brian Branfireun
China, Zheng Jianyun (contact person Liu Zhiyu)
Indonesia, Arie Setiadi Moerwanto
Israel, Joseph Guttman
Philippines, Milo M. Landicho
Senegal, Alioune Kane
South Africa, Graham Jewitt
Thailand, Suthep Tansup
Tunisia, Zoubeida bargaoui

Welcome to all the newcomers.

Full contact details for all national Representatives are available at:

www.iahs.info/nreps.htm

First Announcement of the IAHS Symposium on:

Completion of the IAHS Decade on Prediction in Ungauged Basins and the Way Ahead

Delft, The Netherlands, 23–24 October 2012

In October 2012 we celebrate both the 90th anniversary of IAHS and the completion of the IAHS Decade on Prediction in Ungauged Basins (PUB). The Symposium will report on the scientific achievements that were made during the decade and the insights that were gained. We also look ahead to identify the major scientific challenges for the coming period.

During the conference we invite contributions from all scientists who have worked on the main themes of PUB to share their conclusions and views on the advances made during the Decade and the remaining research questions. The conference has a general part which provides a summary of the PUB Decade, presentations on the Synthesis Report and the PUB Manual, as well as a visionary session on the future challenges. Subsequently, there are thematic sessions organized around the six research themes of PUB.

Please reserve the dates in your diaries You may already contact the convenors of the thematic sessions if you would like to contribute. In due course more detailed requests for papers will be circulated.

Scientific organising committee:
Hubert Savenije (Chair)
Murugesu Sivapalan
Jeff McDonnell
Guenter Bloeschl
John Pomeroy
Alberto Montanari

Sponsored by IUGG

International Union of Geodesy and Geophysics
Union Géodésique et Géophysique Internationale

Thematic Sessions:

Theme 1: Catchment Classification
Convenor: Peter Troch
Co-convenors: Markus Hrachowitz, Ross Woods

Theme 2: Conceptualisation of Process Heterogeneity
Convenor: Günter Blöschl
Co-convenors: Stefan Uhlenbrook, Doerthe Tetzlaff, Erwin Zehe

Theme 3: Uncertainty Analysis and Model Diagnostics
Convenor: Hoshin Gupta
Co-convenors: Thorsten Wagener, Saket Pande, Jim Freer

Theme 4: New Approaches to Data Collection
Convenor: Erwin Zehe
Co-convenors: Nick van de Giesen, Vincent Fortin

Theme 5: New Hydrological Theory
Convenor: Murugesu Sivapalan
Co-convenors: Hessel Winsemius, Alexander Gelfan

Theme 6: New Approaches to Modelling
Convenor: Hubert Savenije
Co-convenors: Fabrizio Fenicia, Martyn Clark

Local organising committee:
Hubert Savenije
Nick van de Giesen
Stefan Uhlenbrook
Markus Hrachowitz
Saket Pande

Hydrometeorological Projects – Summary of what is ongoing

by Eleanor Blyth *Continued from page 1*

GEWEX (Global Energy and Water Cycle Experiment)

The focus of the GLASS (Global Land/Atmosphere System Study) panel has recently changed from four sub-themes (as described in http://www.gewex.org/glass.html) of local coupling, large-scale coupling, local off-line assessments and large-scale off-line assessments of the land-atmosphere interactions. Now there are three sub-themes: Land Atmosphere interactions, Benchmarking and Data assimilation. This shift reflects the recent advances in the subject of off-line land surface modelling and the new emphasis on benchmarking of land surface models, the need to consolidate the atmospheric coupling studies without the artificial category of local and global feedbacks and the advances in the use of satellite products in model forecasts.

GEWEX and GLASS support the regional studies of AMMA (African Monsoon Multidisciplinary Analysis) with the newly focused ALMIP – AMMA Land Model Intercomparison Project (see http://www.cnrm.meteo.fr/amma-moana/amma_surf/almip/index.html). This project is a regional study, aiming to improve the way hydrological modelling is conducted using downscaled regional climate model data outputs.

GLASS and GEWEX support benchmarking activities with the possibility of using datasets collated by GEWEX for a universal benchmarking suite. They also support the new GSWP3 (or CHEESE) activity which is a new global off-line model intercomparison project (http://www.gewex.org/ssg-22/GLASS_report_SSG_2010.pdf).

WATCH

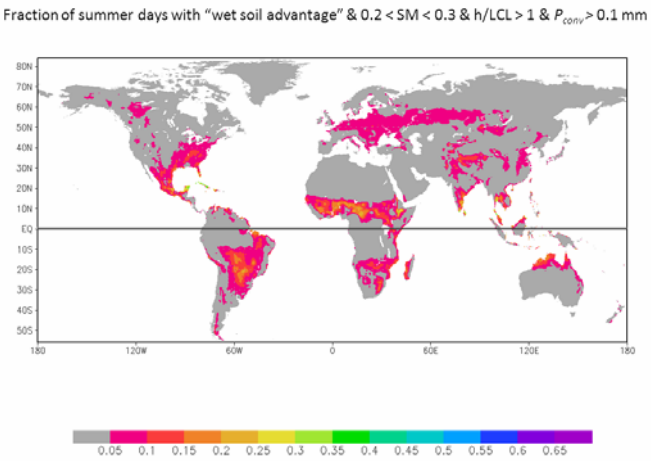
A substantial EU FP7 project called WATCH (Water and Climate Change) has been running since 2007. The project consisted of six workblocks, one of which was 'Feedbacks'. Eleanor Blyth is the leader of this workblock. Its main purpose was to identify where in the world the weather is affected by what is happening on the land. Over large land masses, where the soil is on the verge of being either wet or dry, and where the atmosphere is unstable and moist so that rainfall events can be easily triggered, the land conditions can play a part in affecting the weather.

Classically, weather-prediction models have been used to make these assessments. The overview assessment was made by Koster *et al*. (2004, Regions of strong coupling between soil moisture and precipitation. *Science* 305, 1138–1140) with an iconic map describing the feedback hotspots now cited in many studies looking at feedbacks.

However, this only analysed the Northern Hemisphere summer and was a model-only product. Under the WATCH project, a new analysis based on observations of atmospheric stability has been made.

The figure here shows the fraction of days in the summer when the observed atmospheric profiles (based on soundings) are ready for convective rainfall to be triggered by an increase in surface soil moisture. The definition of 'summer' in this plot is relative to the hemisphere you are in, so Australia and South America show up as feedback hotspots. For the Northern Hemisphere, the patterns match up reasonably well with the modelled hotspots, with a strong hotspot showing up in the Sahel.

Using these new profiles, we have built a new feedbacks



framework (see http://www.eu-watch.org/publications/technical-reports/2) which will be used to apply the feedbacks corrections to water resource models.

WATCH products

Several new products were delivered during the WATCH project that are relevant to the wider hydrological community: a global dataset of daily actual evaporation (0.25 degree spatial resolution) for 30 years (see http://www.hydrol-earth-syst-sci.net/15/453/2011/hess-15-453-2011.pdf); an analysis of the global daily potential evaporation for the last 100 years (see http://journals.ametsoc.org/doi/pdf/10.1175/2011JHM1369.1) on a spatial resolution of 0.5 degrees; and an analysis of the multi-model results comparing large-scale hydrological models and land surface models in their assessment of the global water balance (see http://journals.ametsoc.org/doi/pdf/10.1175/2011JHM1324.1).

Assessment of feedback strengths in the Indian sub-continent and impact of irrigation

Another regional hotspot in both the models and the atmospheric analysis is the Indian sub-continent. This region has been studied using observed radio-sonde profiles of the atmosphere before and after monsoon events over the irrigated areas (see http://journals.ametsoc.org/doi/pdf/10.1175/2010JCLI3779.1). The analysis shows that the large irrigated area of the Indus valley probably brings forward the timing of the onset of the monsoon by a week or so. The atmospheric structure is ready for rainfall as the monsoon arrives and the increased available moisture at the surface is a source of water for the clouds.

A suite of regional climate model simulations were made over this region with and without the irrigated land, and they showed that the biggest effect was on the air temperature, rather than the rainfall. The reduction of the air temperature over the wet regions suppresses the evaporation and plays a significant role in the region's water balance (see http://journals.ametsoc.org/doi/pdf/10.1175/2011JHM1327.1).

Summary of the impact of land-use and land cover change in river flows through feedbacks with the atmosphere and direct impact on runoff generation

A group of scientists collated their modelled land-use change experiments in an attempt to understand the overall climate-

impact of the wide-scale deforestation that has occurred over the last century (see http://www.ess.wur.nl/NR/rdonlyres/1D07EABF-2053-4B96-B266-21A4EC9E215E/88751/Uncertaintiesinclimateresponsestopastlandcoverchan.pdf). The idea was to quantify whether our current regional weather experience has been influenced by the way mankind has altered the landscape. In general, the models were in some agreement about the changes in air temperature – removing the forests and replacing them with shorter vegetation, crops and pasture has cooled the summer air by about 1°C in the last 100 years in the two key regions of largest land-use change: the middle of the USA and West Russia. This result is supported by the study of fluxnet data by Teuling *et al.* http://www.nature.com/ngeo/journal/v3/n10/full/ngeo950.html). The models were not consistent in their results of the changes to the other variables that were studied: namely evaporation and rainfall. The changes were small and some of the models went up and some down.

The difference between the models was partly a result of the lack of consistency in how the land-use change was applied, and further model experiments are being carried out to try and find a consistent experimental protocol to test the theories. The other explanation why the models vary in their results is that there are conflicting reasons for the evaporation and rainfall to vary: swapping forests for crops and grass alters the water availability, the energy absorbed and the efficiency of the surface heat and moisture exchanges simultaneously and they have competing influences on the water flux into the atmosphere. Different models treat these processes in slightly different ways, which is why it is considered safer to use an ensemble of models to make these predictions.

The strength of the signal was strong enough to indicate that the process is one that ought to be considered when looking at the signals for climate change in ground-level weather systems, and that any predictions of future climate change should include the impact of land-use and land cover change.

In addition to the changes that land cover has on the weather systems (explored with GCM models), it is possible to see how land cover impacts the proportion of rainfall that enters our streams. According to the study in WATCH, change in land use has reduced the evaporation by 3% and increased river flow by 5%, while the effect of irrigation was the other way round although smaller: an increase in evaporation by 2% and a reduction of river discharge by 0.5% (see Rost *et al.*, 2008, Agricultural green and blue water consumption and its influence on the global water system, *Water Resour. Res.*, 44, W09405, doi:10.1029/2007WR006331). It was found that this impact was greater in magnitude in the mid-latitude regions than the impact on river flows due to changes in temperature and atmospheric CO_2 (which allows the plants to transpire less due to the carbon-enriched air). However, in northern latitudes the opposite was true: there is more impact due to the carbon-enriched air and the changes in temperature (see http://www.eu-watch.org/publications/technical-reports/4).

The impact of land-use change on water resources is reported in WATCH (see http://www.eu-watch.org/publications/technical-reports/4) and compared to the impact of changing CO_2 levels enriching the air plant carbon uptake, thereby increasing the water-use efficiency and making more water available.

Benchmarking

New work on delivering large-scale datasets to help benchmark the performance of the large-scale land surface models used in Climate Prediction and Climate Impacts assessments has been undertaken in 2010. A paper that uniquely combines large-scale data sets on the water balance as well as the carbon balance was published (see http://www.geosci-model-dev.net/4/255/2011/gmd-4-255-2011.pdf) and the theme has been taken up by the international community to deliver an international standard on such tests (see http://www.ilamb.org/). Eleanor Blyth is the co-chair of the group co-ordinating datasets for the hydrological cycle. New data sets from GEWEX are likely to be used (http://landflux.org/) in addition to river flows from GRDC and evaporation fluxes from Fluxnet (see http://www.fluxnet.ornl.gov/fluxnet/index.cfm).

Regional studies

Regional studies looking at feedbacks are ongoing in India, Europe and West Africa. New research highlights the importance of feedbacks between the land and the atmosphere in the duration of drought in Europe (see http://www.nature.com/ngeo/journal/v3/n10/full/ngeo950.html), in the importance of the soil moisture feedback on the atmospheric structure on rainfall-initiation in West Africa (see http://nora.nerc.ac.uk/12541/1/N012541JA.pdf) and the importance of the presence of large irrigated areas in India on the atmospheric forcing in that region (see again: http://journals.ametsoc.org/doi/pdf/10.1175/2010JCLI3779.1).

Conclusions

There have been a large number of activities in the last few years on Hydrometeorology, and many of these are feeding directly and indirectly into the field of hydrology. The role of carbon dioxide on drought duration is a key subject (see e.g. http://journals.ametsoc.org/doi/pdf/10.1175/2011JHM1386.1) that potentially needs more attention; and the link between atmospheric feedbacks and land surface drying requires more study (see Cai *et al.*, 2009. Rising temperature depletes soil moisture and exacerbates severe drought conditions across southeast Australia. *Geophys. Res. Lett.* 36, L21709; doi:10.1029/2009GL040334). Many of the activities are essential to meteorology and so have been adopted and supported by GEWEX, but support from IAHS would be beneficial in feeding the ideas to the hydrology research.

Related web sites: WATCH, GEWEX/GLASS

Congratulations

Congratulations to Günter Blöschl who has just been elected (the ballot closed on 1 December), as next President of the European Geosciences Union.

Günter is also an active member of IAHS, currently president of the Water Resources Systems commission, and a former chair of the PUB initiative.

International Commission on Statistical Hydrology, ICSH

continued from page 1.

Starting from these premises, during the XXIV IUGG General Assembly, in 2007, a Working Group (named STAHy – Statistics in Hydrology) was proposed and approved by the IAHS Bureau. This working group operated in collaboration with the Water Resources Systems Commission (ICWRS) trying to collect people interested on this topic and creating a virtual common space to coordinate, optimize and concentrate information. The aim was to offer a focal point for statisticians who would like to understand the hydrological applications, for hydrologists who need to use a statistical tool and would like to easily understand what is the right approach, and for statistical hydrologists to easily be updated on recent developments on their research field.

The STAHy family fast became a rich group of young scientists who enthusiastically collaborated in developing several initiatives and the STAHy portal (www.stahy.org). The STAHy member list includes more than 100 people from 35 countries, and in the last year the portal counted more that 10 000 visits from 120 countries. There are three main initiatives promoted by the STAHy-WG:

– the monthly reference collection on specific topics;
– topical conferences; and
– topical short courses.

A significant effort was devoted to reporting on the website all the organized initiatives and collecting much information, pictures and presentations.

During the XXV IUGG General Assembly in Melbourne, the STAHy-WG was transformed into the International Commission on Statistical Hydrology (ICSH-IAHS) so that it is permanent and may continue to make its contribution to the scientific community. This memorable event gave more enthusiasm to the group. For the new ICSH officers (Sander Vandenberghe, Uwe Haberlandt, Emna Gargouri, Ebru Eris, and Simon-Michael Papalexiou) and myself it is an honour and privilege to have the opportunity to launch and make this Commission a prestigious focal point for the scientific community.

Salvatore Grimaldi, President ICSH

3rd STAHY International Workshop on

Statistical Methods for Hydrology and Water Resources Management

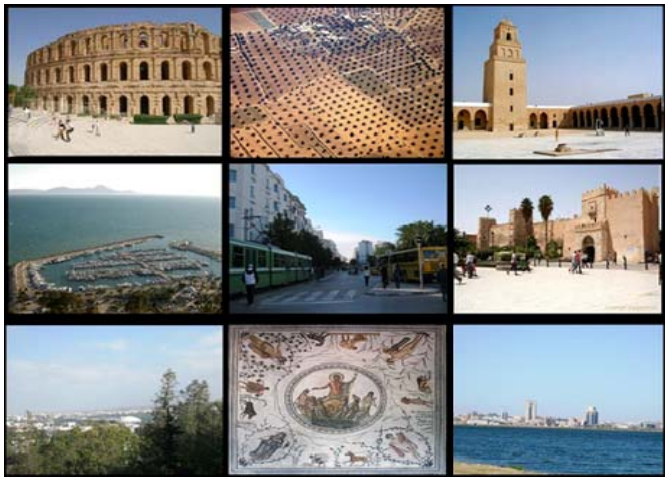
1–2 October 2012 in Tunis, Tunisia

Organized by: International Commission on Statistical Hydrology

Sponsored by: International Commission on Water Resources Systems

Local organizer: Emna Gargouri (ICSH Vice-President), Ecolee National D'Ingenieurs De Tunis, Tunisia

Website: http://www.stahytunis2011.org/ or www.stahy.org



Sponsored by IUGG

International Union of Geodesy and Geophysics
Union Géodésique et Géophysique Internationale

International Commission on Water Quality, ICWQ

HYPE Open Source Community

The HYPE (Hydrological predictions for the Environment) open source community will ease the sharing in a movement of modern hydrological model development, to assess water issues of the future.

HYPE is open to anyone interested in hydrology, hydrological modelling, hydrological data distribution and source code development, e.g. scientists, authorities and consultancies, and welcomes participation.

A Kick-off and International Workshop on HYPE was held on 23 November 2011 in Sweden.

Contact: hype@smhi.se
More information: http://hype.sourceforge.net/
Swedish Meteorological and Hydrological Institute

Intrusive rocks and groundwater flow in weathered rock aquifers

The secondary porosity of aquifers in hard rock regions, resulting from weathering and fracturing, controls the occurrence and movement of groundwater. In peninsular India the hard rocks comprised of granites and granitic gneisses are frequently intruded by dolerite dykes. Dykes acting as barriers to transverse groundwater flow were observed by Nilsen *et al.* (2003). It is important to understand the role of intrusives on groundwater flow and water quality in such regions. Such a study was carried out in a granitic terrain traversed by igneous intrusives in a part of Nalgonda district in Andhra Pradesh, India (Fig. 1), where groundwater is the major source of water for domestic and irrigation purposes.

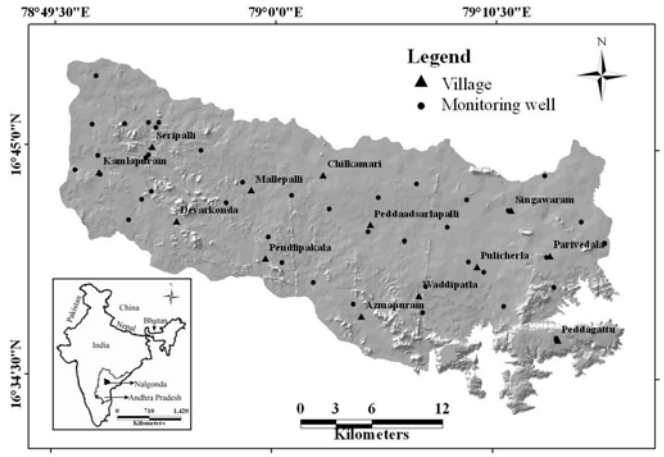


Fig. 1 Location of study area.

This study was carried out by the regular monitoring (every two months) of groundwater level in 46 wells from March 2008 to January 2010. The area is underlain by medium to coarse-grained granite as Basement (Late Archean). These basement granitic rocks are traversed by numerous dolerite dykes and quartz veins. Top soil, moderately weathered, highly weathered and massive rock form four layers at the surface. Top soil thickness ranges from 0.6 to 12 m. The thickness of the moderately weathered and highly weathered zones are 11–25 m and 12–30 m, respectively. Groundwater occurs in unconfined conditions and the groundwater table fluctuates between 0 and 15 m b.g.l. Rainfall is the main source of groundwater recharge. In the monsoon months of July to September, the groundwater level rises by 1–2 m, i.e. if groundwater level varies 3–7 m b.g.l. pre-monsoon, then it is at 2–3 m b.g.l. during the post monsoon. In general, groundwater flows towards the southeastern direction. The depth of dug wells and dug-cum-bore wells in this area varies from 1.5 to 20 m and up to 70 m, respectively.

Fig. 2 Fractures seen in a granitic outcrop.

The impact of lineaments, i.e. linear features in a landscape, that showcases an underlying geological structure in this region occurring due to fractures, faults and dykes, was studied. Fractures seen on the outcrops, excavations and well sections were also studied during the field visits (Fig. 2). The majority of fractures were trending NNE–SSW and N–S. They were steeply dipping with dip angle greater than 80°. Horizontal fractures were also noticed and occur at distances from 30 to 60 cm. In total 217 intrusive dolerite dykes and five faults were identified. The dykes were vertically dipping and were trending ESE–WNW and E–W. The presence of horizontal dykes was also noticed. Generally dykes are considered as impermeable and hence they are likely to function as barriers obstructing groundwater flow. But the temporal groundwater level variation in response to rainfall indicates that there is no major difference between the wells located in low, moderate and high dyke density areas. A comparison of groundwater level in wells located on opposite sides of a dolerite intrusion showed similar trends. Thus the dykes in this area do not act as barriers to groundwater flow. This is because of the presence of major fractures perpendicular to its orientation and also due to the intensity of weathering. Thus, the presence of dolerite dykes could not be directly considered to be a barrier for groundwater flow. Similarly there is no difference in the groundwater quality in locations on either side of the intrusive (Rajesh *et al*., 2011). Thus the presence of intrusive dolerite dykes in this region does not function as groundwater flow barriers due to weathering near the ground surface. Hence, groundwater occurrence is not compartmentalized, especially at shallow depths, as shown in Fig. 3. Thus the occurrence and movement of groundwater flow in this region is predominantly controlled by the intensity of weathering and presence of fractures.

Professor Lakshamanan Elango, Vice-President ICWQ
Dept of Geology, Anna University, Chennai (Madras), India
elango34@hotmail.com

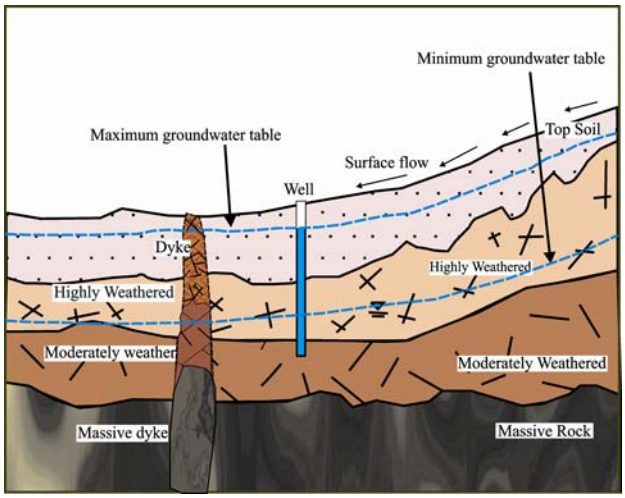


Fig. 3 Conceptual cross section across a dolerite dyke.

References

Nilsen, K.H., Sydnes M., Gudmundsson A. and Larsen, B.T. (2003) How dykes affect groundwater transport in the northern part of the Oslo Graben, EGS - AGU - EUG Joint assembly, Abstracts from the meeting held in Nice, France, 6–11.

Rajesh, R., Brindha, K., Murugan, R. and Elango, L. (2011) Influence of hydrogeochemical processes on temporal changes in groundwater quality in a part of Nalgonda district, Andhra Pradesh, India. *Environmental Earth Sciences* doi: 10.1007/s12665-011-1368-2.

Changes in Flood Risk in Europe

IAHS Special Publication no. 10

Information on the forthcoming book edited by Z. W. Kundzewicz

The project, the editor and the authors

During the realization of the WATCH (WATer and global CHange) Project of the Sixth Framework Programme of the European Union (2006–2009) I managed to encourage Project scientists to join forces in an ambitious task of producing a book on changes in flood risk in Europe. In order to broaden the field and render the book more complete and interesting, I also invited experts from outside the Project, including scientists with whom I have interacted and jointly authored publications in the past. To my surprise, and great pleasure, the support and positive reaction of those approached was overwhelming. This made me aware that the proposed book had potential, that people trust me and expect the volume to be a spectacular success. Indeed, an international dream-team of high-level experts, from Europe and elsewhere, have contributed to this book.

I have dealt with various aspects of floods since the very beginning of my scientific career in 1974. Initially, it was optimal control of a flood protection reservoir and methodological issues related to flood routing. My doctoral and habilitation theses, in the Institute of Geophysics, Polish Academy of Sciences, Warsaw, Poland, were devoted to different aspects of flood routing models, in a more theoretical context. In 1997, during and after the extraordinary flood in Poland, I developed a stronger interest in other aspects of flood science, going far beyond flood routing. I have looked into flood databases, flood management, detection and attribution of changes in flood hazard and flood risk, climate change impacts, flood risk reduction and flood defences in a sustainable development context. And my interest continues. I have published extensively on a number of aspects of flood science.

Structure of the book

The book consists of an introduction and 26 chapters, divided into three parts dealing with: (i) facets of change; (ii) national and regional perspectives; and (iii) detection, attribution, and prospects. The three sections contain, 6, 14, and 6 chapters respectively.

Part I – Facets of Change starts with a chapter setting the stage, discussing flood risk in Europe (Kundzewicz *et al*., 2012). Next comes a catalogue of large floods in Europe in the 20th century (Chorynski *et al*., 2012). The concept of the catalogue was central in the part of the WATCH Project dealing with water extremes and such a deliverable was found necessary in the Project. By definition, a catalogue is sentenced to a short life time, because as time unfolds, there are new events that should be included. However, notwithstanding the need to update the information in future, this pioneering product is much needed now and is expected to raise much interest. The catalogue consists of a set of tables (20 deadliest floods, 20 costliest floods, 20 flood stories with illustrations, and a listing of all floods for which human and economic damage exceeded a fixed threshold). It aims to cover river floods at the pan-European scale, on a temporal scale restricted to post-1900 events, with emphasis on floods in more recent decades. The catalogue is accompanied by complementary material in a separate chapter by Prudhomme *et al.* (2012), reviewing changes in large-scale flooding in Europe, with the help of mathematical modelling. Next, Zolina (2012) examines changes in intense precipitation in Europe, of primary importance to flood hazard and to climate change impacts. Another chapter extending the catalogue deals with the study of changes in floods in Europe, in particular over the last 25 years (Pinskwar *et al*., 2012). Then Brázdil *et al.* (2012) review historical floods in Europe in the past millennium. This is a useful attempt to extend the database beyond the period of instrumental observations, by including older floods.

Part II – National and Regional Perspectives includes an introductory chapter (Kundzewicz, 2012), followed by a suite of 13 national and regional chapters, which deliver a wealth of information on changes of flood risk in 11 European countries and two regions. The country information included in the national chapters of the book, ordered alphabetically, stem from: Czech Republic (Brazdil *et al*., 2012); France (Giuntoli *et al*., 2012) , Germany (Hattermann *et al*., 2012); Greece (Koutsoyiannis *et al*., 2012); Iceland (Snorrason *et al*., 2012); Italy (Salvati *et al*., 2012); the Netherlands (Vrijling, 2012), Norway (Roald, 2012); Poland (Kundzewicz *et al*., 2012); Switzerland (Schmocker-Fackel & Naef, 2012); the UK (Hannaford & Hall, 2012). The geographic distribution of national chapters covers Central Europe (Czech Republic, Germany, Poland), Western Europe (France, the Netherlands, Switzerland, UK), Southern Europe (Greece, Italy) and Northern Europe (Iceland, Norway). Moreover, two European regions are reviewed separately: the multi-national Alpine region (Bard *et al*., 2012) and the Iberian Peninsula (Portugal and Spain; Benito & Machado, 2012).

The focus is always on fluvial (river) floods but there are some specific features of particular national chapters. The Italian chapter compares flood risk with that due to other hazards, e.g. landslides. The Dutch chapter also considers storm surge floods. The Icelandic chapter provides extensive information on jokulhlaups. The Greek chapter embraces a mix of facts about floods and ancient myths and epics. It is interesting to note that zoning, i.e. banning flood-plain occupation, was already present in ancient Greece and mythology, but bad examples of flood plain development exist today.

Several chapters, such as those reviewing floods in the Czech Republic and in Switzerland, extend the coverage by including historic floods.

An example of a national (or regional) chapter is the German chapter (Hattermann *et al*., 2011), which starts from a short, basic description of the topography, climate and hydrography of Germany, then provides information on floods since the 1950s, and on data and methodology. The flood-relevant processes are discussed with a holistic, cradle-to-grave perspective, by considering a logical chain of related processes and variables, interpreting observation records and using results of simulation with mathematical models.

The authors examine and interpret the existence of climate trend in records of several variables related to floods in Germany, such as temperature, atmospheric moisture, both specific (absolute) and relative, and then precipitation. Links between the temperature and precipitation are reviewed, and

changes in intense precipitation are analysed. Maps show the direction and significance of changes for the annual data and also for two seasons – warm and cold. Finally, results of analysis of river flow are provided, in the context of annual maximum values. Time series of material flood damage are also analysed.

This example of a national chapter, dedicated to change of flood risk in Germany, shows that one should be very careful with generalisations. The results of detection and attribution are not uniform, and ubiquitously valid, for all of just one country. In many, but not all, parts of Germany, floods are found to have increased. However, in some areas, a decrease is noted.

It is valuable to make national studies, existing in several countries, accessible to a broader, and international, readership. Hence, the aim of the national and regional part of the book is to enhance dissemination of the wealth of national information, allowing for comparison and synthesis. This is important, because of the often rather limited communication and information exchange. Some national contributions contain unknown, truly pioneering material of broad international interest. Experts in several countries have been carrying out relevant studies and are willing to inform the broader international audience about their results. In order to build an adequate flood preparedness system, it is necessary to examine the tendencies (observed and forecast) in the flood risk and its components, in the area of concern, being aware of the situation in other regions and countries.

Part III – Detection, Attribution and Prospects consists of six chapters, most of which are methodological, but include important applications. Yue *et al.* (2012) introduce the area of change detection in time series, of crucial importance for flood studies. The following three chapters start from application of the concept of change detection, but extend consideration to the very complex area of attribution of changes. Kundzewicz & Cramer (2012) introduce attribution of climate change and climate change impacts. Gerten *et al.* (2012) examine detection and attribution of changes in water resources, while Merz *et al.* (2012) deal with detection and attribution of changes in flood hazard and risk. Next, Kron (2012) of Munich Re presents a re-insurer's viewpoint on changing flood risk. Finally, Prudhomme *et al.* (2012) analyse projections of flood risk in Europe. This is the only chapter dealing with projections for the future. All other chapters refer to floods observed in the past – from remote past to most recent past (as recent as technically possible, even until 2011).

Expectations

The content of the book augurs well. There are excellent authors, who produced highly interesting and innovative material on a topical issue. Despite all the heavy investments into flood defences, inundations remain a serious problem. They continue to destroy and kill. The material flood damages have very clearly increased.

This is a pioneering endeavour. No similar book has been published yet. I am pleased to state that editors of two series of books in well-recognized, commercial, publishing houses enquired whether I would be interested to publish this book in their series. I declined these offers, remaining with IAHS Press, where the idea of this book was anchored from the very beginning.

Z. W. Kundzewicz

Table of contents

1 Introduction. *Kundzewicz, Z. W.*

Part I Facets of Change

2 Flood risk in Europe – setting the stage. *Kundzewicz, Z. W., Plate, E. J., Rodda, J. C., Rodda, H., Schellnhuber, H.-J. & Strupczewski, W. G.*

3 Catalogue of large floods in Europe in the 20th century. *Chorynski, A., Pinskwar, I., Kron, W., Brakenridge, R. & Kundzewicz, Z. W.*

4 Changes in large-scale flooding in Europe. *Prudhomme, Ch., Crooks, S., Parry, S., Hannaford, J. & Kundzewicz, Z. W.*

5 Changes in intense precipitation in Europe. *Zolina, O.*

6 Changing floods in Europe. *Pinskwar, I., Kundzewicz, Z. W., Peduzzi, P., Brakenridge, G. R., Hannaford, J. & Stahl, K.*

7 Historical floods in Europe in the past Millennium. *Brázdil, R., Kundzewicz, Z. W., Benito, G., Demarée, G., Macdonald, N. & Roald, L. A.*

Part II National and Regional Perspectives

8 National and regional perspectives on floods. *Kundzewicz, Z. W.*

9 Floods in the Czech Republic. *Brázdil, R., Řezníčková, L., Havlíček, M. & Elleder, L.*

10 Floods in France *Giuntoli, I., Renard, B. & Lang, M.*

11 Flood risk from a holistic perspective – observed changes in Germany. *Hattermann, F. F., Kundzewicz, Z. W., Shaochun Huang, Vetter, T., Kron, W., Burghoff, O., Merz, B., Bronstert, A., Bardossy, A., Krysanova, V., Gerstengarbe, F.-W., Werner, P. & Hauf, Y.*

12 Floods in Greece. *Koutsoyiannis, D., Mamassis, N., Efstratiadis, A., Zarkadoulas, N. & Markonis, I.*

13 Floods in Iceland. *Snorrason, Á., Einarsson, B., Pagneux, E. P., Harðardóttir, J., Roberts, M. J., Sigurðsson, O., Thórarinsson, Ó., Crochet, Ph., Jóhannesson, T. & Thorsteinsson, Th.*

14 Flood Risk in Italy. *Salvati, P., Bianchi, C., Rossi, M. & Guzzetti, F.*

15 Floods in the Netherlands. *Vrijling, J. K.*

16 Floods in Norway. *Roald, L. A.*

17 Floods in Poland. *Kundzewicz, Z. W., Dobrowolski, A., Lorenc, H., Niedźwiedź, T., Pińskwar, I. & Kowalczak, P.*

18 Floods in Switzerland. *Schmocker-Fackel, P. & Naef, F.*

19 Flood Risk in the UK: Evidence of change and management responses. *Hannaford, J. & Hall, J.*

20 Floods in the Alpine areas of Europe. *Bard, A., Renard, B. & Lang, M.*

21 Floods in the Iberian Peninsula. *Benito, G. & Machado, M. J.*

Part III Detection, Attribution and Prospects

22 Detection of changes. *Sheng Yue, Kundzewicz, Z. W. & Linghui Wang*

23 Attribution of climate change and climate change impacts. *Kundzewicz, Z. W. & Cramer, W.*

24 Detection and attribution of changes in water resources. *Gerten, D., Lucht, W. & Kundzewicz, Z. W.*

25 Detection and attribution of changes in flood hazard and risk. *Merz, B., Kundzewicz, Z. W., Delgado, J., Hundecha, Y. & Kreibich, H.*

26 Changing flood risk – A re-insurer's viewpoint. *Kron, W.*

27 Projections of flood risk in Europe. *Prudhomme, Ch., Williamson, J., Parry, S. & Hannaford, J.*

Fifth International Conference on Flood Management
Floods: from Risk to Opportunity

Under the clear sky in Tokyo, Japan, on 27–29 September 2011, the fifth International Conference on Flood Management (ICFM5) was held and about 450 participants gathered, including about 250 from 40 foreign countries. The umbrella theme of the Conference was *Floods: from Risk to Opportunity* reflecting a belief that the time when a risk becomes known is an indispensable occasion for society to transform its resilience. In order to raise political awareness, the *International Forum on Water-Related Mega Disasters* was also held on the first day inviting politicians and senior officials. It was an honour for the participants that His Imperial Highness Crown Prince of Japan attended to hear the lectures.

Highlighted were the Great East Japan Earthquake and Tsunami, and many recent devastating flood-related disasters in the Philippines, Taiwan, Pakistan, China, Bangladesh, USA and elsewhere. Discussions covered topics such as early warning systems, landslides, channel improvements, climate change, risk management policies, education and many others. The exhibits included satellite remote sensing, advanced flow measurements, etc.

The ICFM is a unique conference, held every three years, which solely focuses on flood-related disaster management, and the participants are largely practitioners from different nations and provinces. It is valuable as field-level practitioners can exchange their own experiences and ideas with research and policy discussions. About 250 papers and posters were presented and post-publication of selected papers in an IAHS Red Book and a special issue of *Journal of Flood Management* are on the way. *Kuni Takeuchi*

The picture was taken during the International Flood Initiative (IFI) session at the Conference (from right, Slobodan Simonovic, ICFM chair; Kuni Takeuchi, LOC chair; Julius Wellens-Mensah, WMO CHy chair; Avinash Tyagi, WMO HWRP director and Arthur Askew, IAHS past president).

Erasmus Mundus Masters Course in Flood Risk Management

The Erasmus Mundus Masters Course on Flood Risk Management is offered by the consortium consisting of UNESCO-IHE (The Netherlands), TU Dresden (Germany), UPC Barcelona (Spain) and the University of Ljubljana (Slovenia). The programme starts in September 2012. During the 2-year programme students follow semester one at TUD, semester two at UNESCO-IHE, semester three at UPC and University of Ljubljana, and semester four (thesis work) at one of the institutes or with an industrial partner. Successful candidates receive MSc degrees from TU Dresden, UNESCO-IHE and UPC Barcelona. The language of instruction is English.

Interested candidates may apply online at http://www.floodriskmaster.org/.
The application deadline is 8 January 2012.

A limited number of **Erasmus Mundus Scholarships** are available on a competitive basis for EU as well as non-EU applicants.

Further information: http://www.floodriskmaster.org/ and email: info@unesco-ihe.org

Ecosystem Services of Wetlands
HSJ Special Issue, *ed. by M. C. Acreman*

Ecosystems all provide services – such as clean air and water, food stuffs and materials – that may be used by humans and contribute to their social and cultural well-being. This Special Issue of *Hydrological Sciences Journal* (*HSJ* 56(8)) comprises 19 papers considering the role of ecosystem services *per se* in wetlands, their asset value, trade-offs in wetland management, and more, as the Contents indicate:

CONTENTS

Ecosystem services of wetlands: pathfinder for a new paradigm *E. Maltby & M. C. Acreman*

Wetlands as natural assets *E. B. Barbier*

Ecosystem services associated with a mosaic of alternative states in a Mediterranean wetland: case study of the Doñana marsh (southwestern Spain) *E. Gómez-Baggethun, P. Alcorlo & C. Montes*

Soil water retention and carbon pools in tropical forested wetlands and marshes of the Gulf of Mexico *A.Campos C., M. E. Hernández, P. Moreno-Casasola, E. Cejudo Espinosa, A. Robledo R. & D. Infante Mata*

Hydrogeology of Wadi Wurayah, United Arab Emirates, and its importance for biodiversity and local communities *C. Tourenq, M. Brook, S. Knuteson, M. Khaled Shuriqi, M. Sawaf & L. Perry*

Relationships between hydrological regime and ecosystem services supply in a Caribbean coastal wetland: a social-ecological approach *S. P. Vilardy, J.A. González, B. Martín-López & C.Montes*

Continued on page 14

Additional reports from Workshops at the IAHS Assembly

These three reports were provided by the convenors of Workshops HW09, HW10 and JHW02 at IUGG2011

Workshop HW09
Revaluing System Knowledge in Water Resources Management

The term Integrated Water Resources Management was originally defined during the Dublin conference in 1992. It emphasized the complexity of WRM, which should integrate over: (1) all the water occurrences and interactions in the hydrological cycle; (2) all the different uses that society has for water and the interactions and feedback with the hydrological cycle; (3) the different temporal and spatial scales of water resources and their use; (4) the full range of objectives (interests) and constraints of water resources utilization; (5) the sustainability of water resources development and use; and (6) the process of implementation and the representation of stakeholders in the decision process. Mostly as a result of the efforts undertaken by the Global Water Partnership, the focus of IWRM shifted towards the process of implementation (item 6), largely due to the fact that in the past stakeholder involvement and participation had not received adequate attention. Also, in the years before Dublin, much attention had been paid to so-called "policy analysis", which included the interactions between the water resources system, the water users system, and the economic system (items 1–5), but did not pay much attention to item 6. As a consequence, in recent years IWRM has been equated with the process, whereby the physical, technical and economic intricacies of changing boundary conditions, human interventions and the feedbacks that these interventions have on the different system elements have often been neglected. The scope and aim of this Workshop was to help restore the balance between scientific system knowledge and processes by addressing the complex interactions between hydrologic, ecologic, economic, social, financial and legal aspects of water resources development, water use and other human activities related to water. Integrated model chains are indispensable to assess the links and feedback mechanisms and project them onto human activities such as energy production, shipping and water abstraction.

All interested people were invited to present and discuss integrated models and investigations about impacts of changing regimes on the hydrologic/hydraulic conditions of water systems. The sensitivities to disturbances or system interventions and the uncertainties related to the predictions of these effects will be a key factor for adaptation measures and a proactive approach to IWRM that is needed in the future.

Attendance at the 1-day Workshop was good and discussions lively.

Nick van de Giesen (The Netherlands)

Workshop HW10
Water Quality and Sediment Predictions in Ungauged Basins (PUB)

During the last decade an up-coming interest by society regarding water status has been noted. As a consequence, water authorities need detailed information to combat pollution in an efficient way. Such information is often lacking and must thus be estimated, using more or less scientific methods. Researchers of IAHS have put much effort during recent years into developing a common scientific knowledge basis and methods for predicting water discharge in ungauged basins through the PUB initiative. The HW10 workshop was initiated to explore whether a similar unified movement could be useful for raising the scientific interactions in water quality and sediment predictions.

At the workshop several case-studies from different parts of the world were presented, e.g. from China, Russia, Europe, South Africa and Australia. Different environmental problems were presented, along with assessments of a variety of substances. Both temporal and spatial analyses of pollution flow were normally considered. Several new methods for collecting *in situ* data were presented, covering a large range of approaches; from new advanced techniques to simple but efficient methods, and different ways of sampling. The case-studies also included a variety of model concepts for the predictions, such as correlations and regressions, lumped models and process-based models.

The overall impression from the workshop was that a lot of work is going on in this field, and that it is now time to go one step further to speed up the scientific communication and interactions between different research groups. It was suggested that streamlining of terminology and identification of major scientific questions may lead to more focused research and development of science. This research could be approached in a variety of applications and assessments of water status problems. It was suggested that an attempt to organise the thinking in a kind of white paper should be made during follow-up meetings and/or video conferences in the coming year. This white paper will be the basis for a follow-up workshop in Gothenburg 2013.

Berit Arheimer, Scott Wilkinson, Michael Rode

Joint Workshop JHW02
Interaction between Freshwater and Ecosystems in the Coastal Zone

Joint workshop JHW02 was organized by both IAHS and the International Association for the Physical Sciences of the Oceans (IAPSO) to discuss the interaction between freshwater hydrological and ecological processes.

In the workshop, new research on interactions between freshwater and ecosystems in the coastal zone was discussed from physical, chemical and biological points of view. Although both surface (river) water and groundwater affect the coastal hydrology and ecology, this workshop focused mainly on the role that coastal (intertidal and submarine) groundwater discharge can play in coastal ecosystems. The associated geochemical and hydrological processes occurring at the land–ocean interface have received an increasing amount of scientific attention in the past decade or so, but to date little research is dedicated to understanding "downstream" ecological effects of this coastal groundwater discharge.

The main subjects discussed in the Workshop were as follows; (1) Physical effects of input of groundwater to the coastal ocean, (2) Coastal Groundwater – a source for near shore nutrients, and (3) Coastal management implications.

Makoto Taniguchi
(Research Institute for Humanity and Nature, Kyoto, Japan)

United Nations Educational, Scientific and Cultural Organization

International Hydrological Programme

IAHS AISH

11th KOVACS COLLOQUIUM, Paris, May/June 2012*

Storage, Flows and Transformations in the Hydrological Cycle – Synthesizing Synergies between FRIEND, HELP and PUB

This colloquium is the continuation of a series of biennial international scientific meetings organized jointly by the International Hydrological Programme (IHP) of UNESCO and the International Association of Hydrological Sciences (IAHS) in the most challenging fields of water resources research. These meetings commemorate the late George Kovacs, an established authority on hydrology, who served as Chairman of the Intergovernmental Council of IHP and as Secretary General and President of IAHS. The Kovacs colloquium jointly organized by UNESCO IHP and IAHS will take place prior to the Intergovernmental Council of IHP in June 2012 and will draw on the successes from three international hydrological initiatives, i.e.:

- IHP-FRIEND (Flow Regimes from International Experimental and Network Data)
- IHP-HELP (Hydrology for Environment, Life and Policy)
- IAHS-PUB (Predictions in Ungauged Basins)

The program addresses storage, flow and transformations in the hydrological cycle by examining how to quantify change, transfer knowledge and understand dependencies with presentations on each of these themes contributed from each of the FRIEND, HELP and PUB initiatives. It will finish with an integration presentation to synthesize the synergies of these research efforts and concepts.

Theme 1 Quantifying changes

FRIEND: How do flow regimes respond to global change (Lena Tallaksen, Norway)
PUB: Hydrological prediction of non-stationary systems. (David Post, Australia)
HELP: Global change thresholds and limits for action at the river basin level (Jianxin Mu, China)

Theme 2 Transferring knowledge

PUB: Using information from data rich catchments to predict in data-poor catchments (Lev Kuchment & Alexander Gelfan, Russia).
FRIEND: Tools for Regionalization in low flows (Gregor Lahaa, Austria)
HELP: Making IWRM work in different socio-economic settings (Shinsuke Ota, Japan)

Theme 3 Understanding dependencies

FRIEND: Understanding climate – river flow interactions and tele-connections (David Hannah, UK)
PUB: Combining inductive and deductive methods and unorthodox observations for hydrological prediction (Pablo Dornes, Argentina)
HELP: HELP dependencies within and out of the river basin (Peter Hyde, Australia)

Integration Presentation – Storage, Flows and Transformations in the Hydrological Cycle – Synthesizing Synergies between FRIEND, HELP and PUB

Posters In addition to the invited presentations, posters along with extended abstracts (two printed pages maximum) on the colloquium themes are also welcome.
Abstracts (English or French) should reach the Colloquium Secretariat (g.gobina@unesco.org) by 20 February 2012 at the latest!

The Colloquium will be held at the premises of UNESCO in Paris.

As previously, attendance at the Kovacs Colloquium will be free of charge, but participants will be required to register for it with UNESCO beforehand.

*Exact date will confirmed as soon as possible by email to IAHS members and at www.iahs.info

HydroPredict'2012

http://web.natur.cuni.cz/hydropredict2012/

3rd International Interdisciplinary conference on

Predictions for Hydrology, Ecology and Water Resources Management: Water Resources and Changing Global Environment

24–27 September 2012, Vienna, Austria

The deadline for abstract submission is 1 February 2012

SCOPE AND OBJECTIVES

Water resources systems, being the main link between the people and the climate, are affected by human activities (such as land-use change) and climate change. Thus, any assumption related to stationarity of the water resources system characteristics is highly questionable, may not be valid any more. Direct human interactions with the water cycle are occurring at the small catchment scale, while the climate change impacts dominate at the large catchment scale. However, there are examples of the opposite – impacts in large basins such as the Aral Sea, the Tchad, and the Nile are caused by water management practices, while the hydrology of small high Alpine catchments with major contributions from glacier runoff is predominantly affected by climate change, with limited human impacts.

There is a clear need for better understanding of the complex interactions between water resources and global environment. This conference will focus on **complexity and uncertainty** as two main characteristics of global change. New tools for solving water resources problems will need to be developed, or existing tools will need to be adapted to respond to the challenges of global change.

Complex dynamic water resources systems, bridging the span from ecosystems to climate, can have tipping points at which a sudden shift to a contrasting dynamic regime may occur. Although predicting such critical points before they are reached is extremely difficult, work in different scientific fields is now suggesting the existence of generic early-warning signals that may indicate for a wide class of water resources systems if a critical threshold is approaching. This conference has **prediction** as one of the main themes.

The objectives of HydroPredict2012 are: (i) to present tools and methods which assist in assessing and discriminating between human- and climate change-induced impacts on water resources systems; (ii) to discuss the predictive capability of simulation models used for water resources issues, including the model output uncertainty; (iii) to present tools and methods for adaptation to changing global conditions; (iv) to address water management policy to reduce vulnerability and to increase the resilience of water resources systems; and (v) to analyse the role of water resources within the complex social-economic-climatic system.

The conference will bring together professionals, scientists and members of governmental institutions dealing with water resources management. Representatives of natural, social and engineering sciences will meet to exchange experiences and present the current views on **the adaptation and mitigation of adverse effects of global change on water resources systems**.

CONFERENCE THEMES

Theme A1: How can we identify and quantify water-related changes due to direct human interventions?
Theme A2: How can we identify and quantify water-related changes due to climate change?
Theme B: How can we quantify/prognose/predict the effect/consequences of water-related changes in terms of economic, social and environmental impacts, including impact on water resources?
Theme C: What are the appropriate adaptation and mitigation strategies to reduce vulnerability and to increase the resilience of our water resources systems?
Theme M: Methodology, modelling, prediction and uncertainty

For TOPICS within each of these themes, please see diagram opposite and refer to the conference website.

Special Session S1: Risks of water supply systems originating from climate change and land-use changes
Special Session S2: Ensemble predictions in a decision-making context

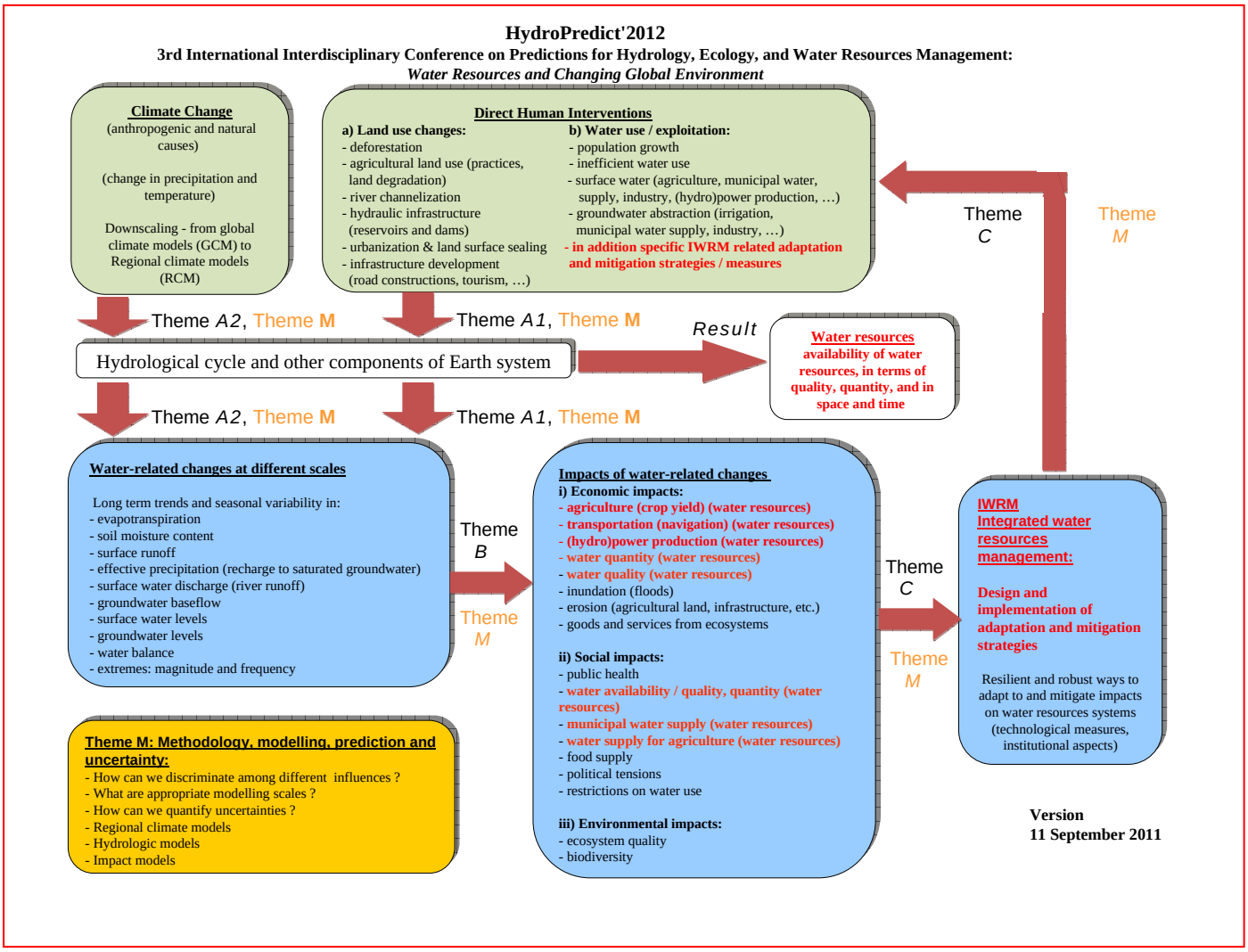
VENUE University of Natural Resources and Life Sciences (Universität für Bodenkultur Wien (BOKU)), Muthgasse 18, Vienna, Austria.

SCIENTIFIC ADVISORY COMMITTEE András Bárdossy (*Germany*), Luis Araguas (*Austria*), Berit Arheimer (*Sweden*), Okke Batelaan (*Belgium*), Janos Bogardi (*Germany*), Fi-John Chang (*Taiwan*), Christophe Cudennec (*France*), P.S. Datta (*India*), Victor A. Dukhovny (*Uzbekistan*), Jacques Ganoulis (*Greece*), Salvatore Grimaldi (*Italy*), Pierre Hubert (*France*), Zbigniew Kundzewicz (*Poland*), Esko Kuusisto (*Finland*), Deborah Lawrence (*Norway*), Henrik Madsen (*Denmark*), Hans-Peter Nachtnebel (*Austria*), Jens Christian Refsgaard (*Denmark*), Liliang Ren (*China*), Huub Savenije (*The Netherlands*), Andreas Schumann (*Germany*), Jan Seibert (*Switzerland*), Uri Shamir (*Israel*), Slobodan Simonovic (*Canada*), A.M. Subyani (*Saudi Arabia*), Edward A. Sudicky (*Canada*), Kaoru Takara (*Japan*), Albert Tuinhof (*The Netherlands*), Brian Wagner (*USA*), Chunmiao Zheng (*USA*).

FOR MORE INFORMATION PLEASE CONTACT

- *Hans-Peter Nachtnebel,* (IWHW-BOKU), Vienna, Austria, hans_peter.nachtnebel@boku.ac.at
- *Karel Kovar,* PBL Netherlands Environmental Assessment Agency, Bilthoven, The Netherlands, karel.kovar@pbl.nl

Further information at
http://web.natur.cuni.cz/hydropredict2012/



Ecosystem Services of Wetlands – HSJ Special Issue

continued from page 10.

To connect or not to connect? Floods, fisheries and livelihoods in the Lower Rufiji floodplain lakes, Tanzania *O. Hamerlynck, S. Duvail, L. Vandepitte, K. Kindinda, D.W. Nyingi, J.-L. Paul, P. Z. Yanda, A. B. Mwakalinga, Y. D. Mgaya & J. Snoeks*

A study of wetland hydrology and ecosystem service provision: GaMampa wetland, South Africa *M. McCartney, S. Morardet, L.-M. Rebelo, C. M. Finlayson & M. Masiyandima*

Ecosystem services delivered by small-scale wetlands *M. S. A. Blackwell & E. S. Pilgrim*

A simple method for assessing the vulnerability of wetland ecosystem services *C. J. Stratford, M. C. Acreman & H. G. Rees*

Broad-scale ecosystem services of European wetlands—overview of the current situation and future perspectives under different climate and water management scenarios *T. Okruszko, H. Duel, M. C. Acreman, M. Grygoruk, M. Flörke & C. Schneider*

Modelling water-level options for ecosystem services and assessment of climate change: Loktak Lake, northeast India *C. R. Singh, J. R. Thompson, D. G. Kingston & J. R. French*

Trade-off in ecosystem services of the Somerset Levels and Moors wetlands *M. C. Acreman, R. J. Harding, C. Lloyd, N. P. McNamara, J. O. Mountford, D. J. Mould, B. V. Purse, M. S. Heard, C. J. Stratford & S. J. Dury*

Synergies and trade-offs in the management of lowland rural floodplains: an ecosystem services approach *J. R. Rouquette, H. Posthumus, J. Morris, T. M. Hess, Q. L. Dawson & D. J. G. Gowing*

Ecosystem service trade-offs in wetland management: drainage and rehabilitation of the Hula, Israel *E. Cohen-Shacham, T. Dayan, E. Feitelson & R. S. de Groot*

Assessing wetland ecosystem services and poverty interlinkages: a general framework and case study *R. Kumar, P. Horwitz, G. R. Milton, S. S. Sellamuttu, S. T. Buckton, N. C. Davidson, A. K. Pattnaik, M. Zavagli & C. Baker*

Valuing ecosystem services of wetlands—a tool for effective policy formulation and poverty alleviation *M. Verma & D. Negandhi*

Managing wetlands: integrating natural and human processes according to law *C. A. Sullivan & D. E. Fisher*

Ecosystem services of inland wetlands from the perspective of the EU Water Framework Directive implementation in Spain *A. de la Hera, J. María Fornés & M. Bernués*

Hydrological Sciences Journal is available at the Taylor & Francis Online platform: www.tandfonline.com/loi/thsj or click on the link at the IAHS website.

The editorials, abstracts and certain free-to-view/open access papers are available to all. Library and individual subscribers can access the full papers.
The backfile, volumes 1–54, is available open access.

Free online access to the journal is available for IAHS members in the poorest countries. Eligible members should go to the Membership Area at the IAHS website, enter their personal userid and password, then click on HSJLink.

Personal subscription prices for 2012 for all other IAHS members are the same as in 2010 and 2011:
£27 for an online-only subscription, and
£48 for a print + online subscription
(£32.40 and £53.40, respectively, for members in the EU, inclusive of VAT.)

Please order from Jill Gash: *jilly@iahs.demon.co.uk* at IAHS Press

Calendar of Meetings Organized/Sponsored by IAHS, its Commissions, and IUGG

2012	Conference	Contact details
London, UK 26–29 March	Planet under Pressure: New knowledge towards solution	http://www.igpb.net
Nanjing, China 10–12 May	International Strategic Workshop on Future IAHS Science Initiative	Prof Liliang Ren, IAHS Vice-President Hohai University, No.1 Xikang Road, Nanjing 210098, China njrll9999@126.com
Prague, Czech Republic 21–24 May	GFR2012 International Conference on Groundwater in Fractured Rocks Jointly convened by IAH Czech National Chapter, IAH Commission on Hydrogeology of Hard Rocks, and International Commission on Groundwater (ICGW) of IAHS	Dr Zbynek Hrkal, Charles University, Prague, and T.G. Masaryk Water Research Institute (VÚV), Prague, Czech Republic. Also Secretary of Czech National Chapter of IAH; tel: +420 220 197 463; zbynek_hrkal@vuv.cz Karel Kovar, VP IAHS/ICGW: karel.kovar@pbl.nl http://web.natur.cuni.cz/gwfr2012/
Ohrid, Macedonia 28 May–2 June	BALWOIS 2012 Conference on Water, Climate and Environment	http://www.balwois.com/2012
Paris, France May/June Date to be confirmed as soon as possible	Storage, Flows and Transformations in the Hydrological Cycle – Synthesizing Synergies between FRIEND, HELP and PUB Kovacs Colloquium at UNESCO, Paris	Christophe Cudennec, cudennec@agrocampus-ouest.fr; g.gobina@undesco.org
Banff, Canada 11–15 June	IAHS-ICCE International Conference. Wildfire and Water Quality : Process, Impacts and Challenges	Michael Stone mstone@uwaterloo.ca
Edinburgh, UK 18–22 June	IUGG Conference on Mathematical Geophysics	http://www.cmgedinburgh2012.org.uk
Hamburg, Germany 14–18 July	10th International Conference on Hydroinformatics HIC2	loebkens@tutech.de
Oulu, Finland 13–15 August	NORDIC WATER 2012, XXXVII Nordic Hydrological Conference, Catchment Restoration and Water Protection	Prof. Bjørn Kløve, University of Oulu bjorn.klove@oulu.fi
Niagara Falls, Canada 16–23 September	IAH Congress. Confronting Global Change	conference@iah2012.org
Vienna, Austria 24–27 September	HydroPredict2012, International Interdisciplinary Conference on Predictions for Hydrology, Ecology and Water Resources Management	Universität für Bodenkultur Wien (BOKU) University of Natural Resources and Applied Life Sciences Institute of Water Management, Hydrology and Hydraulic Engineering, Vienna, Austria Prof. Hans-Peter Nachtnebel or Mr Karel Kovar hans_peter.nachtnebel@boku.ac.at or karel.kovar@pbl.nl
Tunis, Tunisia October	Statistical Methods for Hydrological Application, 3rd official STAHy workshop (postponed from October 2011)	
Chengdu, China 11–15 October	International Symposium of IAHS-ICCE	Prof. Xiubin He, Prof. Xinbao Zhang, Dr Yuhai Bao http://iahs.info/conferences/2012_Chendu_ICCE.pdf
Baghdad, Iraq 17–18 October	First International Conference on Water Resources Engineering Technology in Iraq and its Obligation for Technical Potential to Satisfy the Future Demand	Prof. Dr Aqeel Al-Adili, University of Technology, Baghdad, Iraq tel: 009647901766126 aqeeladili@yahoo.com
Delft, Netherlands 22–26 October	Completion of the IAHS Decade on Prediction in Ungauged Basins, and the Way Ahead. IAHS 90th Anniversary meeting	Hubert Savenijie, h.h.g.savenije@tudelft.nl
Orange, CA, USA 15–18 December	First IUGG GRC Conference on Extreme Natural Hazard and their Impacts	Chair of the LOC: D. Ramesh P. Singh, School of Earth and Environmental Sciences, Schmid College of Science and Technology Chapman University, Orange, CA 92866, USA tel: +1 714-289-2057; fax: +1 714-516-4542 rsingh@chapman.edu

2013	Conference	
Koblenz, Germany June	International Conference on Water and Environmental Research	Johannes Cullmann; cullmann@bafg.de
Göteborg, Sweden 22–26 July	Joint IAHS-IAPSO-IASPEI Scientific Assembly	
Alice Springs, Australia September	IAH Congress	

2014	Conference
Hanoi, Vietnam February/March	FRIEND Conference

2015	Conference
Prague, Czech Republic 22 June–2 July	XXVIth IUGG General Assembly, including the IAHS Assembly

International Association of Hydrological Sciences
Association Internationale des Sciences Hydrologiques

Contacting IAHS and the Commissions

Information about all aspects of IAHS is available from the IAHS web site: ***www.iahs.info*** or:

Prof. Christophe Cudennec, at cudennec@agrocampus-ouest.fr or
IAHS, UMR SAS, Agrocampus Ouest,
CS 84215, F-35042 Rennes Cedex, France

Registration is free, please register online at the web site or contact:

Mrs Jill Gash, Membership Secretary,
IAHS Press, Centre for Ecology and Hydrology, Wallingford,
Oxfordshire OX10 8BB, UK
jilly@iahs.demon.co.uk

For information about the Commissions and other groups visit their web sites via www.IAHS.info or contact:

ICCE, Continental Erosion
President: Valentin Golosov, gollossov@rambler.ru
Secretary: Paolo Porto, paolo.porto@unirc.it

ICRS, Remote Sensing
President: Ian Cluckie, i.d.cluckie@swansea.ac.uk
Secretary: Yangbo Chen, eescyb@mail.sysu.edu.cn

ICSIH, Snow and Ice Hydrology
President: John Pomeroy, john.pomeroy@usask.ca
Secretary: Regine Hock,
regine.hock@gi.alaska.edu

ICSH, Statistical Hydrology
President: S. Grimaldi, salvatore.grimaldi@unitus.it
Secretary: S. Vandenberghe
sander.vandenberghe@ugent.be

PUB, Predictions in Ungauged Basins
Chair: Hubert Savenije, h.h.g.savenije@tudelft.nl

ICCLAS, Coupled Land–Atmosphere Systems
President: Stewart Franks,
stewart.franks@newcastle.edu.au
Secretary: Dawen Yang,
yangdw@mail.tsinghua.edu.cn

ICWQ, Water Quality
President: Valentina Krysanova, valen@pik-potsdam.de
Secretary: Wouter Buytaert, wouter@paramo.be

ICT, Tracers
President: Piotr Maloszewski,
maloszewski@helmholtz-muenchen.de
Secretary: Przemyslaw Wachniew
wachniew@novell.ftj.agh.edu.pl

Education Working Group
Chair: Thorsten Wagener, thorsten@engr.psu.edu

ICGW, Groundwater
President: Chunmiao Zheng, czheng@ua.edu
Secretary: Gunnar Nützmann,
nuetzmann@igb-berlin.de

ICSW, Surface Water
President: Eric Servat, eric.servat@univ-montp2.fr
Secretary: Yan Huang, y.huang.ctw@gmail.com

ICWRS, Water Resources Systems
President: Günter Blöschl,
bloeschl@hydro.tuwein.ac.at
Secretary: Nick van de Giesen,
n.c.vandegiesen@tudelft.nl

Precipitation Working Group
Chair: Daniel Schertzer,
daniel.schertzer@cereve.enpc.fr

Distribution of IAHS Publications to "Countries in Need" is funded by the IAHS Task Force for Developing Countries (TFDC). *Hydrological Sciences Journal* and other IAHS publications are currently distributed free to 48 organizations worldwide, to help scientists there to acquire pioneering results of hydrological sciences and their application. All correspondence concerning the distribution of IAHS publications to "countries in need" should be sent to:

Denis Hughes
d.hughes@ru.ac.za
Institute for Water Research, Rhodes University, Grahamstown 6140, South Africa
Tel: +27 (0) 46 6224014 Fax: +27 (0) 46 6229427

IAHS National Representatives and Correspondents Contact details for all National Representatives and Correspondents are available at *www.iahs.info*