International Geographical Union Study Group 7

Water Sustainability
(formerly Environmental change and extreme hydrological events)

Newsletter No. 1
December 2000

Contents:

Website: http://www.mfn.unipmn.it/~cassardo/igu/igu_main.html

1. New title for the Group

At the International Geographical Congress in Seoul in August, the IGU General Assembly voted to change the title of our Study Group to "Water Sustainability". This was the title of our proposed Commission. However, as those of you who were present at the Study Group sessions in Seoul will know, an executive decision was taken at the outset of that meeting that no new commissions would be created during this period of rapid transition. The group will have a new 4-year term beginning this year, but there is a strong possibility that another General Assembly will be convened at Durban in 2002 to reconsider the position of commissions and study groups.

2. Revised aims and objectives

The new Group aims to interpret "sustainability" in the widest possible sense, including the sustainability of the environment in the face of water development work as well as the sustainability of water resources.

2.1 The official aims of the Study group
The Study Group aims to foster closer links between the human and physical aspects of water management, with specific concern for the sustainability of water resources and for the impacts of water management on the environment.

2.2 Specific Objectives

The Study Group intends to focus on developing research is the following areas:

1) Study of adaptation and measures to enable sustainability

This will range from 'primitive' methods, such as water harvesting, to modern 'advanced' techniques, including 'real time' monitoring, modelling and warning systems, and relate these to the local livelihood/life-style to ensure sustainability. The former Study Group is in the process of editing a Special Issue of the Kluwer journal *Mitigation and Adaptation Strategies for Global Change*, based on papers delivered at its last three conferences, which is likely to be published in 2001. This work will continue under the Commission.

2) Water sustainability for the environment

Study of the two-way relationship between water and the environment, covering issues of integrated catchment planning, wetlands restoration, groundwater abstraction, river channel engineering and the impact of dams large and small. Links with engineers and ecologists will be important here. Recent experiments with recreating floods on 'over-engineered' reservoir catchments, for example, on the Colorado, and recreation of wetlands on the upper Missouri and the Lower Rhine are just two interesting aspects of the increasing awareness of a need return river systems to a more natural state. A big question is how far back the retro-(bio)engineering should go.

3) Hydrologic modelling for planning and impact studies of water sustainability in a changing environment

Particular emphasis will be placed on separating the effects of atmospheric change and land surface change, both of which may contain elements of natural and anthropogenic causes. Most predictions for the effects of global warming in the century ahead suggest that extreme events will become more common. Landuse changes associated with climate change may intensify these effects, e.g. desertification. Other landuse changes driven by social, political and economic forces have a similar capacity for altering riverflow and groundwater regimes.

This will continue many of the themes formerly addressed in the IGU Study Group on Environmental Change and Extreme Hydrological Events. Both floods and droughts raise important issues for sustainability. A number of members of the current Study Group, especially the teams led by Heinz-Theo Mengelkamp (Geesthacht), Axel Bronstert (Potsdam) and H K Barth (Paderborn), have contributed valuable innovations to modelling in this field. The Vice-chair is Principal Investigator in the largest GEWEX experiment in Canada, and other members are involved in parallel experiments in their own countries.

An important inter-Commission link here will be with the proposed new IGU Commission on Hazards under Richard Dickau. Dr Dickau has already expressed an interest in holding joint meetings.

4) Quantifying water sustainability

Interest has also been expressed in collaborating to try to develop a quantitative method of defining sustainability in the context of water resources. Professor Xia Jun has just published a paper in an IAHS red book entitled 'Eco-environmental quality assessment: a quantifying method and case study' and is keen to develop a similar

approach to this question. There is no doubt that this would be a useful aid to assessing the success of sustainability schemes. There are also many difficulties that will need to be overcome. Some of the issues are discussed in the Appendix. This could well form a useful theme for a Task Force.

5) A world inventory of water resources for sustainability

The chairman has been commissioned by Hodder, the publishers of the UNEP *Atlas of Desertification*, to produce an *Atlas of World Water Resources.* Initial funding has been obtained from ICSU/IGU, but the Study Group is still seeking the larger financial support that will be required for this project. It is intended that the Atlas covers far more than previous atlases, which have been confined to global and regional resources and fluxes, and should include a wide range of human issues, including demand and health, and 'novel' issues like water trading and hydropolitics. It is intended to take a more rounded 'geographical' viewpoint, and a number of other IGU Study Groups and Commissions have expressed interest in collaborating.

3. Proceedings of the Group meeting at the International Geographical Congress, Seoul, August 2000

Despite the high cost of attending the IGC in Korea, a sizeable number of faithful members attended the two days of paper sessions and the one day fieldtrip, and some sessions topped 45 participants. We are indebted to our Korean colleagues for organising a very successful meeting, especially Professor Jong-Kwan Park and his colleague Professor Moowoong Choi. The fieldtrip was a most memorable event. This was the last conference organised under the heading of 'Environmental Change and Extreme Events' and effectively the first under the new title.

Abstracts of the papers were pre-published by IGU in the Conference Proceedings. These are ***now available on the Study Group website***, which can be accessed directly on:

http://www.mfn.unipmn.it/~cassardo/igu/igu_main.html

At the work session, members ratified the Agenda (outlined in section 2 above) and welcomed the planned meeting in Zaragoza in July 2001 (see next section). It was decided to hold the 2002 meeting as part of the IGU Regional Conference in Durban, South Africa. Plans for this conference include holding joint sessions with the IGU Commissions on Land Degradation and Geomorphology devoted to the sound integration of management of catchment landuse and hydrology. An invitation from Dr Trahel Vardanian to meet in Yerevan, Armenia, in 2003 was also enthusiastically accepted.

4. Group conference in Zaragoza 2001

First Announcement

ENVIRONMENTAL CHANGE AND WATER SUSTAINABILITY

2 - 6 July 2001
IGU Study Group on Water Sustainability
Venue: Instituto Pirenaico de Ecologia, Zaragoza, Spain

The International Geographical Union Study Group on Water Sustainability (formerly Environmental Change and Extreme Hydrological Events) is holding this 5-day conference in Zaragoza, Spain.

The Conference is calling for papers focusing on the following major themes:

- Water management and sustainability
- The impact of reservoirs on water sustainability
- The effects of land-use changes on floods and low flows
- Sediment transport and water sustainability

The Conference is particularly concerned with changes in water quality and quantity, and hydrological régime in relation to environmental and human-induced changes, such as climate change, land-use changes, and increasing population and water demand. Water is a strategic resource and the future health, livelihood and development of many people and countries in the world will depend on the way we manage both water and the environment. Water quality and quantity are very sensitive to changes in plant cover, farming systems and patterns of industrialisation. Thus the main question is: How can we manage both the environment and water resources in order to ensure human development and sustainability?

FIELDTRIP: There will be a two-day to the Spanish Pyrenees. The fieldtrip will consider the hydrological and geomorphological effects of land-use changes (reforestation, farmland abandonment), as well as extreme events and landslides both related and unrelated to land-use changes. Visits are planned to reservoirs built for irrigation purposes (e.g. Yesa), as well as on-site discussion of water management methods and their effects on sustainability in mountain areas. At least one experimental catchment will be visited, discussing the effects of the evolution of plant cover on water quality, floods and sediment transport.

ABOUT ZARAGOZA: Zaragoza is one of the major cities in Spain. It is located in the Ebro Depression near the Ebro River, in a semi-arid environment with many problems of water quality, salinization and increasing water demand for irrigation. Fifty kilometres northward, the Pyrenees range receives large amounts of precipitation and rivers show the typical mid-latitude mountain régime, with a strong influence from snow accumulation and melt. Rivers draining from the Pyrenees are regulated by large dams, and more new reservoirs are planned for the immediate future. Major land-use changes have occurred recently both in the plains and in the mountainous areas, resulting in changes in water balance and river régime and in the main characteristics of erosion and sediment transport. Zaragoza and its surrounding area is thus an excellent example of the close relationships between environmental change, water quality and availability, and water sustainability.
A visit to Zaragoza city is recommended, including the Roman walls, theatre and forum, the large "Pilar" square around the Cathedral (in gothic style, though with wonderful romanesque and arabic remnants), the arabic castle (now the regional Parliament), and the Ebro River and its Roman/Medieval bridge. Tourist information will be available at the beginning of the Conference.

REGISTRATION FEES:
For registration before February 1st 2001:

a) Participating member: $260
b) Accompanying person: $175
c) Student member: $125

On site registration fees will be $300, $200 and $150 respectively.
Registration fee includes documentation, coffee breaks, the Conference Dinner in Zaragoza, and the total cost of the fieldtrip (bus, one night in a hotel, two lunches and one dinner, all in restaurants).
Registration excluding the fieldtrip: $125, $60 and $50 respectively for registration by February 2001, and $160, $75 and $70 after.

During the three days of the Conference at Zaragoza, lunches will be in the Campus Restaurant, at very low cost (around $2-3 per lunch). The Institute can also arrange reservations at a reasonably priced hotel in Zaragoza (around $40 per night at a 3- star hotel, including breakfast). There is also a cheaper Residence on the Campus.

PUBLICATION: It is planned to publish peer-reviewed papers in a book published during 2001 and sent free of charge to all the participants in the Conference.

ABSTRACTS: Abstracts must be received by the Organising Committee by February, 15, 2001. They must include the title of the paper, author(s) name(s) and address(es) at the top. The text should cover no more than one page. Up to three papers per author can be accepted.

Abstracts should be submitted to the Chair of the Organising Committee, from whom further details are available:

Dr José M. Garcia-Ruiz,
Instituto Pirenaico de Ecologia, Campus de Aula Dei, Apartado 202, 50080 Zaragoza, Spain.
e-mail: humberto@ipe.csic.es ; Phone: 34-976-716026; Fax: 34-976-716019.

IGU Organising Committee: Tony Jones (UK), Hok Woo (Canada), Olga Scarpati (Argentina), Claudio Cassardo (Italy).

REGISTRATION FORM

(please send by e-mail to humberto@ipe.csic.es)

ENVIRONMENTAL CHANGE AND WATER SUSTAINABILITY

2 - 6 July 2001
IGU Study Group on Water Sustainability
Instituto Pirenaico de Ecologia, Zaragoza, Spain

Surname..... Given names……..

Complete address.....

Telephone.....

Fax.....

E-Mail.....

Accompanying Person (include name and surname)

I wish to make a Hotel reservation (indicate type of hotel and room (double or single), and the arrival and departure dates in Zaragoza)

I have paid the amount of ...……to the Conference bank account below.

BANK ACCOUNT: Please send the registration fee to the following bank account address: Banco BSCH, Jaca, Spain. Account number: 0049-2461-70-1410311140.

5. Links with the World Meteorological Organisation Commission for Hydrology

The chairman attended the 11th Session of the Commission for Hydrology (CHy) held in the new Nigerian capital of Abuja in November as representative of the IGU. The Commission acts as a forum for planning and promoting international collaboration in operational hydrology and water resources and linking meteorological and hydrological services. Amongst its current programmes are:

1. ***Basic Systems in Hydrology*** - concerned with collection, transmission and processing of data. This includes the development of global systems of hydrological networks like HOMS - Hydrological Operational Multipurpose System - and WHYCOS (the World Hydrological Cycle Observing System), which was an initiative of the Water Resources Division of WMO designed to give hydrology the worldwide monitoring coverage enjoyed by meteorologists from World Weather Watch.
2. ***Forecasting and Applications in Hydrology*** - aiming to apply modelling to disaster mitigation.
3. ***Sustainable Development of Water Resources*** - to ensure effective use of hydrology in support of sustainable development
4. ***Capacity Building in Hydrology and Water Resources*** - mainly concerned with education and training of staff in National Meteorological and Hydrological Services.
5. ***Water-related issues*** - to increase the effectiveness of WMO by collaboration with other organisations in the water field.

The work is basically organisational or operational rather than scientific and collaboration is normally seen as relating to other UN activities or to governmental and non-governmental organisations which operate water-related programmes. Working Groups concerned to plan and implement these activities are organised around national delegations appointed by governmental meteorological/hydrological services and constituted to give a balanced regional representation from around the globe. However, a number of international River Basin Authorities, like the Rhine and Niger, were present, as well as non-governmental organisations like IAHS and IGU, and the chairman was given the opportunity to make a short presentation on the scientific work of IGU.

Delegates showed considerable interest in our activities and the seeds were sown for future cooperation. In particular, the aims of our Study Group are very close to both the Sustainability Working Group of CHy and the new series of World Water Development Reports that is being planned by WMO, with their first report due in 2002 prior to the next World Water Forum. Discussions on collaboration are in progress.

Address of the Study Group chairman to the Commission for Hydrology

The following is the text of our address to the WMO Commission for Hydrology, which will be summarised in the proceedings of that session:

"Mr President, representative of the Secretary-General and delegates,

I believe it has been some time since the IGU was represented at one of these meetings, and we are very pleased to have this opportunity. The IGU has a strong interest in hydrology and water-related issues.

At the IGU Congress in Seoul this August, the General Assembly set up a new Study Group on "Water Sustainability" to run initially until 2004. This aims to foster research not only into the sustainability of water resources, but also into the sustainability of the environment in which water resources are developed. This includes the interactions and feedbacks between water and the environment and methods of mutual rehabilitation in damaged and polluted water environments. We are currently editing a number of Special Issues of international scientific journals containing papers presented at our conferences, and have published a book with Kluwer Academic on climate change impacts. The group meets annually, with meetings already planned for Zaragoza, Spain, in July 2001, Durban, South Africa, in 2002 and Armenia in 2003.

This is the third IGU water group in the last decade, successor to one on "Environmental change and extreme hydrological events" and the earlier one on "Regional hydrological response to climate change". The new group aims to continue promoting investigations into the impact of climate and land surface changes on water resources and régimes, including the application of new methods to downscale GCM climatology to feed into rainfall-runoff models, and modelling the effects of land-use change on river régimes. Among its new objectives is the quantification of sustainability in water resources and the water-related environment.

One of the new initiatives that may be of particular interest to delegates is a new *Atlas of World Water Resources*. We were approached to undertake this work by the publishers of the UNEP *Atlas of World Desertification*. Our plans for the *Atlas* aim to cover a much broader range than the average water balance, which has generally been the main focus of previous atlases, to include socio-economic and political aspects. Among the aspects to be covered are: dynamic aspects of the water balance, past and future - extremes, trends, cycles, even reconstructing the terrestrial hydrology of the last Ice Age; water demand and usage; water conservation; water pollution; impacts on human health; environmental rehabilitation; issues of hydropolitics and transboundary watercourses; organisational and legislative aspects of water supply; strategic water transfers and water-trading; and the effects of changes in land-use, urbanisation and climate on water resources.

I would like to conclude by reporting the current status of this project. We have established cooperative agreements with a number of other IGU Commissions, including the Commission on Health, Environment and Development and the Commission on Natural Hazards, as well as with many individual members of the Water Sustainability group. The International Cartographic Association is also interested in collaboration. We have secured some funding from ICSU, the IGU and the publishers. We have been involved in discussions with Gordon Young in the new World Water Development Report headquarters at the Unesco offices in Paris, and it has been suggested that we might provide graphic support for these Reports with material from the *Atlas*. Our publishers have agreed that we may make this material available on early release. However, we are still seeking the basic funding that is critical to launching the project.

I mention this to you as a matter of report, but we are also keen to discuss collaboration with any representatives here either at the institutional level or at the individual level, and I shall be pleased to talk with anyone who may be interested.

Thank you."

6. Publications

Progress has been slower than expected with some of the Special Issues of international journals that we have been editing. However, we now have three that are nearing completion. In order of progress, they are:

Hydrological Processes, published by Wiley, edited by J A A Jones and M-K Woo.
Title: **Modelling the impact of climate change on hydrological regimes**
All papers are now complete. Some are still out for final revision, but publication is due in 2001. The provisional line-up is:-

Effects of transient climate change scenarios on basin hydrology: the Arno River, Central Italy 1 Precipitation, 2 Impacts on runoff.
Paolo Burlando and Renzo Rosso

Modelling the impacts of climate change on Australian streamflow.
Francis H.S. Chiew and Thomas A. McMahon

Downscaling of GCMs for flood frequency analysis.
C. Prudhomme, N Reynard and Crooks

The impact of future climate change on hydrological processes and extreme flows in the upper Wye experimental catchment, mid-Wales, assessed by downscaling output from the Hadley Centre GCM with sulphate aerosols.
C. Pilling and J. A. A. Jones

Prospects for downscaling seasonal precipitation variability using conditioned weather generator parameters.
R.L.Wilby, D. Conway and P.D. Jones

El Niño-Southern Oscillation and aspects of Western South American hydro-climatology.
Peter Waylen and Germán Poveda

Extreme rainfalls in a changing climate: regional analysis and hydrological implications in Tuscany.
A. Crisci, B. Gozzini, F .Meneguzzo, S. Pagliara, and G. Maracchi

The flood of November 1994 in Piedmont, Italy: a quantitative analysis.
Claudio Cassardo

A case study of the South Ticino flash flood 1995: impact of soil surface moisture initialisation.
Claudio Cassardo

Mitigation and Adaptation Strategies for Global Change, published by Kluwer, edited by M-K Woo and J A A Jones.
The following papers are currently completed and publication is also expected in 2001.

The impact of the heavy floods at the Salado River Basin, Buenos Aires Province, Argentina.
Olga E. Scarpati, L. Spescha and A. Capriolo

Flood studies in Portugal: examples of different kinds of floods and their impacts in the south of the country.
Catarina Ramos and Eusebio Reis

Geomorphological consequences of frequent and infrequent pluviometric and hydrological events in a Mediterranean mountain area.
Jose M. Garcia-Ruiz, Carlos Marti-Bono, Adrian Lorente and Santiago Begueria

Observations on the dynamics of the rural water supply from natural sources: a village example in semi-arid Nigeria.
Aondover Tarhule and Ming-ko Woo

The impacts and counter-measures: drying up of the Yellow River.
Changming Liu and Shifeng Zhang

Geomorphology, published by Elsevier, edited by P A Brewer, J A A Jones and M K Macklin.
Title: **Reconstructing flood frequencies from geomorphic and climatic data**
First drafts are now due for the following papers:-

Role of paleodata in human adaptation to environmental change and extreme hydrological events.
Vic Baker

Floodplain sedimentation and simulated floods of the 19th and 20th century in the Geul catchment, The Netherlands.
Marleen Stam

The impact of environmental change on channel stability in gravel bed rivers.
P.A. Brewer and D.G. Passmore

A 300-year history of flooding in an Andean mountain river system: the Rio Alizos, Southern Bolivia.
Mark G. Macklin and Glenn S. Maas

Palaeoflood analysis of the Tagus River (Central Spain) using slackwater deposits.
G. Benito , A. Sopeña , M.J. Machado , and A. Pérez-González

A geomorphic based record of debris flow events in the catchment of the Arroyo del Medio, Northwest Argentina.
Glenn Maas

R*econstructing historical flood frequency and flow duration curves using an airflow index-based stochastic weather generator and a hydrological simulation model.*
N.C. Mountain and J.A.A. Jones

7. Membership

In light of the new aims and objectives of the Group, we would ask all Full and Corresponding Members to ***let us know if you no longer wish to receive information about our activities***. If we do not hear from you, we will assume that you wish to remain on the mailing list and take part in our work.

We currently have over 100 Corresponding Members. The following new members have joined the Group recently:

Professor Jong-Sung Ahn, Dept. of Geography, College of Science, Kon-kuk University, 1 Hwayang-dong, Kwangjin-gu, Seoul, Korea 143-701

Dr N. Batnasan, Science Secretary, Institute of Geography, Mongolian Academy of Sciences & Secretary, Mongolian Geographical Society, P.O.Box-664, Ulaanbaatar-24, Mongolia.

Dr Santiago Begueria, Instituto Pirenaico de Ecología, CSIC, Campus de Aula Dei, Apdo. 202, 50.080 - Zaragoza, Spain.

Professor Moowoong Choi, Prof of Hydrology, President of Korean Groundwater Association, Faculty of Science, Konkuk University, 1 Hwayangdong, Kwangjinku, Seoul 143-701, Korea.

Dr Carlos David Hoyos Ortiz, Universidad Nacional de Colombia, Facultad de Minas, Medellín, Antioquia, Colombia.

Professor Noboru Hida, Akita University, Japan.

So Hee Kim, Dept. of Geography, College of Science, 1 Hwayang-dong, Kwangjin-gu, Seoul, Kon-Kuk University, Korea 143-701.

Dr. R.H. Kripalani, Senior Scientific Officer – I, Forecasting Research Division, Indian Institute of Tropical Meteorology, Pashan Road, Pune 411008, India.

Dr. Adrian Lorente, Dept. of Geography, University of La Rioja, Logroño, Spain.

Professor Omar Abel Lucero, National University of Cordoba, Argentina.

Dr John Freddy Mejía Valencia, Universidad Nacional de Colombia, Facultad de Minas, Medellín, Antioquia, Colombia.

Professor Lekan Oyebande, Professor of Hydrology, Hydrology Laboratory, Department of Geography, Faculty of Environmental Sciences, University of Lagos, Lagos, Nigeria.

Professor Jong-Kwan Park, Dept of Geography, College of Science, Konkuk University, 93-1 Mojin-dong, Kwangjin-gu, Seoul 143-701, Korea.

Dr I.J. van der Walt, Chair, Geography and Environmental Studies, Potchefstroom University for Christian Higher Education, Potchefstroom, South Africa.

Professor Trahel Vardanian, Department of Physical Geography, Yerevan State University, Manoukian St., 375049, Yerevan, Republic of Armenia.

Dr Julius Wellens-Mensah, Hydrological Services Department, P.O. Box MB 501, Accra, Ghana.

Professor Doracie B. Zoleta-Nantes, Department of Geography, College of Social Sciences and Philosophy, University of the Philippines, Diliman, Quezon City, Philippines.