Hydrology and water management in the humid tropics

PROCEEDINGS

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A "Success Story"
of the Humid Tropics Programmeof UNESCO’sInternational Hydrological Programme

For many years the International Hydrological Programme (IHP) has studied hydrological and water resources management problems of the world. Included on a more-or-less regular basis had been specific problems of the humid tropics. But the projects had an unconnected aspect since there always loomed in the background the feeling that "...why should we study the humid tropics; don't they have all the water they need?" Yet, in spite of that there was a strong feeling (based on the results of those studies) that everything concerning the hydrology and water resources of the humid tropics was not okay.

Then two projects that ended in the mid-1980s concluded independently that there was a good reason to look at the region in a comprehensive way. Both suggested that an international conference would be a worthwhile activity. The first reaction at UNESCO headquarters to the suggestion of a conference was one of great reluctance because all too often one of the results of a research project or study is simply to suggest more of the same -- and so often, a symposium is considered "essential." However, there were factors that caused UNESCO to realize that this subject needed careful consideration. One was the list of special problems that these two projects had identified. A second was the large population that lived in the region -- almost 100% of which was in developing countries. A third, and a strong influence, was that because of the natural reaction that the humid tropics had all the water they needed, the result had been that those efforts that did exist were not extensive and extremely poorly coordinated internationally.

An informal international steering committee was established. At the same time Professor Michael Bonell, of the James Cook University of North Queensland, was asked to meet with the Project Officer to assist him in scoping out a first move. After some discussion they concluded that an international meeting was desirable -- but not simply another symposium. The thoughts were that:

- The participants in the meeting should be carefully selected.
- That roughly half of the participants would be established scientists in the area of the humid tropics ("grey hairs"), and that the remainder would be up-and-coming scientists ("young Turks").
- That organizations other than UNESCO should be encouraged to participate, personally and financially, in the event.
- That the expenses of the invited participants should be subsidized to the maximum extent possible.
- That the meeting consist of invited papers and workshops, with ample time for discussions and resolution of conclusions. And,
- That the participants should make concrete suggestions for high priority future work of the IHP.
In order to distinguish the meeting from the typical international symposia, it was to be called the International Colloquium on the Development of Hydrologic and Water Management Strategies in the Humid Tropics. The participants would be encouraged to have, to the maximum extent possible, a free flow of dialogue throughout the event.

The importance of the topic of the Colloquium was recognized not only by the informal international steering committee but also by UNEP (which agreed to join with UNESCO in its presentation) and the 22 organizations that agreed to co-sponsor and cooperate in the support of the seven-day event. The Colloquium was held in July 1989 in Townsville, Australia.

During the Colloquium the participants developed strong evidence that not only was the present situation in the humid tropics in need of serious consideration, but that the potential for vastly increased negative human impacts would be quite significant if they were not adequately considered immediately. They concluded in general that many of the water-related issues and problems in the humid tropics and the other warm humid regions are similar to those facing planners, administrators and governments of the temperate climate regions -- but that while there are resemblances, there are also many dissimilarities. Both the tropical and temperate regions can be afflicted with lack of coordination between organizations and agencies, failures to achieve what had seemed to be reasonable goals, ineffective institutional arrangements, economic infeasibilities, severe environmental and social impacts, inequitable outcomes, and similar failings. However, the impacts of such shortcomings seem to fall heavier on the region of the humid tropics. The impact is partially caused by the increased severity of the hydrological events in the tropics and other warm humid regions -- the heavier rain, the repetitive occurrence of damaging cyclonic weather, the higher temperatures, and the non-stationarity of the climates.

In these regions there often are large numbers of residents crammed into small areas, magnifying their vulnerability to severe weather and creating major problems of water quality degradation. A related factor is the relative stage of economic development among the region’s governments and their abilities to cope with these extreme hydrological and water management problems. Many of these developing nations still do not have in place the necessary mechanisms and trained people to ameliorate what their weather may bring them.

It was also evident that one of the major problems in water management in these regions was the failure or apparent inability to consider water resource development within the context of overall development plans. Fragmentation of responsibility is the case in most of these countries. Attempts to alleviate water-related problems in the tropics and other warm humid regions can be further complicated by the entrance of non-governmental organizations into the picture. While the motivation of such international agencies may be excellent, they often have their own methods and technologies that may not mesh with those of the host country or with those of other specialized agencies.

Although no one region in the tropics may suffer from all of these water resource management difficulties, there are a number of commonalities. There is inadequate data -- both physical and biological -- from which to make informed judgments. There was the narrow scope of the planning being done, along with inadequately trained professionals and staff. In addition, there were the fragmented administrative arrangements and responsibilities that further hampered sound management. It was also believed that an overemphasis on project development and construction in comparison to post-construction project operation and maintenance and the pursuit of some national economic goals could overemphasize and seriously damage the existing water resources. Clearly, better interaction among water planners, policy makers and knowledge
developers would help meet the goals of economic development and water resource protection.

It was definitely felt by the participants of the Colloquium that a mutual recognition of the problems faced and an improved interaction of planners and policy makers would aid in better utilization of the valuable water resources of the humid tropics. Toward this goal it was believed that the establishment of special centers of training for technology interchange and implementation and coordination of research into the unique problems of tropical islands and other warm humid regions would aid in reducing these critical knowledge gaps.

Toward this end, in order to accomplish the various activities foreseen as being needed, networks of water and water-related experts and research organizations involved in warm humid region hydrology and water management studies were proposed – in Africa, Latin America and the Caribbean, Asia and a fourth on the special problems of the small islands.

However, the establishment of a regional center requires many efforts, not the least of which is the agreement by a country to be the host. It also must settle a basic philosophical test: is a regional center to be established to manage an existing package of work – or is it to be established in order to develop the package. In other words, does the activity funding come before or after the center is established. The chicken/egg problem. And, while it would have been well received had funds simply been waiting for the development of the centers, such was not the case. The funding agencies, in general, wanted to know what the proposed programmes were to be and who would be administering them before they would become involved. Furthermore, many have not been too happy with "centers" because they too often appear to become obligated to continued support.

It was decided that the center for Latin America and the Caribbean would definitely be established on the basis that it would then find funding for the various activities. It then became necessary to find the right location and then, after agreement with that country, to find the director who could lead the center to a successful programme. It obviously meant, however, that sufficient financial support had to be found so that the center would be able to manage the basic administrative activities until such time as the externally funded projects could do so.

After some discussions with the UNESCO regional office in Montevideo, in particular Carlos Fernandez-Jauregui (the Regional Hydrologist), and individuals in the Latin America and Caribbean region it was decided to approach the Republic of Panama. The reasons behind this decision included the following:

- Panama is centrally located within the humid tropical region of LAC.
- While Spanish is the official language, at least in the area of the capital city of Panama, English is quite commonly understood and spoken.
- Access to Panama is possible through an excellent network of airlines, by sea, and even by road.
- Electronic communication -- telephone, telex, cable and fax -- was available.
- The geography, industry, urbanization and agriculture of Panama is quite varied, and thus offered a wide variety of examples for field trips and for research. And,
- The capital city of Panama, while maintaining the appearance of a tropical city, is in fact a highly business-oriented one, with all manner of technological back-up available for communication, equipment, computers, etc.

Early in 1991 the Vice President of Panama, The Honorable Guillermo Ford Boyd, was contacted concerning the possible interest of the Republic of Panama. His
response was an immediate and positive encouragement to UNESCO to develop the concept further. This was followed up by visitations of UNESCO personnel to the Republic of Panama, in which the Republic confirmed that it intended to support financially and with physical facilities the site of the regional center. In June 1991 a formal letter of intent was signed setting out the understanding concerning the center’s establishment. UNESCO then began dealing directly with the Permanent Delegate to UNESCO of the Republic of Panama (The Honorable Arturo de la Guardia) in development of the formal Agreement. In great part because of his dedicated assistance, in June 1992 representatives of the Government of Panama presented the details of the proposed Center to the UNCED (United Nations Conference on Environmental Development) for the information and support of the delegates. In the meantime, the process of selection among the candidates for the position of Director began.

On 13 November 1992 the Agreement between UNESCO and the Republic of Panama to establish CATHALAC (Centro del Agua del Trópico Húmedo para América Latina y El Caribe) was signed by the two entities. In January 1993 UNESCO assigned an Associate Expert (with the generous contribution of The Netherlands) to Panama to assist in the preliminary organization of the Center. As a result of a change in government in the Republic of Panama, there was a brief period of inactivity, during which new principal directors of governmental agencies relative to CATHALAC were appointed. During this time, a contract was signed with the new CATHALAC Director, Sra. María Concepción Donoso. In October 1994 Ing. Rolando Guillén, Director of Panama's Institute of Renewable Resources (INRENARE), was appointed by the government to be the first Chairman of the CATHALAC Board of Governors. It was evident that Panama intended that CATHALAC was to be a success.

In November 1994 the first session of the Board of Governors of CATHALAC was held in Panama. The task before the Board at this meeting was to establish the working rules for future sessions of the Board, including the proposed program of work for CATHALAC. The Board members were also taken to the new offices of CATHALAC, they being located idyllically on the premises of the former Fort Amador, at the Pacific entrance to the Panama Canal. The building was half of a duplex (formerly US Army officer housing), and was located at the entrance of the causeway leading out to the former "Fortified Islands" that guarded the entrance to the canal. The causeway is narrow at this point, and the view from the office on its front side was the canal entrance. The view from the back was that of Panama Bay and the city of Panama. The facilities were more than adequate for the business of CATHALAC at that time. The Board was also pleased to note that the Republic of Panama had expressed the intention to continue the financial support to the Center.

On 22 March 1995 a formal dedication of the CATHALAC headquarters and the programme were held. As a show of the strong backing of the Government of the Republic of Panama, His Excellency Licenciado Felipe Alejandro Virzi, Senior Vice-President of the Republic cut the ribbon.

Since that time, CATHALAC, as it has grown in its activities, has shifted its office location twice: first to the former Albrook AFB, and now (most appropriately) to the newly established Ciudad del Saber (City of Knowledge) that was established by the Republic of Panama as an educational, scientific and high technology site using the facilities of the former Fort Clayton. Its physical facilities have now expanded greatly to match its increased activities. The Republic of Panama has continued to support CATHALAC financially and politically.

CATHALAC’s primary objective is to serve as an administrative focal point for scientific and technical activities in the humid tropic regions of Latin America and the
Caribbean in the area of training, research and transfer of knowledge and technology in the field of water resources and the environment. The main scientific goal is to improve the understanding of interactions between the land, vegetation, ocean, atmosphere and human actions. It coordinates activities of technical assistance, training, research and information transfer and focuses on the following areas:

- Air-sea-land interactions
- Small islands
- Hydrological processes
- Integrated urban water management
- Water quality control
- Water resources assessment, management and control
- Water and health
- Knowledge, information and technology transfer

CATHALAC organizes (and participates in the organization of) courses, workshops, seminars and symposia, and offers scientists of the region the opportunity to exchange ideas and experiences. As a means of better serving the region two sub-regional offices have been established: one in Miami, Florida, concentrating on the Caribbean sub-region; and another in Sao Paulo, Brazil, concentrating on urban hydrology and water resource management.

Since its formal inauguration in March 1995 the Director of CATHALAC has set about, quite successfully, to establish the presence of the center as a major factor in the humid tropics of Latin America and the Caribbean. It is now well recognized for its coordinating activities, and is beginning to play a very important role as a scientific arm of political organizations such as the Organization of American States. Moreover, while CATHALAC is yet a young organization, its rapid involvement in the international activities of the region indicates that it is filling a very important niche in the humid tropic region of Latin America and the Caribbean.

[This introduction was prepared by Dr. John S. Gladwell of Hydro Tech International, Vancouver, BC, Canada – and former Senior Programme Specialist in the International Hydrological Programme, UNESCO SC/HYD, Paris, France]
Preface

During the Week of March 21-26, 1999 a series of parallel meetings took place in Panama City, Republic of Panama, which collectively was referred to as *Water Week in Panama*. The *Second International Colloquium on Hydrology and Water Management in the Humid Tropics*, as one of these events, brought together a group of leading researchers and water managers from around the world who work in the humid tropics region or execute research programs related to the hydrology of these regions. The participants discussed their research and how it relates to the need of water managers for hydrologic understanding upon which to base sound management decisions. During this Water Week in Panama the inaugural and closing sessions of the Colloquium, the lunches, a field trip through the Panama Canal, and other social events were combined with the other events that formed part of the Water Week. In this manner, the organizers stimulated a lively dialogue between practicing water managers and researchers on current water issues.

The Colloquium consisted of presentations of technical papers and discussions on the following themes:

- Multi-dimensional Approach to Water Management
- Climate Variability and the Impacts on Hydrology and Water Resources
- Surface, Sub-surface and Ground Water Quality
- Urban Hydrology
- Tropical Island Hydrology
- An Ecohydrological Perspective of Montane Cloud Forests

Because of the great importance of ground water as source of water resources, a special paper on groundwater quality in the Humid Tropics, by Foster, *et al.*, was presented. Because of the importance of the subject, the paper has been placed in these Proceedings next to the Closing Remarks.

In parallel with the Colloquium, the Organization of American States (OAS), the National Environmental Authority (ANAM) of Panama, the Inter-American Water Resources Network (IWRN), and the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) held the *Third Inter-American Dialogue on Water Management* on March 21-25, 1999. The meeting of more than two hundred senior water managers and decision makers of stakeholder groups identified actions for integrated water resources management in the following five general areas:

- Water and health
- Transboundary water management
- Economic valuation of water
- Public participation
- Responses to impacts of global change

Using case studies and round table discussions, the Dialogue sought to assign priorities to the identified initiatives to encourage water managers to take action at local levels in their countries. The Dialogue also aimed at fostering political support for these initiatives within the governments of the Americas and within multilateral funding.
agencies at the hemispheric level.

Early during the week, 50 members of the _Inter-American Water Resources Network_ (IWRN) Advisory Committee met to elaborate future activities of the IWRN including the support the World Water Vision in a series of regional workshops during 1999, the water information summit in the fall of 1999, and a meeting of experts on water and health.

Participants of all parallel meetings visited the _Children and Water Festival_ to receive the Children’s Declaration on Water and to witness the dedication by the children of the “Water is Life” fountain in the Parque Omar, Panama City, Panama. The festival, organized by the Office of the First Lady of Panama, with assistance from ANAM, CATHALAC, and many other organizations, served as a reminder to the water professionals of the importance of educating the future generations on the importance of clean water for a healthy environment, a productive economy, and good public health.

An exhibition, _AQUA '99_, was also held during the meeting. Consultants, water-related industrial firms, professional organizations, and NGOs presented their products, services, and programs.

Finally, the Committee for the Water Vision of the Americas (CWVA), a committee formed to facilitate and coordinate the World Water Council’s Water Vision activity in the Americas, held the first _Water Vision in the Americas Workshop_ during the last two days of the Water Week. A group of 70 water policy-makers met to develop a general understanding of the purpose of the vision effort and to develop a process and framework for conducting the Water Vision exercise in a series of meetings to be held during 1999 in various regions of the Americas. The Committee examined the recommendations and priorities developed during the Second Colloquium, the Third Dialogue and other recent meetings, to gain a sense of how water management in the Americas will develop over the next several decades and consecutively develop a general consensus on the shape of the future of water resources under several proposed scenarios. The elaborated regional visions will be presented at the World Water Forum in March 2000 in the Netherlands.

Apart from this intensive agenda, there were numerous social events, of which especially the boat trip through the Panama Canal made an unforgettable impression on the 300 participants of the Water Week. Many professional and personal relationships were established, renewed or strengthened during these social events.

This book contains speeches, conclusions, recommendations, final statements and technical papers that were presented at the Colloquium.

The organizers wish to express their gratitude to the Government of the Republic of Panama for the generous offer to host these events and to contribute actively to their organization. Dr. John S. Gladwell, President of _Hydro Tech International_, was responsible for the editing and preparation of the manuscript of this book for publication by UNESCO.
Organizing Committee – Second International Colloquium on Hydrology and Water Management in the Humid Tropics

CATHALAC
Water Center for the Humid Tropics of Latin America and the Caribbean
Republic of Panama

ANAM
National Environmental Authority
Republic of Panama

UNESCO – IHP
United Nations Educational, Scientific and Cultural Organisation,
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Principal Advisors -- Second International Colloquium on Hydrology and Water Management in the Humid Tropics

John S. Gladwell  
President, Hydro Tech International  
3477 Beach Avenue  
Roberts Creek, BC  
V0N 2W2  
CANADA  
Tel. (+1) 604-885-0188  
ohngladwell@dccnet.com

John Fischer  
Consultant  
Water Resources and Environmental Consulting  
11422 Waples Mill Road,  
Oakton, Virginia 22124  
Virginia, U.S.A.  
Tel. (+1) 703-620-0825  
jnfischer@aol.com

Ramon Vargas  
Vocal del Directorio  
Administracion Provincial del Agua  
Sta Maria de Oro 1266  
(3500) Resistencia, Chaco, ARGENTINA  
Tel. (+54) 03-722-432904  
ravargas@sinfovia.com.ar

Keynote Speakers

Jochen Bundschuh  
Darmstadt Technical University  
Institute of Geology  
Schnittspahnstrasse 9  
64287 Darmstadt  
GERMANY  
Tel. (+49) 7366-919-167  
Fax: (+49) 7366-919-167  
jbundsch@hrz2.hrz.tu-darmstadt.de

Pilar Cornejo  
FIMCM-ESPOL  
Guayaquil  
ECUADOR  
Tel. (+593) 4-269478  
Fax: (+593) 4-854587  
pcornejo@goliat.espol.edu.ec

Janusz Niemczynowicz  
Department of Water Resources Engineering, University of Lund  
Box 118, S-221 00 Lund, SWEDEN  
Tel. (+46) 46-222-8981,  
Fax: (+46) 46-222-4435  
janusz.ni@tvrl.lth.se

Norman J. Peters  
U.S. Geological Survey  
3039 Amwiler Rd., Suite 130  
Atlanta, GA 30360-2824.  
USA  
Tel. (+1) 770-903-9145  
Fax: (+1) 770-903-9199  
nepeters@usgs.gov

Tony Falkland  
ECOWISE Environmental  
7224 ACTEW Corporation  
PO Box: 1834, Fyshwick,  
Canberra, ACT 2609  
AUSTRALIA  
Tel. (+612) 6285-7221  
tonyf@ecowise.com.au

Sampurno Bruijnzeel  
Tropical Environmental Hydrology Programme (TRENDY)  
Faculty of Earth Sciences  
Vrije Universiteit  
De Boelelaan 1085  
1081 HV Amsterdam  
THE NETHERLANDS  
Tel. (+31) 20-444-7294  
Fax: (+31) 20-646-2457  
brul@geo.vu.nl