

Latin American and Caribbean hydrological cycle and water resources activities information system (LACHYCIS)

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Abstract The LACHYCIS is an information system on the hydrological cycle and water resources activities in Latin America and the Caribbean and its objective is to provide reliable information using a holistic approach that allows the user to have a global vision of information available in the region. The system offers information on: institutional and legislation aspects, availability of water resources in terms of quantity and quality, physical infrastructure, education and training, research and development, equipment and instrumentation, international cooperation and other aspects. Each one of the databases has been developed by UNESCO, using in each case a methodological guide so that the bases are standardized, allowing for their compatibility in any country of the region. At present the system is available on the Internet at the following address: www.unesco.org.uy/phi. This project is the result of the efforts made by all the countries of the region which, in the last 15 years, have generated fundamental information for sustainable development of water works.

Sistema de información sobre el ciclo hidrológico y los recursos hídricos de América Latina y el Caribe (LACHYCIS)

Resumen El LACHYCIS es un sistema de información sobre el ciclo hidrológico y las actividades sobre recursos hídricos de América Latina y el Caribe que tiene por objetivo dotar de información confiable utilizando un enfoque holístico que permite que el usuario tenga una visión global de lo que se dispone en la región. El sistema ofrece información sobre: aspectos institucionales y legislativos, disponibilidad de recursos hídricos en términos de cantidad y calidad, infraestructura física, educación y formación, investigación y desarrollo, equipo e instrumentos, cooperación internacional y otros. Cada una de las bases de datos ha sido desarrollada por UNESCO, y en cada caso se ha utilizado una guía metodológica, de tal forma que cada una de las bases ha sido estandarizada, lo cual ha permitido que sea compatible en cualquier país de la región. Actualmente el sistema está disponible en el Internet en la siguiente dirección: www.unesco.org.uy/phi. Este proyecto es resultado del esfuerzo de todos los países de la región, que en los últimos 15 años generaron información fundamental para el desarrollo sostenible de las obras hidráulicas.

SYNTHESIS OF THE PROPOSAL

Over the past thirty years, a considerable number of hydraulic works have been designed, built and operated, with different objectives and different scales and magnitude. The majority of these works used unreliable information, provided by

institutions involved in the subject, leading in the first place to over-scaled designs (to be on the safe side) and secondly to the establishment of parallel institutions to the meteorological and hydrological services within each of the institutions linked to a hydraulic development project.

The use of unreliable information has resulted in an increase of direct over-costing to the order of 25% of the total investment in this type of work, leading to an increase in the foreign debt of the countries of the region that could have been reduced if reliable information had been available.

On the basis of a need felt by the users of water information on subjects such as: (a) water resources activities—institutional sector, legislative sector, availability of water in time and space, availability of human resources, availability of infrastructure, education and training, research and development, development projects and international cooperation; and (b) mobilization of funds—preparation of projects, financial management, capital investment, assistance for acquisition, etc., the establishment of a system for the information of the Latin American and Caribbean hydrological cycle is proposed. The system will operate through a single secretariat and a network via the Internet in the countries, based on hydrology and hydraulics research centres and water authorities. The main objective of this system will be to provide reliable information on water to public and private sectors in the countries of the region for the development of their activities, enabling the efficient use of the region's water and financial resources. The potential market for the project is very wide and varied as it will make it possible, at a national level, to plan rational and multiobjective development of water resources at the medium and long term, to plan human resource training, to avoid duplication of efforts, to strengthen technical infrastructure, and to coordinate international technical and financial cooperation, *inter alia*.

Finally, in recognition of the economic value of water and the fact that, as such, it constitutes a common good, the project should, once in operation, be self-sustainable in all its aspects and have the use of all the necessary basic tools in a period of five years from its initiation.

INTRODUCTION

The Latin American and Caribbean hydrological cycle and water resources activities information system (LACHYCIS) is intended as a tool to enable the public or private user to obtain information on the subject of water in its various aspects, in an orderly and concise manner, ensuring that their water-linked products will have reliable information available. It is foreseen that this system will be part of a wider, global system having the same objective and strategy: a World Hydrological Cycle Information System (WHYCIS).

The LACHYCIS system (Fig. 1) will make it possible for both suppliers and users of information to establish a virtual balance, enabling the former to concentrate on the areas of interest shown by the information market, and avoiding the creation of useless information in the data banks which involves high costs for the countries or institutions financing it.

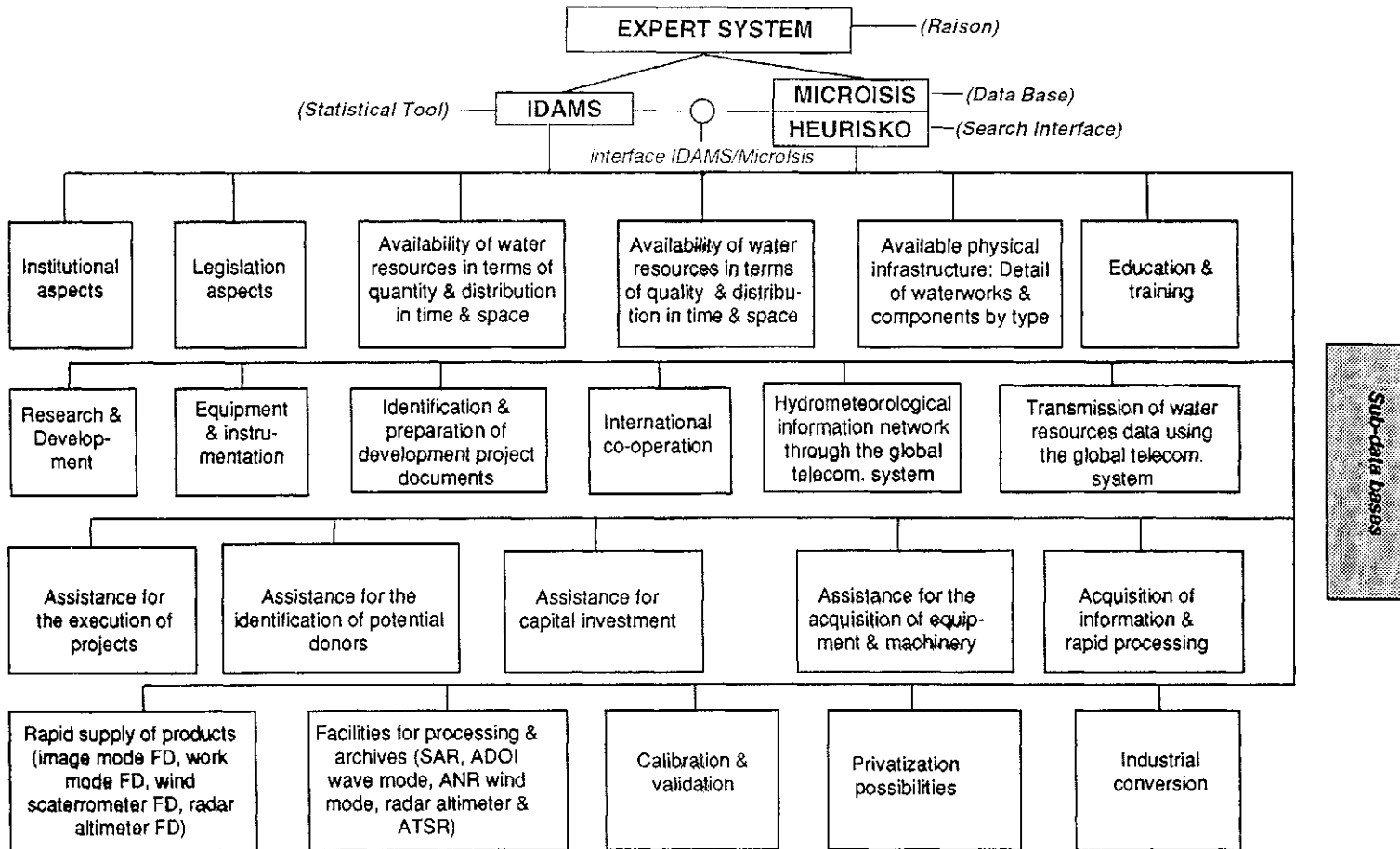


Fig. 1 Schema of information to be offered by LACHYCIS.

On the basis of already existing agreements among the countries of the region and specialized water committees, the system will make it possible to exchange information in real time for activities carried out in common or shared watersheds. The support of hydrology or hydraulic research centres, water authorities and the secretariat of the project which will comprise a coordination unit with the participation of specialized agencies, will be of relevance for the total operation of the system.

The stages of development of the project will be based on topics to be offered as a function of priority demand, following an open market development policy, and should be competitive eventually with other services from outside the region as to product/price. Further information on the need for water resources management generally and in Latin America, and on the development of the LACHYSIS project are provided by Bretschneider (1993), Bogardi & Nachtnebel (1994), Fernández-Jáuregui (1994a, 1994b, 1995, 1997), Flescher (1994), Martínez (1997), Mesarovic (1994), Mesarovic & Postel (1976), Newsweek (1995), Postel (1996), Saaty (1995) and UNDP (1995).

MAIN AND SPECIFIC OBJECTIVES

The Latin American and Caribbean hydrological cycle and water resources activities information system will have the following main objective:

- to provide reliable generated or acquired information on the water sector for development purposes to users from the public and private sector in the region.

Information supply is characterized by the following three basic management principles:

- (a) standardized quality
- (b) timeliness of supply
- (c) quantity control

The specific objectives of the system are to provide reliable information for:

- the planning activities of the water sector;
- pre-investment and investment studies in the water sector;
- standardization and legislation activities;
- water resources science and technology activities;
- human resources training and refresher activities; and
- international cooperation activities.

EXPECTED RESULTS

Considering that water is a principal factor of development and acknowledging the vital role of the water cycle as a unifying element, triggering force, vector, supplier and limiting factor, it is pertinent to present in the framework of hydroeconomics a detail of the results expected of the project at short, medium and long term, always in the context of direct and indirect cost-benefit ratios and an integrated multi-objective planning of the following topics:

- (a) human consumption (drinking water and sewerage);

- (b) food production (irrigation and drainage);
- (c) energy production (hydroelectricity);
- (d) water transport (waterways, etc.); and
- (e) others.

PLANNING METHODOLOGY

The project will use the infrastructure existing in the region, pilot experience on the subject and the technological and scientific prospects of the region as a planning methodology:

- Currently, UNESCO has established a network of hydrology and hydraulics research centres in the region, which in its initial stage has established a roster of the region's excellence centres, based on the following criteria:
 - (a) research areas;
 - (b) type of research;
 - (c) human resources;
 - (d) physical infrastructure;
 - (e) scientific instrumentation;
 - (f) libraries;
 - (g) international relations; and
 - (h) other relevant information.
- Likewise, UNESCO has prepared a directory of professional water scientists following the standards of the American Institute of Hydrology (USA), providing a list of specializations within the water sciences and information on university attended, academic level, experience and languages of each individual.
- Both information systems have been developed using a standardized common software: Micro Isis/CD.
- Through the satellite telecommunication system and the UNESCO water sciences network, an information service is provided via EARN with access to over 70 million references and summaries and statistics. The system covers over 170 databases via SIDS (Selective Information Dissemination System), codified in ASCII, with an operational speed of 30–120 characters per second.
- System for information communication on the Internet and Waternet.
- Specific projects on evaluation of surface and groundwater resources sponsored by UNESCO through two regional projects: surface water balance and hydrogeological maps, systematically using UNESCO standards and guidelines of 1981 and 1983.
- The aerological water balance of South America project (concluded), which used UNESCO published observations (UNESCO, 1990) on the upper air layer and rainfall data.
- Project on evaluation of activities in water resources on a national level, using the UNESCO/WMO guidelines. The project is being implemented in stages at a regional level.

The above information has in many cases been compiled by the projects

themselves, and in other cases transferred from other sources. However, a study of their consistence has been carried out, enabling further suggestions to be made on basic standards and approaches concerning the subject of water in the region.

On the basis of this background, the following planning methodology is proposed:

- (a) design and operation of a basic network with primary information for basic electronic operation (first phase);
- (b) design and operation of a basic network with primary, secondary and tertiary information on electronic operation in real time (second phase); and
- (c) design and operation of a basic and advanced network with information on electronic network operation and under a modular expert system (third phase).

PROJECT MANAGEMENT

The project will be carried out under the coordination of a group of executing agencies led by the World Bank/UNESCO and will be used as a reference and coordination framework for the system established in the region.

The project will comprise a scientific and technical steering committee which will be in charge of providing advice and supervision to the participants in the project and other tasks incumbent on a scientific and technical committee.

In view of the fact that a national unit exists in each country which will be administered by a group on the basins of the two leading institutions, they will appoint a national project manager, who will be in constant communication and coordination with the main unit. His/her role will be to provide technical and financial assistance to the project at a national level.

A schedule of activities for the LACHYCIS system is given in Table 1.

Table 1 Schedule of LACHYCIS activities.

Activities	Year 1	Year 2	Year 3	Year 4	Year 5
1 Design of the system and implementation of phase 1	xxxxx	xxxxx			
2 Adjustment of the system and design of phase 2			xxxxx		
3 Implementation of the system in phase 2				xxxxx	
4 Adjustment of the system in phase 2 and design and implementation of system 3					xxxxx

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