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WORLD METEOROLOGICAL ORGANIZATION



INTER-AMERICAN DEVELOPMENT BANK

**CONFERENCE ON WATER RESOURCES ASSESSMENT AND MANAGEMENT
STRATEGIES IN LATIN AMERICA AND THE CARIBBEAN**

San José, Costa Rica, 6 - 11 May 1996

REPORT OF THE CONFERENCE

WMO - Geneva - Switzerland
June 1996

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ACKNOWLEDGMENT

Appreciation is expressed for the financial contributions for the Conference which were received from Germany, Switzerland and UNESCO. Thanks are also due to the various agencies, regional bodies and to the host country, Costa Rica, for the assistance and support provided.

The opinions, concepts and recommendations included in this report are those of the participants of the Conference and do not necessarily represent the official position of the governments, the World Meteorological Organization, the Inter-American Development Bank, or any of the participating agencies.

SAN JOSÉ DECLARATION

CONFERENCE ON WATER RESOURCES ASSESSMENT AND MANAGEMENT IN LATIN AMERICA AND THE CARIBBEAN

1. *A "Latin America and Caribbean Water Resources Assessment and Management Action Plan" was prepared by the World Meteorological Organization/Inter-American Development Bank (WMO/IDB) Conference on Water Resources Assessment and Management Strategies for Latin America and the Caribbean, which was held in San José, Costa Rica, from 8 to 11 May 1996. It was attended by 150 senior representatives and experts of water resource agencies from 33 Latin American and Caribbean countries and 18 international and regional organizations.*
2. *The objective of the meeting was to develop an Action Plan within the context of sustainable development, ensuring that integrated and comprehensive assessment and integrated management of water resources reflects the socio-economic needs of the country and its citizens and the preservation of the environment. In this plan, the national water resource agencies will play an important role and will strive towards self-sufficiency.*
3. *The Action Plan has been prepared following the findings of the UNESCO/WMO Report on Water Resources Assessment (1991) and a number of studies on water resources management carried out by Regional Organizations, United Nations (UN) Agencies and the IDB, in collaboration with the countries involved. The Action Plan has taken into account the principles of Chapter 18 of Agenda 21 of the UN Conference on Environment and Development (UNCED) (1992) and strategies under development by the IDB. It also takes into account the recent call by the Commission on Sustainable Development (1994) regarding a comprehensive assessment of freshwater resources and the Partnership for Pollution Prevention of the Action Plan of the Summit of the Americas (1994).*
4. *The Conference recognized that Water Resources Assessment in Latin America and the Caribbean should be based on a strong determination to develop self-sufficiency, efficiency and effectiveness. Equally important is the need to overcome the constraints and conditions that have in the past prevented progress. To this end, water resource agencies, along with other appropriate institutions and the communities, should co-ordinate and integrate their efforts for the development of national policies, strategies, legislation and standards. Programmes should reflect the socio-economic and environmental needs of the countries, and serve the interests and needs of water users at the local and community level with due regard to conservation and sustainable use of natural resources and bio-diversity, taking the hydrographic basin as the basic management unit. A better use of human and financial resources; better support of data collection and monitoring programmes for sustainable development; and an increased effort to empower community participation should be sought. In particular, attention should be given to increased demand for the water resource, serious water pollution problems, the challenge of meeting the water supply needs of a rapidly increasing urban population, and the need to preserve the environment. In those countries where such actions are already on their way, necessary efforts should be made to urge the rational use and protection of water.*
5. *The Action Plan recommended by the Conference covers the areas of integrated water resources management, institutional and legal framework, comprehensive water resources assessment, basic information for the integrated management of water resources, human resources and training, education and community participation, natural disasters, transboundary water resources, role of international organizations, regional recommendations and follow-up to the action plan. The Action Plan is also formulated to encourage greater bi-lateral co-operation and make better use of Regional Organizations and external support.*

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6. *The Conference recommends that:*

National governments, supported by UN agencies, funding and regional institutions, should:

- a) *formulate or improve, as appropriate, national water resources policies that recognize the social, economic and environmental value of water and the need for sustainable management of the water resources with the participation of the communities and the private sector;*
- b) *support the policies and strategies in order to ensure their implementation, by:*
 - * *adjusting the institutional framework to promote co-ordination and integration between sectors;*
 - * *developing capabilities within each country to undertake comprehensive water resource assessment, including definition and fulfilment of common standards, integrated water resource planning including mechanisms for cost recovery, re-allocation of water, economic instruments, community and private sector participation, and resolution of conflicts;*
 - * *developing adequate legislative frameworks;*
 - * *finding innovative ways to procure financial resources to overcome deficiencies in data acquisition networks, human resources and other limitations with particular attention given to groundwater and water quality assessment, water use and water demand; and*
 - * *support the exchange of data and information among countries of the region and facilitate the implementation of programmes of UN agencies and other institutions.*

7. *The preparation of the Action Plan by the Conference is part of a process to improve self-sufficiency in the region and meet priority needs within the countries. The process will also promote the Action Plan widely to appropriate authorities at the national, sub-regional and regional levels and also to external support agencies.*

8. *The Conference of San José recommends that:*

- a) *The Statement and Action Plan be presented to the forthcoming Second Dialogue of the Interamerican Water Resources Network organized by the Organization of American States (OAS), which is to be held in September 1996, for their consideration in the preparation of the Agenda of the next Hemispheric Summit on Sustainable Development (Bolivia, December 1996).*
- b) *The Governments of Central America should fully support “the Central American Water Charter”, which was originally presented in the document of the meeting “Integrated Management of Water Resources of Central America” held from 9-12 August 1994 at the venue of the Central American Parliament (PARLACEN), in Guatemala.*

San José, Costa Rica, 11 May 1996

PREFACE

As part of its policy to enhance the assessment of freshwater resources globally, WMO has initiated a programme of regional conferences to address water resources issues and to formulate strategies and action programmes for this purpose. This approach is in keeping with the call by the UN Commission for Sustainable Development (CSD) (New York, 1994) for improved knowledge on water resources and its management. The first conference was convened jointly with the UN Economic Commission for Africa (UNECA) and was held in Addis Ababa (Ethiopia) in March 1995. The second conference on "Water Resources Assessment and Management Strategies for Latin America and the Caribbean", which is the subject of this report, was convened in association with the Inter-American Development Bank (IDB) in San José, Costa Rica, 6 - 11 May 1996. The Conference was designed to explore strategies which would ensure that national water resources agencies play a full part in national and regional development in Latin America and the Caribbean. The Conference comprised two parts. The first part consisted of two parallel workshops, the WMO workshop on Water Resources Assessment - National Perspectives and the IDB workshop on Water Management Strategies, held on 6 - 7 May. The second part was the main conference event, which merged the participants of the two workshops, held on 8 - 11 May.

The objectives of the Conference were the:

- Definition of the means to enhance awareness of the important role that sound water resources knowledge plays in national economies.
- Definition of the needs of policy and decision-makers for water resources information and derived products.
- Promotion of national water resources assessment and the evaluation of the adequacy of national data acquisition and management systems (both water quantity and quality).
- Preparation of water resources assessment and management strategies in support of the national development planning of the water sector.
- Creation of awareness of conservation strategies to better balance water supply and demand.

This document contains the San José Declaration, a statement compiled by the participants of the Conference, and a three part report on the Conference itself. **Part I** provides the summary report of the Conference. **Part II**, the Action Plan, has two components. **Part II-1** describes the conceptual framework and guidelines behind the development of the action plan and **Part II-2** presents the Action Plan for water resources assessment and management for Latin America and the Caribbean. **Part III** of this report provides summaries of the outcomes associated with the six themes of the Conference and the findings of the two workshop sessions held prior to the Conference. The proceedings of the Conference have been published separately. There are two versions of this publication providing the Conference papers in English and Spanish; both versions contain the WMO Workshop papers in their original language.

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PART I

SUMMARY REPORT OF THE CONFERENCE

I SUMMARY REPORT OF THE CONFERENCE

Opening

1.1 At the kind invitation of the Government of Costa Rica, the Conference on Water Resources Assessment and Management Strategies for Latin America and the Caribbean, was held at the Hotel Herradura in San José, from 6 to 11 May 1996. The Conference was convened jointly by the World Meteorological Organization (WMO) and the Inter-American Development Bank (IDB) with financial support from Germany, Switzerland and UNESCO. The Conference was divided into two parts:

Part I - (6-7 May) consisted of two parallel workshops

- WMO workshop on Water Resources Assessment - National Perspectives
- IDB workshop on Water Management Strategies

Part II - (8-11 May) was the main conference event which merged the participants of the two workshops.

1.2 At the opening of the Conference a warm welcome was extended to the participants by Mr. Hugo Hidalgo, Director of the National Meteorological Institute and Permanent Representative of Costa Rica with WMO. He highlighted the strong links between Costa Rica and WMO in all the areas of common interest.

1.3 The Conference was opened by Mr. Marco Gonzalez, Vice-Minister of the Ministry of Environment and Energy. He recalled some water related problems faced by Costa Rica and the other countries of the region. In particular, he echoed the concern of the region with the recurrent natural disasters such as floods and droughts associated with hurricanes, tropical storms and the El Niño phenomenon. He called for greater recognition of the link between water resources assessment and management and the decision making process for sustainable national development.

1.4 In his statement Mr. Emil Weinberg, representative of the IDB in Costa Rica, highlighted the role of the bank in supporting water resources development in Latin America and the Caribbean. He noted that the Bank was currently developing a new strategy regarding water management projects which called for a more market oriented and ecologically sustainable approach. This would involve greater community participation within a framework of an overall integrated management of water resources. The new strategy was expected to lead to a more equitable distribution of the benefits for users, both at present and in the future.

1.5 In his address, Prof. G.O.P. Obasi, Secretary-General of the WMO, thanked the Government of Costa Rica for hosting the conference and for the excellent facilities and support which had been provided. He noted that the joint convening of the conference by WMO and IDB was just one example of the close collaboration and good relations which had been established between the two organizations. Prof. Obasi noted that while the Latin America and Caribbean region appeared well endowed with water resources, current predictions are that per capita water availability would be cut by half by the year 2025. He observed that the goal of the Conference was not to produce resolutions, statements or yet another agenda, but an Action Plan based on the capabilities and resources of the national and regional institutions. He stressed that WMO, with its mandate in operational hydrology and water resources assessment, will continue to encourage greater recognition for the important role of water resources institutions and to urge greater support for their work.

Participation

1.6 The conference was attended by senior representatives of national and regional water agencies, river basin authorities, research and training institutions and external support and United Nations specialized agencies. There were 150 participants from 33 countries and 18 regional and international organizations. The list of participants is given in Annex 1.

Programme

1.7 Mr Claudio Caponi (Venezuela) acted as Conference Chairman. The Conference adopted the programme as given in Annex 2.

1.8 The Conference considered all its six themes in plenary sessions. The resume of the theme papers and the discussions are presented Part III of this report. Detailed discussions were undertaken by four sub-regional working groups namely:

- Mexico and Central America
- The Caribbean and Guyanas
- South America - Atlantic region
- South America - Pacific region

The working groups developed proposals for the Action Plan and criteria for its support in water resources assessment and management in Latin America and the Caribbean. These were based largely on the results of the above-mentioned workshops and on the proposals presented in the keynote paper on Theme 6 prepared by the WMO Secretariat.

1.9 Side meetings were also organized to discuss the profile for a CARIB-HYCOS and proposals for a similar project for the Rio de la Plata basin. The CARIB-HYCOS proposal generated much interest resulting in the signing of a Letter of Intent by practically all participating countries of the Caribbean region to support this initiative. There was also interest in the Rio de la Plata basin project which has potential for possible IDB / WMO collaboration.

1.10 A field excursion to visit the Poas Volcano was organized on the final day of the Conference by the host agencies. This effort was deeply appreciated by the participants.

Recommendations

1.11 The Conference recommended that:

- a) The Statement and Action Plan be presented to the forthcoming Second Dialogue of the Interamerican Water Resources Network organized by OAS, which is to be held in September 1996, for their consideration in the preparation of the Agenda of the next Hemispheric Summit on Sustainable Development (Bolivia, December 1996); and
- b) The Governments of Central America should fully support "the Central American Water Charter", which was originally presented in the document of the meeting "Integrated Management of Water Resources of Central America" held from 9-12 August 1994 the venue of the Central American Parliament (PARLACEN), in Guatemala.

Closure

1.12 The Conference adopted the report of its deliberations, a Conference Statement and an Action Plan for Water Resources Assessment and Management for Latin America and the Caribbean (LAC). It requested the Secretariats of WMO and IDB to ensure that the final document be made available, as soon as possible, to national governments, regional and international institutions concerned and to external support agencies.

1.13 The Chairman, Mr. C. Caponi, expressed his appreciation to the conference participants for their enthusiastic input and to the WMO and the IDB for the organization of and support for the conference. Mr D. Kraemer, Director of the Hydrology and Water Resources Department (WMO) thanked the participants for their constructive contributions and the chairman for his skilful leadership of the Conference. The Chairman closed the session on Saturday 11 May 1996.

PART II

ACTION PLAN

PART II - 1 Conceptual Framework and Guidelines

PART II - 2 Action Plan

II - 1 CONCEPTUAL FRAMEWORK AND GUIDELINES

II -1.A CONCEPTUAL FRAMEWORK

2. MANAGEMENT AND ASSESSMENT OF WATER RESOURCES

2.1 The population growth and economic progress of the LAC countries are creating a need for greater volumes of water, especially in areas where population levels are highest and water sources scarce. In fact, the region suffers from an inverse distribution of population and water wealth.

2.2 Regular pollution and variations in rainfall patterns make water an **even more limited resource**, whose use must be properly planned to ensure its conservation and indefinite use, focusing on the development of water as a **scarce resource** and maintaining the balance between available supplies (in quantity and quality) and user demands.

2.3 Water resources development is a national activity requiring the concerted efforts of multi-disciplinary teams, since it involves a wide range of interrelated elements: the physical hydrological regime, the environment and its ecological balance as well as socio-economic, political, technical and legal factors, which must be taken into account in order to achieve the national objectives and promote fair access to water for all users. This therefore involves engineers in various fields: hydrology, hydraulics, water resources, hydroelectric power, drinking water, sanitation, sewage disposal, irrigation and agriculture, as well as civil engineers and construction specialists; specialists in other areas such as planners, environmentalists, ecologists, economists, legal advisers, sociologists and representatives of user groups and beneficiaries.

2.4 However, there is no widely accepted consensus (even among specialists) on what is meant by: **management, planning, integrated management, sustainable development and water resources assessment**. Depending on the climate and the availability or scarcity of water (humid tropical regions, semi-arid, arid, desert-like, etc.), the definition of these terms covers a range of ideas which may often seem confusing. Therefore it is necessary to make these concepts and their meaning known, especially among the non-technical staff and government officials who take part in the decision-making process, and among the users themselves.

2.5 **Water resources management** is a complex process of multidisciplinary actions which orient and determine decisions on the final use and conservation of water. **Planning** must take into account both the analysis of demands and the full range of activities involved in the creation of projects, including the design, construction, and operation of all works required to satisfy these demands. Management becomes **integrated water resources management** when the interests of all the economic sectors (local, provincial, state and national), which depend on the same water source, as well as those of the direct and potential users and beneficiaries (drinking water, electrification, navigation, recreation, etc.), are treated as an integral part of the overall national objectives.

2.6 Integrated water resources management is a dynamic process involving complex hydrological systems of water basins for the catchment and retention of water resources. Appropriate use of hydrographic systems promotes the economic development of the local population in a sustainable manner, for the benefit of present and future generations. This principle is generally defined as **sustainable development**, and in this specific case, as the **sustainable development of water resources**.

2.7 Water resources management is, essentially, a multifaceted, sequential process. Its field of action is closely related to the management of bodies of surface water and groundwater with continuous space-time variations in behaviour and characteristics. Management is preceded by planning for water resources development, which requires information on the current and future water users' needs and an assessment of available supplies in terms of basins, regions or the country itself. Therefore, **water resources assessment** is a prerequisite for all planning, development and integrated management of water and plays a major role in decision-making, as well as in environmental conservation activities as part of sustainable development.

2.8 **Water resources assessment** is defined by WMO/UNESCO ¹ as "the determination of the sources, extent, dependability, and quality of water resources, on which is based an evaluation of the possibilities for their utilization and control". The determination of the sources and their extent refers to the geographical distribution and volume of the resources and their weather-related normal and extreme variations, while dependability and quality refer to man-induced alterations. Due to the fluctuating nature of these physical and human factors, water resources assessment requires ongoing efforts to constantly monitor the water's natural behaviour and man-induced variations and alterations in hydrographic systems.

2.9 The new concept of "**comprehensive assessment**" ² was introduced during the second session of the UN Commission on Sustainable Development (New York, 1994). This assessment goes beyond a simple inventory of available water resources in terms of quantity and quality, since it also covers the dynamics of water consumption from the standpoint of the various productive economic sectors, as well as current land use and other environmental aspects. Planners and decision makers require information on ways of meeting the expected demands and evaluating the impact which the water system and environment may suffer as a result of hydraulic works and pollution. Furthermore, the assessment can provide knowledge which is vitally necessary for implementing water policies and taking adequate water protection measures.

2.10 The comprehensive assessment of national water resources is indispensable, even in regions of the continent which are not classified as arid or semi-arid, and is especially important for island territories which not only have finite resources but also suffer natural disasters caused by water. In these countries, the groundwater overutilization is in danger of causing salinization of a large part of available water sources.

3. BASIC INFORMATION NEEDED FOR WATER RESOURCES DEVELOPMENT AND MANAGEMENT

3.1 Water resources development is based on a series of short- and medium-term projects, as well as planning over a longer period; therefore, the assessments should be periodically updated as additional information is received, so that the necessary changes can be made.

¹ WMO/UNESCO, 1991: *Report on water resources assessment. Progress in the implementation of the Mar del Plata Action Plan and a strategy for the 1990s.*

² A Comprehensive Assessment of Freshwater should always be comprehensive in terms of aspects included. The Comprehensive Freshwater Assessment asked for by the CSD will also be regionally comprehensive as it will be global and will include an assessment of the problems in dealing with freshwater resources.

3.2 A synthesis of the various hydrological phenomena - which provides the basis for all water resources assessment - can only be achieved by means of **continuous, permanent (historical) monitoring** of meteorological, hydrological and hydrogeological parameters, combined with associated areal and environmental data. In turn, the information needed to protect life and property against the risks of natural disasters (such as floods) should be accessible **in real time** to enable the necessary forecasts and emergency warnings to be issued. This calls for the creation of permanent observing and measurement programmes, administered by the government through the Hydrological Services' departments in charge of water resources management. To the extent that these Services are able to provide the necessary information in a timely, reliable fashion, the countries will thus be able to obtain a clear picture of their potential water wealth and to take decisions regarding the risk of water-related disasters, and use this information to promote their own development. Furthermore, their contribution to knowledge of water will be more effective and useful.

3.3 From the standpoint of future knowledge of water resources, the reliability of the data required for calculating the variations and trends of precipitation, river stage and discharge, aquifer levels, capacity and production, water quality, sediment transport, etc. depends on the length and continuity of the observations and the coverage and representativity of the sampling points, i.e. on the configuration of the networks of monitoring stations **which are actually operating** in the basins or at national level. For the data to be reliable, the observing, measurement, and recording stations must operate, and be maintained efficiently; the information must be taken from as long a time series as possible, as future variations in meteorological and hydrological elements can usually be forecasted on the basis of their past behaviour.

3.4 The future planning of water resources development must reflect the climate change projections which may be felt in 20 or 30 years' time, possibly as a result of the accumulation of carbon dioxide and other so-called **greenhouse gases** in the atmosphere. These projections indicate that changes may occur in global warming which will affect the dynamics of the atmosphere, influencing the world climate and the behaviour of the hydrological cycle. The direct influence of global warming on the precipitation regime (the frequency and magnitude of which are still unknown) could eventually have marked effects on the variation of flows, increasing the rate of disastrous floods in some regions and severe droughts in others. It could also cause the sea level to rise, which in turn would lead to saline intrusion and flood-related disasters in islands and coastal areas³.

3.5 In view of the above, permanent, systematic recording of data is indispensable and irreplaceable as a basis for the assessment, planning and development of water resources; the need for basic information fully justifies the activities of data collection, the expansion of station networks and, in general, the operation of the national agencies and services responsible for obtaining this information.

II - 1.B GUIDELINES

4. PROBLEM ANALYSIS REGARDING WATER RESOURCES

4.1 The economic development plans of the countries in the region are all significantly linked to water resources (drinking water, sewage systems and health, irrigation, hydroelectric power, control of waterways, navigation, tourism, etc.), and must therefore be coordinated in order to

³

Source: WMO/UNEP, 1995: *IPCC Second Assessment. Climate change 1995.*

optimize investments, satisfy growing demands and promote the sustainable use of water, including the international waters of shared basins.

4.2 In spite of LAC's enormous water wealth (the largest in the world in terms of land area), water is a major problem in almost all of the countries, as it is only found in abundance in places where there is little or no development, whereas, in places where there are large numbers of people who need water and its derived services, it is either scarce or insufficient for many months of the year, or pollution has rendered it unusable, making it necessary to use distant sources and pumping, which add considerably to project costs.

4.3 Knowledge of actual and potential availability of water resources is thus indispensable for development planning, as are comprehensive assessment and water-related databases. However, budgetary restrictions (usually at national level) have brought about a general deterioration in the data collection operations of many national agencies producing basic information on water resources. Moreover, the depressed economies of many LAC countries are forcing governments to set priorities on spending.

4.4 Even worse, there is a general ignorance - among both the public and decision makers - of the main issues regarding water and its interrelationship with public health and environmental conservation; the current shortage and pollution of sources, and water supply problems, and, above all, the economic value of water and its importance for the national economy. Little is known of the ill effects on productivity and the economic repercussions of natural disasters, and there is widespread ignorance regarding the activities of monitoring, and collection and management of basic information and their benefits.

4.5 Paradoxically, the governments do not seem to be aware of the economic repercussions and damage which can be caused by projects using insufficient or flawed databases; this forces the project designers to work on the basis of assumptions, increasing the probability of expensive errors and leading to improper use of the resource, as well as inefficiency in the operation of works and water management.

4.6 In conclusion, the comparative unavailability of water near the user centres and the indiscriminate pollution of water bodies have reached alarming proportions, hindering the social and economic development of many regions of LAC. The situation calls for urgent measures to improve project coordination and promote orderly, integrated water management with a view to environmental conservation. The availability of water supplies must be clearly defined in order to effectively plan the resource's development potential. In spite of the fact that many countries are water rich, specific areas are suffering from scarcity due to high demand and competitive use, and this means that local and national governments will have to take drastic measures to solve their **acute water problems**.

5. APPROACH

5.1 The following guidelines are proposed in order to orient the LAC countries - to the extent necessary and with an indispensable measure of external support - to:

- Strengthen their managerial and technical staff in order to achieve a **certain self-sufficiency in assessment and planning for the development of their water resources**,
- Motivate them to create modern water policies, and

- Promote the sustained use and integrated management of water.

5.2 In view of the positive effects of past intra-regional collaboration, water technology should be transferred horizontally among the countries, accompanied by bi/multinational studies aimed at water resources assessment in international rivers and/or basins, planning their joint use as part of the economic development of the border areas.

6. MAIN CRITERIA FOR SUPPORT

6.1 Guidelines have been developed in accordance with the criteria shown in Table 1.

CRITERIA FOR SUPPORT	Table 1
A. Recommendations of international conferences on water resources assessment and management;	
B. The population growth and economic and productive activities of the LAC countries will, in the near future, call for substantial increases in water supplies;	
C. The institutional organization in charge of water resources development should effectively promote the multiple, sustainable use and the integrated management of water, and be able to handle water-related emergency situations;	
D. The water resources of the Caribbean countries are of critical importance in view of their limited supply and their close relationship with natural disasters;	
E. Databases, assessment and planning for water resources development are indispensable for national water policies and integrated water management.	

A. Recommendations of international conferences on water resources assessment and management

6.2 The concern for worldwide water resources assessment and management led to the 1977 United Nations Conference on Water, in Mar del Plata, Argentina. This was followed by the International Conference on Water and the Environment (ICWE, Dublin, Ireland, January 1992), which focused on current worldwide water problems in preparation for the United Nations Conference on Environment and Development (UNCED, Rio de Janeiro, Brazil, June 1992). These international events stressed the importance of the efficient use of water to assist the economic and social development of humankind, pointing to the need to assess water resources in terms of the present and future demand and the impact of climate changes, and recommending that governments use a coordinated inter-sectoral approach to water resources management.

6.3 The most significant result of UNCED was the creation of Agenda 21 which contains major recommendations for the protection and supply of water and emphasizes the concept of integrated action for the development, management and use of water resources. Agenda 21, Chapter 18, paragraph 18.26, states:

"Water resources development and management should be planned in an integrated manner, taking into account long-term planning needs as well as those with narrower horizons, that is to say, they should incorporate environmental, economic and social considerations based on the principle of sustainability; include the requirements of all users as well as those relating to the prevention and mitigation of water-related hazards; and constitute an integral part of the socio-economic development planning process. A prerequisite for the sustainable management of water as a scarce vulnerable resource is the obligation to acknowledge in all planning and development its full costs. Planning considerations should reflect benefits investment, environmental protection and operation costs, as well as the opportunity costs reflecting the most valuable alternative use of water...."

6.4 Lastly, the second session of the Commission on Sustainable Development (New York, May 1994) considered Chapter 18 of Agenda 21 and made the following recommendations:

- "(a) Governments are urged to mobilize, within the framework established by Chapter 33 of Agenda 21, adequate financial resources, through the use of all available sources and mechanisms, to implement Chapter 18, and UN agencies and programmes are urged to provide necessary technical assistance, particularly to developing countries;*
- (b) UNEP, FAO, UNIDO, WHO, WMO and UNESCO are urged, in collaboration with UNDP, the World Bank and other relevant bodies, to strengthen their efforts towards a comprehensive assessment of freshwater resources, with the aim of identifying the availability of such resources, making projections of future needs and identifying problems to be considered by the 1997 Special Session of the General Assembly.*
- (c) Adequate support is to be given to strategies which address water resources issues identified in the Programme of Action for the Sustainable Development of Small Island Developing Countries, adopted at the Barbados Conference (1994)."*

6.5 The Action Plan of the Summit of the Americas (Miami, December 1994) in its part related to "Guarantee of Sustainable Development and the Natural Conservation of the Environment for Future Generations", highlights initiative 23 "**Partnership for Pollution Prevention**", with specific mandates for the governments and international organizations like the World Bank and regional organizations like IDB, OAS and PAHO. The progress in the implementation of the activities defined with such an initiative will be discussed in the Hemispheric Summit on Sustainable Development, to be held in Bolivia, December 1996.

B. The population growth and economic and productive activities of the LAC countries will, in the near future, call for increases in water supplies

6.6 In view of the increasing rate of population growth and urban sprawl, water demands in the countries of the region will grow sharply, both in quantity and quality. More people will require greater volumes of water for domestic and collective use, and to sustain sanitary conditions and general well-being; agriculture will also require larger volumes to increase the areas under irrigation, and industry will require more water and energy - to mention only a few of the future needs of the productive sector.

6.7 If the current abuse and over-use of water resources continues, user demands will overtake available supplies by the first few decades of the next century. The current situation of scarcity will become critical and, as a result, the degradation and pollution of sources will worsen.

Urgent steps must be taken to optimize the current services, in order to reduce losses and increase the water supply, by means of new projects in line with the countries' economic and funding capacities. If this is not done in the near future, the restrictions and scarcity of water will soon become a genuine obstacle to the region's economic development and social well-being. This means that it will be extremely difficult to provide water supplies and sanitation services to city and country dwellers, creating an obstacle to the elimination of poverty. The prevention of disease and the reduction of potentially fatal water-related epidemics will prove very costly for the economies of the region.

C. The institutional organization in charge of water resources development should effectively promote the multiple, sustainable use and the integrated management of water, and be able to handle water-related emergency situations.

6.8 Water is a natural resource which must, by its very nature, be controlled by the government, administering it wisely as a national possession, ensuring its quality and making it available to all citizens. In the countries of the region, however, this responsibility has traditionally been discharged in a piecemeal fashion, to satisfy the specific objectives of the most privileged user groups, according to their needs, political power and institutional authority. Very few such user groups have ever attempted to plan their projects in consideration for the rights of other users over the same sources - rather, there has been a general indifference towards the physical, biological, social and economic inter-relationships of others with the same source, as well as for the environmental impact and degradation which the resulting waste water causes to the natural quality of the receiving basin.

6.9 Future water resources development should be based on long-term planning and on intelligently designed national programmes, and be able to ensure an adequate supply to all the users. Past experience has shown that planning and administrative systems have not always been effective, due to needless overlapping, indistinctness and gaps in authority in water-related matters.

A national water policy must be created as a vehicle for optimizing training, stimulating future investment and reorienting water administration towards integrated management; wherever appropriate, this should reflect the new trends towards decentralization and privatization.

The sector's administrative and institutional systems should be restructured and modernized to permit joint, coordinated participation of all the user sectors in the creation of water policies and in the decision making process. They should be organized in such a way as to achieve maximum effectiveness in the design and execution of the measures to be taken in water-related emergency situations.

D. The water resources of the Caribbean countries are of critical importance in view of their limited supply and their close relationship with natural disasters

6.10 Water supplies in the Caribbean countries largely depend on rainfall. Available freshwater depends on the area of each island, on the orographical conditions for retention and storage of surface flows, and on the ways in which groundwater aquifers are fed or replenished. Otherwise,

there are only two solutions for increasing the freshwater supply: to desalinate sea water at a comparatively high cost, and, as a last resort, to import water from the mainland.

6.11 Also to be considered are the negative impacts of the hurricanes and tropical storms, which affect the region every year. These phenomena strike all the islands of the Caribbean almost simultaneously, causing losses of human and animal life and damage to public and private property, with dire effects on the national economies.

It is clear that for the Caribbean islands available water supplies are finite and represent a vital element for economic survival. This means that water is an intrinsically precious resource which must not be wasted or misused. In view of the population growth, economic and social progress and the increase of tourist traffic, it seems obvious that per capita volumes will gradually drop, since water - here more than anywhere else - can have a decisive effect on development.

6.12 These are serious problems to which the Caribbean countries must give their fullest attention, both in terms of water resources assessment and integrated water management and as regards emergency measures for warning the population and limiting the damage caused by natural disasters.

E. Databases, assessment and planning for water resources development are indispensable for national water policies and integrated water management

6.13 The assessment of, and planning for water resources development requires complete information (in time and space) regarding the hydrological cycle and the behaviour of surface water and groundwater supplies. Planning requires assessment as the basis for knowledge, and assessment, in turn, needs data in order to synthesize the hydrological system.

6.14 A clear understanding of the quantity and quality of currently existing resources is necessary in order to form an advance picture of future competition among water users, financial policy for private and public hydraulic projects, water distribution, attribution of user rights, water market legislation and standards, diversification of uses, the protection of human life and property against risks related to the excess (floods) and shortage (droughts) of water, and the future of integrated water resources management in general.

6.15 Clearly, the various sectors of the national economy are in need of water-related data (in terms of quantity and quality) for operational and planning purposes. The effectiveness of such activities is often a function of the availability of the necessary information. Depending on the users' desires and objectives, various types of information may be necessary: meteorological, hydrological, hydrogeological, geographical and demographic data, as well as information on water use and quality and the ecological impact. Over the next few years there will be an even greater need for information, both of a standard type (historical records) and for immediate use (in real time).

6.16 However, the primary function of water-related data and information is to guide government policies related to the development, organization and management of national water resources, and to conserve water quality, natural resources and the environment - in other words, for the

integral management of water at national level, by means of a national water policy. Fig. 1⁴ gives an indication of hydrological data management procedures.

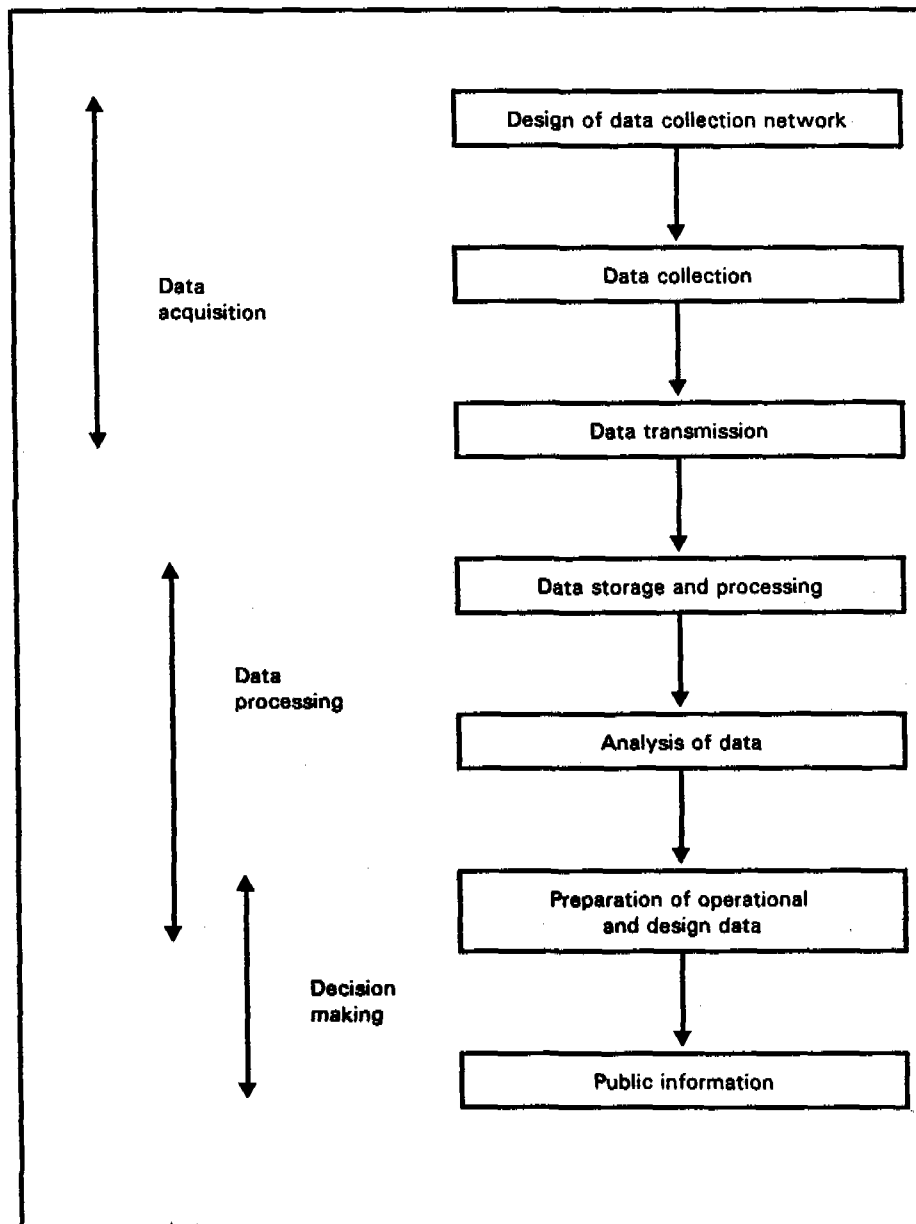


Figure 1 — Activities of a Hydrological Service

6.17 All of the above must be taken into account by the governments of the LAC countries, so that they can take the necessary measures and set up the appropriate administrative structures enabling them to obtain the information they need in order to develop the national water resources.

⁴

World Meteorological Organization, 1994: *Guide to hydrological practices*. WMO-No. 168, Geneva.

This means that agencies in charge of information should restructure themselves and strengthen their financial, logistical and human resources in order to face the challenges of water resources development. The traditional tasks of information collection and management, and making information easily available to users will no longer be their only concern. Depending on users' needs, the range of measurements and parameters may have to be broadened; and the agencies should become more actively involved in the systematic assessment of resources and in all water management-related decision making.

PART II - 2 ACTION PLAN

II - 2 ACTION PLAN

7. MAIN FIELDS OF ACTION

7.1 The purpose of the Action Plan is to draw the attention of the LAC governments to the need to review all plans and programmes related to integrated water resources management, analyse current water administrations - including the legal framework and ability to adjust to future needs - and, in general, to emphasize the importance of water-related information for all management actions.

7.2 The Action Plan covers the fields shown in Box 1.

FIELDS OF ACTION		Box 1
A.	Integrated water resources management	
B.	Institutional and legal framework	
C.	Comprehensive water resources assessment	
D.	Basic information for the integrated management of water resources	
E.	Human resources and training	
F.	Education and community participation	
G.	Natural disasters	
H.	Transboundary water resources	
I.	Role of international organizations	
J.	Regional recommendations	
K.	Follow-up to the Action Plan	

A. Integrated Water Resources Management

7.3 The government should formulate and execute integrated management policies for the development of water resources, to ensure the orderly use of, and access by all citizens to, the social and sanitary benefits of water. Priority must be given to the creation of appropriate policies for stimulating the efficient use and control of demands, in parallel with the protection and conservation of water resources.

7.4 It is necessary, in order to ensure the sustainable development and integrated management of water resources, as well as the participation of private initiative and the functioning of water markets, to analyse the effectiveness and suitability of current water-related standards and legislation, including the attribution of water rights, obligations and responsibilities to the organizations of the sector. Box 2 summarizes the action suggested.

ACTION

Box 2

A. INTEGRATED WATER RESOURCES MANAGEMENT

- **To create a National Water Policy for the management and comprehensive assessment of water resources - as a function of national social and economic growth trends - and the countries' development strategies, and with the participation of the user sectors and the rest of the society. Establish measures to ensure that the policy is executed continuously and independently of changes in government**
- **To define the supply and demand for water at the level of the hydrographic unit, making them, as appropriate, an integral part of the national development policies**
- **Prepare an inventory of water uses and the level of fresh and ground water use, evaluating the risks of pollution and saline intrusion**
- **To create the necessary standards to ensure that all water-related economic, social and environmental projects are based on comprehensive, up-to-date water resources assessment**
- **To promote the creation of bodies responsible for integrated river basin management**
- **To draw up a list of national projects for meeting demands in accordance with criteria for the integrated use of water and on the basis of magnitude, financial needs, feasibility, execution time and social benefits**
- **To review current subsidies for water-related services from the social standpoint, establishing subsidies in the sphere of demand rather than supply, and making water available to the weakest sectors of the society**
- **To foster the protection of the natural resources of the basin as a means of conserving water resources, promoting the efficient use of water, the intersectoral transfer of water and development of new sources of water**
- **To perform studies on economic instruments, for example water rights markets, to improve water resources management**

B. Institutional and legal framework

7.5 Government activity cannot be fully effective without the appropriate institutional and administrative organization. Therefore, an analysis should be made of the government department in charge of water resources, including all aspects of basic data collection and processing, in order to endow this service with a modern, functional structure able to ensure sustainable management and the participation of the private sector. The National Water Policy, in order to achieve integrated water planning and management, will require an organized, well-coordinated distribution of authority among the agencies concerned.

7.6 When the cost of maintaining an appropriate structure of databases is seen in relation to the amounts needed to fund hydraulic development projects and the resulting economic benefits, it becomes clear that the security provided by assessment is relatively inexpensive. Analysts and planners should, therefore, include - from the initial stages of the projects - a provision for the maintenance of the information producing agencies. This simple reasoning should also guide government authorities to give adequate financial support to the systematic strengthening of national Meteorological and Hydrological Services.

7.7 The above national Services should, however, strive to overcome their limitations and their exclusive financial dependency on the State. Their new responsibilities should motivate them to break with the traditional model and become more than just providers of basic information, evolving into public service bodies with a more relevant role in water resources development. They should participate in all assessment projects, in operating hydraulic works, flood forecasting and preventing flood risks during natural disasters, as well as in agrometeorological studies to increase agricultural productivity and other studies, and they should increase their participation in, and open their own service market in the public and private water sectors. Box 3 summarizes the action suggested.

C. Comprehensive water resources assessment

7.8 Government officials should be made to clearly understand that good water resources management calls for an adequate assessment of the characteristics and distribution of existing water wealth. This is an indispensable prerequisite for satisfying demands and controlling water-related activities. Water resources assessment is the responsibility of the government, which must also issue forecasts and process user demands. Inadequate or insufficient assessments may have a damaging effect and create a risk for investments in the sector.

7.9 Comprehensive assessment does not only concern the quantity and quality of water resources, but also demands and uses (such as water for agriculture, municipal use and industry), sources of pollution and the protection of water bodies; furthermore, it is essential for the interpretation and enforcement of the law in water-related disputes. This means that water authorities should take care to update their assessments on a regular basis and ensure that data-collection activities are permanently maintained. Box 4 summarizes the action suggested.

ACTION

Box 3

B. INSTITUTIONAL AND LEGAL FRAMEWORK

- To elaborate diagnoses on the institutional and legal situation of the countries with relation to water resources management, and study appropriate methods of improving the existing situation
- To establish institutional means for stimulating effective coordination and integration among the user sectors in the planning of water resources through the creation and/or strengthening of a national water body responsible for the formulation of National Water Policy to provide integrated water management and ensure the conservation of resources and the social function of water
- To organize and modernize the institutional and administrative framework of the water resources sector, in line with the current trend towards the integrated development and management of water, in order to strengthen the institutional capacity of the national agencies and increase the effectiveness of their participation in water-related policies, use and conservation
- To strengthen the technical, logistical and financial capacity of the agencies in charge of water resources management, particularly those charged with the monitoring, collection and processing of water-related data and information, and improve the administrative personnel structure with a view to more active participation in this management activity
- Agencies in charge of water-related information should launch strategies aimed at obtaining additional funding, expanding their functions to include technical consultation services, designed to orient the government departments and the private sector in water resources assessment and research
- Elaborate or update water-related legislation for the regulation of surface-water and groundwater use, create incentives for state and private funding, as well as the effective and beneficial use of water, in the light of the juridical security of water rights and the protection of water resources and the environment, in which the advice of water information agencies will be a determining factor
- Agencies in charge of data and information should promote systematic research, alerting the authorities and public on the real availability of water resources and the effects of pollution caused by development projects, with special emphasis on areas with high population density and chronic water scarcity
- Include in all water project investments a percentage for the strengthening of agencies in charge of the generation of information. Funding institutions should apply this criterion when granting loans
- Include charges for the use of water and the granting of rights as additional sources for increasing the budget of water resources agencies

ACTION

Box 4

C. COMPREHENSIVE WATER RESOURCES ASSESSMENT

- To establish programmes for the research and assessment of potential and available water uses and resources (quantity and quality), including extreme events (floods and droughts); ensure the regular updating, publication and dissemination of results; and see that programme recommendations are implemented
- To establish programmes for systematic groundwater assessment and the natural and artificial replenishment of aquifers, considering the use of modern techniques, such as isotopic methods
- To draw up an inventory of the sources of water pollution, their levels of seriousness and characteristics, providing the control and regulation thereof; and take the legal and technical measures necessary for the protection of bodies of surface water and groundwater
- To design and execute special assessment programmes for the restoration of the natural quality of water bodies in which pollution levels are serious enough to warrant being classified as a natural resource in crisis
- To create, for the territories with extreme water scarcity, special research studies on storage, collection and retention of precipitation and surface runoffs
- To investigate and recommend the most cost effective method for the transportation of water between territories, where a shortage may occur due to drought or other natural phenomena, as well as other means of increasing water availability (desalinization, management of demand, importation of water)
- To assess the institutional framework for water-related information and analyze the qualities and deficiencies of national databases and their capacity to provide the necessary data for integrated water management
- To promote a closer relationship among the user agencies and data producers, organizing consultative committees and other types of coordination which satisfy information requirements and orient future data-collection and processing activities, raising the quality thereof and providing access to databases and information sources

D. Basic information for the integrated management of water resources

7.10 Water-related databases and information are essential for designing and planning projects, avoiding situations of over- or under-design in hydraulic works and the operating difficulties which these often cause. In the former case, the information creates considerable financial savings, and in the latter, higher profitability in project management: in other words, information creates significant economic benefits. When information is lacking, financial costs rise due to over-estimation, and ineffective projects may be approved which lead to continual losses and create a drain on the national economy.

7.11 Furthermore, information is essential for settling conflicts and, in general, all problems related to public sanitation, anti-epidemic campaigns and water-caused diseases, as well as for the use and conservation of this vital resource. Box 5 summarizes the action suggested.

ACTION

Box 5

D. BASIC INFORMATION FOR INTEGRATED WATER MANAGEMENT

- **To focus data-collection activities on basins and regions in which short-term projects are already being conducted, or which are included in the national development policy and in areas where data are urgently needed for practical application; promote efforts for a closer relationship among information agencies and between agencies and users, in order to increase the amount of information which is immediately accessible to all citizens**
- **To establish coordination procedures for the standardization of criteria and technical methods among the various data-collection agencies, including the planning of network expansion and the use of non-conventional observing and data-recording systems**
- **To update the design of meteorological and hydrometric station networks (including aspects related to water quality and sediment transport) from the standpoint of future user requirements and the priorities of the National Water Plan. The analysis should cover the rationalization of network operation, the use of remote sensors and real-time transmission systems, financial outlay and future budgetary increases incurred by station operation and maintenance**
- **To establish programmes for the systematic monitoring of water quality (physical, chemical and biological), giving priority to highly developed areas and areas in which risks for public health could arise**
- **To formulate and execute a systematic plan for groundwater research, including the design and enlargement of piezometric networks and water quality control, with priority for aquifers suffering from over-use or risk of saline intrusion**
- **To organize a national system of water-related databases and Geographical Information Systems**
- **To establish or strengthen modernization programmes for the management, filing, storage and distribution of water-related data and information**

E. Human resources and training

7.12 Human resources are essential for integrated water management. The governments should take all the necessary administrative and financial measures to increase their potential, maintaining working teams on a permanent basis and creating economic incentives, in order to make civil service work in this area attractive as a career. Instruction should include specialization at all levels, including training for managerial posts, to avoid the possibility of poorly-prepared managers leading major projects.

7.13 Training must be provided for highly specialized professionals able to participate and assume responsibility for all stages of project development and - even more important - to take over operations once the projects have been concluded, attaining successive stages of technological training. This will increase national self-sufficiency and independence from external experts and consultants in water resources development. Box 6 summarizes the action suggested.

ACTION	Box 6
E. HUMAN RESOURCES AND TRAINING	
<ul style="list-style-type: none"><li data-bbox="186 404 1347 466">• To study national needs for human resources in the water resources sector for the short, medium and long terms<li data-bbox="186 504 1347 566">• To create and strengthen programmes aimed at short-term training and specialization of the staff who will be needed for the integrated management of water resources<li data-bbox="186 603 1347 696">• To create regional refresher courses for managerial and executive personnel, covering the most recent techniques in the development and integrated management of water resources<li data-bbox="186 734 1347 796">• Foster the exchange of national experiences in aspects of the assessment and management of water resources<li data-bbox="186 833 1347 895">• Use the existing capacity of the region's centres to carry forward the training of human resources<li data-bbox="186 933 1347 1024">• Foster the permanence of qualified personnel in the institutions of the water sector, by means of policies aimed at job stability, economic incentives and training, among others	

F. Education and community participation

7.14 Much of the success achieved by the projects is due to the active participation of the beneficiaries, as testified by the results of many internationally-supported projects. The number of users of water resources is increasing, with wider diversity of demands, leading to situations of scarcity and creating new sources of pollution. This is why all people, regardless of their level of education, should be made aware of the need to conserve water, make rational use of it, and pay a fair price for right of access to it.

7.15 The governments should allocate funds to the agencies concerned in order to promote campaigns in urban and rural areas, drawing comparisons between the benefits and damage caused by good and bad use of water to the environment and the users themselves. Teaching the sustainable use of resources should begin at school and continue through all stages of education. Box 7 summarizes the action suggested.

ACTION

Box 7

F. EDUCATION AND COMMUNITY PARTICIPATION

- To design and carry out ongoing strategies for education and communication, and special public information programmes in all the mass media (radio, press - including posters - and television) to make known, in simple language and with readily-understood graphics, the current water situation, with emphasis on the effects of pollution, rational and sustained use, and the economic value and real cost of water
- To create communication channels among the countries of the region for the exchange of dissemination programmes and viewpoints related to the public awareness campaigns
- To include in school curricula and text books more material on the national water resources, the value of water, sectoral use, pollution problems and the importance of conservation
- To set up, in the Hydrological Services, an administrative body acting as a reference centre, in charge of the development of public information strategies. Use international events such as World Day for Water to launch water-related information campaigns
- To establish intensive programmes of education, communication and information aimed at creating public awareness on the rational use of water and the need to pay for it at its real cost, as a basis for efficient services and the continued ability to re-invest
- To strengthen the associations and user groups which work at the level of small municipalities or communities, autonomously or with the participation of governmental and non-governmental organizations

G. Natural disasters

7.16 Several times a year, thunderstorms and hurricanes occur in the Caribbean causing death and destruction. Considered to be the most frequent water related natural disasters, these phenomena produce large and sudden river floods, inundating flood plains with resultant losses in agriculture, infrastructure and public services. The extent of damage is impossible to establish as it includes a degree of suffering by the people impacted on. The impacts on the economy spread beyond the affected areas involving the nation as a whole. Landslides (huaycos in South America) are also frequent phenomena related with an excess of rainfall as well as the flooding of the low valleys of the big rivers in the south; while the absence of rain results in droughts in several parts of Latin America. Box 8 summarizes the action suggested.

ACTIONS

Box 8

G. NATURAL DISASTERS

- **Foster national and regional studies of hydrometeorological origin, making it possible to create early warning systems and disseminate information on disasters**
- **Foster the elaboration of national and regional atlases of natural threats of hydrometeorological origin**
- **Foster the creation of meteorological and hydrological data banks on the regional level on events which may have generated disasters, facilitating the exchange of information and the elaboration of prevention-oriented studies**
- **Support the management of the national and regional agencies for the prevention and mitigation of natural disasters**

H. Transboundary water resources

7.17 Socio-economic development is closely linked to the use of shared water resources; this means that water-related programmes should attempt to make joint studies and assess all their shared natural resources - and particularly water - in order to avoid future disputes on distribution and use. Several cooperative efforts in Latin America can be used as models: the Treaty for Amazonian Co-operation (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela), the Argentine-Paraguayan Joint Commission of the Paraná River, the Itaipú Bi-National Entity (Brazil and Paraguay), the Intergovernmental Committee on the River Plate Basin (Argentina, Bolivia, Brazil, Paraguay and Uruguay), the Bi-National Yacyretá Entity (Argentina-Paraguay), the Joint Technical Commission of Salto Grande (Argentina-Uruguay), etc. Box 9 summarizes the action suggested.

ACTION

Box 9

TRANSBOUNDARY WATER RESOURCES

- **To share, among all countries of the region, national experiences in the execution of bi- and multi-lateral projects for the use of international water resources and the development of border areas. The international organizations could be an ideal medium for this effort**
- **To promote, among the countries, initial technical coordination for water resources assessment in international basins, as well as joint planning and coordinated action for monitoring networks for collecting the basic necessary information, as the first step towards drafting international agreements for the protection of resources and the development of border areas**

I. Role of International Organizations

7.18 Several international organizations and externally-supported agencies work with aid programmes linked to water resources (see Annex 3). However, coordination between these programmes and national bodies and agencies not directly related to water is very limited, as is knowledge of existing information and experiences, both positive and negative. This means that a closer relationship must be created between all external and national organizations involved in projects and/or similar activities.

7.19 The international organizations should cooperate closely in the promotion of training for multi-disciplinary teams, for the joint study and development of border areas and, especially, for the creation of water-related study projects and the infrastructure which is needed for the monitoring and recording of information and the exchange of data. They could also provide an appropriate channel for the horizontal transfer of technology among the countries of the region, the exchange of qualified personnel for training and practice, and the dissemination of locally-produced technical reference material on water resources. Box 10 summarizes the action suggested.

ACTION	Box 10
I ROLE OF INTERNATIONAL ORGANIZATIONS	
<ul style="list-style-type: none"><li data-bbox="186 984 1372 1078">• To promote the coordination of water-related aid programmes in line with integrated planning and management criteria, and create awareness among government authorities of the importance of basic information<li data-bbox="186 1116 1372 1247">• To promote greater participation of the national technical multidisciplinary teams in the preparation of water management plans and in the creation and design of hydraulic works projects, in order to upgrade technical capacities and add to local experience and technology<li data-bbox="186 1284 1372 1415">• To promote the translation and distribution of technical documents, reports and publications on development and integrated management of water resources into the languages of the region (English, French, Portuguese, Dutch and Spanish), in order to compensate for the lack of reference material on water resources<li data-bbox="186 1452 1372 1546">• To design and sponsor horizontal technical aid strategies for the transfer of experience and technology among the countries of the region; the Inter-American Water Resources Network (IWRN) provides a framework for these activities<li data-bbox="186 1583 1372 1712">• To promote and finance short training courses on the procedures recommended by WMO/UNESCO in <i>Water Resource Assessment: Handbook for review of national capabilities</i>, and disseminate the results which have been obtained by the countries of the region in which this manual has already been applied	

J. Regional recommendations

7.20 Natural phenomena such as tropical storms and hurricanes, droughts and "El Niño" affect several LAC countries. This calls for collaboration at regional level and/or among the affected countries for the creation of joint studies on these phenomena, and the planning of emergency and mutual assistance measures. Scientific events must be held, on a yearly or periodical basis, on recent progress, experience, preventive methods, emergency measures, and assessment of results, in order to create the appropriate infrastructure for data-collection activities.

7.21 An adequate assessment of the damage caused by water-related natural disasters and the study of their effects on the national economy could be used to justify support for national Services and the maintenance and modernization of the monitoring station networks. The use of simulation models and remote sensors transmitting in real time should be applied on a widespread basis, to guide the authorities during emergency cases.

7.22 In response to the call by the UN Commission on Sustainable Development (CSD) for the improvement of knowledge on world water resources, WMO, together with the World Bank, has developed the concept of a World Hydrological Cycle Observing System (WHYCOS). This system is administered through several sub-regional units called HYCOS, which supply scientific information and the conceptual framework for horizontal cooperation in the monitoring, assessment, management and integrated development of national, regional and worldwide water resources.

7.23 WHYCOS acts as a tool for the improvement of the collection, dissemination and use of high quality, consistent, standardized hydrological information at the level of basins and at national, regional and global levels. One component of WHYCOS is a series of automatic stations receiving information via satellite, supplying data on water quantity and quality, as well as other meteorological parameters. This data will be accessed by means of WMO's international communication networks. Box 11 summarizes the action suggested.

K. Follow-up to the Action Plan

7.24 The main result of the Conference will be the exchange of experience and the standardization of criteria for the national and regional recommendations aimed at overcoming the problems which limit knowledge about, and the development of, water resources in the LAC countries.

7.25 The main purpose will be to draw up the recommendations to the governments on the necessary actions and measures for performing and updating water resources assessment as a basis for the development, planning and integrated management of water and, especially, for the protection of water bodies from pollution.

7.26 The achievement of objectives will be observed in terms of the concepts presented in the **Action Plan**, which are based on a dynamic development process; therefore, it is advisable to create a number of follow-up actions for this purpose. Box 12 summarizes the action suggested.

ACTION

Box 11

J. REGIONAL RECOMMENDATIONS

- **To provide the necessary support and active participation in the study and research of events such as the "El Niño" phenomenon, hurricanes and droughts which affect several countries of the region**
- **To create awareness among government officials of the importance of having the appropriate information in real time, and of the permanent role played by the national services of hydrology and meteorology, particularly in emergency situations**
- **To promote and support the creation of WHYCOS units on the sub-regional level in the LAC countries, and in particular, stimulate the effort to establish CARIB-HYCOS**
- **Provide full support to sub-regional organizations charged with co-ordinating actions executed by countries in the area of water resources, such as the Regional Committee of Hydraulic Resources for the Central American Isthmus (RCHR) and Caribbean Meteorological Institute (CMI)**
- **To foster and strengthen the exchange of national experiences amongst countries of the region in all aspects related to water resources assessment and management**

ACTION

Box 12

K. FOLLOW-UP TO THE ACTION PLAN

The participants are urged to:

- **To make the Action Plan known to national and professional agencies involved in the water sector in their countries, in order to adapt it to their specific requirements, obtain the necessary political support and bring it to the full attention of the government authorities**
- **To hold yearly or periodical meetings with water-related agencies in order to discuss the development of the Action Plan, analyze existing obstacles and recommend strategic solutions**

The agencies of the United Nations, funding agencies and the Regional Organizations are recommended to:

- **Use the Action Plan approved by this conference as a guide for their water-related projects in Latin America and the Caribbean**
- **Promote the knowledge of the Action Plan in international spheres, as a means of supporting its dissemination and obtaining the support of other donor organizations and countries**
- **Provide periodical follow-up of the actions proposed in this Plan**

PART III

**SUMMARIES OF THE CONFERENCE
PRESENTATIONS AND
FINDINGS OF THE WORKSHOP SESSIONS**

III - 1 SUMMARIES OF THE THEME PRESENTATIONS

THEME 1: The role of water resources in addressing the economic challenges facing the Latin American and Caribbean countries at the dawn of the 21st Century

Keynote speaker: Terence Lee (ECLAC)

Summary of Presentation

8.1 This paper provided a brief review of the major challenges to water management by the main economic issues faced by the LAC countries at the beginning of the 21st Century. It highlighted the demands which will be placed on water management in contributing to the future economic and social development of the people of the region.

8.2 In general, freshwater is abundant in LAC, the region is the best endowed in the world, but the distribution is unequal and, especially, in the Caribbean there are areas of incipient water scarcity. Moreover, the population has tended to concentrate in the less humid parts of the region and three of the largest metropolitan areas are in regions with less than 500 mm of precipitation.

The major economic challenges

8.3 The greatest challenge facing the LAC countries is to achieve a high level of economic development which is both sustainable and equitable. The challenges facing water management are:

- a) to maximize the contribution of water-based services to increasing productivity;
- b) to ensure that water services contribute to the satisfaction of the basic needs of the whole population; and
- c) to meet the challenges posed by the necessity of ensuring that development is environmentally sustainable.

Actions recommended

8.4 The following were recommended in the presentation:

- a) Water services should be managed so as to be both profitable and self financing;
- b) The role of government and the public sector needs to be reconsidered away from the direct operation of public services towards the supervision and regulation of autonomous public or private providers;
- c) The transfer of water management responsibilities to the users, particularly in irrigation and rural water supply;
- d) The creation of decentralized systems of water management, particularly at the river basin level, with much greater community and private participation in decision-making, to permit the incorporation of environmental considerations in the decision-making process;
- e) The creation of effective systems for water quality management.

Water management in the 21st Century

8.5 In the opinion of the speaker, the emphasis in water management policies must be on decentralization and private participation. The opportunity exists to the creation of institutions based on the concept of integrated river basin management and the transfer of responsibilities from central to local governments. These institutional changes, together with renewed economic growth can possibly ensure that, at last, the water resources of the region will fulfill the role demanded from them by the people of the region.

Summary of discussions

8.6 During the session, widely-felt scepticism was expressed with regard to achieving, in Latin America and the Caribbean, a sufficient level of self-financing in water uses, especially water for human consumption, in view of the extremely low per capita incomes of most of the population. One of the participants, however, stated that this was being achieved in his country, and gave several examples of success in this area.

8.7 It was repeated that the countries of the region have neither succeeded in fully satisfying the populations' basic water needs, or the needs of productive activities. The solution does not lie in magic formulas in the form of new instruments, but rather in carefully analysing the reasons for which the traditional instruments have failed, for example from the standpoint of regulations; and, consequently, proposing, in accordance with the specific conditions of each country, an adequate combination of traditional and innovative instruments, such as decentralization, water markets and privatization.

THEME 2: Strategies for the integrated management of water resources

Title: Conclusions of the IDB Workshop on Water Resources Management Strategies

Keynote speaker: L. García (IDB)

Summary of presentation

8.8 The speaker provided a detailed description of the workshop which was aimed at identifying strategic guidelines for integrated management of water resources. Topics for discussion included the planning of water resources and integrated management of basins, institutional innovation for integrated water resources management and the social and economic role of water. Mr. Garcia summarized the conclusions and recommendations adopted by consensus in the workshop. A significant conclusion was the recognition of the need to consider not only the beneficial uses of water, but also the economic, social, legal political and environmental aspects. It was also concluded that an analytical framework dividing actions into three levels: constitutional, institutional and local, was a useful tool. It was noted that there were diverging opinions on privatization and water markets, calling for greater understanding on their related advantages and drawbacks. Part III-2 (B) contains these conclusions and recommendations in full.

Title: Modernization of water management. The Mexican experience.

Invited speaker: J. Tinajero González (Mexico)

Summary of presentation

8.9 This document considers the instruments which Mexico is following in order to improve the institutional capacity of the National Water Commission, as the country's only Federal water

authority. For this purpose, Mexico and the World Bank have jointly prepared the Modernization of Water Management in Mexico Project (PROMMA), which calls for - as part of the process of hydraulic planning - the structure of basin councils; in this regard, guidelines have been laid down for establishing these councils in the framework of the current National Waters Law, dividing the national territory into 13 Hydrological Regions.

8.10 The general outline includes the consideration of the guidelines of the National Development Plan and national zoning law, from the perspective of water policy and in accordance with the objectives of hydraulic development. Several stages will be completed, including the diagnosis of the current situation, the determination of short, middle and long term scenarios for solving the water-related problems which arise in each basin, the establishment of objectives and alternative strategies for water resources management, as well as investment programmes and other activities related to management, implementation, monitoring and assessment.

8.11 This process will include the structuring of the Basin Councils as a means for establishing communication and harmonization among the users, giving them roles and responsibilities in the solution of problems.

Summary of discussions

8.12 The matter which drew most attention was the constitution of basin councils and the way in which the users participate in decision-making.

THEME 3: Water resources assessment

Title: Water resources assessment - The tool for a sustainable development

Keynote speaker: D.A. Davis (Canada)

Summary of presentation

8.13 The water availability and water use of Central and South America, and the Caribbean were compared to other regions of the world for 1990 and projected to 2025. The region is well endowed with water resources, with 30.8% of the available water supply and only 8.4% of the world's population. However, there are extreme variations in availability within and between countries, and the specific situation on Small Island States where population increases, limits water supplies, salt water intrusion and sea level rise must be considered. The challenges of limited water supply, safe drinking water, environmental sanitation, food security, human health and natural disasters of flood and drought are identified as limitations in reaching sustainability of water-related resources. The need for Water Resources Assessment is identified, with a focus on balancing supply and demand and using the basin as the planning unit. Limitations, such as lack of input data and human resources are identified. Specific reference is made to UNESCO/WMO efforts in updating the Handbook for the Evaluation of National Capability for Water Resources Assessment. The paper concludes with a discussion of management response strategies, including demand management and appropriate pricing.

Challenges in reaching sustainability

8.14 There are a number of challenges which directly or indirectly affect sustainability, summarized as follows:

- a) The fast growing concentrations of population and economic activities;
- b) Water quality degradation;
- c) Decentralization of decision-making;
- d) Lack of policies and strategies at the national level;
- e) Difficulty of resolving conflicts over the use of the limited and increasingly scarce water resource.

Actions recommended

8.15 The following are some of the actions recommended:

- a) To integrate quality and quantity concerns;
- b) Link land and water resource management;
- c) Recognize water as economic good;
- d) Development must be cost-effective and sustainable;
- e) Stakeholders must participate; and
- f) Use the river basin as the planning and management unit.

Summary of discussions

8.16 Discussions were centered mainly on the following aspects:

- a) Region specific water management challenges as water demand increases;
- b) The growing importance of water quality problems;
- c) Transboundary water issues and the importance of evaluation of water balances in international basins; and
- d) Need for research linked to operational requirements.

Title: Findings of the WMO Workshop on Water Resources Assessment - National Perspectives

Speaker: G. Arduino (Uruguay)

8.17 The summary of the conclusions of the WMO workshop are reported under Part III -2 (A).

Title: Progress toward a comprehensive global freshwater assessment

Invited Speaker: G. Bjorklund (Sweden)

Summary of presentation

8.18 The global concern over fresh water manifested in the Dublin Statement, as well as in the

Rio Conference (1992) initiated, as a consequence of a decision at the Commission on Sustainable Development (1994), a comprehensive freshwater assessment.

8.19 The assessment will be comprehensive in terms both of regional and global coverage, as well as in its content, comprising availability and use of water, surface water as well as ground water, and present situation as well as the future by using scenarios up to 2025. Special studies will be conducted on water and conflict, gender considerations, water economics, and water and urbanization.

Recommended actions

8.20 The outcome of the work, a comprehensive and integrated strategy, should be taken into consideration while designing the actions proposed for at national level in Latin America and the Caribbean countries.

THEME 4: *Floods and natural disasters caused by tropical storms and hurricanes*

Title: Floods and natural disasters of hydrometeorological origin

Keynote speaker: J.Chacón/ E. Zárate (Costa Rica)

Summary of presentation

The presentation was given in two parts:

8.21 In the first part, several statistics were given on several hydrometeorological phenomena which have adverse impacts on the countries of the isthmus, hindering their development and causing huge losses of human life and economic resources, as well as severe damage to the infrastructure.

8.22 Given the magnitude of the problem, the speakers recommend the creation of a regional programme which brings together and develops initiatives in this area, and which includes measurement, inventory, evaluation, co-ordination and action relative to natural disasters in the Central American region. It was specifically proposed that, as part of the integration of local governments in the decentralization process, regulations should be developed and applied to ensure that the use of the land minimizes the impact of floods.

8.23 The second half of the talk summarized the actions which have been carried out by the Regional Water Resources Committee (CCRH) and the Co-ordination Centre for the Prevention of Natural Disasters in Central America (CEPREDENAC), in the area of natural disasters of hydrometeorological origin.

Recommended actions

- a) Set in motion a Regional Water Resources Plan which includes natural disasters,
- b) The national and local (municipal) governments should incorporate in their action plans for the integrated use of water resources, laws on the use of the land which prevent the occupation of the floodlands by urban, agricultural and industrial development.
- c) Financial support to be provided for projects related to disasters of hydrometeorological origin.

- d) Continue to support the installation of networks for the measurement of hydrometeorological parameters, to create data banks for the assessment of available water resources.

Summary of discussions

8.24 With regard to the presentation as a whole, the conference confirmed the need to make comprehensive efforts to protect the life and health of the population from natural disasters of all types, and that technical and institutional development is needed to mitigate the impacts of these disasters.

8.25 It was agreed that statistics on natural disasters are not complete and that, to gain better knowledge of the phenomena and to support the decision-making process, it is not sufficient to improve the monitoring networks, but that the information on the socio-economic losses and effects of the disasters must be improved.

Title: Advanced forecasting of floods in Ecuador's coastal region: impact of the ENSO on the pluviometric regimes.

Invited speaker: G. Gómez (Ecuador)

Summary of presentation

8.26 The talk described the scientific efforts currently being made by Ecuador's institutions to forecast the dynamic of the El Niño - Southern Oscillation (ENSO) phenomenon and to prevent its harmful effects.

8.27 The "El Niño" phenomenon and its disastrous effects were described, particularly along Ecuador's shoreline. The phenomenon is being studied and knowledge has already been gained regarding its geographical orientation, chronological frequency and relation to other natural phenomena.

8.28 It has been shown that this type of analysis makes it possible to estimate, several months ahead, the variability of rains; the coast can be sectorized in homogeneous areas, making it easier to manage protection efforts aimed at reducing the influence of the disasters.

Summary of discussions

8.29 The study included the need to enlarge this type of research to include oceanographic and atmospheric phenomena in inland areas where the ENSO has also been proven to have an influence; furthermore, the studies should include the use of isotope techniques for analysis of rain samples, to enlarge the range of results and knowledge on the phenomenon.

THEME 5: Capacity building, technological trends, manpower development and training for water resources assessment

Keynote Speaker: Alvaro A. Aldama Rodríguez (Mexico)

Summary of presentation

8.30 The paper discussed the relevance of the water sector to future development of Latin America and the Caribbean. It also indicated that there are several regions in which the over-exploitation of surface and groundwater had almost produced an environmental disaster.

8.31 Such environmental problems could be addressed, as was demonstrated with the Mexican experience, by initiating technological development. Implementation was facilitated by:

- a) adapting technologies from developed countries; and
- b) inputting local in-house technologies.

8.32 These activities resolved the problems in the hydraulic sector to some extent, but it was the setting up of the Mexican Institute of Water Technology (IMTA) which resulted in the major achievements.

Principal technological developments

8.33 The presentation highlighted the under-mentioned developments which occurred during the last five years:

- a) Numeric model to enhance hydraulic designs;
- b) Computer model for complex water systems;
- c) Advanced technology inputs to enhance water quality assessments and water treatment;
- d) Improved drainage and irrigation techniques to enhance water use efficiency;
- e) Improved communication and participation which propelled the advancement of the modernization process;
- f) Improving information technology by providing an interactive system (SIDICA-ZR) which is an aid for the planning and design of channels and drains taking into account topography.

Title: Crisis and victories in Caribbean Hydrological Services and prospects for the future

Invited Speaker: F. Farnum (Caribbean Meteorological Institute)

Summary of presentation

8.34 This presentation suggested that the linkages between water resource and the diverse hydrological regimes and developments were not clearly understood. Six constraints were identified which may prevent the development of a general water resources strategy. Specifically this paper addressed the crisis which Hydrological Services still face but pointed out that out of the crisis come victories.

Crisis of Hydrological Services in the Caribbean

8.35 Three crisis situations were discussed and summarized as:

- a) Establishment, maintenance and monitoring of stations;
- b) High turn-over rate of staff;
- c) Manpower development.

Victories of the Hydrological Services

8.36 The following are some of the victories which have been won over the years:

- a) Member States continue to maintain their networks;
- b) The availability of a regional institution which can provide hydrological technical support to members;
- c) Systems are in place in few countries to facilitate compensation by polluters and the payment for water abstraction.

8.37 For the future, additional victories would be possible in the field of water resources assessment and management provided that the region does not lag behind the technological trends. The paper cited a number of recommendations to ensure victory in the future.

Recommendations

- a) Increase the number of professionals in the field;
- b) Raise the profile of hydrology;
- c) Governments should upgrade remuneration of hydrological personnel to encourage people to choose careers in the field;
- d) Governments should grasp training opportunities afforded to them in the training of hydrological technicians;
- e) CMI/COHI should be involved to a greater extent in water resources activities in the region;
- f) Countries should use available new technology to develop their water resources infrastructure.

Summary of discussions

8.38 The workshop indicated that isotope hydrology is new and can contribute to enhancement of work in hydrology and could produce valuable information for the region.

Title: CARIB-HYCOS: A Caribbean Basin Hydrological Observing System

Invited Speaker: J. Llinás (Dominican Republic)

Summary of presentation

8.39 This paper discussed the status of development of a World Hydrological Cycle Observing System (WHYCOS). This was being undertaken in response to a call by UN Commission for Sustainable Development for a reliable system for water resources monitoring using modern technology. Several WHYCOS components (HYCOS) were being developed notably in Africa and the Mediterranean Basin. A CARIB-HYCOS project was being proposed.

Summary of discussion

8.40 Many countries expressed interest in the project and enquired as to how they might participate.

THEME 6: Strategy and action plan for water resources assessment and management

Keynote Speaker: C. Caponi (Venezuela)

Summary of presentation

8.41 The speaker presented a summary from the Keynote Paper on Theme 6, which had been circulated to participants in advance. The emphasis was put on Part III - Action Plan. It was noted that the fields of action and supporting documentation had been developed to stimulate discussion for the delegates' consideration in moving forward with development of a conference action plan.

8.42 It was also indicated that "strategy" was not an appropriate word in the title as the focus should be on the end result - the conference action plan - rather than strategies which had already been discussed at the IDB and WMO workshops.

Summary of discussions

8.43 A number of useful ideas were presented for further discussion at the working group sessions. A number of specific examples were given by individual countries of their experiences and the challenges that lie ahead. Common themes included the importance of monitoring activities, the need to integrate assessment and management activities across sectors and between agencies, and the need to evaluate quantity and quality in terms of the intended use.

8.44 A number of interventions stressed the importance of pragmatic, affordable and innovative approach in defining actions and ensuring that they are attractive to decision makers. The need for explaining the long term monitoring needs in socio-economic terms was also identified. Several examples were given of the co-management concept at the user level and the funding of monitoring and assessment activities from tariffs or fees on use of the resource. The multi-disciplinary aspect of sustainable development was mentioned by several interventions and emphasis was put on trying to put it into practice. The need to cross disciplinary boundaries in workshops and conferences was also mentioned. Specific comments were noted with the intent of incorporating these into the final text of the Action Plan.

III - 2 FINDINGS OF THE WORKSHOPS SESSIONS

A. WMO Workshop: Water Resources Assessment in LAC - National Perspectives

9.1 The purpose of this Workshop was to evaluate the capacity of the national agencies in charge of water resources information and to analyse effectiveness in the supply of data and the promotion and access of the users to information sources, in order to strengthen these agencies in responding in a timely and effective manner to a wide range of data requests related to the use, protection and integrated management of national water resources.

9.2 The activities of the workshop (see the programme in Annex 4) were carried out in three sessions:

- a) National reports on the status of WRA activities in their respective countries (Session 2): 14 countries presented their reports (Barbados, Colombia, Cuba, Dominican Republic, Peru, Venezuela, Costa Rica, Uruguay, Paraguay, Guatemala, French Guyana, Panama, Argentina and Brazil).
- b) Reports from the participating international organizations: International Atomic Energy Agency (IAEA), Organization of American States (OAS), UNESCO, Global Runoff Data Centre (GRDC) and the Regional Water Resources Committee of Central America (CRRH) (Session 3).
- c) Case studies and technical contributions related to water resources assessment. Studies presented were prepared in Uruguay, Bahamas, Guyana, Cuba, Jamaica, Mexico, Nicaragua, Chile and Belgium (Session 4).

9.3 Each session included a presentation and question and answer period. The main conclusions and recommendations were divided into:

- a) similar types of institutional, technical and human resource problems;
- b) problems related to studies for the evaluation and integration of basic information;
- c) positive aspects and actions taken in several countries for the solving of specific problems.

9.4 The conclusions and recommendations of this Workshop were subsequently presented in the plenary session of the Conference, and were taken into account in the deliberations of the working groups. Annex 5 contains the conclusions and recommendations in full. They are summarized below:

- a) The national governments, supported by the UN agencies, financial and regional institutions, should formulate a national waters policy which acknowledges the social and economic value of water and the need for the sustainable development of water resources.
- b) In order to support this policy and ensure its execution, they should also:
 - i) develop an institutional framework which, among other things, is able to overcome the current lack of co-ordination and integration among the sectors;
 - ii) develop capacities in each country to make a complete assessment of water resources, including the definition of, and compliance with shared standards and an adequate management of water resources, as well as mechanisms for the recovery of costs, reallocation of water and

- iii) settlement of conflicts;
- iii) develop a legislative framework; and
- iv) allocate sufficient resources to overcome the serious deficiencies in the observation networks, human resources and other limitations, particularly in the assessment of groundwater, water quality and the knowledge of the use of and demand for water.

B. IDB Workshop: Consultation on strategy for the integrated management of water resources.

9.5 The objective of this workshop was to consult national authorities in charge of the formulation of national strategies and policies for the integrated management of water resources, with regard to strategic guidelines for the integrated management of water resources in LAC. The results of the workshop will be used as input by the LAC countries in the formulation of the Bank's strategy for the integrated management of water resources, which will be submitted to the authorities of the Bank.

9.6 The workshop took the form of presentations followed by question and answer periods, in the plenary sessions and meetings of the working groups (see Annex 6). During the sessions of the working groups, the following subjects were discussed: *"Elements for a Bank strategy"*, *"Planning of Water Resources and Integrated Management of basins"*, *"Institutional innovation for integrated water resources management"*, *"Ways in which the Concerned Parties can Participate"* and *"The Social and Economic Role of Water: legal and economic aspects"*.

9.7 The representatives of the countries described the current situation of water resources management in each country, and made proposals for requirements to the Bank, to be used in the preparation of future strategies, in the light of the described problems and needs.

9.8 The results of the discussion showed a consensus among the working groups with regard to the need to support planning activities for water resources; to strengthen institutions to provide integrated water management; to train human resources on all levels, in order to create a "critical mass", including the users; to create better understanding of the scope, benefits and limitations of the application of economic instruments such as the creation of water markets and privatization; to stimulate the exchange of information and to strengthen participation and decision-making processes on the community and basin levels.

9.9 The conclusions and recommendations of the working groups are given in full in Annex 7. The main deliberations of the final plenary session are presented below.

9.10 Firstly, there appears to be a consensus on what is needed, not only to approach water resources from the standpoint of increasing the supply of water, but also from the standpoint of demand - in other words, to **manage** the resource, which includes both aspects; this management should be **integrated** and not performed by sectors.

9.11 This means that not only the beneficial uses of water should be considered, but also the economic, social, legal, political and environmental aspects.

9.12 Secondly, the analytical framework presented by the consultants which divided the actions on three levels - constitutional, institutional and local - seems to be a useful tool for defining possible future actions by the Bank.

9.13 It was also agreed that the main elements discussed, such as the planning of water resources, the management of hydrographic basins, community participation, institutional innovation and economic and legal instruments such as water markets, privatization and water legislation, are not an end in themselves but, rather, **means or instruments** for achieving an end, which is the use and conservation of the resource as the basis for sustainable development in its

three dimensions: social, economic and environmental. The various social, economic and environmental dimensions should have access to the necessary quantity and quality of water in a timely manner, as a vital resource.

9.14 In the framework of the discussions, new elements and variations on previous elements were brought up. These included: i) the need to assess the resource, its use and the discharges of the various uses, for the appropriate management thereof; ii) training on all levels to create a "critical mass" and, particularly, for those charged with the management of resources in decentralization processes; iii) the application of the principles of water resources planning, with new elements making it possible to incorporate the needs expressed by the user communities, in a "bottom to top" approach; iv) the need for new and flexible institutional mechanisms, both horizontal and vertical; v) these mechanisms should be an integral part of the State modernization processes currently taking place in several countries; and vi) the need for internal co-ordination in and between the financial organizations.

9.15 It was also noted that, as with institutional innovation in water-related matters (which must be initiated on the basis of the specific requirements for the management of the resource and, subsequently, as part of a broader process of State innovation and modernization), it will be necessary to apply similar criteria in other cases, such as the following:

- a) From community participation in solving water problems, towards participation in the tackling of other basic needs and problems;
- b) From the integration of water-related environmental aspects towards environmental problems of a more global nature;
- c) From legislation and regulation on water-related matters, towards legislation and regulation on health, environment, etc.

9.16 However, the above does not mean that all problems must be solved simultaneously. Here one should remember the words of several of the speakers, who said that it is necessary to "**think globally and act specifically**".

9.17 The same applies to the management of basins and the creation of basin councils or authorities, which constitute instruments or mechanisms which can, **in some cases**, be used to solve specific problems affecting a given basin.

9.18 Lastly, the discussions made it clear that there are diverging opinions on privatization and water markets, calling for greater understanding on the related advantages and drawbacks and, especially, the need to learn from previous experiences in order not to repeat mistakes.

9.19 Given that the economic instruments, as their name indicates, are **instruments and not ends in themselves**, it is clear that they are not able to solve all water management problems; the same applies to the construction of dams and canals, community participation, and legal frameworks.

9.20 Engineers, hydrologists, lawyers, economists, sociologists, environmentalists, are all individually able to grasp **part** of the problem. However, real solutions require the involvement of all, and of careful analysis of the effects which the application of a given instrument can have on other sectors which belong to the integrated sphere of water resources.

9.21 There is a general agreement that attention should not only be focused on one given **instrument**, but, rather, towards the definition of the **problem to be solved** in each case, which should involve a range of appropriate instruments.

ANNEXES

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Mr Orlandino Arteaga, Consultor en recursos hídricos OMM, 20 Calle 15-27 Zona 10, GUATEMALA 01010, Guatemala, Tel: (502 2) 37 17 47, 66 55 30, Fax: (502 2) 72 36 73

PROGRAMME OF THE CONFERENCE

WEDNESDAY - 8 MAY

8.00 - 9.00 Registration of participants

9.00 - 10.00 **Session 1 - Opening**

Mr Hugo Hidalgo, Permanent Representative of Costa Rica with WMO
Mr Emil Weinberg, Representative of Inter-American Development Bank (IDB)
Prof. G.O.P. Obasi, Secretary-General, World Meteorological Organization (WMO)
Mr Marco González, Vice- Minister of Natural Resources and Energy

Break

10.30 - 10.45 **Session 1 (Continued)**

Conference Chairman: Mr Claudio Caponi (Venezuela)

Organization of Conference

10.45 - 12.00 **Session 2 - Theme 1:**

The role of water resources in addressing the economic challenges facing Latin American and Caribbean countries at the dawn of the 21st century

Chairperson: H. Garduño (Mexico)
Rapporteur: E. Zárate (CRRH)
Keynote Speaker: T. Lee (ECLAC)
Title: The role of water resources in addressing the economic challenges facing Latin American and Caribbean countries at the dawn of the 21st Century

Lunch

14.15 - 15.45 **Session 3 - Theme 2:**

Strategies for integrated water resources management

Chairperson: L. Ferraté (IDB)
Rapporteur: L. Oberti (IDB)
Keynote Speaker: L. García (IDB)
Title: Findings of the IDB Workshop on Water Management Strategies, (6-7 May 1996)
Invited Speaker: J. Tinajero González (Mexico)
Title: Modernization of water resources management - The Mexican experience

Break

16.15 - 18.00 Session 4 - Theme 3:

Water resources assessment

Chairperson: Prof. G.O.P. Obasi (WMO)
Rapporteur: S. Naipal (Suriname)
Keynote Speaker: D.A. Davis (Canada)
Title: Water Resources Assessment - The Tool for a Sustainable Development
Speaker: G. Arduino (Uruguay)
Title: Findings of the WMO Workshop on Water Resources Assessment - National Perspectives (6-7 May 1996)
Invited Speaker: G. Bjorklund (Sweden)
Title: Progress towards a comprehensive global freshwater assessment

19.00 - 21.00 Reception

THURSDAY - 9 MAY

8.30 - 10.00 Session 5 - Theme 4:

Floods and related natural disasters produced by tropical storms and hurricanes

Chairperson: C. Candanedo (Panama)
Rapporteur: E. Bondy (Honduras)
Keynote Speaker: J. Chacón / E. Zárte (Costa Rica)
Title: Floods and natural disasters of hydrometeorological origin in Central America
Invited Speaker: G. Gomez (Ecuador)
Title: Advances on Flood Prediction over the Equatorial Coastal Zone: The impacts of ENSO on precipitation regimes

Break

10.30 - 12.30 Session 6 - Theme 5:

Capacity building, technological trends, manpower development and training for water resources assessment

Chairperson: R.M. Coimbra (Brazil)
Rapporteur: D.K. Jaigopaul (Guyana)
Keynote Speaker: A. Aldama (Mexico)
Title: Capacity building, technological trends, manpower development and training for water resources assessment
Invited Speaker: F. Farnum (Barbados)
Title: Crises and victories in Caribbean Hydrological Services and prospects for the future
Invited Speaker: J. Llinás (Dominican Rep.)
Title: CARIB-HYCOS: A Caribbean Basin Hydrological Observing System

Lunch

14.30 - 16.00 **Session 7 - Theme 6:**

Strategy and action plan for water resources assessment and management

Chairperson: D.A. Davis (Canada)
Rapporteur: D. Kraemer (WMO)
Keynote Speaker: C. Caponi (Venezuela)
Title: Strategy and action plan for water resources assessment and management in Latin America and the Caribbean

Break

16.30 - 17.30 **Working group sessions**

Development of sub-regional action proposals on a Water Policy, Strategy and Action Plan for Latin America and the Caribbean

Mexico and Central America

Chairperson: E. Zárate (CCRH)
Rapporteur: J. Tinajero G. (Mexico)

The Caribbean and Guyanas

Chairperson: B. Fernandez (Jamaica)
Rapporteur: P. Vauchel (France-Guyana)

South America - Atlantic Region

Chairperson: G. Arduino (Uruguay)
Rapporteur: V. Pochat (Argentina)

South America - Pacific Region

Chairperson: Rodrigo Marín R. (Colombia)
Rapporteur: J. Muñoz (Chile)

FRIDAY - 10 MAY

9.00 - 12.30 **Session of working groups (continued)**

Lunch

14.30 - 17.30 **Session 8 -The programme and resources:**

A programme for water resources assessment and management in Latin America and the Caribbean-Strategy and Action Plan

Chairperson: C. Caponi (Venezuela)
Rapporteur: D.A. Davis (Canada)

Reports: Working group presentations

Mexico and Central America

The Caribbean and Guyanas

South America - Atlantic Region

South America - Pacific Region

SATURDAY - 11 MAY

9.00 - 12.30 Report preparation

_____ Lunch

14.00 - 17.00 Session 9 -

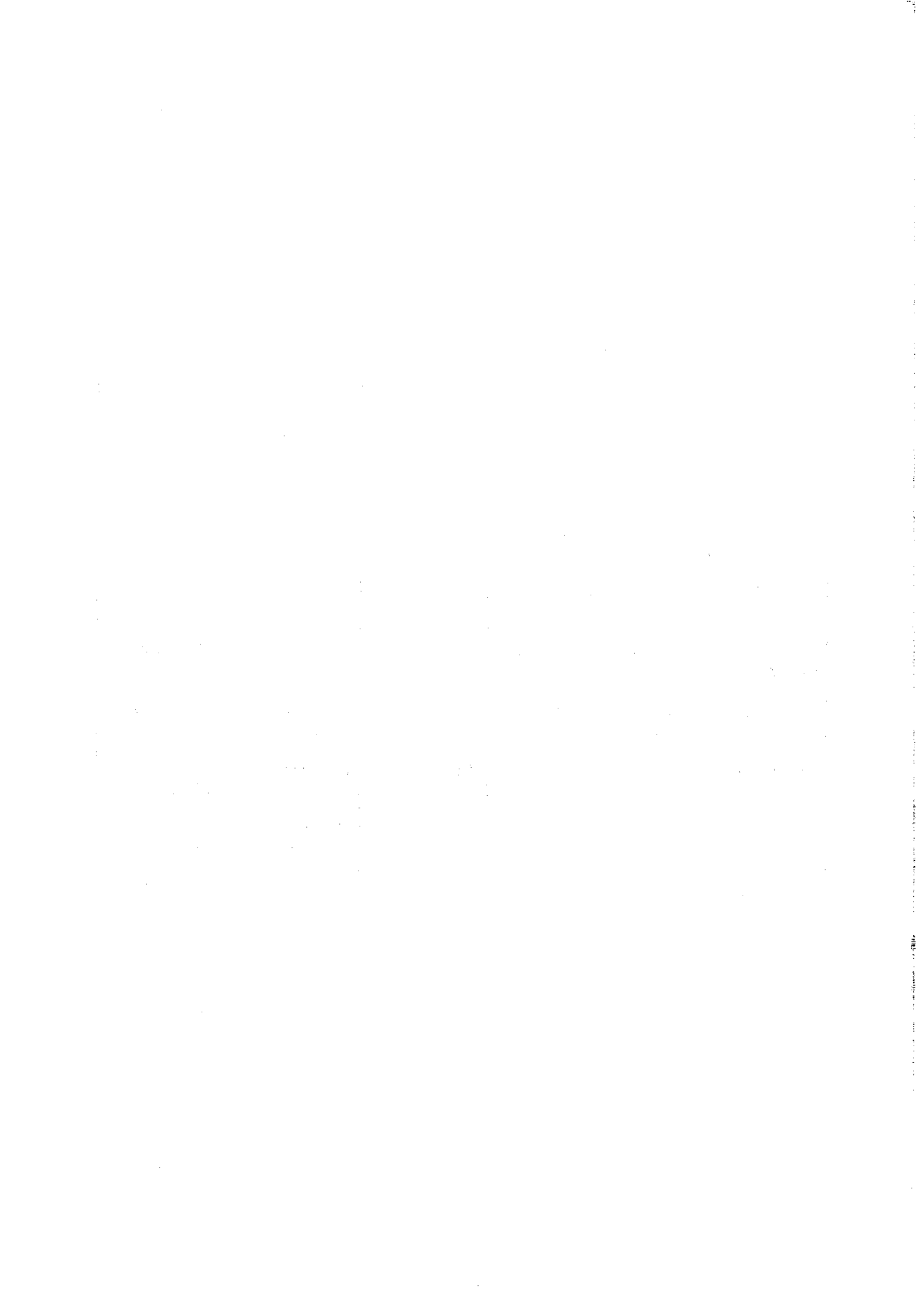
Adoption of the report of the Conference and the strategy and action plan for water resources assessment and management in Latin America and the Caribbean.

Chairperson: C. Caponi (Venezuela)

Closure of the Conference

**INTERGOVERNMENTAL ORGANIZATIONS
WHICH PROVIDE TECHNICAL ASSISTANCE**

<i>Name</i>	<i>Abbreviation</i>	<i>Address</i>
UNITED NATIONS		
Department for Development Support and Management Services	DDSMS	United Nations Headquarters, New York, N.Y. 10017, USA
United Nations Children's Fund	UNICEF	3 United Nations Plaza, New York, NY 10017, USA
United Nations Development Programme	UNDP	One United Nations Plaza, New York, NY 10017, USA
United Nations Environment Programme	UNEP	P.O. Box 30552, Nairobi, Kenya
Department of Humanitarian Affairs - Office of the United Nations Disaster Relief Co-ordinator	DHA - UNDRO	Palais des Nations, CH-1211 Geneva 10, Switzerland
SPECIALIZED AGENCIES AND OTHER ORGANIZATIONS		
Food and Agriculture Organization of the United Nations	FAO	Via delle Terme di Caracalla, 00100 Rome, Italy
United Nations Educational, Scientific and Cultural Organization	UNESCO	7 place de Fontenoy, 75700 Paris, France
World Health Organization	WHO	20 avenue Appia, CH-1211 Geneva 27, Switzerland
World Bank	IBRD (WB)	1818 H Street, N.W., Washington, DC 20433, USA
Inter-American Development Bank	IDB	Sede, Washington, DC, USA
World Meteorological Organization	WMO	P.O. Box 2300, CH-1211 Geneva 2, Switzerland
United Nations Industrial Development Organization	UNIDO	P.O. Box 300, Vienna International Centre, A-1400, Vienna, Austria
International Atomic Energy Agency	IAEA	P.O. Box 100, Vienna International Centre, A-1400, Vienna, Austria
Organization of American States	OAS	1889 F Street, N.W., 3rd Floor Washington, D.C. 20006, USA



PROGRAMME OF THE WMO WORKSHOP
WATER RESOURCES ASSESSMENT IN LATIN AMERICA AND THE CARIBBEAN
- NATIONAL PERSPECTIVES -

MONDAY - 6 MAY

8.00 - 9.30 Registration of participants

9.30 - 10.00 **Session 1: Opening**

Representative of Costa Rican Meteorological Institute
Representative of the Commission for Hydrology (CHy)
Representative of the World Meteorological Organization

10.00 - 11.00 **Session 2: National Reports on Water Resources**
Chairperson: Gabriel Arduino (Uruguay)
Rapporteur: Eladio Zárate (Costa Rica)

Barbados	Bwalya Mwanga
Colombia	Rodrigo Marín
Cuba	Eduardo Planos

_____ **Break**

11.30 - 12.30 **Session 2: National Reports on Water Resources**
(cont'd)

Dominican Republic	José Febrillet
Peru	Jorge Yerrén
Venezuela	Abraham Salcedo

_____ **Lunch**

14.00 - 16.00 **Session 2: National Reports on Water Resources**
(cont'd)

Costa Rica	Sadi Laporte
Uruguay	Gabriel Arduino
Brazil	Roberto Coimbra
Argentina	Carlos Damboriana

_____ **Break**

16.30 - 19.00 **Session 2: National Reports on Water Resources**
(cont'd)

Guatemala	Pedro Tax Tzoc
French Guyana	Philippe Vauchel
Panama	Claudia Candanedo
Paraguay	Oscar Martinez

Round Table Discussion

Conclusions and Recommendations
(to be fed into the main Conference)

TUESDAY - 7 MAY

9.00 - 10.30 Session 3: International Reports on Water Resources

Chairperson: Karl Hofius (WMO-CHy)

Rapporteur: Dilip Jaigopaul (Guyana)

- Speaker:* Klaus Froehlich (IAEA)
The use of isotope techniques in water resources assessment in Latin America and the Caribbean.
- Speaker:* Wolfgang Grabs (GRDC)
Assessment and monitoring of freshwater resources in South America: A view from the Global Runoff Data Centre
- Speaker:* Carlos Fernández-Jáuregui (UNESCO)
IHP Water Resources Assessment activities in LAC
- Speaker:* Nelson da Franca (OAS)
Inter-american Water Resources Network (IWRN)
- Speaker:* Eladio Zárate (CRRH)
The role of CRRH in water resources assessment and management

Break

11.00 - 12.30 Session 4: Water Resources Management and Assessment

Chairperson: Abraham Salcedo (Venezuela)

Rapporteur: José Febrillet (Dominican Republic)

- Speaker:* Roberto Torres (Uruguay)
Water conservation in wetland regions of Uruguay
- Speaker:* Ezekiel E. Hall (Bahamas)
The application of surface and borehole geophysics to groundwater assessment: a case study of the northern extension wellfield
- Speaker:* Dilip Jaigopaul (Guyana)
Water Management Practice in Guyana
- Speaker:* Eduardo Planos (Cuba)
Regional analysis of hurricane rain and their influence on the hydrological regime

Lunch

**14.00 - 15.30 Session 4: Water Resources Management and Assessment
(cont'd)**

- Speaker:* Basil P. Fernandez (Jamaica)
Allocation of National Resources and the Impact on Water Resources Development and Sustainability
- Speaker:* Francisco J. Plata Olvera/Hector Garduño (Mexico)
Statement and progress of the water rights registration in Mexico
- Speaker:* Jose Jesus Mairena Gonzalez (Nicaragua)
The water resources action plan for Nicaragua

Break

16.00 - 17.30 Session 4: Water Resources Management and Assessment
(cont'd)

Speaker: Blanca Elena Jimenez Cisneros (Mexico)
Criteria for integrated management of water quantity, quality and use in Mexico

Speaker: Eduardo Basso (Chile)
Water resources management in relation to insurance issues

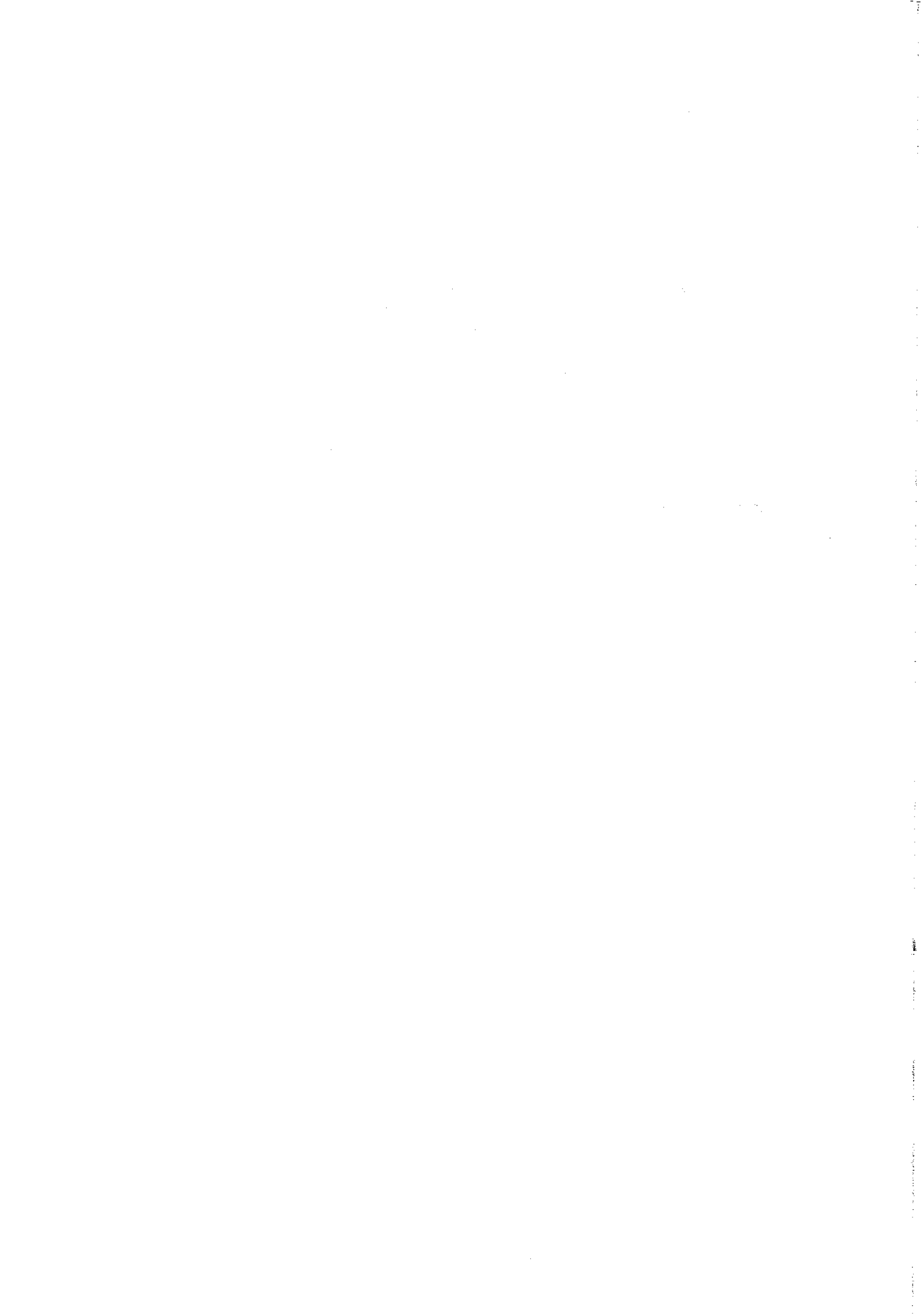
Speaker: Gaston Demarée (Belgium)
The HOMS-micro project: An integrated microcomputer system to allow water resources management

17.30 - 18.00 Session 5: Workshop Discussion, Conclusions and Recommendations

Chairperson: Abraham Salcedo (Venezuela)

Rapporteur: José Febrillet (Dominican Republic)

Closure of the Workshop



CONCLUSIONS AND RECOMMENDATIONS OF THE WMO WORKSHOP
WATER RESOURCES ASSESSMENT IN LATIN AMERICA AND THE CARIBBEAN
- NATIONAL PERSPECTIVES -
(6 - 7 May 1996)

Session 2: National Reports on Water Resources

1. Practically all of the (fourteen) national reports referred to the same type of problems, namely:

- * lack of co-ordination among the institutions in charge of water resources;
- * deficiencies in legislation, which has not kept abreast of needs;
- * lack of a national water policy;
- * reduction of staff dedicated to activities in the field of water resources;
- * poor integration of networks for the monitoring of the quantity and quality of water, and shortcoming in groundwater networks; and
- * lack of controls and legal instruments for the preservation of water resources.

2. Most of the reports pointed to:

- * lack of knowledge among decision-makers and users regarding the importance of, and need for, water resources assessment (WRA) in the countries's development;
- * difficulties in charging for water use;
- * low budgetary allocations for the institutions in charge of data collection and processing;
- * privatization has had varying effects from one country to the other, from the standpoint of water resources assessment; some of these effects have been positive and others negative;
- * heavy reliance on external consultation;
- * there is a lack in the application of modern techniques, such as the Geographic Information Systems (GIS);
- * difficulties in solving problems related to water use conflicts;
- * insufficient studies on the supply and demand of water;
- * lack of user participation in decision-making processes;
- * reduction and/or deterioration of hydrometeorological networks; and
- * reductions in available water for supply to cities.

3. Some countries have special difficulty with regard to:
 - * wetlands management;
 - * water-related diseases;
 - * integrating information to data banks; and
 - * obtaining information on sediment transportation.
4. The positive actions which have been taken in the countries include:
 - * the updating and creation of laws and regulations, and the increased importance being given to water-related matters by the decision-makers;
 - * the creation of "Water Resources Secretariats" (or similar bodies) on the ministerial level, aimed at the formulation of water policies and co-ordination among the institutions;
 - * recognition of the economic value of water and the need to charge for its use; and
 - * innovative approaches in the financing of data collection and processing.
5. The participants expressed their interest to:
 - * continue studies on natural disasters caused by water;
 - * make use of the region's existing training capacities;
 - * continue with staff training in the area of water resources; and
 - * strengthen educational programmes on water use.

Session 3: International Reports on Water Resources

6. As background, the workshop noted that the United Nations Conference of Environment and Development (UNCED), Rio de Janeiro, 1992, had emphasized in Chapter 18 of Agenda 21 the need for Protection of the Quality and Supply of Fresh Water Resources, Applications of Integrated Approaches to the Development, Management and Use of Water Resources.

7. To achieve this, UNCED identified seven programme areas. Section B of Chapter 18 shows that programme area 2 is devoted to Water Resources Assessment. UNCED itself and, later on, the Commission for Sustainable Development (CSD) urged international governmental organizations to implement these initiatives. WMO and UNESCO were requested to take over the leadership on a collaboration basis. Furthermore, in the Plan of Action of the Summit of the Americas, held in Miami, December 1994, Chapter IV- "Guaranteeing Sustainable Development and Conserving our Natural Environment for Future Generations", an initiative related to water was approved. This initiative "Partnership for Pollution Prevention", identified several actions for the countries of the hemisphere. Among the organizations asked to implement these activities are the Inter-American Development Bank (IDB), the Organization of American States (OAS) and the Pan American Health Organization (PAHO).

8. As a result of the presentations of the following international organizations (OAS, IAEA, UNESCO, CRRH and GRDC), the participants:

- * expressed their interest to continue and further enhance their support to global data centres such as the Global Runoff Data Centre (GRDC), Global Precipitation Climatology Centre (GPCC) and to the water related activities under the Global Environment Monitoring System (GEMS-Water);
- * emphasized that there is scope for the application of modern technologies such as remote sensing, isotope and tracer techniques;
- * felt that the programmes of the international and regional organizations should strengthen their efforts to co-ordinate their programmes to increase resources and effectiveness of their programmes;
- * noted the Interamerican Water Resources Network as a tool to design and sponsor horizontal technical aid strategies for the transfer of experiences, information and technologies among the countries of the region.

9. With regard to UNESCO's activities on the results of holistically oriented water resources assessment, it was stated that:

- * the quantification of surface and ground water resources now covers 80% of the region;
- * the diagnosis of water resources activities on the national level, according to the UNESCO/WMO manual, covers 66% of the region; and
- * in the generation of scenarios on the challenges of the water sector, emphasis was laid on the importance of the role of science and technology (human resources, scientific and technological research).

10. It was pointed out that these works represent the effort of 33 countries and a large number of specialists and agencies of the United Nations (UN) system which support the development of the International Hydrological Programme (IHP) in Latin America and the Caribbean.

Session 4: Assessment and Management of Water Resources

11. In this part of the workshop, the participants pointed out a number of problems which are similar to those described in Session 2, and which, therefore, are not repeated here. Furthermore, the following general problems were noted:

- * Under-use of observed data;
- * High concentration of population in regions with low water resources;
- * Lack of adequate plans for the use of water resources;
- * Serious conflicts over water use.

12. The workshop also noted that:

- * Geophysical techniques provide important information for the adequate use of groundwaters;

- * Understanding of the ENSO can help to improve water resources management;
- * Correct understanding of the causes of extreme phenomena and an adequate statistical control help to improve the design and operation of hydraulic works;
- * Adequate criteria must be established in the monitoring of water quality as an important tool for the management of water resources;
- * The Belgian HOMS component of hydrological data is an effective tool for the management of information and has been very successful in several Latin American countries, and its dissemination is recommended;
- * Insurance companies can make a great contribution to the strengthening of hydrological services.

13. One positive aspect which was noted was that excellent results have been obtained from international co-operation, and that the horizontal transfer of technology must be promoted.

PROGRAMME OF THE IDB WORKSHOP

STRATEGIES FOR INTEGRATED WATER RESOURCES MANAGEMENT

San José, Costa Rica, May 6-7, 1996

Monday, May 6

- 8.00 - 9.00 a.m. Registration
- Inaugural Plenary Session
- 9.00 - 9.30 a.m. Welcome and Inauguration
Mr. Emil Weinberg, IDB Representative in Costa Rica
- 9.30 - 10.00 a.m. Workshop objectives
Mr. Luis García, Environment Division, Social Programs for Sustainable Development Department
- 10.00 - 10.30 a.m. Elements for a Bank Strategy
Mr. Morris Israel, University of California at Davis
- 10.30 - 10.45 a.m. Coffee break
- Plenary Session
- 10.45 - 11.15 a.m. Water resources planning and river basin management
Mr. Enrique Aguilar Amilpa, Consultant, México
- 11.15 - 11.45 a.m. Institutional innovation for integrated water resources management
Mr. Armando Llop, Director, Centre for Water Economics, legislation and Administration, Mendoza, Argentina
- 11.45 - 12.30 p.m. Stakeholder participation- integration with environment
Ms. Lori Barg, Step by Step, Plainfield, VT
- 12.30 - 2.30 p.m. Lunch break
- Plenary Session
- 2.30 - 3.00 p.m. Social and economic role of water; legal aspects
Mr. Miguel Solanes, ECLA, Santiago, Chile
- 3.00 - 3.30 p.m. Social and economic role of water; economic aspects:
Water markets; privatization; cost recovery.
Mr. Carl Bauer, University of California, Berkeley
- 3.30 - 3.45 p.m. Coffee break
- 3.45 - 4.00 p.m. Organization of working groups:
- a. Brazil, Paraguay, Uruguay, Argentina, Bolivia, Chile.

- b. Central America, Belize, Dominican Republic, Haiti, Mexico, Panama
- c. Colombia, Ecuador, Peru, Venezuela, Bahamas, Barbados, Guyana, Jamaica, Suriname, Trinidad and Tobago

Working Groups

4.00 - 6.00 p.m. Parallel working group sessions

Tuesday, May 7

Working Groups

9.00 - 10.30 a.m. Parallel working group sessions

10.30 - 10.45 a.m. Coffee break

10.45 - 12.30 p.m. Parallel working group sessions

12.30 - 2.30 p.m. Lunch break

2.30 - 4.00 p.m. Parallel working group sessions

4.00 - 4.15 p.m. Coffee break

4.15 - 5.00 p.m. Parallel working group sessions

Plenary Session

5.00 - 6.00 p.m. Presentation and discussion of working group conclusions and recommendations. Adoption of general workshop conclusions and recommendations.

6.00 - 6.15 p.m. Workshop adjourn

CONCLUSIONS AND RECOMMENDATIONS OF THE IDB WORKSHOP

Strategies for the Integrated Management of Water Resources

WORKING GROUP No. 1

The discussion led to the following conclusions and recommendations:

- Support the countries in analysing their institutional and legal situation with relation to water resources management, and in studying alternative approaches for improvement in this area.
- Assist in the search for sources of financing for the continuous and systematic training of human resources in the various areas related to the management and assessment of water resources, particularly in managerial, economic and legal matters, in order to reach a "critical mass" capable of bringing about transformation processes, on the national, regional and basin level.
- Support the elaboration and setting in motion of general plans for water resources management, with special attention to countries and international basins, rather than to sectoral plans for the use of water resources.
- Support the countries in the definition of their water policies, fostering new awareness and dissemination on the governmental and user levels, with regard to the economic, social and ecological value of water resources and the importance of their sustainable use.
- Support the organizations which are responsible for integrated water management on the national level, since they will be the main representatives dealing with the Bank on this issue.
- Foster the exchange of management experiences among the various countries, thus leading the governments to give fuller importance to water resources management as part of national policies.
- Support the institutional strengthening and the search for forms of financing which facilitate integrated water management, in accordance with the forms of organization adopted by each country.
- Foster the establishment, in each country, of systems of technical and socio-economic information on water resources which are easily accessible to the various users, and promote the exchange of information and technology among countries, using the Inter-American Water Resources Network (IWRN).
- Continue the Bank's plans to finance actions for the use of water resources, as part of the general management plans.
- Support the assessment and management programmes undertaken by the countries in international basins with shared water resources.
- Strengthen the legal framework on water resources, in terms of each country's

specific jurisdiction and in the light of one another's experience, striving to ensure the stability of the users' rights and conditioning them to the need to make effective and beneficial use of the resource.

- Support water assessment and quality monitoring programmes, as a basis for sustainable management.
- Search for means of genuine funding for the activities of organizations charged with water resources management, on the various jurisdictional levels. Help the investment programmes and projects which are implemented on the basin level to become financially independent.
- Support programmes which strengthen associations and user groups in small townships and communities, either autonomously or with the participation of governmental and non-governmental organizations.
- Support public awareness programmes aimed at young people, focused on the importance of water resources and related activities, in order to increase their interest in university studies leading to professions in this field.
- Support the up-dating of university curricula in the area of water resources, adapting them to the new requirements.

WORKING GROUP No. 2

I Recommendations aimed at facilitating integrated water resources management:

1. Assist inter-institutional harmonization aimed at improving water resources management.
2. The Bank's water-related actions with the countries should be channelled through a single body in each one.
3. Without prejudice of major projects and actions, promote water-related projects on the basin level, as well as the multi-objective and integrated management of water resources.

II Facilitate institutional-organizational development

1. Consider ways of implementing the loans without reducing local technical staff for budgetary reasons, cutting down on external consultancy and maximizing local technical capacity.
2. Make it obligatory for the consultants to transfer knowledge to the local technicians (re-affirm the existing standards).
3. Convince the Bank of the reliability of the local technical authority (essential for progress).
4. External evaluation of the project.

III Improve the technical and administrative capacity in order to promote community participation:

1. Reduce the cost of loans for decentralization projects.
2. Technical assistance and training in order to develop community participation.
3. Training for developers, farmers and the public in the conservation of water resources.
4. Increase of non-refundable resources for strengthening and training at all levels.
5. Development of participatory methods of basin management.
6. Flexibility and special conditions for project development where the necessary cultural conditions and financial capacity are lacking.
7. Strategies for making credit available to the poor:
 - * Credit lines for enlarging the institutional capacity.
 - * Credit lines for training on the community level in basins where natural resources are under threat.

IV Define the basic structure of water rights and the appropriate economic market instruments which can be applied to water:

1. Incorporate "effective use" in actions related to changes in the constitutional component.
2. The Bank should support the use of water rights policies in the development of projects.

VIEWPOINT OF THE HAITIAN DELEGATION ON A PROPOSED BANK STRATEGY

On behalf of the Haitian delegation, we would like to take the opportunity to make some observations and recommendations in relation to the process of developing and enhancing the strategy paper.

- Integrated management of Water Resources in our country involves a wide range of Institutions which intervene in the sector, directly or indirectly. These include:

Ministry of Health
Water Utilities
Ministry of Public Works
Ministry of Agriculture
Ministry of the Environment
Ministry of Interior and Territorial Affairs
Most importantly, the Communities.

Thus, sharing the workshop documents prior to the workshop would have helped gather the concerns, recommendations or suggestions, enriched with all the experience of the aforementioned institutions.

We believe this experience of consultation with the technical bodies of the member states is a positive and commendable step. But, again, we strongly recommend that all future drafts be shared for more thoughtful comments, since we believe that this is only the beginning of a consultative process.

In light of sector constraints and current Bank policy, we would suggest that the Bank's specialists give attention to the following areas:

- The Bank's allocation of funds for the water sector.
- How integration of water resources management could be a starting point for strengthening the decentralization process which is being implemented on an "ad hoc" basis in many countries.
- Allocation or sharing of funds available in each project or programme for Institutional Capacity Building.
- Land tenure in vulnerable watersheds and population relocation.
- Growing numbers of urban poor living in slums - currently 40% of the total urban population - without access to the basic services needed to alleviate their poverty.

WORKING GROUP No. 3

On the topic: "**Elements for a possible Bank strategy**", it is recommended:

1. That the Bank should support and promote the development of national water-related strategies (for example: identify problems, available information, etc.) and identify the necessary instruments.
2. The Bank should focus on integrated water management.
3. Institutional change should be undertaken in order to modify current regulations and standards. This should be done before the process of water privatization, decentralization and marketing is set in motion.
4. The Bank should not propose the specific instruments which are to be used in the national strategy. The Bank should provide a range of possible instruments, suggesting the use of specific instruments in accordance with the country's legal framework and political and socio-economic conditions.
5. The Bank should orient the countries in the use of specific instruments, indicating conditions and providing the necessary recommendations. This orientation process should be accompanied by diagnosis, preferably of a multi-sectoral type.
6. Bank strategy should be oriented towards aspects such as the covering of costs and user participation. All considerations of the covering of costs should be made in the light of factors such as the fight against poverty, the development of under-privileged areas, etc.

On the topic "**Planning of water resources and integrated management of basins**", it is recommended:

1. Initiate integrated water management as part of the general national development plan.
 - * Where the political will is absent, the Bank should assist the process by intervening at the highest (policy) level to convince policy makers of the benefits of this approach.
 - * Sustainability should be an integral part of these plans, which should also focus on demand management.
2. The planning concept should be re-evaluated in the light of current knowledge of the physical and socio-economic conditions, on both the basin and national level.

3. The planning of the energy, drinking and irrigation sectors should include the participation of the various stakeholders.
4. The Bank should evaluate the recommendations contained in the document "A strategy for fostering and facilitating better planning of water resources in Latin America and the Caribbean" in terms of the enlargement and modernization of data systems. Furthermore, it is considered that, as well as being enlarged, these systems should be used in a more integral manner, not only to enhance short-term activities, but also to improve our knowledge of the system: forecasting, variability, etc.

The Caribbean recognizes that in small countries there is little room for error, in view of the limited sources of water supplies. Therefore it is felt that:

- Where none exist, the IDB should assist countries in developing these plans. The specific strategies should be tailored to the local situation.
- Where none exist, the IDB should help in establishing strong institutions to manage the water resources.
- The Bank should recommend that technology transfer be included as part of the plan.
- It should be recognized that planning must be flexible, in order to overcome difficulties created by external factors.
- Wherever possible, there should be co-operation and co-ordination among agencies and donors in the area of water resources planning.

On the topics of "Environmental aspects and ways in which the concerned parties can participate" and "Institutional innovation for integrated water resources management", it is recommended:

1. That the Bank support the development of new institutions (prepare standards and regulations)
 - * That the Bank support institutional development, especially in the training of personnel, transmitting the experiences of other countries.
2. The new institutions which are created should have more than just a regulatory function; rather, the concerned organizations (municipal governments, electricity companies, irrigation districts) should be linked to the water supply authority. The Bank should provide technical assistance in the organizational structuring of the water sector.
 - * Co-ordination of the Bank's programmes, both internally and with those of other international agencies and organizations.
 - * In this institutional development, the Bank should make use of the countries' existing governmental resources.
 - * The Bank should deal with the communities not only as collaborators, but also as active partners in decision-making and planning.
3. The Bank should create spaces for community interchange and training.
 - * The Bank should support efforts on the intermediary and institutional level in order to strengthen the institutions. Support at this level should be provided over the long term.

- * The regulatory and operative agencies should be individual and separate.
- * The Bank should see to it that regulations and standards are prepared not only with the participation of the community's attorneys, but also of its technical experts and representatives.
- * The Bank should strengthen regional training institutions.
- * The Bank should help the countries with the training of the users, making them players in the decision-making process. rather than just consumers.
- * The Bank's strategies should be aimed at the improvement of the marketing function of water companies, as an alternative to privatization.
- * The Bank should develop an institutional evaluation programme.
- * Support for the country should not be aimed at a single sector, but across the board.
- * The participation process should not only include the communities, but also other sectors, such as the NGO's, universities, research institutes, etc.
- * The Bank should provide orientation to the highest level of government (ministerial, etc.) with regard to the benefits of treating water resources from the multi-sectoral standpoint, and call attention to the problems which have arisen in countries where the various sectors lack co-ordination.

Appendix 1 contains several recommendations, which did not meet with the general approval of Working Group, but which were considered sufficiently important to be recorded here.

WORKING GROUP No. 3

- 1 The Bank should provide training spaces for the management of water resources, from the users' standpoint as well as on the technical level.
- 2 Training on regulations and standards should include specialization on legal matters related to water resources management, so that there will be water management lawyers, in the same way that there are criminal lawyers.
- 3 The participation of the beneficiaries should not be confined to the collaborators alone, rather, it should be aimed at the beneficiaries of the overall proposal, including those sectors which will be the beneficiaries in the years to come.
- 4 The inter-institutional co-ordination should be based on common objectives, so that roles and responsibilities can be shared.
- 5 Promote differentiated treatment for impoverished communities living in the Andean highlands, at the heads of the basins and micro-basins.

The Caribbean group suggests:

- 1 The Bank should promote the bringing together of the various water-related bodies under the same "umbrella" (Secretariat or Ministry) in order to facilitate the co-ordination of their activities. This does not mean that the bodies should lose their administrative independence.
- 2 The Bank should collaborate with the NGO's and other local and regional organizations to strengthen education and the dissemination of information on the local and regional level.
- 3 The Bank should support the financing of pilot projects aimed at demonstrating to the inhabitants how the basins should be managed, and teaching them to co-habit with the environment, in other words, to live in the basin, develop economic activities and prevent the basin from deteriorating.

On the topic: "**Social and Economic Role of Water**", including Legal aspects and Water markets, privatization, covering of costs, it is recommended:

- 1 That the Bank should promote, in the countries, open debate on the various criteria for water use rights. It should assist the countries in the dissemination and application of these criteria.
- 2 That the Bank should support the countries in the analysis and study of alternative economic instruments, and support them in defining the regulations for water use.
- 3 It is stressed that the consequences of the implementation of the various economic instruments are not yet clearly understood.
- 4 With regard to the social and economic role of water, it is recommended that consultation should be extended beyond the scope of this workshop, and lead to greater participation of other experts and institutions in the countries.

Caribbean group's suggestion:

- 1 That the Bank should help the agencies which regulate water resources, such as drinking water supplies, to be self-financing and develop their own economic base.