71
ICWE92

IHP INFORMATION

International Hydrological Programme

January 1992



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SPECIAL ISSUE DUBLIN CONFERENCE

International Conference on Water & the Environment:

Development Issues for the 21st Century
(Dublin, Ireland, 26-31 January 1992)

Contents

1	On the road to Rio, by Maurice F. Strong, UNCED Secretary-General
2	Statement by Brice Lalonde, Minister of the Environment of France
3	The International Hydrological Programme
6	Climate, Climate Change and Hydrology
8	The Humid Tropics Programme
9	Education & Training
10	Regional Activities
16	Non Governmental Organizations and the IHP

71-ICWE 92-19135

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• The Spanish edition is produced and distributed by ROSTLAC
• The Russian edition is produced and distributed by the USSR IHP National Committee

SC/92/WS/1

Barcode 19135
Loc 71 ICWE92

On the road to Rio

Statement by Maurice F. Strong,
Secretary-General,
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There can be no issue that more conclusively demonstrates the integrated nature of environment and development than that of freshwater. The challenge of securing for all the basic human need of a reliable supply of freshwater, adequate in quality and quantity, is perhaps the most fundamental development issue. At the same time this cross-cutting issue is linked to most major environmental questions.

A casual examination of the main linkages between freshwater and other issues in environment and development reveals just how pervasive an issue it is. Agriculture, for example, is almost totally dependent on the regular supply of freshwater, accounting for roughly two-thirds of its use. Recent investigations have shown that a major source of contamination of freshwater can be traced to air-borne pollutants. Both surface and ground water are increasingly contaminated by toxic chemicals and hazardous wastes, and some of these substances can pose a serious threat to health on the timescale of hundreds of years. Health, of course, is most directly associated with problems in the supply of freshwater: data suggest that some 5 million children under five years of age die each year from lack of potable water and sanitary facilities.

Freshwater ecosystems rank among the most threatened. Increasingly heavy demands are being made upon them as demographic pressures mount and the growing population aspires to live close to pure freshwater sources. The biological diversity of these unique ecosystems is being constantly eroded when many of them have yet to be catalogued and studied. There is now barely a river or lake in the world that has not suffered some degree of anthropogenic change. In many cases, freshwater systems have been treated as a convenient sink to assimilate man's wastes. There is strong evidence that their capacity to do so is being approached.

All these are issues with which the Earth Summit is very much charged. It is a conference on environment and development, and will deal with all the issues on its agenda in an integrated manner. In the case of freshwater, it is possible to build on a number of initiatives that have already been taken at the highest international and national levels. These must now be translated into practical action plans at both regional and local levels.

The Mar del Plata Action Plan which was adopted at the 1977 United Nations Conference on Water held in Argentina, has resulted in several significant initiatives. A prime example is the International Drinking Water Supply and Sanitation Decade (1981-1990).

During the last decade there has been a growing realization that problems of freshwater availability and quality are intimately linked to broader environmental concerns and that they should not be viewed in isolation. I am confident that the International Conference on Water and the Environment (ICWE) to be held in Dublin in January 1992 will address the critical freshwater issues in an integrated manner.

At the 3rd session of the Preparatory Committee which concluded recently in Geneva, negotiations were initiated on a comprehensive freshwater chapter for an Agenda for the 21st century: ***Agenda 21***. The draft chapter, as it came out of PrepCom III, will now be submitted to the experts assembled in Dublin to give their advice on the feasibility and implementation of the proposed programmes. In particular, the experts at Dublin are asked to:

- Consider this material with particular attention to implementation mechanisms, programme targets and costings;
- Identify options for appropriate mechanisms for implementing and coordinating the programmes;
- Identify options for improved coordination and cooperation on water management at the local, national, regional and global levels;

- Submit the report on the results of the meeting to the Secretary-General of the Conference before the fourth session of the Preparatory Committee.

The Dublin meeting will provide an extremely important contribution to the UNCED preparatory process. The participation of the experts at ICWE will offer valuable substantive submissions to the fourth UNCED Preparatory Committee meeting which will take place in New York in March 1992. Indeed, at the request of the Preparatory Committee, the working group themes of the ICWE reflect the programme areas of the component of Agenda 21 on freshwater. The results of the conference will provide crucial assistance in the shaping of this key element of the Earth Summit. Dublin is undoubtedly an important milestone on the road to Rio.

Statement by Brice Lalonde, Minister of the Environment of France

Man is bound to the water cycle by vital links. Mastering this cycle has always been a major challenge in the development of human societies.

Today, more than ever, this challenge is at the very heart of sustainable development.

With its uneven spatial and temporal distribution, *water*, like any natural resource, needs to be redistributed more equally among all. Access to water must not be the cause of conflict, but should on the contrary be a means of bringing about better social justice and a new order based on increased solidarity between countries of the North and South.

While climate change partly induced by our industrial activities is growing in magnitude and often in its impact on the least developed areas of the world, it is important that the results of scientific research aimed at understanding such phenomena be confronted with the objectives of technological development. What we need is a new charter for the preservation of humankind and the earth.

The important international conferences scheduled to take place during 1992 will hopefully contribute to the promotion of such ideas and increase a planetary awareness of the importance of water for our survival.

For its own part, the French Government has decided to give a new impulse to its national water policy by updating legislation and reinforcing the capacity of its survey and management tools.

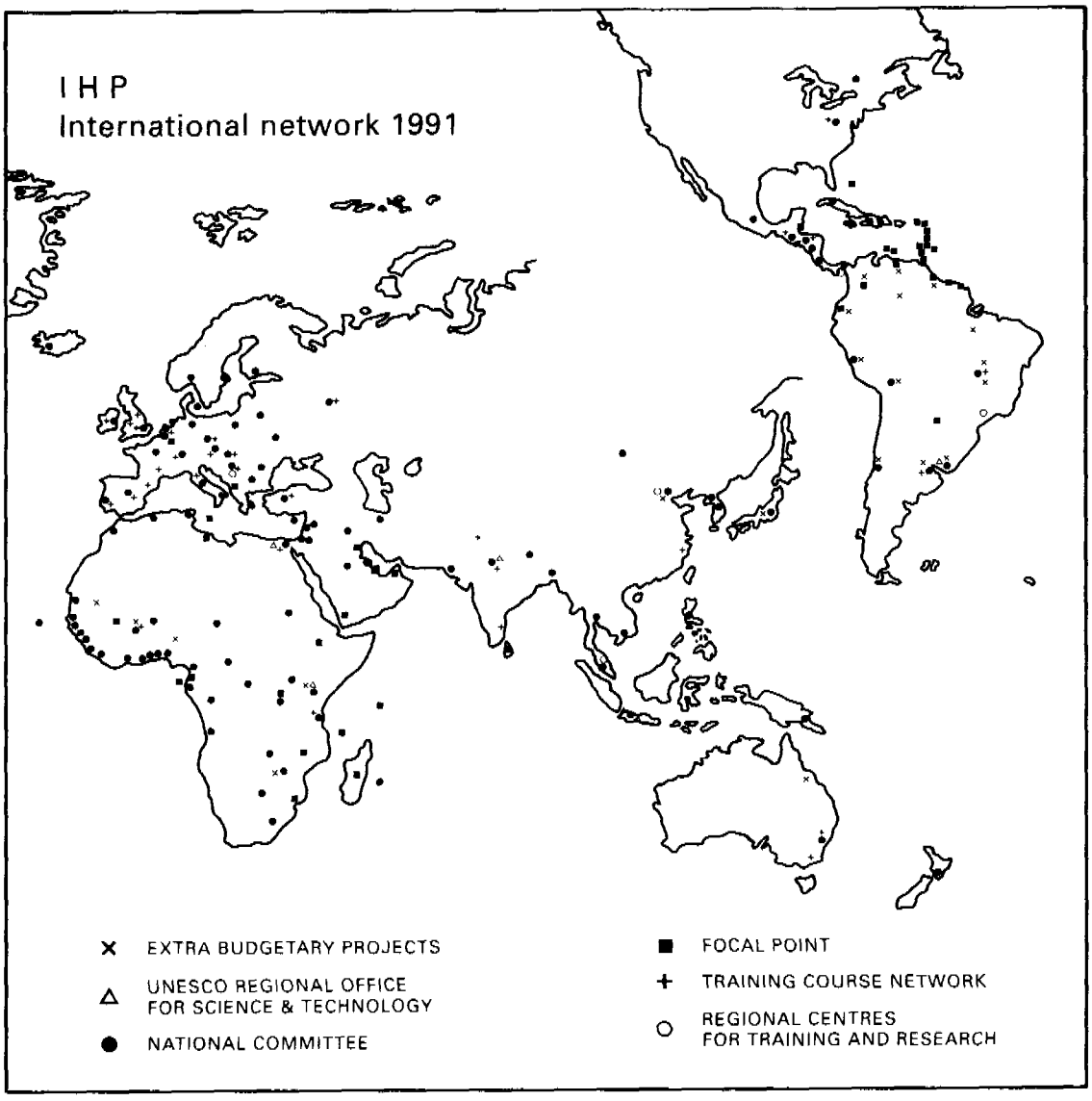
The International Hydrological Programme, among others, is a necessary link in the association of *development* with *knowledge*.

The International Hydrological Programme

Freshwater Resources

UNESCO's International Hydrological Programme (IHP) is at the centre of scientific efforts to improve basic knowledge of the global hydrological cycle and encourage proper water management. The IHP was formed in 1975, as the logical extension of the International Hydrological Decade (1964-74). If the results of 10 years of international research were to be translated into effective programmes to manage finite water resources, an institutional mechanism needed to be created.

The General Conference of UNESCO created an Intergovernmental Council charged with the responsibility to form the IHP, defining its priorities and supervising its programmes. By now, 147 states have set up National Committees, making the IHP's international water network the most comprehensive in the world. The IHP works through and with these National Committees, as well as with non-governmental organizations.



Programme Objectives

The IHP's mandate is to develop the scientific and technological capacity that will permit the rational management of water resources, both in terms of quantity and quality. Central to this mandate is the building up of national capacities to monitor and manage freshwater resources.

During its first decade and a half, the IHP's four principal objectives were:

O To promote a better understanding, through interdisciplinary studies, of how the global hydrological cycle works and how human activities affect it.

O To improve regional and country-level data on available water supplies, both surface and ground water.

O To upgrade the training of hydrologists, particularly in the developing world where there is a growing gap between available resources and human needs.

O To build an international network of hydrological expertise.

During its present phase (1990-95), the IHP is concentrating its efforts on three major objectives:

O To promote hydrological research in a changing environment.

With the likelihood of climate change at a still to be determined level, it is imperative that water specialists begin to design and put in place water management schemes which take a more flexible approach to coping with water resources and their quality. At the same time, scientists working through the IHP are studying the possible effects of storm surges and saltwater intrusion into river estuaries and coastal aquifers as a result of rising sea levels.

O To manage water resources for sustainable development.

In order to meet the escalating water demands of ever-increasing numbers of people - expected to double in many Third World countries over the next decade - it is imperative to develop integrated water management strategies that take account of available resources and future water needs.

To do so, it is necessary to provide improved assessment methodologies for evaluating the current status of freshwater resources, as well as predicting the likely impacts of water development projects. The protection and conservation of water must receive greater priority by national water management authorities.

O To improve education, training, the transfer of knowledge and public information.

In order to better manage and conserve water resources in a changing environment, it is essential that education and training programmes in the fields of hydrology and other related water sciences be upgraded considerably. For the developing world in particular, an army of hydrologists needs to be trained who will be capable of meeting the challenges ahead. At the same time, relevant technologies need to be transferred from North to South, wherever appropriate.

Perhaps even more fundamental is the need to provide relevant information and data on the availability, use and conservation of water to the general public, planners and decision makers, as well as to specialists in related fields.

Future Directions

There is little doubt that in many water-short areas of the world - the arid Middle East, North and sub-Saharian Africa, the Indian subcontinent, parts of Southeast Asia, China, the Caspian and Aral Sea region and the ex-Soviet Union, Mexico and the arid southwest portion of the United States, and large parts of Latin America - the lack of water for agricultural, industrial or even municipal uses will present severe constraints on future economic development. In those developing countries plagued with high population growth rates (particularly in the tropics) the next 10 years will witness a tightening of those constraints unless vigorous and definitie steps are taken now to head off an emerging water crisis.

Because of the urgency of the problems and the over-riding need to develop integrated land-water management schemes, UNESCO's IHP will concentrate its efforts on the conservation and sustainable management of water resources (both surface and ground water) over the course of this decade and beyond. Special attention will be given to the problems and needs of those developing countries already facing severe water shortages.

In line with this focus, the IHP will accelerate its efforts to provide timely and useful information to decision makers, hydrologists, water engineers and other specialist groups, on how best to safeguard and utilize available supplies of fresh water. In this respect the following areas will be stressed:

- Develop and maintain information on the availability of water, globally, regionally and by country.

- Continue to monitor and assess the quality of water available for various purposes.

- Develop a better scientific understanding of how human activities affect, for better or worse, the hydrological cycle and regional and local water balances. Special attention will be paid to the effects of possible climate change on water resources.

- Tailor the information to the specific needs of intended user groups.

In a world beset by dwindling and polluted supplies of fresh water, coupled with the prospect of climatic change on some level, the role played by the IHP will be increasingly important as governments try to fashion realistic national policies to deal with the water needs of growing populations. Managing water for future needs will be even more critical as this decade wears on.

At the same time, it is clear that climate change could have a serious impact on the hydrological cycle. Data and computer models are not yet detailed enough to predict possible impacts in specific areas, but most suggest an alteration in rainfall patterns over wide areas of the globe. Understanding how and where these changes might occur will require an internationally coordinated research effort, using multidisciplinary approaches to problem solving.

Water resource assessment and management is moving away from the engineering-led era into one characterized by *eco-hydrology*. The state of water resources is now linked directly to global, regional and local environmental change. Since water is one of the key elements which makes life on Earth possible, it is imperative that it be managed properly for the benefit of all. In taking a more ecological approach to water resource management, policy makers and resource scientists are able to look at the wider implications of land use practices which contribute to the degradation of water supplies.

By the end of this decade, about one third of the global population will be concentrated in the humid tropics. Given the rapid rate of tropical deforestation in many countries, and resultant erosion of soils and sedimentation of water courses, it is vital that developing countries understand how the loss of vegetation cover affects their hydrological regimes. Regional *water centres* are being established around the humid tropical belt.

The rapid expansion of urban areas is another factor that is affecting water availability and degrading its quality. In cooperation with the UNESCO Man and the Biosphere (MAB) Programme, the water needs of urban areas are being assessed in light of the quantity and quality of existing supplies.



Climate, Climate Change & Hydrology

Anticipated Climate Change

One of the greatest challenges now facing scientists and planners, including hydrologists and water resources engineers, is to answer the following questions:

1. Are human activities causing a global climate change?

2. If so, how strong will these changes be?

3. What impacts might they have on the environment, and consequently on the economical, social and other conditions?

There is growing evidence to suggest that the greenhouse effect and related phenomena linked to the presence of man-made pollutants in the atmosphere may be knocking the earth's delicate climate system out of kilter. But the question remains controversial, even at the scientific level.

There is no doubt about a naturally-occurring greenhouse effect. Carbon dioxide (CO2) and water vapour in the atmosphere act like the glass in a greenhouse, allowing incoming sunlight to reach the earth, but preventing the escape of most of the trapped heat back into space. This phenomenon is what makes the world particularly suitable for human life.

But we know for certain that some human activities are substantially increasing the atmospheric concentrations of greenhouse gases: carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxide. These increases - brought about by mass deforestation, the burning of coal and oil, the use of certain aerosols and coolants - increase the greenhouse effect and could certainly result in an additional warming of the earth's surface.

First Estimates of Global Warming and Sea Level Rise

Global climate models (GCM's) currently forecast a mean temperature increase during the next century of about 0.3°C per decade - greater than that seen during the past 10,000 years. If correct, this would represent an increase of about 1°C by the year 2025 and 3°C before the end of the next century.

Using *business-as-usual assumptions* as defined by the Intergovernmental Panel on Climate Change (IPCC) -- whereby greenhouse gas emissions are considered to remain at today's high levels -- simulation models also predict an average rate of global mean sea level rise of about 6 cm per decade over the next century. A warmer climate would result in the ocean's expanding and would cause the melting of glaciers and polar ice caps. That would have drastic economic and social consequences for the low-lying coastal areas, and in particular for the world's major cities, so many of which are located in those areas. Flooding would occur, navigation would be disrupted and populations displaced.

Required Integrated Response

The afore-mentioned developments are critical in themselves. But they must be viewed as they are connected with the following other developments ongoing on our planet:

1. The human family is rapidly growing, and to meet its basic needs, an increase in economic activity is required, albeit a more equitable and sustainable one.

2. The unprecedented human impact on the natural environment has caused serious degradation of land resources, including desertification and deforestation, air pollution and contamination of freshwater resources, oceans and seas, etc.

3. The scale of the changes and the rapidity with which they are occurring have reached a critical level and the effects could become irreversible in many respects during the next decade, threatening our very survival.

Therefore an urgent, world-wide, integrated and co-ordinated response is required for:

- developing improved scientific bases for climate change predictions, involving all relevant disciplines of natural sciences;

- deriving efficient response strategies which take into account political, economical and social fields.

The ultimate goal must be to achieve a *sustainable and environmentally sound development* as advocated in the Brundtland Report.

Hydrology and Climate Change

Water represents a crucial element in the global climate change process,

- by its linking role through the global hydrological cycle;
- by its basic importance for the environment, particularly for the biosphere and agriculture;
- by its involvement in nearly all issues of economic development and human welfare.

It is for these reasons that a new and deeper understanding of hydrology as a science must be developed, and new ambitious projects and action programmes were initiated, most of them within the framework of the following ongoing international programmes:

- the International Hydrological Programme (IHP) of UNESCO;
- the Operational Hydrological Programme (OHP) of the World Meteorological Organization (WMO)
- the World Climate Programme (WCP) of WMO, and its sub-programmes, especially the World Climate Research Programme (WCRP) and its Global Energy and Water Cycle Experiment (GEWEX), and the World Climate Impacts and Response Strategy Programme (WCIRP) of UNEP;
- the International Geosphere-Biosphere Programme (IGBP) of the International Council of Scientific Unions (ICSU) with its Core-Project on *Biospheric Aspects of the Hydrological Cycle* (BAHC).

UNESCO's IHP contributes to these efforts through studies of hydrological processes and their role in the hydrological cycle, and through the development of *environmentally sound* water resources use and management strategies, as well as through its education and training sub-programme.

In conclusion it must be emphasized that hydrological sciences, as other natural and environmental sciences, are faced with new challenges, and that considerable effort and interdisciplinary collaboration are required to solve the various problems connected with climate change issues. A primary challenge to the Hydrological Science is in this connection to provide a coherent and deeper understanding of the role of water within the planetary-scale environment.



The Humid Tropics Programme



The tropics stretch 42,000 kilometres around the earth at the equator. These mostly warm and humid areas are a treasure house of natural resources. Besides making up twenty-two per cent of the globe's land area, they hold most of the world's 2970 million hectares of uncut forests, most of the unharnessed hydro- electric power, most of the world's genetic riches among their estimated 30 million species of plants and animals. They may also contain vast, untapped supplies of minerals. A large proportion of the world's developing countries lie within the humid tropics and adjacent areas, and estimates suggest that by the year 2000 a third of the global population of more than six billion will inhabit this part of the equatorial belt. As used in this programme, the term ***humid tropics*** is a shorthand expression that includes as well ***other warm humid regions***, though of course the major area is in the humid tropics.

Environmental and social problems in the humid tropics are particularly complex. Nearly all are water-related, caused by population and land-use pressures and the failure to consider water resources management adequately within the context of general development plans for the region.

Until recently, little coordinated attention was paid to studying the hydrology and water resources of the humid tropics. With plentiful rainfall, apparently endless forests, and major rivers - like the Mekong, the Irrawaddy, the Ganges-Brahmaputra of East Asia, the Amazon and its South American tributaries, the Congo and Niger of Africa - dominating the landscape, it didn't seem that water could be a problem.

Now, however, it is understood that there are many water-related problems in the humid tropics, often caused by the great variability of weather conditions. The irregular distribution of water in time and space leads to extreme conditions such as drought or floods. Sudden storms are common - as are cyclones, hurricanes, monsoons, typhoons - and in their wake come destruction of life and property, severe erosion, the silting up of waterways, pollution and disease.

Coordinated cooperative studies of interrelationships are the key to understanding and rational management.

But the interrelationships between population growth, wholesale forest conversion, agricultural practices and water resources are exceedingly intricate. They also have global significance: human activities in the humid tropics could play a crucial role in world climate change and, specifically, in the collection of so-called greenhouse gases that are trapping heat in the upper atmosphere and may lead to a global warming. Whether in liquid or vapour form the movement of water in these regions almost certainly affects world climate patterns.

Scientific understanding of interactions between land, vegetation, oceans, atmosphere and human actions is one of the IHP's priorities in the humid tropics. By definition, the problems are multidisciplinary, and the IHP encourages an integrated approach in studying the various links and linkages that make up the world water cycle. This is accomplished by globally and regionally coordinated cooperative efforts of networks of experts and organizations, facilitated by the establishment of *regional administrative centres.*

Together with other UNESCO divisions and with outside agencies and institutions, IHP works to support projects throughout the humid tropics. Whether dealing with irrigation management, water balance studies, data analysis techniques, pollution control, environmental impact assessment or curriculum development, the approach is always the same: understand the underlying processes, and then find ways of applying this learning so that it will be understood that water resources are a critical part of the larger environmental picture.

Education & Training

The Education and Training of the International Hydrological Programme is enjoying an increased popularity and hydrologists trained under the IHP umbrella can be found world-wide.

The Education and Training activities started with the very inception of the International Hydrological Decade (1965-74) with the creation of the UNESCO-sponsored postgraduate courses. By now, 32 courses in all continents are training annually more than 500 postgraduates. Besides establishing the network of courses, a special benefit was the compilation of a number of books helping course organizers in the design of the curricula and syllabi, in the selection of appropriate textbooks, and in applying suitable teaching aids, both indoor and outdoor.

While the IHP efforts for postgraduate training are considered to have reached a certain maturity, very little has been done at undergraduate university level. The present phase of the IHP (1990-1995) foresees the compilation of a guide on curricula and syllabi in hydrology for university education in fields as diverse as civil engineering, agriculture, physics, chemistry, geology and geography, with various degrees of intensity, ranging from programmes where hydrology is only an auxiliary subject, to where it forms an essential part up to full-fledged instruction. Another important activity is the creation of cooperative agreements between universities in developing and industrialized countries.

The training of hydrology technicians is an extremely complex subject, as the level of technicians, their hydrological knowledge, the modalities of instruction and the purpose of training vary from country to country, from service to service, and from case to case. Such diversity for a long time has led to some reluctance at embarking in the production of educational material for technician training.

Earlier attempts by the IHP to prepare material for the education of technicians were not altogether successful. UNESCO, therefore, started from the other end and organized or co-organized training courses at a regional level, particularly in Africa. This was perhaps only *a drop on a hot stone*, but UNESCO thus gained much experience and acquired an insight into the problems of technician training.

The result has been a number of activities, at three levels:

1. As an immediate outcome, the lecture notes of the teachers were collected, edited and published. A forerunner of 1977 was replaced by a four-volume issue in 1988 which is in turn being revised.
2. Rather than training technicians it is believed to be more effective and less costly to train teachers and supervisors of technicians in order to enable them to transfer their knowledge. Two publications to his end have been issued, one containing curricula and syllabi as well as course models, and the other containing a set of course material for courses of supervisors.
3. On the basis of the above work, an IHP working group ventured to analyze the various conditions of technician training and to elaborate guidelines. A publication is being compiled providing guidance material for the assessment of training needs and facilities, on educational systems for higher hydrological technicians, and on organizational aspects of holding training courses.

While these programmes for technicians, university students and postgraduates are designed for persons more or less prior to, or in the starting phase of, their professional career, a great need for continuing education has been identified. A special working group is elaborating guidelines to this end.

The IHP not only provides material for hydrologists at all levels, but also includes special components for the hydrological education at secondary school level, for the general public and for planners, politicians and decision-makers. This programme can only serve its purpose if it is conducted in close cooperation with the Member States in order to cope with the very different hydrological, climatic, socio-economic and cultural conditions of each country and taking into account the need for using local languages.



REGIONAL ACTIVITIES

AFRICA

In the field of water resources, the main problems arising in Africa are related to capacity building, water resources assessment and their proper management to meet the needs of agriculture and the population, further studies on the arid zones, and also on the humid tropic regions.

Many activities relating to these problems have been undertaken by the Regional Office for Science and Technology for Africa (ROSTA), and other activities are being prepared.

• **International seminar on hydrology in the *African arid zones* (February 1989)**: This seminar reviewed the state-of-the-art in hydrology and hydrogeology in the arid and semi-arid zones of Africa. 15 African countries presented national reports and key papers on main items were discussed. The participants attended several workshops devoted to the problems faced in the arid regions, and made recommendations for further studies and research to be undertaken. These recommendations constitute the framework of UNESCO's activities in this region.

• **Water resources assessment activities**: A cooperative action was developped by UNESCO and WMO in 1991 to assess the present situation of African hydrological services in charge of water resources. Consultants visited selected countries and identified the main problems. A report was prepared underlining the poor situation of these services, and proposing solutions for their improvement.

This document will be included in a global report to be presented by UNESCO and WMO at the United Nations Conference on Environment and Development (UNCED - 1992).

• **Hydrogeological map of Africa**: UNESCO is associated with the African Organization of Mapping and Remote-Sensing (OACT) and other organizations in the implementation of the hydrogeological map of Africa at scale 1/5 million. This map is based on the international legend of hydrogeological maps prepared by UNESCO. Work started in 1983 and was concluded after several workshops at a meeting held in Nairobi in March 1991, with the presentation of the 5 sheets prepared and the legend. During this meeting a new mapping programme was considered for Africa, including in particular a Water Resources Map directed to decision-makers and non-specialists.

• **FRIEND project**: FRIEND (Flow Regimes from International Experimental and Network Data Sets) is one of the IHP-IV projects aimed at the study of flow regimes at regional level. It started in Western Europe and it is UNESCO's intention to extend it around the world in order to develop the study of flow regimes under different climatic conditions, and introduce the modern technologies used. For Africa, it is a good opportunity to improve the scientific level of African Hydrologists together with the national databanks. A first meeting was held in Harare in February 1991 for the Southern African region, bringing together representatives from 9 African countries of SADCC (Southern Africa Development Coordination). Plans were established for the development of this project. Another meeting is planned in 1992 for the Western African region, with the contribution of CIEH (Inter-African Committee for Hydraulic Studies).

• **Comprehensive and comparative study of the Great Lakes of Africa**: This activity is being developed under IHP-IV project H-5-5. Its purpose is to bring together the knowledge gathered on the hydrology and limnology of the great lakes of Africa, by the preparation of monographs and a comprehensive report on their similarities and differences. This project will be developed in cooperation with SIL (International Limnological Society) and IDEAL (International Decade for the East African Lakes) which held the first meeting of its African Committee in Nairobi in September 1991.

• **Training activities and strengthening IHP National Committees**: UNESCO is sponsoring and supporting two courses in Africa -

- Ouagadougou (Burkina Faso): With particular emphasis on mobilization of water resources and agricultural hydraulics;
- Dar-es-Salaam (Tanzania): Water resources engineering.

ROSTA is also contributing to strengthen the activities of IHP National Committees. In November 1990 the IHP National Committee of Nigeria organized its first biennial national hydrology symposium in Maiduguri on the theme *hydrology in national development.*

One important event is foreseen in 1993 in Addis Ababa: the ***International Conference on the Hydrological Services in Africa*** to be convened by UNESCO and WMO. The objective of this conference is to identify the main problems faced in the carrying out of hydrological activities and the preparation of a Plan of Action to improve the situation.

ARAB STATES

The Arab region is situated mainly in the arid zone where groundwater problems are predominant, even if surface water still plays a key role at the sub-regional level, particularly in the Maghreb countries, or in relation with the large rivers outside the region (Nile, Euphrate).

Assessment and sound management of water resources to meet the needs of a fast growing population are the main targets of the countries involved.

For this purpose, UNESCO conducted several activities in relation with IHP.

• **Major regional project on the rational use and conservation of water resources in rural areas with emphasis on traditional water works**: Launched by the Conference of Ministers of the Arab States on the Application of Science & Technology to Development (CASTARAB), the project was implemented through regional meetings and production of national reports. A final document was established with inventory, assessment and analysis of the traditional water systems in the Arab States and published in Arabic.

• **Hydrogeological map of the Arab countries**: This map was prepared in two sheets, at scale 1/5 million with the contribution of the countries concerned, and the collaboration of ACSAD (Arab Centre for the Study of Arid Zones and Dry Lands) and ALECSO (Arab League Educational, Cultural and Scientific Organization). The sheets were published in 1988 and distributed to interested countries.

A new mapping activity is being developped: the ***Water resources atlas of the Arab Region.*** A project document was prepared in order to seek financial support before launching the project.

• **An assessment of water resources in the Arab region** was carried out, resulting in figures and information on the present state and prediction of future water needs of each country.

• **Training activities**: In addition to the regular course sponsored by UNESCO in Cairo on ***environmental hydrology for arid and semi-arid zones***, several training courses were organized in order to introduce modern technologies for the proper assessment of water resources. The fields of interest concern:

- ***Simulation techniques in hydrogeology and surface hydrology*** : several consecutive courses organized in Tunis (1987, 1988, 1989) and one session in Damascus (1991);
- ***Management of water resources in expanding urban areas*** (Damascus, 1987);
- ***Technician training course on the technology of hydrology*** (3 sessions in Damascus).

Other training activities are being conducted by the Regional Office for Science and Technology for the Arab States (ROSTAS) in relation with the *use of the Geographic Information System (GIS) in water resources activities*: 2 pilot projects have been contracted with Sudan and Syria; in 1993, a *regional hydrological network utilizing GIS* is expected to be launched.

• **Seminars and Conferences**: With the cooperation of ACSAD and ALECSO (in particular the Arab Regional Committee for IHP), several meetings were organized in relation with the following topics:

- Problems related to deep aquifer exploitation (Tunis, September 1985);
- Environmental impact of major water projects in the Arab region (Tunis, May 1988);
- Regional workshop on water resources planning and management in arid and semi-arid zones (Tunis, March 1990 - in the framework of IHP-III);
- International seminar on the application of mathematical modelling to changes in water quality (Tunis, May 1990 - in the framework of IHP-III);
- Efficient water use and conservation is a must for survival (Tunis, May 1991).

Due to the rapid population growth, Arabic countries are threatened by water shortage in the forthcoming years. The main problems to solve are related to the assessment of available water resources, particularly from major deep aquifers with fossil water and the management of shared water systems. The results of the ***Middle East Water Summit*** for the establishment of a water security framework for the region, foreseen to be held in Istanbul in 1992, will also be taken into consideration.

LATIN AMERICA AND THE CARIBBEAN

In the framework of the International Hydrological Programme and bearing in mind the problems faced by the region in connection with: *hydrology in a changing environment, water resources management for sustainable development, and education, training and public information*, it was necessary to concentrate actions and efforts on the basis of manifest needs of Member States expressed at meetings of IHP National Committees and of other established information mechanisms between Member States and the Regional Office.

The main objective of the IHP in the region can be summarized as follows: execution of integrated and multiobjective water resources planning based on an assessment of the resource and development and adaptation of environmentally sound techniques for its rational use. A brief outline of projects follows:

Water Resources Assessment

The subprogramme has been divided into 4 projects dealing with the different assessment components.

• **Surface water balance**: The project started with the preparation of a methodological guide for elaboration of water balances in the region. Subsequently each country initiated the project at national level. Two workshops for evaluation of progress in surface water balances in South and Central America and Mexico were held in La Paz, Bolivia (1987) and Panama (1988).

Project documents on the *Surface water balance of the Amazon basin* and on *Geomorphological identification of high mountain sub-basins of the Amazon river basin, as support to the water balance through the use of PCs* have been prepared, then submitted to funding agencies for discussion.

• **Hydrogeological map**: The project started with the definition of standards and legends. Five workshops were held for evaluation of progress.

In South America all the countries have concluded preparation of their maps and descriptive memory. They are now in the fourth phase (publication).

In Central American Isthmus and Mexico, three countries are in the first phase (data collection) and one is in the third phase (descriptive memory).

In the Caribbean, 24 countries or dependent territories are in the third phase. Four are in the fourth phase (publication).

• **Diagnosis of water resources assessment activities**: The project started with the preparation by UNESCO and WMO of a handbook for national evaluation. It has been implemented in one country and is in execution in six others. A regional cooperation programme has been defined in the framework of the UNDP V Programming Cycle with UNESCO/WMO sponsoring.

Development of hydrological processes and their techniques

The subprogramme has been divided into five projects:

• **Hydrology of the Andean region**: The main activities are: studies on evaporation, evapotranspiration, sediment transport, development of specific mathematical models and preparation of standards in hydraulics and hydrology.

• **Hydrology and water resources of the humid tropics**: The project, which is a major effort of the IHP, is carried out with participation of all countries in the humid tropics. The most relevant results are the establishment of the subcentre on urban drainage for the humid tropics in Sao Paulo, Brazil and the foreseen establishment in 1992 of the Water Centre for the Humid Tropics of Latin America and the Caribbean (CATHALAC) -- for coordinated cooperative studies and technology transfer activities in the humid tropics. Specific projects on land use changes and their influences on the hydrological cycle in the Amazon basin are being executed with UNESCO/UNEP sponsoring.

• **Hydrology of flatlands**: Two colloquia have been organized and the proceedings of research projects carried out in South America are under preparation.

• **Hydrology of arid and semi-arid regions**: The project is carried out with participation of countries with altiplano and desertic zones, their main research subjects being: water resources management, water collection techniques and studies on behaviour of the hydrological cycle.

• **Hydrology of snow and ice**: Two workshops have been held during which glacier research, a training course and three working groups were defined, and participation in an international IHP-IV working group was established.

Major Regional Project on Use and Conservation of Water Resources in Rural Areas of Latin America and the Caribbean (MRP/LAC)

The project is divided into three categories and subprojects:

• **Development of water techniques with specific purposes**: 133 projects have been implemented in 23 countries of the region in the areas of water management, irrigation and drainage, drinking water and sanitation, education and dissemination, rural energy, rural hydroeconomy and integrated development.

• **Development of integrated pilot projects with water as the central element**: 15 projects are being implemented in 10 countries of the region.

• **Development projects**: On the basis of pilot projects, 4 countries are executing 7 extrabudgetary projects by direct administration.

Education and Training

The subprogramme has been divided into three groups:

• **Short courses**: Five courses dealing with Latin American and Caribbean IHP themes were held with duration ranging from 20 hours/course to 240 hours/course.

• **Postgraduate courses (M.Sc. and Ph.D.)**: Two postgraduate courses are given in Mexico.

• **Network of postgraduate courses in hydrology and water resources**: A meeting for coordination and evaluation is being organized for directors of courses sponsored in the region by UNESCO and other cooperation agencies.

Clearing-House and Publications in Hydrology and Water Resources

The project undertakes six main activities:

- Publication of scientific documents
- Production of methodological guides
- Publication of IHP Information Bulletin in Spanish
- Production of audiovisual programmes
- Dissemination of information on possible funding sources
- Dissemination of popularized documents from UNESCO and other organizations.

Network of Hydraulics and Hydrology Research Centres and Specialists of the Region

The project executes the following activities and keeps updated networks in:

- Directory of hydraulics and hydrology research centres
- Electronic network of computerized scientific service
- Technical cooperation among research centers
- Directory of hydrologists and hydrogeologists of the region.

Identification, Preparation, Funding, Execution, Monitoring and Evaluation of Development Projects

This activity is implemented on the basis of an action plan coinciding with the programming cycle of UNDP, UNEP, WMO, FAO, UNICEF, GTZ (German Technical Cooperation Agency), ORSTOM (French Scientific Research Institute for Development in Cooperation) and non-governmental organizations, with the objective of providing technical and financial assistance to Member States in the region.

SOUTH & CENTRAL ASIA

In many countries of South Central Asia, water is both worshipped for quenching thirst of millions and irrigating lands that feed an ever increasing population, and cursed for causing widespread flooding and misery. This precious resource is unevenly distributed, either there is too much of it or none at all !

A host of pressing and dramatic problems arising out of an enormous population and diverse geographical settings are at the heart of water management issues. South Central Asia has a varied topography encompassing high snow-covered mountains, low lying plains, a very long coastal line and coastal plains, large deserts, deltas and tropical forests. Each of these has unique problems of Water Resources Management. Storage of flood waters, too, presents difficulties of its own: these waters carry large volumes of silt and detritus. Suitable dam sites do not exist in the plains and construction costs are high in the mountains. High evaporation rates and soil erosion/ sedimentation processes pose many engineering problems. Because over-year storage is both expensive and uneconomic to build, dams have to be multi-purpose, i.e. for the generation of hydroelectricity, irrigation and water supply, etc. Unfortunately, the low demand for electricity occurs not in the vicinity of production but in the neighbouring countries, thus adding to the transmission costs. In the absence of water sharing agreements, the supply and demand situation cannot be assessed, unless there is economic and political cooperation.

In the past, unplanned development of water resources has lead to problems of salinity and water logging, with negative effect on agricultural productivity. In the South and Central Asia region the ever growing urban agglomerations have given rise to severe hydrological problems hitherto unexperienced anywhere. The UNESCO Regional Office for Science and Technology for South and Central Asia (ROSTSCA) has regularly carried out regional activities to draw attention to these problems.

ROSTSCA had organized a *Workshop on Mountain Hydrology* focussing on the Himalayas, resulting in the setting up of a Regional Working Group. It is now working out a proposal to launch a *Regional Project on the Himalayan Hydrology*. It is expected that by controlling snow-melt releases, some of the water supply problems in the plains during the dry season could be solved.

The Ganges and Brahmaputra rivers have formed one of the largest deltas in the world, which requires in-depth studies for understanding the physical processes involved to minimize damages in the future.

The recent cyclone in Bangladesh and the resultant storm surges causes collosal loss of human lives and economic damage. The Coastal Zone is an area of intense economic activity. In recognization of this, ROSTSCA is planning to organize an *International Workshop on Coastal Zone Management* which will address all the aspects, including global warming.

Rational Management of Water Resources is crucial to the future survival and development of South Central Asia for which trained manpower is essential. The Post-Graduate Hydrology Courses at Roorkee, Madras and Lahore, which have been established with UNESCO's assistance, have contributed substantially to this end.

To meet the requirements of trained technicians, ROSTSCA has regularly organized training courses in Kathmandu and Lahore. A series of courses is being held in Dhaka.

To feed the growing population and meet their agricultural and industrial requirements, the countries of the region have to increase their water resources development activities. This entails additional use of limited water resources. Extensive use/reuse of available water resources often leads to increased pollution. Hence, prevention of pollution and its control have acquired great importance to sustain present development and ensure future survival.

In most countries of the region, assessment activities and development of water resources have received low priority due to economic conditions. As a result, water resources development projects have been constructed with inadequate planning leading to uneconomic operation.

ROSTSCA assists the Member States in assessing their available water resources and meeting their trained manpower requirements; supports national/regional activities; promotes the exchange of ideas and the introduction of new technologies through the services of consultants.

SOUTHEAST ASIA & THE PACIFIC

The Southeast Asia and Pacific region lies largely in the ***Humid Tropics***, where the natural state is characterized by highly variable conditions (river flow, soil types), extreme meteorological phenomena (very high precipitation rates, cyclones), rapidly changing socio-economic conditions (population, economic development, urbanization, tourism) and the fact that it is mainly composed of developing countries which lack sufficient and reliable hydrological data. In these characteristics, it is markedly different from the temperate regions for which most of the management techniques in water resources have been developed. The fast growing population and extensive land-use changes are causing rising demands for irrigation, domestic and industrial water. Ground and surface water pollution, and erosion-related problems due to the inappropriate utilization of land are at the same time reducing the availability of water resources.

So far, little emphasis has been given to the study of the processes involved in the hydrologic cycle in these environments so that management strategies are often based on inadequate knowledge. A comprehensive approach is a first step to the need to enhance the capacity of the countries of Southeast Asia and the Pacific to manage their water resources in a manner which will ensure that desired levels of development can be sustained.

UNESCO, recognizing the need to address the problems in the humid tropics, emphasized these aspects in its International Hydrological Programme (IHP) phases III & IV and organized an International Colloquium on *Development of Hydrologic and Water Management Strategies in the Humid Tropics*, Townsville, Australia, July 1989. This Colloquium brought together specialists from the humid tropic zone from around the globe to identify ways in which the problems of this zone might be addressed through an international programme. In a regional response, a one-week Seminar on Tropical Forest Hydrology was held in Malaysia in September 1989.

From the interest generated by these two events, the UNESCO Regional Office for Science and Technology for Southeast Asia (ROSTSEA) took the initiative to convene a *Meeting of National Committees for the IHP and the Humid Tropics Programme* among member countries in the region. This meeting took place in Kuala Lumpur in June 1990. The countries present at this meeting identified projects to address hydrology related problems and issues, which were to their view the most urgent, and recommended the establishment of a regional Centre to coordinate activities in these projects and this region's contribution to the global Humid Tropics Programme.

During the past phases of IHP, many seminars and workshops were conducted, so that the picture of what is needed is more or less complete. Therefore, the emphasis of the Humid Tropics Programme in this region is now shifted to research projects. The research will be carried out simultaneously at several sites and one of the tasks of the Centre will be to coordinate the cooperative activities. In this way duplication is avoided. Another important aspect will be the dissemination and sharing of information so that the more advanced nations will be able to help the weaker ones. The research projects will be finalized by holding a regional workshop, which all countries will be invited to attend, even if they did not directly participate in the activity. In this way maximum benefit from the obtained experience will be ensured.

NON GOVERNMENTAL ORGANIZATIONS AND THE IHP

International Association of Hydrological Sciences (IAHS)

The International Association of Hydrological Sciences is the oldest international non-governmental body dealing with hydrology and water resources. It was founded in 1922, incorporating the International Commission of Glaciers, to bring together individual hydrologists to promote the sciences that involved them. The Association is a constituent body of the International Union of Geodesy and Geophysics (IUGG) which is itself a member of the International Council of Scientific Unions (ICSU).

IAHS is governed by a General Assembly formed by the delegates from each country adhering to IAHS through IUGG. Every four years, the General Assembly elects the IAHS Bureau Officers: the President, three Vice Presidents, the Secretary General, the Treasurer and the Editor. The Assembly also elects the officers of the six commissions and three committees; these bodies are the International Commissions on Surface Water (ICSW); on Groundwater (ICGW); on Continental Erosion (ICCE); on Snow and Ice (ICSI); on Water Quality (ICWQ) and on Water Resources Systems (ICWRS) and the International Committees on Remote Sensing and Data Transmission (ICRSDT); on Atmosphere-Soil-Vegetation Relations (ICASVR), and on Tracers (ICT). From time to time ad hoc Working Parties are established.

The aims of IAHS are the promotion of the study of hydrology, the provision of means for discussion, comparison and publication of results, and the initiation and coordination of research that requires international cooperation. To fulfil these aims the Association organizes general assemblies, symposia and workshops in various parts of the world, publishes the proceedings of these meetings and special monographs, publishes a scientific journal, contributes to a wide range of international initiatives and generally fosters activities and collaboration in hydrology and water resources.

It is important to emphasize the long standing cooperation between the Association and the International Governmental Organizations, in particular with UNESCO. This cooperation dates back to the early sixties when the basis was created for the International Hydrological Decade (IHD). In the course of time UNESCO and IAHS have jointly organized many symposia and workshops and UNESCO has also strongly supported the Scientific and General Assemblies of the Association. The proceedings of the meetings have often been jointly published either in the UNESCO Series *Studies and Reports in Hydrology* or in the *Red Book* series of IAHS. Some of the titles include: Surface Water and Groundwater Interactions, Scientific Basis for Water Resources Management, and Hydrology of Mountainous Areas. Some other areas where the two organizations have been and still are closely cooperating include: snow, ice and glaciers; land subsidence; human influence on the hydrological cycle and the inventory of very large/maximum floods. The activities of the IAHS/UNESCO Panel on Hydrological Education should also be noted. That Panel published an important report on the Education of Hydrologists in December 1990.

Some of the IAHS activities within IHP-IV are:

- The IAHS Core Group for Project H-1-1: *Scientific aspects of the interface processes of water transport through the atmosphere-soil-vegetation system at different scales*;
- The implementation of Project M-3-1: *Hydro-ecological models and biomonitoring for environmental evaluation and prediction of impacts*;
- The activities on Projects H-4-1 and H-4-2 on *the effect of large scale snow and ice covers on global and regional precipitation and long-term variations in water storage.*

Current IAHS activities related to WMO's research programme are mainly focussing on the

Operational Hydrological Programme (OHP) and the World Climate Research Programme (WCRP). Representatives of IAHS are participating in the meetings of the various OHP working groups, where a special representative for WCP-Water has been nominated. Another programme of great interest to the Association is the Global Energy and Water Experiment (GEWEX). An IAHS/WMO working group on this programme has been established. Most attention is focussed on plans for the GEWEX Continental-Scale International Project (GCIP) which is to be undertaken during the 90's and is based on the Mississippi River Basin. Another project within GEWEX with a considerable IAHS input is on the measurement and estimation of areal precipitation.

A further international research programme of great interest to IAHS is the International Geosphere-Biosphere (IGBP). An IAHS working group for IGBP was set up which has prepared a number of proposals for cooperation. The Association has also participated in the organization of the IGBP/IAHS/IHP workshop on Plant-water interactions in large-scale hydro-ecological modelling.

The following publications are regularly issued by IAHS:

- Hydrological Sciences Journal (six times a year)
- Proceedings of Symposia (six to twelve reports a year)
- Monographs and Reports (series started in 1989)
- IAHS Yearbook (published every four years)
- Catalogue of IAHS Publications (published every two years)
- IAHS Newsletter (three times a year).

The Association makes an annual award, jointly with UNESCO and WMO, of a silver medal known as the ***International Hydrology Prize*** to distinguished hydrologists. An award known as the ***Tison Award*** is to be made annually to a young hydrologist on the best paper published in one of the publications of the IAHS.

The IAHS Secretariat is located at: *TNO Committee on Hydrological Research, P.O. Box 6067, 2600 JA Delft, The Netherlands. Telephone: +31 15 69 69 00 / Fax: +31 15 56 48 01 / Telex: 38071 ZPTNO NL.*

International Association of Hydrogeologists (IAH)

The International Association of Hydrogeologists was founded in 1952 by a group of hydrogeologists attending the International Geological Congress in Algiers. The first statutes were confirmed at the International Geological Congress in Mexico City in 1956.

IAH has been established as a non-governmental, non-profit making, scientific and educational organization established to encourage the exchange of hydrogeological information and to advance the science and study of groundwater and aquifers. It is an affiliated organization of the International Union of Geological Sciences. Although the formal status of IAH is with the geological community, it is very firmly linked also to the family of international organizations working in the field of water. This is manifested in two ways, by the participation of IAH in COWAR, the joint committee of ICSU (International Council of Scientific Unions) and UITA (Union of International Technical Associations) on water issues and through its continuing and active participation in the International Hydrological Programme (IHP). The primary source of funding for the work of IAH comes from its own members. The second largest source is the support provided in respect of IAH participation in the IHP.

The objectives of IAH are to:

- ***Promote*** international cooperation among groundwater scientists and engineers;
- ***Sponsor*** international and national technical meetings and symposia on hydrogeology;
- ***Publish*** hydrogeological reports, maps and memoirs;
- ***Establish*** study commissions and working groups to report on special topics;
- ***Cooperate*** with other national and international scientific and technical organizations in related fields;

- ***Encourage*** the worldwide application of hydrogeological skills to the benefit of mankind.

Seven commissions have been established to address specialist topics:

- Commission on Hydrogeological Maps
- Commission on Hydrogeology of Karst
- Commission on Mineral and Thermal Waters
- Commission on the Hydrogeology of Volcanic Terrains
- Commission on Groundwater Protection
- Commission on Hydrogeology and Hazardous Wastes
- Burdon Commission (on Hydrogeology in Developing Nations).

In addition, there are two current working groups on New Methods of Instrumentation and on the History of Hydrogeology.

Many of the Commissions projects have been conducted directly in support of IHP. Recent examples have been:

- Application of geophysical methods to groundwater exploration;
- Hydrogeology and management of hazardous waste by deep-well disposal;
- Manual of groundwater recharge estimation;
- Integrated land use planning and groundwater protection management;
- Hydrogeological mapping of Europe;
- Mapping of groundwater vulnerability;
- Groundwater recharge in semi-arid areas.

Much of the output of IHP projects have been published within the two publication series of IAH produced in conjunction with Heise Verlag of Germany:

- *International Contributions to Hydrogeology* (13 volumes to date) publishes the work of IAH Commissions and working groups
- *Selected Publications* (2 volumes to date) publishes selected papers from IAH Congresses.

Copies from these book series are supplied to all members as part of their annual subscription. In addition, IAH publishes a twice-yearly newsletter, and in 1991 began the publication of the *Journal of Applied Hydrogeology.*

IAH holds an annual Congress on a specific technical theme. Many of these themes are chosen to complement IHP projects and IAH is grateful for the support of UNESCO through IHP in contributing to the attendance of groundwater scientists from developing nations to these congresses.

The IAH Secretariat is located at: *National Rivers Authority, 550 Streetsbrook Road, Solihull, West Midlands, B91 1QT, U.K.. Telephone: +44 21 711 5802 / Fax: +44 21 711 2794 / Telex: 336748 NRAST G.*

International Water Resources Association (IWRA)

The International Water Resources Association is a multidisciplinary, international professional organization dedicated to the worldwide advancement of water resources knowledge and technology. It was founded in 1972 as a people-to-people effort to promote communication, collaboration, education, and support among nations for water resources programmes. IWRA's founder, the renowned hydrologist Ven Te Chow, believed that the wise management of the world's water supplies required an understanding of the complex physical, economic, social, and ecological aspects of water resources issues. IWRA was established to serve as a channel for information and as an exchange to promote such understanding.

Today, as in 1972, IWRA fulfills a critical worldwide need for interdisciplinary information on water resources. When IWRA was established, the missions of existing international water organizations were directed toward specific scientific and technical aspects of hydrology, hydrogeology, water supply, irrigation, navigation, and water pollution. None of them focused on the integrated use and management of water resources, which as the world is coming to realize, is necessary for sustainable development.

IWRA initiated the trend towards interdisciplinary communication in water resources and is committed to its furtherance. The association publishes a quarterly journal that addresses both the technical and the nontechnical audience in referred papers covering the socio-economic, ecological, and environmental impacts of water-related problems worldwide. IWRA also sponsors or cosponsors more than a dozen international conferences, workshops, and symposia each year. In 1990, IWRA will be active in conferences in Mexico, Spain, the United States, Canada, Brazil, the Netherlands, China, and Thailand. Every three years, it hosts a World Congress that attracts nearly a thousand attendees from around the world for a week of multidisciplinary, state-of-the-art presentations on current issues in water resources management and technology. The next World Congress is scheduled for October 1994 in Egypt. Whenever possible, IWRA works with existing international organizations, such as the United Nations agencies, and governmental institutions within countries on activities that support water resources programmes.

In 1991, IWRA assisted IHP in printing French, Spanish, and English versions of IHP's report on water issues in the humid tropics. The report emanated from an international colloquium on this subject that was organized by IHP and IWRA, along with numerous other international organizations. This colloquium was one of many similar projects IWRA has worked on with IHP.

For the past four years, IWRA has also produced and distributed to United Nations agencies and nine major nongovernmental water organizations a quarterly calendar of professional meetings, including proposed meetings. The purpose of the calendar is to reduce unnecessary duplication of activities within the different organizations and to coordinate the exchange of scientific and technical information among them. The programme will be taken over by UNESCO/IHP so that the calendar can be more widely distributed.

IWRA's Executive Director serves on the U.S. National Committee for the IHP that allocates limited U.S. funds to American scientists who are cooperating on UNESCO's IHP programmes. Funds for their activities have been distributed by IWRA on behalf of the U.S. Geological Survey, which administers the programme.

The address of IWRA is: *The Executive Director, IWRA, 205 North Mathews Avenue, Urbana, Illinois 61801, U.S.A. Telephone: 217 333 6275 / Fax: 217 244 6633 / Telex: 5101011969 UI TELCOM URUD.*

International Association for Hydraulic Research (IAHR)

Within the family of water-related associations the International Association for Hydraulic Research represents the platform for basic and applied water sciences and makes itself subservient to all sectors of hydraulic and environmental engineering, water resources management and industrial process engineering. IAHR was founded in 1935 as a worldwide independent organization of scientists, researchers and engineers interested or working in fields to develop hydraulics, and to secure its practical application in all relevant fields. IAHR provides the ambiance to stimulate and promote both basic and applied research and strive to have science and technology contribute to safe design of engineering works; optimal world water management and effective industrial processes. Through its members, IAHR accomplishes its goals by a wide variety of activities, establishing a network for the hydraulic research community. Keywords are: *congresses; specialty conferences; workshops; short courses; Journal of Hydraulic Research; monographs; proceedings; participation in international programmes of UNESCO, WMO, IDNDR (International Decade for Natural Disaster Reduction) and UNIDO (UN Industrial Development Organization); cooperation with other water-related (inter)national organizations.*

For many years IAHR has had close links with the IHP Programme. Over the past four years IAHR and IHP have successfully cooperated in sending out four distinguished lecturers to institutes of research or higher learning (preferably in developing countries) who applied for an IAHR/IHP lecturer in a specific field. This feature, established as the IAHR/IHP

Lecturer Award is to honour the awardee and to help the applying institute to initiate or improve its curricula on modern hydraulic engineering, hydraulic research or water resources development.

In its interaction with UNESCO, IAHR has co-sponsored lectureships, workshops, seminars and symposia. Many of its members are linked to the national committees of IHP and other global programmes. Together with UNESCO's Division of Water Sciences, IAHR also recommended a number of experts for membership on IHP-IV projects.

It is IAHR's strong wish to make available every knowledge from within the organization to help solve global water problems. Furthermore it strives for a real worldwide representation on its membership because only then is a wide exchange and transfer of this knowledge possible. This will be achieved by a fee structure which is based on the GNP of a country. Moreover, the Third World Membership Fund, sponsored by IAHR members, facilitates colleagues from Third World countries to become members. Student participation in IAHR is encouraged by special student membership rates, student paper competitions and awards, and young scientists meetings.

Since the present world developments and the need for sustainable development are pressing more and more on nature and mankind in general, and on the responsibility of water scientists in particular, it is of primary importance that national, international organizations and associations active in the field of water sciences join forces and cooperate in every possible way to meet the societal needs of present and future generations. On that basis IAHR participates actively in COWAR (ICSU/IUTA Committee on Water Research) and develops publications on the partnership of hydraulicians and ecologists in sustainable development.

The IAHR Secretariat is located in *Delft, the Netherlands, P.O. Box 177, NL 2600 MH Delft. Telephone: 31 15 569353 / Fax: 31 15 619674 / Telex: 38 176 HYDEL NL.*