

INTERNATIONAL REFERENCE CENTRE
FOR ENVIRONMENTAL WATER SUPPLY AND

Three Experiences in Latin America

The commitment of Italian cooperation in the sector of sanitation and health care, through the improvement of water supply infrastructures. Experiences in three different countries: Chile, the Dominican Republic and Honduras.

by Fabio Rovis

Chile

The water resource and continental plateau management cooperation program first applied to the Bio Bio River basin (Central Chile), and then extended to the tract of sea facing it, draws its origin from a specific Council of Europe initiative on cooperation with Latin America.

The program was developed by Italian university professors adhering to the Centro interuniversitario per la cooperazione scientifica con l'America Latina (Interuniversity Center for Scientific Cooperation with Latin America whose administrative and organizational headquarters are at the University of Genoa), by experts from the Istituto per la cooperazione universitaria (ICU - Institute for University Cooperation, Rome), and by some faculty members of the University of Concepcion, in Chile, located in the area covered by the project. The feasibility study also involved research dons from the University of Santa Catarina (Florianopolis, Brazil), and from the National Sur University (Bahia Blanca, Argentina). This study was financed by the Italian Ministry for Public Education, while the University of Concepcion sustained some local expenses.

The project was presented by the ICU given this NGO's involvement in the first stage of elaboration and in implementing the feasibility study.

The initiative emerged favorably from numerous controls and scientific verifications and has met with the approval and support of many institutions. It is endorsed by requests and specific understandings reached by the University of Concepcion, which is also central in coordinating all the other Chilean universities involved.

The general objective of the one-year



program, the first of two self-sufficient blocks, is to create the conditions for more rational use of Chile's natural resources. The point of departure is the water subsystem, a basic element for any other territorial program aimed at fostering harmonious development in line with environmental conservation requirements.

This goal is to be achieved through the training of suitable professionals at different levels, with the same mentality and environmental principles, and subsequently capable of overall action, albeit specialized in the vast sector of environmental issues, which also call for marked inter-discipline.

As stated previously, the cooperation initiative (training and research) basically relates to the water subsystem (continental and marine). However, it is obvious that in light of the well known interactions between this and other subsystems (air and soil), an analysis of the whole territorial system, if along basic lines, is inevitable especially in terms of the use man makes of the physical environment.

Therefore, the analysis phase comprises all the possible aspects of human action and related motivations. Among the latter, particular importance is attached to those that contribute to defining the plan-

ning objectives, which in addition to envisaging an essential transfer of experience, also comprise regulatory proposals emerging from a comparative environmental law analysis.

Another feature of the project is the analysis-project-check-plan sequence arrangement. This methodical succession, widely used within the scientific and experimental arena and applied to an interdisciplinary context such as this may be geared towards an important general training goal. It may unify within the single method, the two branches of natural sciences and human sciences whose distinction today impedes the correct understanding (and consequently management) of a situation.

Moreover, emphasis should be placed on another objective: to complete a plan whose management should not require particularly advanced technologies.

On the basis of this general approach, the envisaged research initiatives aim at achieving total environmental reconnaissance within the year covered by the program. This will then be the basis for any possible further development of planning initiatives.

The envisaged setting up of centralized disciplinary laboratories will also serve to pursue the same general training objective as a tool of support as adapted as possible to the need for an interdisciplinary approach to environmental reconnaissance.

On the whole therefore, the program with all its components, aims at defining a more general phase that may possibly lead to subsequent developments of a more specialized and specific nature.

To achieve the illustrated goals and methodological approach, theoretical activities (lessons) in seminar and practice form (in the field and in the laboratory) have been envisaged, within the framework of three different training courses. The number of participants will be restricted by a selection procedure. A total of 36 openings will be available for the researcher training course, 12 for laboratory technical directors, and 25 for laboratory technicians.

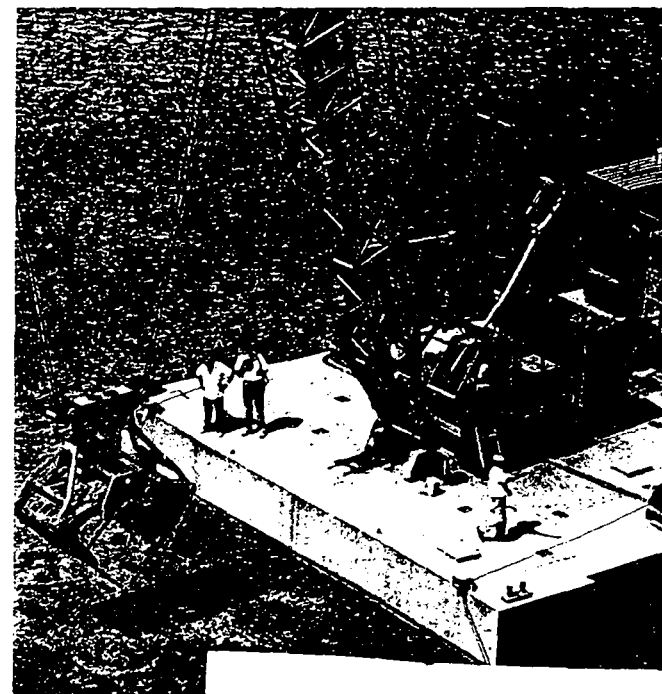
The envisaged research activities cover 16 areas which as such, represent sub-projects. Basic themes for each sub-project have been identified.

Given the objectives for the year covered by the cooperation program, research activity will start with the setting

Facing page: Dominican Republic, Valdesia Basin. A trunk slicing machine at work.

Top: Dam discharge mud removal.

Bottom: Silt removal from the lake.



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up of an initial data bank pertaining to the themes, utilizing a thorough bibliographical analysis of the existing material.

Six campaigns have been planned, during which the values of some traditional environmental parameters will be recorded on site, and samples of water, sediment, biological material and air collected for later laboratory analysis.

Moreover, recording instruments will be installed on site to collect continuous data on the trend of certain parameters.

The Dominican Republic

The Valdesia basin in the Dominican Republic plays a very important role in the country's economy. Indeed, in addition to supplying water to irrigate a vast area devoted to intensive farming and to feed a hydro-electric plant providing energy for the capital, the basin has also become the point of departure today for the new Santo Domingo water system.

The hurricanes David and Frederick, which hit the country with great violence in 1979, discharged an enormous quantity of clay, silt and sand debris into the basin together with tree trunks and roots. By settling on the basin bed, they considerably reduced its storage capacity and obstructed the dam's outflow drains, thus seriously jeopardizing its functional and security features.

By request of the Corporacion Dominicana de Electricidad (CDE) in 1982, GEOLIDRO examined the problem of the Valdesia reservoir and submitted to the CDE a technical and economic proposal structured in two phases. The first comprised studies, surveys and projects, and the second the supply of a complete GEOLIDRO system-type unit for the removal of lithoid sediments from the reservoir, technical assistance in preparing the work-site, delivery and assembly of the system, its activation and the training of local staff.

The President of the Dominican Republic requested Italy's cooperation for the Valdesia reservoir mud removal program.

Italy granted a subsidy for a total of Lit. 316.6 million for studies, surveys and projects, and Lit. 7.842.400.000 for the supply of special equipment and machinery for technical assistance activities.

The studies, surveys and projects have made it possible to determine the nature and quantity of the lithoid sediments, and

Top: Honduras. Drilling experimental wells and a survey of underground water and spring resources.

Bottom: Geotechnical survey of the area around Tegucigalpa.

to plan the worksite initiatives and the measures to clear the drains on the reservoir bed. Finally, they have allowed for the definition of all the equipment needed to de-silt the reservoir and conduct related operations on the dam.

During operations, the reservoir was also filled with numerous trunks that the Dominican authorities cannot remove for technical and financial reasons, as well as with lithoid materials to be removed with the Italian machinery.

To bring the program to a close, it was decided to grant the request to supply a special machine capable of removing the trunks in the lake, and to provide for

their subsequent grinding.

Following an inspection last March, the project's implementation was seen to proceed according to plan. However, it was also observed that the huge mass of trunks in the lake was an obstacle to attaining the pre-set goals. Therefore, the Direzione generale per la cooperazione allo sviluppo (DGCS — Directorate General for Development Cooperation) has granted an additional sum of Lit. 1,313,300,000 for the supply of the following equipment: cranes, a trunk-slicing machine, skirting boards, winches, trunk conveyor belts and slides, an oleodynamic bucket, cables and technical assistance.

Honduras

The city of Tegucigalpa, capital of the Republic of Honduras, has a population of 450,000. Its rapid development as the country's tertiary sector center, has caused serious infrastructural shortfalls, first and foremost in the drinking water distribution and sewage systems.

The real average water supply for the population, guaranteed by a special body, the Servicio Autonomo Nacional de Acueductos y Alcantarillados (SANAA), is extremely limited. Optimistic evaluations estimate 75 liters per person a day. It should be added that not all the capital's

Services for a Pueblo Joven in Peru

Over the past 30 years, Peru has witnessed an increase in the exodus of rural populations to urban areas and especially to Lima, the capital. Naturally however, the existing infrastructures have not been capable of coping with this mass internal migration phenomenon. As a result, several areas in the urban outskirts of many cities throughout the country have been occupied, giving rise to the so-called *pueblos jovenes* (recently established districts).

One such *pueblo joven* is the "7 de octubre" district, which rose with the occupation of a hill in the urban area of Lima by several hundred families (on October 7, 1963, hence its name). This district now comprises 2,700 shacks made of mud, wood and cardboard and has about 30,000 inhabitants, 60 per cent of whom are under 25 years of age. Most of the children do not attend school, although no fee is required, because they are forced to find a way to survive, since their families cannot guarantee their subsistence. Most young people are jobless, which explains the high juvenile delinquency rate.

This is the social backdrop for the work of a parish group of Italian priests from the diocese of Ca-

merino.

The existing infrastructures were implemented with the direct contribution of the local population, the coordination of the Italian priests and the support of the Maria Sofia Giustiniani Bandidi Foundation also from the diocese of Camerino.

The water supply and sewage system was never built due to a lack of funds to purchase the construction material, and because, by its nature, the system cannot be implemented on an individual basis but requires community coordination. The problem of water is pressing however (because of its hygienic and health care implications). For the past 15 years, a specially constituted committee has been urging national and international organizations to contribute to the implementation of the system. The various local water initiatives have converged within the parish which, through the diocese of Camerino, has appealed to the Centro internazionale di cooperazione allo sviluppo (CICS — International Development Cooperation Center), a non-governmental organization recognized by the Ministry of Foreign Affairs.

The CICS has developed a project, financed by Italian cooperation for a total of Lit. 907.84 million, whose

objectives are as follows: provide the district with a water supply system and a water run-off system; improve the health-hygiene conditions of the population through adequate educational initiatives related to the introduction of the new water resource; create jobs and therefore generate income, albeit to a limited extent, in order to overcome youth unemployment particularly; provide vocational training for the young who will be employed on the worksite, to give them greater opportunities for insertion in the world of work once the project is completed.

The construction work will be conducted on the basis of an *administracion controlada* approach. According to this arrangement, the non-governmental organization will select the staff and purchase the materials, entrusting a local firm with the management and administration of the building site. This also guarantees that the works are implemented effectively in line with quality and security standards and at low cost. Moreover, this approach makes it possible to provide the opportunity for vocational training, which is normally not envisaged by contracting firms and finally, it guarantees that the work income resource is made available to the jobless

young.

The improvement of the population's health-hygiene conditions is to be attained through an educational activity related to access to the new water resource. This activity will be developed by means of evening meetings especially for mothers, and week-end seminars for instructors and social workers.

The program envisages the employment of three Italian cooperators: a coordinator, an hydraulic technician and a health worker.

To guarantee the durability of the program, the participation of the people is fostered through district organizations, which are involved in implementing the work, during the decision-making and operational phases. From a technical point of view, the continuity of the operation is guaranteed by the involvement of the municipal water company (SEDAPAL), both during the planning and supervision of the work. The skills acquired by local workers, following vocational training courses, are a further guarantee of the structures' durability.

Sergio Barbieri

inhabitants are served by the water system managed by the SANAA. New suburbs of the city, which have mushroomed spontaneously and in chaos, are only supplied by wells with no sanitation controls and which draw from water beds too near the built-up area to be considered safe.

Finally, other populous outskirts totally lack any sort of water source and depend exclusively on a sporadic service supplied by the SANAA with tank trucks.

The deficiencies of the current drinking water supply system are attributable to the resource's scarcity and to the poor state of the existing networks.

Although something has been done to improve the existing water supply facilities, the same could not be said about the exploration and tapping of new water resources until a few years ago.

The governmental program (Master Plan) had defined several possible initiatives for the detection of potential resources. But the only source that could be tapped immediately, the Amarateca groundwater, fell short of expectations after the first few test drills.

If for long-term programs recourse to catchment basins along rivers flowing near the capital is envisaged, the possibility of meeting the urgent and pressing water requirements of the capital depends exclusively on the rapid study and subsequent development of two resources: the ground water of the Tegucigalpa plain, which looked promising, and the series of surface resources of the "Montana el Chile", which could be tapped using a rather simple and easily implemented water pipeline. By request of the Government of Honduras, through the SANAA, Italian cooperation financed a program for the study of these two potential resources through hydrogeological and hydrological surveys that were carried out with suitable equipment (drill rig, pumping test material, and hardware and software to manage the acquired data).

The financing the Italian Government granted for the study, the supply of equipment for the surveys and personnel training, amounted to Lit. 3,471,960,000, while the local government contributed with activities worth about Lit. 820 million in total.

Two parallel training programs were developed: the first for a post-graduate specialization course in Italy for four Honduran engineers on subjects of interest to the SANAA, the second for a seminar on the "management and planning of drinking water supply systems", to train six SANAA executives. Three of the seminar's participants remained in Italy for a period of job training and were thus actively involved in the executive planning

and preparation of the software required within the framework of the technical assistance initiative. All the training activities were held within 13 months.

The project, brought to a close in the first half of last year, through the analysis of the surface water resources and the general hydrogeological features of the area, was geared towards proposing solutions to overcome the capital's immediate problem. A detailed study of the Tegucigalpa plain ground water was thus carried out. An executive project also involving a detailed study was implemented to tap the spring areas of Montana el Chile. Moreover, equipment was provided, vital for assessing these resources and for training SANAA technicians.

The study of the hydrogeological resources on the Tegucigalpa plain lasted 13 months, and entailed the collection of existing data and an in-field geological survey with photographs, photographic sensing, a census of the existing wells and tests on some of them. Furthermore, a physical and chemical ground water assembly network was defined. Test wells were then located and drilled (which could be used immediately if connected to the existing network), and pumping as well as geophysical boring tests were conducted. The collected data were then processed. A mathematical model of the water bed was prepared to constantly evaluate its evolution and future activity with programmed extraction and its maximum drawing capacity in a stationary regime was also assessed.

The spring resource study conducted in Montana el Chile will also last 13 months. It envisages a field survey, the collection of available data, the inspection of existing facilities and verification of their possible integration within the first immediate development phase of the executive project, map-making, and levelling operations.

A hydrogeological inspection was conducted to determine the minimum available volume, and define in broad terms the first immediate development phase and subsequent stages. The immediate development phase of the project was also defined with the Honduran counterparts, its related costs estimated and detailed topography and geotechnical surveys implemented.

The final data processing gave rise to technical reports, executive drawings, computations and specific estimates, etc.

The programs for the pressure calculation and verification of water supply networks, and for data storage and analysis were consigned to the Honduran officials along with all the equipment provided to carry out the initiative. The Italian project has made it possible to gain an insight into

the hydrological situation of the whole Tegucigalpa catchment basin, and has allowed for the drilling of new water-points for the inhabitants' immediate use.

On the basis of the surveys and the appropriate economic considerations, the SANAA established that the only possible way to supply the capital with water in the medium term was to construct a dam in Concepcion, on the Rio Grande about 12 kms south-west of Tegucigalpa, with a 23-million cubic meter storage capacity.

Italy was asked to design, manage the works and construct the dam, for an estimated cost of about MECU 39. Italy, in turn, has conceded a MECU 4.394 grant to the Honduran Government for works management and planning and MECU 27.811 in soft loans for the implementation of the construction work. The remaining expenses will be incurred by the Government of Honduras.

The project will be completed by ancillary and secondary works (water pipelines, treatment plant, connection to the existing network, measurement and control equipment), and will be implemented in two stages. The first envisages the barrage of the Rio Grande in an area presenting favorable morphological and geological features. The barrage will be a rolled concrete structure allowing very fast implementation times, and lower costs than those required by more traditional barrages. The second phase envisages the construction of a water treatment plant and of the related pipeline.

Rural Development to Quench Sahelian Thirst

Ever present in integrated rural development programs in the Sahel, village water supply is approached case by case. When a water-point becomes a key element of rural development.

by Massimo Candelori



Facing page: Kayes, Mali. Works on the Senegal River near Kidira.