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EVALUATION OF THE PAN AMERICAN CENTER FOR SANITARY ENGINEERING AND ENVIRONMENTAL SCIENCES

This document describes the evaluation process of the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS) and contains an Executive Summary of the findings of the Evaluation Team in addition to the complete report.

The Evaluation Team was composed of Dr. A. F. Bartsch, environmentalist and former director of the National Environmental Research Center, Corvalis, Oregon, USA; Eng. Humberto Romero Alvarez, Technical Adviser to the Ministry of Agriculture and Hydraulic Resources, Mexico; and Eng. Carlos Celso do Amaral e Silva, Director of the Companhia de Tecnologia de Saneamento Ambiental, CETESB, São Paulo, Brazil. The Team conducted its analysis during the period November 1981-March 1982.

CE88/14 (Eng.)
ANNEX

REPORT OF THE EVALUATION TEAM ON THE PAN AMERICAN CENTER FOR SANITARY ENGINEERING AND ENVIRONMENTAL SCIENCES

31 October - 21 November 1981

PAN AMERICAN HEALTH ORGANIZATION/
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EXECUTIVE SUMMARY

The Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS), by Agreement between the Government of Peru and the Pan American Health Organization in April 1971, was founded to apply modern technology to the solution of basic sanitation problems and those deriving from increasing urbanization and industrialization. Direct technical assistance was the major component of its early work.

The Agreement provides that the Center's activities will be in accordance with the directives of the Organization's Governing Bodies and within the policies and budgetary guidelines established by them. This flexibility provides a sound basis for CEPIS' present concentration on technical cooperation and services to populations in rural and urban fringe areas.

The buildings and grounds in Lima, provided by the Government of Peru, are adequate and have been maintained in excellent condition. They are a meaningful part of the learning experience in environmental health.

This evaluation stems from Resolution XXXI of the XX Pan American Conference (1978) which mandated a detailed review of the ten Pan American Centers. CEPIS is the seventh to be evaluated. The Evaluation Team visited the Center, the host government, and beneficiary countries, including a wide range of agencies, institutions, national centers and professionals from various sectors.

The Team found that CEPIS enjoys an excellent reputation based on a sustained, high level of performance. The staff has demonstrated technical competence, a willingness to be helpful and an understanding of most country needs. The Center is in a period of transition for the future. The new "critical mass" at the Center needs to be enhanced by three additional skills: education technology, analytical quality control, and microbiology.

Research is planned to be concentrated in the network of "national centers," in the countries, with emphasis on the development of appropriate technology and sharing of resulting information. The term "national center" refers to a government body, an institution, a laboratory, a university, or other recognized organization. In-house research is kept to a minimum.

Technical assistance has been very significantly reduced to urgent, high priority problems, but there is still a role for this service in the eyes of some countries. Technical cooperation is effectively achieved through the network of national centers, some of which have attained a high degree of sophistication and specialization.

Training is perhaps the most important activity for the 1980's and beyond. Courses at CEPIS will be reduced from about 100 held annually in the past to 20 in 1982, the latter being focused on training national trainers. This strategy is designed to achieve the multiplier effect necessary to stimulate and assist national training programs in planning and developing sufficient technical and non-technical staffs by 1990.

The collection and dissemination of technical information is complementary to the rapid development of human resources. It is also a key element in the wide and timely exchange of technical information. The present operation is close to the limits of available staff, financial and equipment resources, and library space. It may be timely to streamline the publications service, perhaps even broadening the sources of technical information but focusing the subject matter on the highest priority programs and ensuring wider distribution and exchange of technical information.

The current and future work of CEPIS could be further strengthened by the appointment of a Scientific Advisory Committee, meeting every other year, and by periodic external evaluation starting after three years.

1. Introduction

1.1 Purpose of this evaluation

This evaluation was undertaken in conformance with Resolution XXXI of the XX Pan American Sanitary Conference (1978), which called for a review of the 10 Pan American Centers, and with Resolution XXII, operative paragraph 3, of the XXVI Directing Council (1979), which requested, among other things, with respect to the International Drinking Water Supply and Sanitation Decade:

> ii) The full utilization of the resources of the Organization, particularly those of the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS), for the training of personnel at all levels and the dissemination among the governments of information on the availability of such activities; iii) the establishment of systems for the exchange of information; iv) the identification and preparation of project proposals; and v) the seeking of extrabudgetary resources to further collaboration with governments in implementing their programs.[1]

Resolutions XXVI and XXVII of the same meeting of the Directing Council emphasized continuation of the evaluations of Pan American Centers, including management aspects and the costs of services rendered and increasing the technical and financial self-reliance of the Centers.

1.2 Members of the Evaluation Team

The Director of PASB appointed Dr. A. F. Bartsch, Eng. Humberto Romero Alvarez and Eng. Carlos Celso do Amaral e Silva to form the Evaluation Team, with the assistance of Dr. Robert de Caires (Temporary Adviser) and Mr. Frank Lostumbo (PAHO/Administration). The Team chose Eng. Romero Alvarez to be the Team Leader.

1.3 Approach to the evaluation

CEPIS is the seventh Pan American Center to be evaluated. The Team assembled in Lima, Peru, on 2 November 1981 for a visit to the Center and to national authorities and institutions 2-6 November. A "Guide for CEPIS Evaluation Team," which was received from the Division of Environmental Health, Washington, D.C., was reviewed. The Team studied the Basic Agreement, between the Government of Peru and the Pan American Health Organization/World Health Organization, "Concerning the Establishment of a Pan American Center for Sanitary Engineering and Environmental Sciences in Peru," dated 8 April 1971. The Center actually began operations in 1968. The Team also reviewed the Self-audit, prepared in detail by the Center Director and staff. The information in this document was expanded through discussions and written presentations.

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[1] Pan American Health Organization, Official Document 167, p. 70.

The Team, reduced to Dr. Bartsch and Eng. Romero Alvarez, then visited Brazil, Colombia, Costa Rica, Nicaragua and Jamaica, 7-21 November. A list of the national institutions and personnel visited is given in Annex I. In addition, a questionnaire was developed to obtain information from key staff during the country visits; a matrix of the country responses to the issues identified and discussed in some depth is attached as Annex II. This mechanism was successful in acquiring additional information on individual attitudes and perceptions regarding CEPIS in the field.

1.4 Acknowledgements

The Team expresses its gratitude to the Center Director and staff for the considerable time and effort devoted by them to its visit to CEPIS, and was impressed by their enthusiasm, frankness and spirit of genuine self-evaluation. The visits to the countries and national institutions were marked by the cordial reception and courtesies extended by the nationals and the PAHO Area and Country Representatives. The Team wishes to express appreciation for the many ways in which help was provided by Dr. de Caires and Mr. Lostumbo.

2. General information on CEPIS

2.1 Genesis

The Center was established in response to the interest expressed by the countries of the Region in the improvement of human health through better environmental conditions and protection of natural resources against pollution, and the incorporation of these goals into national plans for economic and social development. It was considered that the Organization had an increasing need for an instrument to provide highly specialized technical and scientific assistance to its Member Countries, as a complement to the assistance already offered through its regional and national offices. The Basic Agreement between the Government of Peru and the Organizations represented on the Board of Technical Assistance, signed on 30 March 1956, forms the basis of the Agreement which established CEPIS "as an international institution" to "be administered by the Organization."

2.2 Objectives, goals and strategies

This latter Agreement is couched in general terms and is open ended. It can be modified by mutual consent or terminated by either party with one year's advance written notification. For CEPIS, "as a highly specialized technical agency of the Organization's program in environmental sciences and engineering" it sets these goals:

A. To contribute to the improvement of environmental conditions in Peru and the other countries of the Region, with special attention to the complex problems which have arisen as a result of population growth, industrialization and intensive urbanization.

B. To encourage and advise governments in the adoption of new approaches and the full use of the extensive resources of modern technology,

for the improvement of environmental conditions and the protection of natural resources, keeping in mind, above all, the health and well-being of the human population, and duties:

a) Provide technical and scientific assistance in the field of environmental sciences and engineering.

b) Act as a regional reference center in environmental sciences and engineering, which includes the gathering, preparation and distribution of technical information.

c) Collaborate in, support and promote training and research activities.

d) Collaborate in the development of special studies and carry out surveys.

While rural areas are not mentioned, Part IV of the Plan of Action states that "activities will be established in accordance with the directives of the Organization's Governing Bodies and within the policies and budgetary guidelines established by them." The emphasis now given to meeting the needs in rural and marginal areas clearly assigns priority to these activities in the program of CEPIS. It appears to the Team that the broad terms of the Basic Agreement will accomodate the changes already made and now being contemplated in the work of the Center.

The text of Resolution XXII, paragraph 3, of the XXVI Directing Council (1979), quoted above under 1.1, gives a clear directive to the Director of PASB, and through him to CEPIS. In adapting to the provisions of this Resolution CEPIS has developed certain criteria which govern its cooperative activities:

a) The activity must have a significant impact on the accomplishment of regional and national goals.

b) The activity must contribute to greater national self-reliance, in the short term.

c) The activity must have a multiplier effect.

d) Technical cooperation must contribute to institutional development through enhancement of technical and financial self-reliance.

e) CEPIS is committed to the development of a network of national centers, which will constitute a regional resource.

2.3 Present functions and programs

The four basic functions of all Pan American Centers apply to CEPIS: research, education and training, advisory services to countries and information analysis and dissemination. The mix of these, at this time, differs significantly from the earlier years. The emphasis on direct technical

assistance has shifted recently to the major activities of development of human and institutional resources, development of technology (through in-country research) and information collection and dissemination.

These four functions are elements of the following eight major regional programs based on the priorities set by the Governing Bodies of the Organization and the requests from the Member Countries:

a) Improvement of drinking water quality.

b) Extension of water services to urban slums through reduction in "unaccounted-for" water.

c) Development of appropriate technology for collection, treatment and disposal of waste water and excreta, for medium and small communities and dispersed rural populations.

d) Strenghtening "commercial systems" of water supply and sewerage disposal (to make them financially self-sufficient).

e) Technical and institutional development of agencies responsible for basic sanitation in concentrated and dispersed rural populations.

f) Improvement of the collection, transport and disposal of solid wastes.

g) Collection and dissemination of information on sanitary engineering and environmental sciences.

h) Assessment and control of environmental pollution and hazardous substances (at this time the major component is water pollution control).

In addition to these eight precisely stated major regional programs, there is a ninth of perhaps lesser importance and having little precision. In disaster situations and in the face of serious factors of environmental risk, CEPIS is required by the governments of Member Countries to give its technical opinion on alternate solutions to given problems. In these circumstances, the Center has acted promptly and effectively, as happened with the repair and modifications that it proposed for a water treatment plant in Manizales, Colombia, destroyed by a meteorologic phenomenon.

These regional programs appear valid and appropriate for CEPIS.

2.4 Organization

CEPIS is managed by the Organization. The Director of PASB appoints the Center Director, who is responsible to the Organization for the administration of CEPIS.

The organizational chart of the Center is reproduced on page 29. All the governments of the Americas are entitled to receive the services of CEPIS and to participate in its activities.

2.5 Budget and sources of funds

The following table details the resources projected for 1984-1985, those allocated for the current biennium 1982-1983, and for the years preceding, provided by:

a) PAHO/WHO regular budget.

b) Contribution of the Government of Peru (host country).

c) Other sources.

Year	Total	Regular Budget PAHO/WHO	Contribution Peruvian Govt.	Other* Sources
1984-1985	2,278,763	1,980,400	277,300	21,063
1982-1983	2,947,807	1,884,800	263,900	799,107
1980-1981	2,638,785	1,686,500	301,193	651,092
1979	977,277	707,226	49,678	220,373
1978	690,996	575,992	45,989	69,015
1977	822,198	595,368	111,282	115,548
1976	918,458	732,917	45,367	140,174
1975	650,933	523,089	119,338	8,506
1974	532,178	452,163	80,015	
1973	415,999	366,669	49,330	
1972	305,589	249,642	55,947	
1971	274,956	270,675		4,281
1970	207,291	203,303		3,988

* Funds appearing in the "other sources" column for 1982-1983 and 1984-1985 derive from the DTIAPA project[1] (an Inter-American Development Bank (IDB)) nonreimbursable loan to Peru for US$1,300,000 to be spent from 1979 to 1983) and funds allocated by the IDRC[2], the IRC[3], and United Nations Educational, Scientific and Cultural Organization UNESCO for the strengthening of information activities and the development of REPIDISCA[4].

1 Technological Development of Drinking Water Supply and Sewerage Supply and Sewage Disposal
2 International Development Resources Corporation of Canada
3 International Research Commission
4 Pan American Network for Information and Documentation in Sanitary Engineering and Environmental Sciences

The 1980-1981 period and preceding years also reflect the sources previously mentioned and, in addition, funds from United Nations Environment Program (UNEP), WHO, University of Oklahoma, and proceeds from the sale of publications, and for the development of activities in information, training and research.

At his request, Mr. Bruno V. Ferrari Bono, Adviser, Water and Sanitation, UNICEF, New York, met with the Team in Lima. He described plans for submission of a funding request to the UNICEF Executive Board in May 1982 for a 1982-1983 program to train (in-country) 200 persons from 25 countries in 8 courses, with the collaboration of CEPIS.

2.6 Physical description of the Center facilities

The Team was impressed by the excellence of the buildings, the care and effort devoted to their maintenance, and the upkeep of the grounds. The main two-story building provides offices for the staff, an auditorium, two small lecture rooms, a conference room and a library. The smaller building houses a laboratory. The capacity of the library, a key element in all program areas, has reached a stage where considerations of space and budgetary restraints have made it necessary to cancel subscriptions to some technical publications.

The laboratory is modest, in keeping with the decision to minimize in-house research activities and to concentrate bench-research in the network of national centers. If some training of laboratory personnel is to be undertaken at CEPIS, appropriate provision of laboratory space for this purpose will have to be made. The total floor area of both buildings measures 2,241 square meters.

3. General considerations

3.1 Accomplishments during the past 11 years

There has been technical cooperation with more than 100 institutions annually, in all the countries of Latin America, several in the Caribbean and some outside the Region. Activities include air and water pollution control, industrial hygiene, water and wastewater treatment, water chemistry analyses, rural physical planning, solid waste management, environmental systems analysis and technical information exchange. Center staff carried out more than 400 technical service missions. Resulting from these missions and specific enquiries were some 700 reports and technical communications. In support of training activities CEPIS collaborated in the organization, scheduling and presentation of over 100 courses in the countries of the Region, attended by some 3,500 professionals and technicians. The Center also participated in the planning and development of postgraduate programs, conventions, conferences, seminars, symposia and advisory groups, in various countries, with a total attendance of more than 600 persons. Research and technology transfer was served through consultant services to, and collaboration in 89 projects, approximately 3/4 of which were carried out by the countries themselves or by

national institutions. An example of technology development is the Project for Technological Development of Drinking Water Supply and Sewerage Institutions (DTIAPA) in Peru, financed by the Inter-American Development Bank (IDB) with PAHO support through CEPIS and the Area IV Office.

The Pan American Network for Information and Documentation in Sanitary Engineering and Environmental Sciences (REPIDISCA) was developed through CEPIS serving as a reference center for the collection, preparation and dissemination of technical information. Other mechanisms serving the same purpose include the publication of books, manuals and technical documents, periodical publications such as "Noticias," a technical information bulletin and a Newsletter. Some selected publications in English are translated and published in Spanish. Special efforts have been devoted to research to improve rural sanitation, with CEPIS providing advisory services and modest financial support.

3.2 Image of CEPIS

Based on the quality performance over the past years CEPIS has acquired a fine reputation among client countries and elsewhere for: technical competence of staff, willingness to be helpful and its understanding of country needs. It is important to assure that this fine reputation is maintained for the future as the Center shifts emphasis from technical assistance to other areas, especially training.

The countries, in some instances, would like to have more direct technical assistance, effected by longer visits by Center staff and consultants. A few countries would like to see more research, directed at their individual problems. Information exchange is well served by REPIDISCA, of which there is good awareness. It is felt that its value could be enhanced by more attention to specific rather than general matters. Some countries see it as a one-way system, from CEPIS to the countries, rather than a two-way exchange. Such cooperative exchange must be strongly encouraged. Many would like to see European literature searched and excerpted and more material in Spanish, while translations into English were felt needed in the Caribbean.

Institutional development and training are regarded highly, but some express the need for more follow-up. The training modules system is known and utilized. Correspondence courses are considered a viable and valuable adjunct to present methods. It is suggested that countries be grouped by degree of sophistication and similarity of needs, thus enhancing the development of human resources at appropriate levels. A summary of the country responses to issues identified in the Questionnaire is given in Annex II.

3.3 Resources available

Technical and administrative support come from a total allocation of 53 posts: 16 professional and 37 "general service employees." Of the latter, 12 are assigned to specific technical functions in the library and information unit, laboratory, programming and computer science and printing. The remaining 25 include a significant element of secretarial support for the three technical units (resources, technology and information); this places them more in the category of auxiliary technical rather than administrative support. There are six temporary employees, one of whom provides administrative support. The personnel assigned to CEPIS, by category and sources of funds, are shown below:

Source of Funds	Scientific & Technical Personnel	Adm. Support Personnel	Total
PAHO regular budget	11	8	19
WHO regular budget	4	6	10
Peru Gov. contribution	4	7	11
EHP Division	3	-	3
Fixed-term subsidies	5	5	10
	27	26	53

The budgetary proposals, in Offical Document 169, for the 1982-83 and 1984-85 biennia, assign an upper limit to PAHO/WHO Regular funds, which does not allow for additional personnel, funded from that source, during those periods. The budget figures for 1970-1985 appear above, under 2.5.

3.4 Countries' needs, programs and technical capabilities

Countries vary considerably in their development of technical, institutional and financial resources to cope with environmental health problems. Of the countries visited some, like Brazil, Colombia and Costa Rica, are moving vigorously to develop and apply technology appropriate to their urban and rural needs. Others are less well equipped to move forward with effective programs and require considerable guidance and help. CEPIS already is taking advantage of country skills in special areas. Companhia de Technologia de Saneamento Ambiental (CETESB), in São Paulo, for example, is a national center for consultant help in air pollution control, with CEPIS functioning as a coordinator and clearing-house for this service. This is one example of many noted by the Evaluation Team of technical cooperation by two or more countries (TCDC), through the Center.

4. Program evaluation

4.1 General statement

During the more than ten years of operation CEPIS has gained an excellent reputation as an international institution responsive to the technical assistance needs of the countries. During the last few years the Center has had to face up to a situation in which the requests for assistance have exceeded the capacity of the available staff resources to respond. The picture has also changed in that, in some of the more developed countries, there are professionals and technicians trained up to the level of CEPIS staff, with local knowledge and experience, and in some instances there are nationals specialized in areas not covered at the Center. Country needs vary quite widely, from some making a first start to the very sophisticated, thus demanding a broad range of response. The change in Organization policy, away from technical assistance toward technical cooperation, requires a change in the mode of interacting with governments if CEPIS is to maintain a dynamic image. Through the network of national centers resources can be identified, relevant research initiated, funding sources identified and developed, and technical advice provided. But the component of technical assistance, though reduced, still offers an entree for CEPIS.

As a result of this new policy, a gradual reorientation already is taking place, with the active participation of Area and Country Representatives, so that the Center's approach to technical cooperation with Member Countries can be viewed in a new and equally favorable light. CEPIS' role will be more as a catalyst, strengthening national institutions so that they become more self-reliant and capable of solving their own problems, as well as assisting other countries to solve similar ones. Guiding principles, as stated by the criteria in Section 2.2, will guide all activities.

In addition, the focus will be on the priority programs of the Division of Environmental Health, emphasizing those environmental factors which affect health: water supply and sanitation services, solid waste management, and also pollution control, and control of hazardous substances in the environment. As an integral part of the efforts of the Division of Environmental Health, the Center also will emphasize activities to promote intersectoral action, to implement bilateral agreements and to assist governments in seeking extrabudgetary funds. Some such fund resources have already been identified, e.g. Canada, Holland, Germany, Japan, and Sweden, as well as UNICEF and other agencies.

In-house activities will be kept to a minimum and, instead, CEPIS will seek to establish and work with a network of national institutions on specific problems. Chemical, microbiological and other analytical controls of water are needed and are being developed mainly for training purposes.

The advisable grouping of countries according to the level of needs and requests has implications for the "stratification" of Center staff, recognizing that the greatest needs are, at this stage, at the lower levels of sophistication.

The views which follow are based on the philosophy enunciated above and will focus on CEPIS' functions, programs and related matters.

4.2 Technical and scientific assistance

Many country institutions have high esteem for CEPIS' services in this area and some would like to see them expanded. However, with the need to intensify the Center's thrust in other areas, especially in training, the situation today calls for de-emphasis of direct assistance. It should be possible to refer country clients to appropriate consultants, sometimes in some other Latin American countries, e.g. Colombia and Costa Rica for water treatment, Brazil for solid waste disposal (Rio de Janeiro) and air pollution control (São Paulo)

Furthermore, inflation has placed severe restrictions on CEPIS' ability to respond, unless some means are found to decrease, and perhaps defray, the costs of providing staff assistance to countries. When projects are financed by international credit agencies, such as the World Bank and the IDB, these agencies have paid the travel, per diem and salary costs of Center staff and this has been extremely helpful. In some cases, where appropriate, some countries pay travel and per diem. Usually this payment is made from PAHO funds assigned to the country. Roughly one-third of the visits made by CEPIS professional staff are being financed from funds other than the Center's budget. The CEPIS staff recognize that acceptance of payment for services is a delicate matter, calling for careful judgement to govern these transactions.

In addition, providing self-financed services which are not pertinent to the priorities set by the Organization and its Member Countries could divert the Center from its goals. It would be a mistake, and it might impair the image of CEPIS, if technical assistance provided by the Center were to compete with professional consultants capable of doing the work, when these are acting on the same matter under the client country's request. Appropriate ground rules should be developed which identify the circumstances under which Center services would or would not be provided.

It is the Team's view that provision of technical and scientific assistance is a function that should be limited in the future. Yet it should be continued at a reduced level while the promotion of horizontal technical cooperation between countries, now offering favorable prospects, becomes more common practice. Nevertheless, fostering such cooperation requires CEPIS to continually update precise knowledge of institutions and individuals potentially available and capable to provide help. Up to now there has been a

tendency to resort more frequently and successfully to one or two countries whose institutions are internationallly known, have technical credit and are in a position to furnish assistance. But it is evident that a complete current inventory would reveal possibilities for extending this cooperation, through CEPIS, with the participation of a greater number of countries and institutions.

It is interesting to note that the private practice of sanitary engineering is growing at an ever-increasing rate; even the smallest countries show an increasing tendency to utilize the services of consultant firms. CEPIS must be very careful in granting its technical advisory services to avoid the appearance of conflict of interest situations. The offer of a broad view of the problems and the possible options for their technical and financial solution, as well as the establishment of guidelines to govern the selection and hiring of the consultant firms to address them, are valuable and commendable services that CEPIS is able to provide upon request.

Another aspect of technical assistance relates to the fact that many countries now have their own highly trained professional personnel. Their knowledge of the country and occasionally their long experience make them true experts, highly qualified, and in an advantageous position. This suggests the advantage of reviewing and perhaps replacing the concept and the expression "asistencia" with "colaboración," bearing in mind the meaning these terms have in the Spanish language.

Avoidance of sophistication and complexity and use of plainer and simpler, if less spectacular, approaches is something that CEPIS practices. This probably has contributed to reinforcing the Center prestige as a consulting institution.

4.3 Research and technology transfer

CEPIS policy in supporting the countries in defining their national reality and developing their own technology is properly directed toward identifying research priorities, according to local needs, and avoiding duplication among the countries. Emphasis on promoting the publication of research results, now an uncommon practice in the Latin American scientific circles, satisfies a fundamental need. Texts in Spanish with an abstract in English would be especially helpful. Limited knowledge of scientific research methodology among many clients presents CEPIS with a valuable opportunity to direct its activities preferentially toward instruction in the design of research projects and in helping the countries to prepare their protocols.

Even without a clearly established research policy setting forth goals and priorities for the Region, the research projects completed, underway or planned seem generally pertinent to country needs. The examples below make the point, and this certainly is true of efforts to develop low-cost

simplified technology to treat water for human consumption, especially in rural areas. One element of this effort is the research on disinfection devices for rural water supplies. This work is being carried out in Costa Rica, Colombia, Chile, Peru and Argentina, with PAHEF funds.

It is the Team's view that there is limited practical usefulness in continuing research on technical matters such as stabilization ponds, sanitary landfill, septic tanks, all of which have already been studied intensely elsewhere. There are a number of topics for study which CEPIS could promote with a more favorable possibility that they would be immediately useful. They include:

a) Institutional development for environmental issues;

b) drinking water and sewerage;

c) environmental and public health legislation;

d) cultural and behavior patterns that affect the problem of sanitation;

e) some epidemiological research for determining the effects of the environment on human health, carried out jointly with other PAHO programs. This would be valuable in the future orientation of program priorities.

Research to develop simplified techniques for analysis of water and environmental contaminants will also satisfy a very important need as a first step toward generating meaningful information on this subject. Without this capability, efforts to cope with real environmental health needs are just so much groping in the dark.

An inventory of data on these relevant subjects, access to them and dissemination of the information (e.g., on stabilization ponds and sanitary land-fills) would be a valuable resource. Research initiatives in some countries are impressive and there have been some especially innovative approaches:

- the installation and operation of over 1,000 windmills in Peru, made exclusively from locally available materials and kept in excellent running order by national personnel;

- the simplified water treatment plants used in several countries including Brazil, Colombia and Costa Rica.

These efforts are particularly valuable in small rural areas, where sophisticated and complicated equipment is costly and difficult to maintain. These initiatives are classical examples of efficient, horizontal transfer of technology between countries, promoted by CEPIS.

Because of time constraints, the technical and scientific excellence of ongoing research was not assessed. It does appear that laboratories for water quality control merit the attention now being devoted to them.

CEPIS can foster in-country research by extramural support through appropriate advisory services, identifying funding resources, preparation of research protocols and promotion of needed research by capable nationals, either in the country needing the research or in an appropriate national center.

Information exchange about in-country research can avoid duplicate efforts and provide a common basis for regional development. International meetings should be encouraged to include on their agenda not only general topics, but more specific subjects that would attract wider attendance. The Inter-American Association of Sanitary Engineering (AIDIS) and other professional organizations already play an important role in this regard, and this could be expanded. Intercountry workshops might well cover the selected specific technical problem more effectively than large meetings.

The Pan American Air Pollution Monitoring Network (REDPANAIRE) has fulfilled the aims for which it was established and was terminated in December 1980, after 14 years of operation. In this program, as in research projects, other monitoring activities and applications of technology, the problem of analytical quality control has been difficult and persistent. The significance of this situation is that interpretations derived from questionable results are themselves equally questionable. The Regional Program for Analytical Control of Water and Wastewater Laboratories (PRELAB), a program to assess and improve the analytical quality of environmental laboratories of the Region, is presently at a partial standstill. This is because the position of laboratory specialist is still vacant. The Team was informed that this position has been cancelled but feels, nevertheless, that it is highly important to the needs of CEPIS and should be restored.

4.4 Preparation and dissemination of technical information

During the past three years CEPIS has established the Pan American Network for Information and Documentation on Sanitary Engineering and Environmental Sciences (REPIDISCA). Participation now stands at 12 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Jamaica, Paraguay, Peru and Venezuela, with 23 information units in these countries. REPIDISCA is already well developed at CEPIS, but the country counterparts have so far only reached an early stage of organization. However, the concept has provided improved accessibility to information, strenghtened information exchange, linked national institutions into a network and provided bibiliographic and document delivery services. Most countries find REPIDISCA useful; some ask for greater specificity drawn from a wider base of scientific journals.

The distribution of material is a matter that requires selectiveness for ensuring the maximum use by those who really need it. It is necessary to focus more attention on mechanisms for determining the matters evoking the most interest on the basis of surveys. Engineering conventions would be a fertile field for this endeavor. The practice that CEPIS follows in regard to utilizing students for the translation of documents of interest seems advantageous. This could be extended to other countries, with the participation of PAHO engineers.

REPIDISCA needs to exercise a more consistent pattern with regard to the establishment, organization, and operation of the national collaborating centers. These should be representative and self-sufficient, and should guarantee not only the efficient distribution of the material that CEPIS produces, but be a source, in turn, of information for the Center.

The costs are becoming higher through inflationary pressures. A number of copies of the publications are provided free to participating countries and institutions, and to national officials. Other users find it of sufficient value to pay for the service. Experience has shown that, in general, those who pay use the service extensively. CEPIS now charges the equivalent of US$25.00 through PAHO for the four quarterly components[1] of REPIDISCA. The sum realized is not great but does offset some costs. The proceeds, about 15% of total costs, constitute a "rotating fund" to facilitate information exchange. There has been a suggestion that, in keeping with practice in other fields, a commercial institution may wish to purchase a relatively large number of copies, stamp its name on them, and distribute the publications to a technical audience. This raises policy and other issues. Some institutions wish to create a formal system for the exchange of publications with CEPIS on a reciprocal basis. REPIDISCA now covers eight different kinds of technology-oriented publications. Screening procedures are costly, as is extracting and printing. It seems timely to re-examine the utilization of resources to determine if there are too many, fragmented inputs. Publication of some selected papers might be given consideration by the PAHO Bulletin.

The specialized library collection of technical publications now exceeds 24,000 titles. CEPIS publications include books, manuals and technical documents. In total, the approximately one million page output in 1979 is now about two million.

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1 News on Sanitary Engineering and Environmental Sciences; Technical Information Bulletin; DTIAPA Project Newsletter; and Index.

4.5 Training activities

While training is a much costlier form of technology transfer than simple dissemination of information, the latter can only succeed if it is a complement to training. It has been estimated that in Latin America and the Caribbean it will be necessary to train some 300,000 or more environmental health workers during the International Drinking Water Supply and Sanitation Decade (1981-1990). It is not surprising then that the XXVI Directing Council, in Resolution XXII, called for "the full use of all the resources of CEPIS for the training of professionals at all levels." It is also recognized that a number of the trainees will be lost (through transfer, attrition, shifts to private sector, and a variety of other options). This is a vitally important and formidable task that will require enthusiastic and cooperative support at all country and PAHO levels. Without a dynamic multiplier effect for the activities of CEPIS and the whole network of national centers, national goals will not be reachable.

From the country perspective, the selection of candidates for training by CEPIS will require great care, taking into account such factors as stability of employment, ability to absorb training, potential output, and the capability of passing on the acquired skills and knowledge to others. A combination of government and commercial (low percentage) sources of candidates promotes the learning process, but the latter must be limited to avoid swamping CEPIS.

To assist in defraying the rising costs of training there is a proposal to establish a daily tuition fee (US$) of:

- $15.00 for governments and national institutions
- $20.00 for fellows from UN specialized agencies
- $25.00 for fellows from financial institutions other than PAHO/WHO
- $30.00 for private individuals and consulting firms (or business enterprises).[1]

For courses given in 1981, some 60% of the work was done by CEPIS and 40% of the courses were given by national institutions, at no cost to CEPIS. There has been a shift to the point where more and more courses are being given in countries (e.g. as seen by the Evaluation Team at the water treatment plant in San José, Costa Rica). In the past training was limited to professionals, with emphasis on the technical supervisory level, the "train the trainer" strategy. This has now been superseded by permanent, self-sufficient systems in each country, including trained trainers and modular materials.

The Team regards the goal of training trainers over the next ten years as the most important objective for CEPIS. This will require modifications to speed up the process, especially broadening the "horizontal" multiplier effect in countries and collaborating institutions. The use of correspondence courses

1 One such firm has already willingly paid $100.00 per day for employee training

has been urged. The active participation and support of PAHO country engineers will be needed. The skills of an education technologist at CEPIS is warranted.

After careful consideration the staff arrived at the conclusion that in 1982 only about 20 courses should be given at CEPIS, concentrating on training the trainers who would return to their countries and institutions to plan and implement the training of environmental personnel in accordance with national needs and capacities and thereby enhance the multiplier effect. The estimated costs of 20 courses in 1982 with a total of 500 participants are:

	US$	%
Teachers[1]	300,000	17
Per diem for participants	340,000	19
Travel expenses of participants	300,000	17
Training materials	160,000	9
Logistical support	150,000	8.5
Salaries of trainees paid by employer	380,000	21
Miscellaneous	150,000	8.5
	1,780,000	100

The approximate breakdown by sources of funding is:

	US$	%
PAHO/WHO Regular[2]	600,000	33
DTIAPA (Peru/IDB)	250,000	23
Governments and national institutions	800,000	44
	1,750,000	100

While this works out to US$3,560 per trainee, this sum must be seen in the perspective of each trained trainer giving courses in each country to a number of trainees. If two courses each with a total attendance of 10 are projected, per trainee per annum, the cost effectiveness is evident. But these numbers (10,000 trainees per annum), impressive as they are, pale into insignificance when confronting a goal of even some 300,000 in ten years. The multiplier effect must be very greatly enhanced, through every available resource, if that objective is to be approached, much less achieved. Therefore, criteria for selection of trainees on the basis of teaching potential and functional duties are important factors.

1 CEPIS, 44%; short-term consultants, 27%; and contract services, 29%

2 Division of Environmental Health, $50,000; CEPIS, $350,000; and from Area and Country Representatives' offices, $200,000

5. Priority programs

5.1 Functions in support of priority programs

In varying degrees the four principal functions of CEPIS, as a Pan American Center, support the Center's eight priority programs. The standard functions of technical assistance/cooperation, research and technology transfer, preparation and dissemination of information, and training activities are all essential components of the Center's programs.

i) The Regional Program for Improvement of Drinking Water Quality seeks significant improvement of water quality (thereby creating a positive attitude toward payment for water services); more efficient and effective use of water treatment plants and existing water disinfection equipment; and to evaluate technology now being applied. A measure of success will be a real decrease in water-borne diarrheal diseases. Development of human resources will be Region-wide through modular learning cycles, regional and subregional courses, residency and in-service training programs and massive national training courses. The technology will include modular training plants and simple disinfection processes for use in rural areas.

ii) The Regional Program for Extending Water Services to Urban Slum Populations through Reduction in Unaccounted-for Water will address the problem of 40 per cent water loss. Reduction of this staggering water loss will allow postponement of new investments, improve financial self-sufficiency and reduce water costs, thus facilitating extension of services to urban fringe areas. While there has been a rapid increase in the number of water supply systems and good design and construction capability, systems are not planned, maintenance is seriously neglected, pumps and other mechanical equipment are frequently out of order, there are significant leakage losses, water flow is poorly monitored, and only about 60 per cent of the water produced is billed and payment collected. Eleven short-term consultant months are now funded and more will be required.

iii) The Regional Program of Appropriate Technology for Collection, Treatment and Disposal of Wastewater and Excreta, for Medium and Small Communities and Dispersed Rural Populations: Present techniques will be evaluated, applied research extended, information disseminated and the health risks deriving from untreated wastewater assessed and publicized. There is pertinent research in Lima on the reuse of waste water treated in stabilization ponds. More is needed on unconventional sewerage systems, separation of sewage and other wastewater (grey water), and reduction of water used in toilets. For more effective approaches to these problem areas a microbiologist is needed at CEPIS, and extrabudgetary funds must be sought.

iv) The Regional Program for Strengthening the Commercial Systems of Water Supply and Sewerage Institutions: The goals are to assist water and public sewerage companies achieve financial self-sufficiency and build up human resources.

Modular learning cycles have been shown to be effective in macro- and micro-consumption measurement, preparing an inventory of users, effective billing and collection of fees, marketing, and sales. Satisfying the requests for these modules requires additional financial resources for preparation and printing.

v) The Regional Program for Technical and Institutional Development of the Agencies Responsible for Basic Sanitation in Nucleated and Dispersed Rural Populations: The human and technical resources of these Agencies will be strengthened, fostering the use of simple and economical technologies, evaluation of rural water systems and promotion of greater information exchanges between the agencies and rural communities. All four basic functions will apply here, especially training and information exchange. In spite of the priority assigned to this activity in the strategy for achieving health for all by the year 2000, extrabudgetary resources have been meager and CEPIS remains the focal point. The UNICEF proposal mentioned earlier will need to be duplicated by other donors.

vi) The Regional Program for Improving the Collection, Transport and Disposal of Solid Wastes: Refuse collection and disposal is a common problem in all countries. In many instances the components of solid wastes in developing countries differ significantly from those in industrialized nations. Institutions must be developed for applying different operating procedures, using unconventional equipment geared toward non-conventional solutions. Lack of funds is the main reason for this problem. Rapid population growth, constant increase in the amount of solid waste per inhabitant, and a dearth of technical and managerial capabilities all add to the complexity of this problem. Careful selection of trainees and development of appropriate simple technology information exchange are needed.

vii) The Regional Program for Documentary Information in Sanitary Engineering and Environmental Sciences (REPIDISCA): This program has already been described, at least in part. Given the volume of source material and information dissemination, a balance has to be struck between available resources, space constraints and the priority areas to receive preferred treatment. A principal limitation foreseen at this time will be in computer services. While the network of centers and information units continues to grow, it will be necessary to be more selective in the number and content of publications. Investment of working capital to maintain and expand this service will depend on the priority accorded to it among the other priorities of the Center.

viii) The Regional Program of Assessment and Control of Environmental Pollution and Hazardous Substances: In point of fact this program has had to concentrate on water pollution control. A group of 20 national centers constitutes a modest but important contribution to the solution of this problem. This mechanism has to be expanded significantly to cover the Region.

6. Interaction with Governments

6.1 Network of national centers

This network, already partially in place, has created some close ties between CEPIS and government officials, national institutions and individuals at all levels. As the two-way flow of information develops, REPIDISCA will further strengthen this linkage and facilitate collaboration and cooperation. The training programs at CEPIS, and increasingly in countries, will create an ever-widening circle of technical and managerial contacts. Applied research, already a major activity in the center network, will play a leading role in the interaction of the Organization and the governments, at all levels. Technical assistance, though more selective, still remains an entree for PAHO/CEPIS to the countries. All of these linkages ensure joint approaches to problems and familiarity with the countries' views on issues facing them.

6.2 Flow of communications

Communications between CEPIS and the countries flow through the offices of the Area and Country Representatives, unless some other arrangement is made and approved. It is essential that AR's and CR's be more familiar with the work of the Center, of the resources available to the Area and the Country, and that country engineers be personally aware of the Center's programs through various means, including regular, periodic visits to CEPIS, and active participation in the activities of the network of national centers. PAHO in-country staff can effectively promote both the local distribution of the CEPIS information and the flow of information from the country to CEPIS, thus enriching the information exchange later on in the process. At present, within this broad framework, there are some effective links between CEPIS and the national centers. These should be preserved and improved.

6.3 Country groupings

The countries of the Americas vary, according to size, stage of development, socioeconomic development plans, degree of professional and technical sophistication, manpower and financial resources, cultural patterns, needs, problems and subregional groupings. CEPIS interaction with countries will therefore vary under the impact of these various factors. CEPIS must therefore be equipped to respond appropriately to a wide variety of needs. It would seem that grouping countries, categorized broadly by their similarities, will facilitate the response of CEPIS to client countries.

6.4 Intersectoral action

In its sphere of activities CEPIS has to deal not only with the Ministry of Health, but with other government and quasi-governmental agencies which have primary responsibility for water supply and sewerage systems. The Center can and does play an important role in bringing these agencies together as they approach different environmental factors which impinge on health, agriculture, industry and development. The same is true internationally, bringing the role of health in development to the attention of bilateral and multilateral donor agencies. This catalytic role is an important part of CEPIS' functions.

7. Perspectives

CEPIS began operations more than a decade ago when the emphasis was on technical assistance and the focus on the rapidly growing urban areas. There has been a significant shift away from both of these areas, the thrust now being toward technical cooperation and the rural and urban fringe populations. The Center has adapted well to these changes, both in the philosophy behind its programs and the priorities dictated by the need for new responses, by limited resources and by stricter adherence to priorities. Current trends have brought CEPIS on a course that is relevant to the goals of the Organization and its Member Countries:

a) In-house research is minimal and applied research is being fostered in national centers able to meet the needs of their own countries and to help others.

b) Direct technical assistance, as such, has been greatly reduced, but still has an important role in the eyes of the countries. Technical cooperation is greatly facilitated through the Center network.

c) Training will be the major activity for CEPIS for many years to come. The only way to approach the massive task of training some 300,000 nationals by 1990 will be to select a relatively small number of courses to be held at the Center, to train trainers, and then fan out rapidly into national courses run by the trainers themselves, with minimal CEPIS guidance and support at first but graduating rapidly to self-sufficiency. The selection of national candidates for training at CEPIS will be crucial to success, as the large multiplier effect required is only possible if the trainers are highly competent and committed to the task.

d) Information collection and exchange is an extension of training. Correspondence courses may be a valuable tool. Limitations of space, equipment, staff and funding require that the present system be streamlined, concentrating on topics of major interest and high priority. The cooperation of all PAHO staff in-country should be enlisted in the effort to make information collection and exchange a two-way process.

One area not now covered is health legislation. A search of successful legislation and dissemination of information on how governments might go about formulating their own laws, or updating old laws, is a needed service which CEPIS can render.

8. Conclusions and recommendations

8.1 General

CEPIS is fulfilling the function for which it was created. In more than ten years of existence, it has rendered valuable sanitary engineering services which have translated into improvement of the environment and of the health conditions in the PAHO Member Countries. From a technical point of view, it has furthered the development of sanitary engineering in Latin America and, administratively, it is a good example of delegation and decentralization of functions to serve the Region.

As a consequence, CEPIS currently enjoys a good reputation, an image that should be maintained in the future. This view was unanimous and was derived from the Team's scrutiny of the Center and its programs over a five-day period and from expressions by key persons in client country institutions. The services CEPIS provides through its four major functions are generally well received. Despite the fact that CEPIS has enjoyed a good reputation as a center of international, technical, and scientific cooperation, it is necessary to bear in mind the following important fact: High turnover among national officials makes it necessary to maintain a consistent information policy, directed mainly toward new staff members, concerning what CEPIS is and what its objectives, functions, and programs are. It is important for the Country Representatives and the engineers under their direction to gain more knowledge of and participate more actively in the (planning and development of the) activities of the Center. It is also fundamental that the national staff members who regularly participate in meetings and make up the governing structure of PAHO be properly informed with respect to the usefulness of CEPIS.

There is no doubt that this action of educational publicity, properly carried out at the higher levels of the national health administrations, should result not only in recognition of and credit to CEPIS, but in the good reputation and image maintained by the Pan American Health Organization, of which the Center is an important part.

The conclusions and recommendations that follow are intended to aid in preserving CEPIS' image in the face of dynamic environmental changes and needs occurring in the client countries, and to identify areas where operational or other improvements seem appropriate.

8.2 Technical Assistance

Providing technical assistance to countries has been a valuable and welcome service during the past ten years, and requests for such help have

now exceeded the staff resources available. The concurrent growth of technical capabilities in more developed countries and the increasing numbers of professional consultants available lead to the conclusion that CEPIS' role in giving technical assistance should be changed.

- In keeping with the policy of the Organization it is therefore recommended that CEPIS downgrade its present technical assistance role and seek as an alternate to strengthen national institutions so that countries can become more self-sufficient.

8.3 Research

In the research area, CEPIS has largely followed a catalytic role in identifying needs, developing proposals, seeking financial support, conducting in-house research, giving guidance, publishing findings, and fostering application of them. It is concluded that:

a) The projects that have been undertaken largely address real and pressing problems of the Region.

b) Some projects, such as ones on stabilization ponds, seem to be repeating work already done elsewhere.

c) The exchange of information on research in progress among country institutions is not sufficient to prevent duplication of effort.

d) The stage of progress in countries suggests that CEPIS' role could profitably shift to a purely extramural one.

It is recommended that:

a) CEPIS seek to assure that projects undertaken emphasize more strongly the environmental health needs in rural and periurban areas.

b) A concerted effort be made to assure that the findings sought through research do not already exist from work done elsewhere.

c) Steps be taken to improve country awareness of research in progress and of results applied successfully or unsuccessfully in the Region and elsewhere.

d) CEPIS gradually close out its in-house research activities so that it may concentrate solely and more intensely on helping to expedite national projects in cooperating institutions.

8.4 Analytical quality control

Among client country institutions there are many analytical laboratories currently generating data that are presumed to reflect the status of environmental health. Such laboratories vary widely in size, in sophistication

of equipment and staff, and in quality of output. In many of them the generated analytical data are of such questionable accuracy that they are practically meaningless. It is concluded that:

a) In many laboratories analytical performance is poor and analytical quality control is woefully inadequate.

b) CEPIS presently does not have a staff member skilled in this specialty who could help establish a Region-wide analytical quality control program.

It is recommended that:

a) CEPIS take the lead in revitalizing the PRELAB programs for continuing analytical quality control and laboratory upgrading among the Region's laboratories to assure more meaningful data by which environmental status can be evaluated.

b) CEPIS fill, as expeditiously as possible, the authorized position for a laboratory specialist and that a consultant in analytical quality control be assigned for a temporary period to work with the incumbent to revitalize and intensify the program.

8.5 Information exchange

It is concluded that:

a) REPIDISCA, and CEPIS' other information-disseminating documents, are generally known, well received and used in country institutions.

b) CEPIS has created more than an optimal number of continuing publications series. However, in various tropical countries a number of successful national projects and operations have evolved through innovative approach to available technology. CEPIS should develop publications with sufficient technical and operational detail to provide a vehicle for transfer of technical applications that can serve as models for other tropical countries.

c) CEPIS' publications are not readily useful in the Caribbean because of the language barrier.

It is recommended that:

a) CEPIS' REPIDISCA/POETRI network be supported financially so that a full blown "regional reference center in environmental health sciences and engineering" can exist.

b) CEPIS examine its array of publications' series toward the objective of decreasing the number while making the surviving ones more inclusive, useful and economical.

c) CEPIS explore means by which its non-English publications can be supplied in the English language to Caribbean country clients.

8.6 Training

It is concluded that:

a) The strategy of "training trainers" is sound, providing the countries send appropriate decision-makers and planners who can implement national programs relative to the needs and capacities of their respective countries.

b) The holding of as many courses for this purpose as possible in the client countries has many advantages.

c) While accurate statistics are difficult to ascertain, the magnitude of training appears quite formidable and CEPIS must marshal its resources in an effort to assist countries in the critical start up phase.

d) There is a need for professional guidance in the training area to get the absolute maximum training return from the resources available.

It is recommended that:

a) The strategy of "training trainers" be continued and pursued as vigorously as possible.

b) Unless prevented by logistic reasons, courses should be held at strategic points away from CEPIS.

c) The training goal and training strategy be re-examined realistically to more sharply define both of them in keeping with the human material and financial resources that can be generated for this worthy program.

d) The CEPIS vacancy for a professional training specialist be filled as quickly as a suitable candidate can be found.

8.7 Organization

It is concluded that the organization of CEPIS is suitably patterned to the size of the Center, its staff, and its principal functions.

- It is recommended that the present organization be continued unless specific problems not known to the Team indicate need for change.

8.8 CEPIS' leadership and staff

It is concluded that:

a) The enthusiasm and high spirit of leadership of CEPIS, exemplified by the Director, pervades the entire staff and was impressive to the Team.

b) Three notable staff deficiencies exist--in the areas of microbiology, analytical quality control, and training technology.

It is recommended that:

a) The Team's favorable impression of the CEPIS staff be brought to their attention and to appropriate levels in PAHO.

b) The staff deficiencies cited be corrected as expeditiously as possible.

8.9 Interaction with PAHO and with countries

The relationship between the Division of Environmental Health Protection and CEPIS is clear and managerially effective, but the Team concluded that:

a) The working relation with country offices varies from country to country, apparently as a result of people concerned, different working styles and degrees of familiarity with CEPIS programs.

b) Potential cooperative activities with other PAHO centers, especially ECO, are not fully developed.

c) National centers that support CEPIS have not yet come to their full potential, in part for lack of coordination among multiple official and private in-country agencies.

It is recommended that:

a) Steps be taken to utilize the country offices more strongly and, toward this end acquaint them as thoroughly as possible with CEPIS programs and plans.

b) CEPIS examine its array of programs to identify specific ones that appear susceptible to improvement through joint action with other centers, and then seek such cooperation.

c) With country office help, assist countries in organizing national centers of support to CEPIS with emphasis on in-country coordination among agencies and institutions.

8.10 Intersectoral aspects

It is concluded that many of CEPIS in-country programs cut accross so many sector lines that they would benefit from even stronger coordination among interested organizations, using country offices as a partner in this endeavor, and action by CEPIS to bring this about is recommended.

8.11 Fund-seeking

It is concluded that, with respect to non-PAHO funds potentially available for special projects, CEPIS has not so far been sufficiently aggressive or successful in seeking them.

- It is recommended that vigorously seeking such funding be undertaken routinely by appropriate elements of PAHO to support worthy program areas.

8.12 Disaster planning

CEPIS has been responsive to disaster preparedness needs in Peru, and it appears that similar potential needs exist in other client countries. It is concluded that providing such assistance is a proper and important function for CEPIS.

- Accordingly it is recommended that CEPIS make known to client countries its capability and willingness to give consultant and related assistance in disaster planning.

8.13 1971 Agreement

It is concluded that the "Agreement Concerning the Establishment of a Pan American Center for Sanitary Engineering and Environmental Sciences in Peru" is sufficiently broad in scope and appropriate in its terms to accommodate the current and forseeable role of the Center.

- It is recommended that the Agreement be continued in its present form.

8.14 Center evaluation

The current evaluation of CEPIS is the first undertaken since the Center was founded in 1971. It is concluded that the rapid generation of new knowledge in the field of environmental health, coupled with the dynamic progress in many of the countries, suggests the value of future evaluations at more frequent intervals.

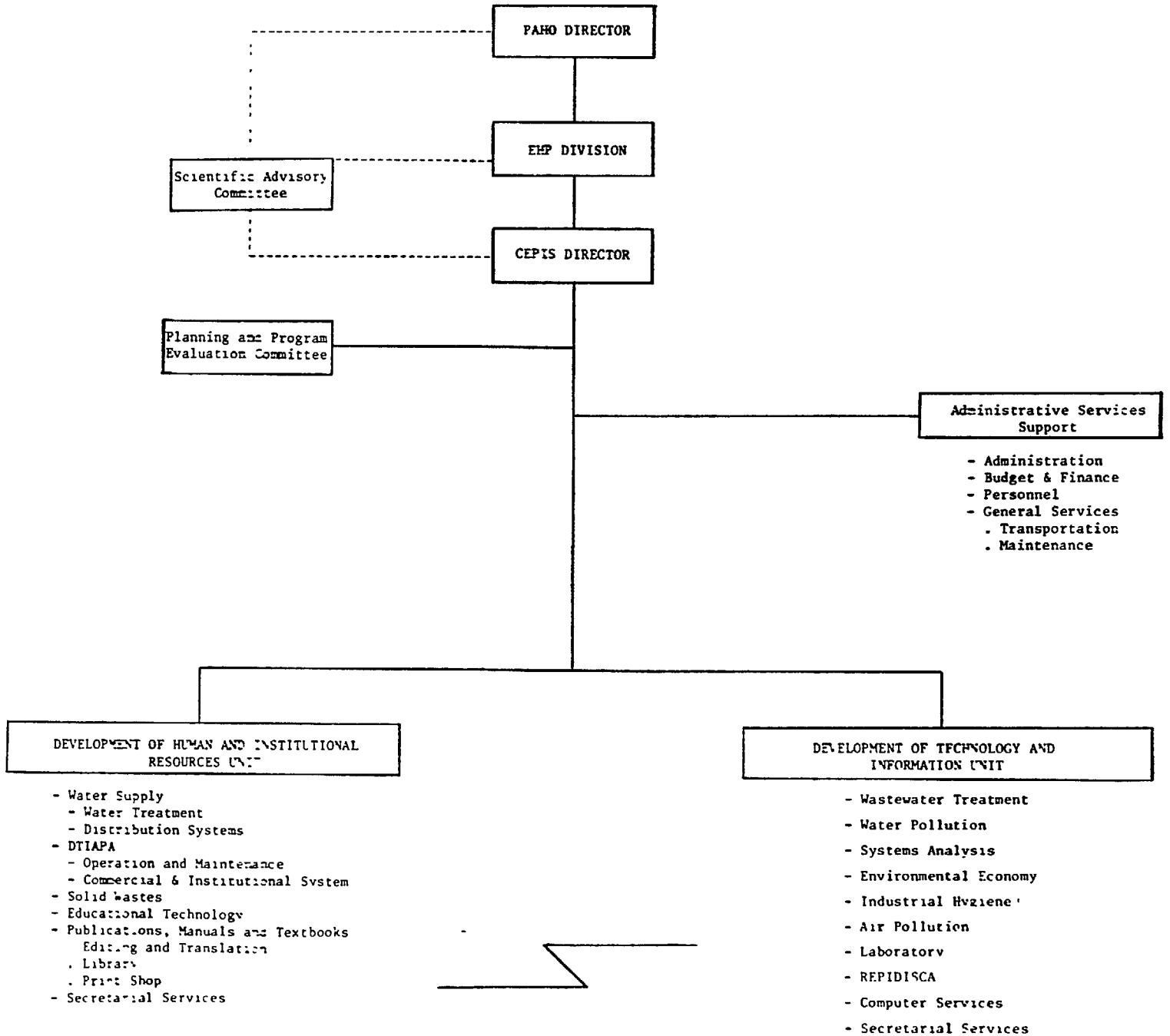
- It is recommended that the next evaluation take place about three years after the present one and that others follow in an approximate orderly three-year sequence.

8.15 Advisory committee

The dynamic social, economic and technological changes occuring in the Region, the continuing generation of new research findings worldwide that are potentially applicable to the Region's problems, and an existing degree of geographical insulation of CEPIS from this activity, support a conclusion that substantial benefits would result from the services of a CEPIS advisory committee.

- It is recommended that a CEPIS advisory committee be appointed by the Director of PASB, the committee to consist of three or more members as appropriate appointed for staggered terms of three years. The advisory committee should meet and serve regularly at CEPIS every other year.

PAN AMERICAN CENTER FOR SANITARY ENGINEERING AND ENVIRONMENTAL SCIENCES - (CEPIS)



ANNEX I

ORGANIZATIONS AND OFFICIALS VISITED BY THE TEAM

Banco Nacional da Habitação, BNH, Rio de Janeiro, Brazil

- Eng. Irrando Mendoza Pires, Cartera de Operacion de Saneamento, COSAN
- Eng. Jose Fernandez Neto, Chefe da Divisão de Estudos Technicos, COSAN

Fundação Estadual de Engenharia do Meio Ambiente, FEEMA, Rio de Janeiro, Brazil

- Eng. Mauricio Gomberg, Vice Presidente
- Eng. Victor Monteiro Barbosa Coelho, Director Chefe do Departamento do Control Poluicao
- Dr. Fausto Guimaraes, Aconselhador

Companhia Municipal de Limpeza Urbana, COMLURB, Rio de Janeiro, Brazil

- Jair Otero Peixoto, Chefe de Gabinete da President
- Eng. Fernando A. Paraguassú de Sá, Director de Transporte e Equipamentos
- Eng. Luiz Edmondo H. B. da Costa Leite, Gerente de Tratamento e Disposição - OGD

Companhia de Tecnologia de Saneamento Ambiental, CETESB, São Paulo, Brazil

- Eng. Carlos Celso do Amaral e Silva, Director
- Eng. B. Griesinger

Ministerio de Salud, Bogotá, Colombia

- Dr. Alfonso Jaramillo Salazar, Ministro de Salud
- Ing. José David Moreno, División de Saneamiento Básico

Instituto Nacional de Salud, Bogotá, Colombia

- Ing. Carlos Humberto Peralta, Jefe de la División de Saneamiento Básico Rural

Empresa de Acueducto y Alcantarillado de Bogotá, Bogotá, Colombia

- Ing. Enrique Giraldo N., Jefe de Proyectos de Alcantarillado

Instituto de Fomento Municipal, INSFOPAL, Bogotá, Colombia

- Ing. Alvaro Martínez Rojana, Director General

Universidad de los Andes, Bogotá, Colombia

- Dr. Gustavo Jaramillo, Decano de la Facultad de Ingeniería

Planta Potabilizadora "El Sapo", Acueducto de Chingaza (16 kilometers north-east of Bogotá)

- Ing. Jorge Arboleda Valencia, Consultor
- Ing. Humberto Peña, Supervisor

Instituto Costarricense de Acueductos y Alcantarillados, ICAA, San José, Costa Rica

- Ing. Olman Cordero, Presidente Ejecutivo

Ministerio de Salud, San José, Costa Rica

- Ing. Edison Rivera, Director de Departamento de Saneamiento Ambiental

Instituto Nicaragüense de Acueductos y Alcantarillados, INAA, Managua, Nicaragua

- Dr. MQ. Ottoniel Arguello H., Director
- Ing. Francisco Solorzano, Sub-Director Departamental
- Ing. Alberto Corrales (Coordinador), Director de Estudios y Construcciones
- Ing. Edgar Flores Castillón
- Ing. Dennis Salas, Programa MINSA-INAA

Ministerio de Salud, Managua, Nicaragua

- Dr. Rafael Salgado, (Coordinador)
- Ing. Gustavo Martínez
- Ing. Oscar González

Ministerio de la Vivienda y Asentamientos Humanos, Managua, Nicaragua

- MQ. Francisco Saavedra

Ministerio de Salud, Lima, Peru

- Ing. Javier Bacigalupo, Director de la Dirección General del Medio Ambiente
- Ing. Carlos Marroquín, Director de Ingeniería Sanitaria

Universidad Nacional de Ingeniería

- Ing. Enrique Jimeno Blasco, Director del Programa Académico de Ingeniería sanitaria
- Ing. Jorge Salinas, Secretario
- Ing. Myriam Mujica, Jefe del Departamento Académico de Saneamiento

Ministerio de Vivienda, Lima, Peru

- Ing. Alfonso Zavala Cavassa, Presidente del Directorio, Servicio Nacional de Agua Potable y Alcantarillado, SENAPA

Empresa de Saneamiento de Arequipa, ESAR, Peru

- Ing. Luis Torres Villar, Gerente General

Ministry of Health, Kingston, Jamaica

- Mr. Donald Miller, Permanent Secretary
- Mrs. Ellie Irons, Senior Scientific Officer, Div. of Environmental Control
- Mr. Edgar D. Dorman, Chief Public Health Inspector.

National Water Commission, Kingston, Jamaica

- Mr. Vin Henning, Director, Systems Operations

United Nations Childrens Fund, UNICEF

- Dr. Bruno Ferrari

Pan American Health Organization, PAHO

- Dr. Héctor R. Acuña, Director
- Mr. Frank Butrico, Chief, Environmental Health
- Eng. Luis Carlos Rangel Soares, Rio de Janeiro, Brazil
- Eng. Humberto Vargas Calderón, Rio de Janeiro, Brazil
- Dr. Lelio Calheiros, CR-PAHO, Bogotá, Colombia
- Dr. Roberto Bobenrieth, Bogotá, Colombia
- Mr. Henyk Weitzenfeld, Bogotá, Colombia
- Dr. Emilio Balbuena Valdez, CR-PAHO, San José, Costa Rica
- Eng. José Godoy
- Dr. Gottlieb Monekosso, CR-PAHO, Kingston, Jamaica
- Ms. Patricia Thompson
- Dr. Thomas Padden
- Dr. Miguel Angel Márquez, CR-PAHO, Managua, Nicaragua
- Eng. Juan Guillermo Orozco S., PAHO, Managua, Nicaragua
- Dr. Luis A. Cervantes, Area Representative, PAHO, Lima, Peru
- Mr. Carlos Cuneo
- Mr. Alberto Florez Muñoz, Director, CEPIS, Lima, Peru
- Dr. Carl Bartone
- Mr. José Pérez
- Mr. Rodolfo Sáenz Forero
- Dr. Kunitoshi Sakurai
- Mr. Fabián Yañez
- Eng. Herbert Farrer
- Eng. Adalberto Cavalcanti Coelho
- Dr. Héctor Sosa Padilla
- Mrs. Norma Llorach
- Mr. Paul Straley
- Ms. Frances De Laney, Institutional Development Research Center, IDRC, Canada

ANNEX II

SUMMARY DATA ON QUESTIONNAIRE REGARDING CEPIS

	YES	NO
1. Do you know what is CEPIS?	62	10
2. Do you have any relations with CEPIS?	34	35
3. Do you receive information?	35	36
4. Do you know what is REPIDISCA?	45	27
5. Have you ever used it?	11	56
6. Do you know the national collaboration Center?	14	50
7. Have you seen the list of CEPIS's publications?	50	22
8. Have you ever received or bought any publication from CEPIS?	41	31
9. Do you know the training program of CEPIS?	29	36
10. Have you ever take any courses?	25	47
11. Do you know someone that has taken courses?	56	15
12. Does the institution where you work, send staff members to these courses?	59	11
13. Do you know of any technical investigation from CEPIS?	47	23
14. Have you ever received advisory services?	22	46
15. Are you interested in a self-learning module?	63	7

Note: Total respondents = 72:

Peru.....23
Colombia.....15
Costa Rica.....22
Brazil..... 8
Nicaragua..... 4

	YES	NO
16. Do you know CEPIS's location?	59	13
17. Do you know who defrays the expenses?	38	33
18. Do you know who is the actual Director?	38	34
19. Do you know who was the Director?	27	35
The services that CEPIS provide are:		
1. Very useful	50	2
2. Useful	30	1
3. Accessible	21	7
4. Expensive	9	20
5. Is it representative?	21	3
6. Is it interesting?	50	0
7. Did you get it easily?	33	9
8. Do you think this is adequate?	34	3
9. Were they useful?	32	1
10. Are you still sending it?	40	7
11. Are you interested in a specific topic?	55	3

Note: Various respondants left some questions blank and the numbers above reflect expressed opinions stated for each question.

ANNEX III

RESPONSES TO QUESTIONNAIRE

PERU		
	Ministerio de Vivienda, SENAPS	10
	Ministerio de Salud, Departamento Ambiental	7
	Universidad Nacional de Ingeniería	6
COSTA RICA		
	AYA	12
	Ministerio de Salud, División de Saneamiento Ambiental	10
COLOMBIA		
	Ministerio de Salud	10
	INSFOPAL	5
BRAZIL		
	FEEMA	8
NICARAGUA		
	INAA	4