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MAN-ENVIRONMENT RELATIONSHIPS: A CHALLENGE OF THE 1970's

PAHO/WHO - Program and Plans

An interesting point in time . . .

The following report seeks to capture the essence of events related to the environmental challenge and to suggest the shape of such events in the 1970's. Perhaps at no time in recent history has there been such difficulty in predicting the future. In all likelihood there will be a real break in continuity in this new decade. Transition will not be circumscribed by tradition; extrapolation may well be purely conjectural; and only sheer ingenuity will provide the many benchmarks needed in a new "age of discontinuity."

The report gives strong indication that there is need for breaking down the barriers of provincialism, the prejudices of proprietary interest, and the varieties of narrow hereditary points of view, too commonly shared by so many. It suggests that we broaden our vistas; reconstitute our priorities; and develop a 360° sweep in our vision. It suggests also that we need to open our manuals and tear out many of the conventional references - and rewrite new materials, bold, aggressive, and responsive to the challenges of the times.

The report suggests that the health profession had best resolve its own debates and note clearly what we believe to be the best course to pursue in the varieties of perplexing questions about environmental trends. We must be ingenious enough to find solutions to human needs in our complex society. If we can, amongst us, help to point the way to better answers than have so far been found and will then use the force of persuasion to make them understood and, consequently, accepted and applied, then we will have immeasurably justified whatever efforts we devote to this task

TABLE OF CONTENTS

	<u>Page</u>
Preface	1
Background	1
The PAHO/WHO Region	2
Environmental Health in Transition	4
Influences Affecting Environmental Change - PAHO/WHO	5
<u>Ongoing Programs</u>	
Environmental Activities	7
1. Community water supplies	8
2. Sewerage services	9
3. Administrative management program assistance	9
4. Pan American Center for Sanitary Engineering and Environmental Sciences	9
5. Water resource developments - Water pollution control . . .	10
6. Solid wastes	12
7. Insect vectors	12
8. Education, training, and research	13
Some Observations Relating to PAHO/WHO Activities	16
1. Parameters of environmental stresses	16
2. Pollution potentials	16
3. Channels of communication	17
4. Environmental coverage by the health sector	18
5. Stress induced diseases	18
<u>Blueprint for the 1970's</u>	
General Analysis	20
Program Objectives and Elements	24
First Approach	24
Second Approach	30
Third Approach	31
Regional Imperatives	31

MAN-ENVIRONMENT RELATIONSHIPS: A CHALLENGE OF THE 1970's

PAHO/WHO - Program and PlansPreface

Rapid population growth and accelerating technological advances in urbanizing societies are creating unprecedented impacts on man's total environment. The speed, magnitude, and complexity of these forces intensify traditional problems and create a host of new stresses, many of which go beyond the indices and parameters commonly used to reflect the general state of public health. Thus the gap widens between the diagnosed and the undiagnosed health implications of environmental change. Considering the broadening dimensions and rapidity of such change, it would be prudent for health agencies, national and international, to reshape and sharpen analytical methodologies in order to update practices; to assess health impairments; and to measure, quantitatively, the effects on the physical and mental well-being of man. Health administrators should initiate effective monitoring of the environment to provide scientific understandings; to project trends to furnish the basis for appropriate corrective measures; and to guide emergency actions needed in environmental crises. For peripheral problems not within their jurisdiction, health ministries should encourage and assist actions by allied agencies.

Taking note of the increasingly complex and broadening implications of the changing environment and recognizing the difficult decisions which face ministries of health in making major program adjustments, the Director has the honor to present this background document for consideration by the Organization's Governing Bodies. The document provides insights on man-environment relationships; it discusses ongoing environmental programs in Latin America; and it sets forth realistically constructive courses of action for the 1970's.

Background

A complex orb of externals - forces, influences, and conditions, some hostile, some friendly - make up man's environment and contribute to his total life. Patterns of human diseases and infirmities reflect man's responses to his environment. Hippocrates recognized this linkage some 2,500 years ago when he emphasized the relationships between human health and "the airs...the waters...the seasons...the places." By the 19th century, scientific inquiry had clarified the etiology of the more prevalent communicable diseases and the behavioral patterns of pathogenic agents in human ecology.

Well documented are the health achievements of the 20th century - in reducing infant mortality, in suppressing childhood diseases, in controlling germ spawned afflictions of the adult, in devising industrial hygiene techniques, and, where feasible, in making efforts towards disease eradication. These achievements have made practical concentrations of peoples in urban complexes - practical at least with respect to microbiological contamination.

In man's interactions with his environment, his greatest ally has been the extraordinary resilience and adaptive capacity of the human organism, especially when time and isolation have controlled the equations of change. Today - in terms of interpersonal relationships - time telescopes, isolation becomes academic. The quarantine sign is a forgotten symbol in history texts.

Currently the variables of change are infinite. They cross time and space. In the dimension of time, decades are colliding. The tempo is so rapid that it is extremely difficult to grasp the full significance and to understand the impacts; to keep the delicate scales tilted in the favor of man - that he understand what he is doing, that he do better in understanding himself, that he retain his mental equilibrium and a balanced perspective, and that he be master, not victim, of his machines and of his technology. This is the hallmark of the current era - a dramatic break with the past. Technological industrialization now spirals upward under the impetus of a logarithmic expansion of knowledge.

A whole array of economic, social, political, and technological upheavals sweep the earth. Throughout history, various peoples have lived in states of development centuries apart. The difference now is that people everywhere are struggling for admission to the 20th century - for a piece of the action and for a share in the amenities. And this goal is within man's grasp, if he can but balance the human equations in a changing world.

Analysis of man-environment relationships must consider this historical setting, this background of paradoxes: an age of wealth and insecurity, of leisure and unrest, of competences and anxieties.

For the health administrator, the task of statesmanship is to recognize and anticipate the directions and extent of these emerging forces. He must evaluate their effects and devise programs, and the devices for administering such programs, that are in harmony with the needs of the people and with the trends of the times. The extent to which programs and services evolve in response to these forces and needs marks the difference between dynamic and static services.

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The PAHO/WHO Region

PAHO/WHO is the international health tool of 28 Member Governments in the American Continent. The Region embraces a wide variety of cultures and social patterns, as well as of economic and political structures. This youngest of

the world's civilizations presents an interesting contrast of the very old and the very new. The Region, with a combined population of about 500 million, has some areas which are economically advanced and others which are undeveloped. Both continents, paradoxically, include ultra modern urban centers - with sophisticated industrial complexes and systems of transport, energy use, and related facilities - and urban centers only partially covered by even such basic services as water supply and waste disposal. The Hemisphere contains rural areas well housed - with power, water, and related services - and rural areas almost as they existed a century ago. Population growth in South America is the fastest of any continent, about three per cent per year. Urban growth rates are much higher, almost six per cent per year.

PAHO/WHO programs focus primarily on Latin American and Caribbean countries. These countries have traditionally looked northward to observe health practices, structures, and administrative patterns. This is particularly true in environmental sanitation. Engineers and scientists - professionals, students, and scholars - have intermingled in the Hemisphere. More than a thousand sanitary engineers from Latin American countries have studied in universities and schools of technology in North America. Latin American practices in sanitary engineering have closely followed those of North America.

In the past decade, South Americans have begun to ask not only about progress in the north and the escalation in standards of living, but also about the nature and the price of such progress. Progress, they found, was measured almost exclusively by production and the use of goods and services, and the price was extreme and accelerating degradation of the environment.

At the same time, a north-to-south look is developing as the north observes the growing numbers of metropolitan industrial complexes in South America poised for technological take-off and wonders how the professionals there will meet their destiny in human ecology.

Latin America will find the answers not simply by observing ill advised actions of northern neighbors and passing laws to avoid them. South America, like North America, is wedded to the concept of an urbanized, technologically oriented society. Already the major urbanized/industrialized areas of Latin America are showing the same signs of environmental deterioration so prevalent in North America. In both regions the reason is the same: the skills and resources used to develop and support technological progress have not been utilized to develop and support mechanisms to control the wastes technology produces. The tragedy of the north must now be faced in the south.

The look from the north and the look from the south may soon begin to merge in hemispheric unison in recognition of the fact that many environmental problems are intercontinental, even global. A closer professional union should emerge in the 1970's to develop the understanding and the monitoring systems to obtain data so desperately needed in this Hemisphere - data which will, in time, be needed in global monitoring structures.

Environmental Health in Transition

During the early decades of this century, health agency resources were heavily committed to the task of strengthening barriers against the spread of communicable and infectious diseases. Basic sanitation services are essential to such a mission. For the Americas, sanitation has become a way of life, and the accomplishments are clearly reflected in the health histories of North and South America.

Environmental sanitation covers the health related problems of the physical environment. Clean air, adequate potable water, safe disposal of human waste, uncontaminated food, and suitable shelter - including protection against the elements and against insect vectors - are basic to health and well-being. Concern about widespread air, water, and land pollution (particularly from chemical pollutants) has emerged with economic progress. As technology spreads across all lands, it leaves in its wake a new array of environmental problems to challenge the capacity of the health disciplines, the environmental engineer and scientist in particular. A major difficulty is that epidemiological intelligence, especially with respect to non-living contaminants, has not kept pace with the times.

History rarely sets off specific eras by convenient dates. What has gone on before affects the present. The past is prologue. However, the phenomenal transformations in the environment of man date from about mid-20th century. In the 1940's, man successfully split the atom and controlled the results. He began manipulating the molecule. These developments and the expanding potentials did for technology what, a generation earlier, the assembly line had done for the logistics of industrial production. They provided unparalleled impetus and new dimensions to evolving technology, and changed the world.

As the tempo of change accelerated, the physician remained largely pre-occupied with the biological environment; the engineer, with the physical and chemical; and the sociologist, with the social, the least understood of all. As technological advancements shrink the world, there is need to deal with the environment in its totality, as the complex ecosystem of man. However, a practical system for doing this is yet to be devised.

These fantastic changes in the total environment of man have been paralleled by significant changes in the established traditional functions of public health agencies. This transition, too, results from new forces and new demands that emerge with the changing patterns of societies. The organization, distribution, and delivery of medical care facilities and services are high priority concerns. The structural and administrative blending of preventive and curative medicine is a global trend with overall governmental responsibilities assigned to the health sector. In the resultant competition for limited health resources, pressures always favor medical care over preventive measures. This is particularly true with respect to environmental problems. A practical reason is the complex logistics and huge cost of providing sanitary services. Moreover, the responsibility for the design, construction, and management of such facilities requires a public works type of governmental structure.

The accelerating nature of environmental change requires flexibility in approach and practice in order to deal with today's problems with greater effectiveness and, at the same time, to meet the evolving needs of tomorrow. In a true sense, the problem requires maximum forward momentum, with minimal inertia, in order to make continuing adjustments. This can be accomplished only through vigorous, aggressive, and competent national institutions. Additionally, this approach gives strength to essential communications and to collaboration, nationally and internationally.

Influences Affecting Environmental Change - PAHO/WHO

There are clear indications that the 1970's will see widespread recognition, understanding, and intensified efforts with respect to man's changing environment and its interregional and intercontinental significance. In the 1960's, a number of environmental determinants, already highly significant in North America, were becoming increasingly so in Latin America. Examples:

1. The rural-urban accelerates, stimulating the growth of gigantic metropolitan complexes. Within these complexes, some of the most urgent problems relating to mental health and to protection against communicable diseases will arise. This is the environment within which problems of providing adequate water supply and sewer services and solid waste management will intensify, and the increasing impacts of toxic contaminants will be felt. Of importance will be health related considerations of slums, poverty, and filth; of ignorance, drugs, delinquency, and crime; and of the effects these have on the total well-being of people.
2. Economic growth amid rapid advances in technology leads to such rapid development of industrial processes and products that their composite effects on health and on the deterioration of the environment are not adequately evaluated. The production and use of chemicals broaden the health problem. Other stresses include tensions, noise, congestion, accidents, and poisoning.
3. The expanding use of ionizing radiation introduces to the air, water, and land resources a pollutant with new terms and new dimensions. The effects of radiation are irreversible; there is little or no accommodation in the human organism. Cells escaping damage in one radiation assault are left with no immunity or tolerance against future exposures. There is an awesomeness about radioactive contamination. It is not detectable by the physical senses, and, to most, it is associated with great destructive forces.
4. New populations - with growing needs, loftier aspirations, and higher standards of national demand - tax hemispheric resources for consumer goods and services. As a conglomerate effect of urban growth and expanded industrial production, problems of air, water, and land pollution become more urgent - as does the problem of noise pollution. That the health threat created by these forces will become increasingly more acute is clearly predictable. Health concern about environmental pollution, formerly centering

largely around microbiological contaminants, now broadens to include pollutants which have their origins in microchemical substances. This raises questions of toxicity: Which of such pollutants are toxic to humans? At what levels? How toxic? How important are additive effects, combinations, and synergisms? These questions are pertinent and timely. Compared to pathogens, microchemical contaminants are more subtle, with the cause-and-effect sequence more widely separated.

5. The competitive nature of industrial enterprise promotes exploitation - human, natural, and environmental. The expanding types and the character of industrial production place heavy demands on industrial hygiene and industrial health practices. Industry must use natural and environmental resources conservatively. It must develop recycling and salvage techniques. The superb technological competence that is producing such fantastic progress in goods and services can, if applied with intelligence, keep detrimental effects within safe limits.

6. The pace of living continues to accelerate in a mechanized society. Mechanization, combined with speed and automation, is a significant source of tensions, of monotony, and of accidents in travel, in business, and in the home. At the same time, in the industrial world, the steady rise and output per man-hour produces an increase in leisure time; in the growth of sedentary occupations; and in a decline of physical activities. Such long range trends have significant implications for physical and mental health and for the general well-being of peoples.

Taken together, these and related influences constitute, in fact, a description of the manner in which man's changing environment is affecting his physical and mental well-being. These influences are pervasive and important. Their full significance is more clearly reflected when viewed as a whole, in terms of the full implications of tense, highly productive, competitive, socially unstable, and technologically oriented economies such as are emerging in the Americas.

Considered together, these influences constitute an homogeneous and powerful conceptual center around which a major health program can and should be oriented, a program geared to problems created by the rapidity of change and the resultant effects on the welfare of all peoples in the American Hemisphere.

In the early 1960's, the Director, taking note of these transitional developments and unprecedented changes, began an orderly adjustment in the use of the Organization's environmental health resources, to provide better support to Member Governments. For traditional problems, greater responsibilities were assigned to field staff at zone and country levels to expedite actions on the growing number of requests for technical assistance. For the

more sophisticated problems, the Pan American Center for Sanitary Engineering and Environmental Sciences was established in Lima, Peru. The Organization expects to meet with greater dispatch requests for consultation on the more complex aspects of environmental health, as well as fulfilling commitments on the more traditional problems. The Alliance for Progress and its Charter of Punta del Este added inspiration and gave impetus to a major effort for improving basic sanitation services for all peoples in the Americas.

Environmental Activities, PAHO/WHO - Ongoing Programs

By the mid-1960's, the Organization formulated its environmental program strategy. There were two major objectives: (a) to update traditional sanitation services, facilities, and practices, with special attention to sanitation needs in rural areas; and (b) to devise structures and to strengthen national institutions to cope with new environmental stresses and evolving problems. In 1961, the Organization applied about 95 per cent of its manpower resources and facilities to traditional problems and about 5 per cent to emerging problems. By the end of the decade, this ratio had shifted to about 80 per cent for traditional updating and 20 per cent for new problem areas.

The Governing Bodies have fully supported this shift in emphasis in the planning and use of PAHO/WHO resources. Most countries now have the institutional structures and competencies to carry out national programs of basic sanitation. In fact, the only reason the Organization still applies a large percentage of its resources to this problem area is to meet requests of Governments for assistance on problems of administration and management; on mass approach techniques; and for assistance with training, systems operation, and finance. In rural areas, special attention is being given to community organization, to self help techniques, and to revolving fund mechanisms.

The Zone Offices constitute the key operations point for the environmental programs. The zone engineer and his staff are thoroughly familiar with problems in the countries of the zone and are able to provide prompt and effective support to the Country Representatives and the country engineers. In instances where requests from Member Governments involve a highly specialized problem beyond the capabilities of the country engineer or the Zone staff, back up support is available from the sanitary engineering center or from the Washington Office.

The following, in outline form, are examples of ongoing environmental programs in Latin America:

1. Community water supplies: The continental program of community water supply was selected as the spearhead activity for the 1960's. The rationale for this emphasis was a great public demand for improved domestic water services and the significance of potable water as a basic health necessity. In

the Alliance for Progress Decade, the signatory governments, by the Charter of Punta del Este, pledged themselves to specific and ambitious goals, including the provision, within the decade (1961-1971), of potable water and safe sewage disposal for 70 per cent of the urban and 50 per cent of the rural populations. This set the targets and stimulated imaginations.

The continental water supply program was based on the simple rationale that fresh water - to satisfy human needs - is nature's most precious substance. Community systems of water supply and sewerage are basic essentials to the health and the economic and social well-being of peoples. Reasonable amounts of safe water available in homes, together with sanitary waste disposal, will reduce enteric infections and related illnesses; will promote cleanliness of the people, of the home, and of the community; and will engender self-respect and enhance the dignity of man.

The community water supply program has been supported with great effectiveness by the several international lending agencies and by the bilateral aid programs of the United States of America and Canada. The establishment and implementation of the Inter-American Development Bank (IADB) and its loan supports have been a major factor in the fantastic success of the Latin American water supply program. The first loan approved by the IADB was for the construction of water supply facilities.

Since 1961 Member Governments in Latin America and the Caribbean countries have committed about US\$1.7 billion for water supply improvements. These improvements benefit 70 million urban and rural peoples. While the success of this program has been more spectacular in urban areas, the program in small towns and villages continues to gain substantial momentum throughout Latin America.

The continental water activity involves much more than the mere installation of pipes and valves and pumps. Such public works, engineered to local conditions, involve high capital investments for cities and to a lesser extent for smaller communities. These works require complex systems of maintenance, of operation, and of management. Fully aware of these requirements, the Governments of Latin America have called on PAHO/WHO to assist in technical and economic aspects; to aid in strengthening institutional and administrative capabilities; and to collaborate on education, training, and research programs. The services that have been provided include the planning and developing of sound projects; counsel in the preparation of successful applications for international financing; and the broader use of teams of experts assigned to assist in setting up realistic rate structures, advising on administrative and management problems, and implementing mass approach techniques.

2. Sewerage services. In the last half decade, provision of sewerage services gained momentum. In 1968, for example, more than eight million additional people were served by sanitary sewers. As the community water supply program moved ahead, the need for municipal sewer services became more urgent. As water supply systems were completed, professional attention and financing

became available to design and construct sewerage systems. The efficient organizational structures developed for water supply improvements enabled the sewerage program to move ahead more rapidly.

3. Administrative management program assistance. In the early years of the Alliance Decade it became apparent that special attention was needed to improve organizational structures and administrative procedures so important in the management of water supply and sewerage systems. To meet this need, the Organization developed a specialized technique for using teams of highly trained specialists to analyze needs and to mold structures and practices to meet these needs. These consultant teams work from two to six weeks in a country with their national or municipal counterparts. Their work covers all aspects of administration and management practice pertaining to the operation of water supply and sewerage works.

The administrative management program has received strong support throughout Latin America. While the normal programs undertaken by the Organization include administrative management assistance in all countries, the specialized team approach has been used in 14 water institutions in Latin America. The Organization's experience has been set forth in operating manuals for wider application and use.

The cost of the administrative management programs obviously far exceeds the resources and facilities of PAHO/WHO. Accordingly, the recipient Governments reimburse the Organization for consultant team costs and for related expenses. Such reimbursements have already exceeded \$2 million since the program's inception in 1963. Member Governments' willingness to use their own financial resources for this technical assistance is indicative of the program's success. This activity has received strong support from the international lending agencies, including IADB.

4. The Pan American Center for Sanitary Engineering and Environmental Sciences. The concept of this Center, which became operational in 1969, is to render expert technical and scientific assistance to Member Governments, with emphasis on the more complex environmental problems arising from technological developments and from urban and industrial growth. The Center serves as an international reference and information source. The preparation and distribution of technical information materials are important functions which serve to extend and multiply the Center's technical assistance services. In addition to these activities, it is anticipated that the Center will, in time, play a key role in the support of training and research activities.

The professional staff now at the Center covers the fields of air pollution, water supply, water pollution, housing, urbanization, physical planning, industrial hygiene, and rural community development. During its first year of operation, advisory services in the fields of specialization covered by the Center were rendered to 14 Member Governments. Among the fields in which the Center has been particularly active are:

a. Air pollution. In the decade of the 60's there was clear evidence that air pollution was increasing in metropolitan areas. PAHO initiated its air pollution control activities as part of its assistance to the Institute of Occupational Health and Air Pollution Research in Chile. The new center is coordinating development of the Pan American Air Pollution Surveillance Network. At present, 22 stations are operating in Argentina, Brazil, Chile, Colombia, Mexico, Peru, Uruguay, and Venezuela. By 1972 the network will have about 100 stations in operation. The first annual report of network data was published in 1968.

b. Industrial hygiene. The Center carries out a number of activities in industrial hygiene. Special assistance has been given to new programs in Argentina, Cuba, Ecuador, and Panama. Technical support has been given to nine other countries. The Organization has served as the executing agency for the United Nations Development Program assistance to the Institute of Occupational Health and Air Pollution Research in Chile.

c. Housing and physical planning. As directed by its Governing Bodies, the Organization has provided support and assistance in improving housing conditions, especially for low income groups in urban and rural areas. In addition to the zone and country staffs, a regional adviser in housing has been available for specialized problems. Expanding populations and rural-urban migrations have combined to make housing a serious problem and a high priority need throughout Latin America. It is most encouraging that building and loan associations are being established in many countries of Latin America and are contributing significantly to the private financing of housing units. However, this source of help does little for the very poor. Hence, governmental subsidies and assistance are of vital importance.

PAHO's housing program emphasizes adequate site drainage and the provision of potable water and waste disposal. The Organization is working with national and international agencies on mass approach techniques that will provide adequate housing within economic realities. The program also covers a wide range of related problems such as orderly urban development, community facilities, and physical planning. Special attention is being given to community organization and the self help concept as a means of improving substandard housing.

5. Water resource developments and water pollution control. Joint river basin planning and development have become more important as competition increases for the use of water resources. Countries in the Rio de La Plata Basin, fully aware of the changing character of environmental problems, have established an intercountry commission for a comprehensive approach to basin problems. PAHO/WHO is contributing consultants for this task and is sponsoring seminars and training courses for professional and technical personnel.

The Santa Lucia, a sub-basin of the Rio de La Plata, has been the subject of a special joint study by the Organization of American States, PAHO, and the Government of Uruguay. This study was designed to meet a dual purpose: it will provide a specific plan for the maximum use of the basin's water resources, and, secondly, it will serve as a model. Member Governments have requested similar types of assistance from the Organization in other river basins such as the Guayas in Ecuador, Lerma in Mexico, Bogota in Colombia; Huallaga in Peru, and two major drainage areas in Brazil affecting Rio de Janeiro and São Paulo.

The upward surge in economic development in the Region is significantly altering water and land uses and values. Water resource development and water pollution control are becoming major problem areas. Water quality management grows in complexity with economic development. The following factors are examples:

- a. Water pollution is a by-product of economic development, an unenviable symbol of technological advancement. Effluents from municipal and industrial sewers, surface run-offs from streets, and drainage from construction and agricultural areas all combine to disrupt biological balances and to deteriorate waters.
- b. The concept of minimum treatment and maximum assimilation is outmoded in North America and will become so in Latin America. This concept must give way to a changing scale of water and land values as development proceeds and affluence increases. Traditional parameters and indices must be modified to include proper emphasis on thermal pollution, on effluent nutrients, and on chemical contaminants.
- c. Water quality control should be an integral part of comprehensive river basin development, with costs and benefits appropriately quantitated and documented.
- d. In most developed areas, public opinion and demand for pollution abatement is ahead of professional actions and plans. This does not imply that the public clearly understands the cost-versus-benefit factors; it does, however, imply that public aspirations are on the ascent. Needed are full national appraisals, by watersheds, of the range of pollution control potentials, with a corresponding price tag attached to each indicated stage of protection. With these data, and with public understanding of costs and values, it might indeed become more apparent where public aspirations and public policy should meet.
- e. In densely populated, highly industrialized complexes, traditional waste treatment technology is reaching the point of inadequacy. An appropriate question: Is our research effort sufficient in magnitude

and properly focused to correct this deficiency? Water pollution control will require increasingly larger amounts of the public works investment. These huge expenditures should be based on sound research, on updated monitoring methods, on effective treatment practices, on good operation, and on water quality needs and costs. For most countries, this is an economic necessity.

f. The relationship of water pollution to public health is changing in concept. Traditional concern has, in the past, centered on the biological aspect. Standards were viewed to be essentially the same for both fresh and marine waters. Epidemiological evidence is now providing the basis for differentiating between the health hazards in fresh and marine waters. Biological water quality standards for drinking, swimming, and food production have been similar and stringent. Chemical standards have been related principally to inorganic chemicals. Conventional water treatment practices are not designed to remove such pollution. This adds emphasis to the question of toxicity.

g. Water pollution control in Latin America is meeting stiff competition. Resources are critically needed to stimulate economic expansion. Industrialization is essential to meet unemployment in cities, to produce export capital, and to meet internal consumer demands. In this urban milieu, water systems and sewer systems can meet the competition. Pollution control works generally do not. Usually, only the measures necessary to prevent gross danger to health, or serious interference with economic progress are taken. In short, there seems to be no simple equation or policy which can be applied uniformly for water quality management in developing countries.

6. Solid wastes. The collection and disposal of solid wastes is a major economic problem for all metropolitan areas. The cities of Latin America spend up to 40 per cent of the municipal budget for this service. The PAHO/WHO program of assistance began in the 1960's. During the decade, requests for technical assistance exceeded resources. Preliminary studies and evaluations have been made of existing conditions, and short courses and seminars on the subject are being held in universities in a number of countries. Technical assistance has been given to more than 30 cities in Argentina, Barbados, Bermuda, Brazil, Chile, Curaçao, Dominican Republic, Honduras, Jamaica, Mexico, Nicaragua, Panama, Peru, Venezuela, and a number of border cities with the United States of America. Eight short courses or seminars have been held on subjects related to solid wastes management in Argentina, Brazil, Chile, Mexico, Panama, Peru, and Venezuela. Most of the Organization's effort has been directed to providing assistance for improving managerial and operational methods and procedures.

7. Insect vectors. Health related problems involving insect vectors are obviously important in many areas of Latin America. A specialized program for malaria eradication is being carried out by PAHO/WHO in close collaboration with the global malaria eradication effort. Chagas' disease is widespread,

requiring specialized control efforts. The staff working on rural and urban housing assist with this problem. Bilharsiasis is also widespread and is becoming more significant with the development of river basins and the expansion of irrigation systems. Aedes aegypti control is also a specialized activity under a Region-wide program of eradication.

8. Education, training, and research. In the early years of the 1960's, it became apparent that the massive continental programs of water supply and sewerage and the broadening nature of environmental controls would require trained manpower in numbers and types far in excess of what would normally be mobilized, and would require service laboratories and related facilities not then in existence.

Responding to this need, PAHO/WHO initiated aggressive actions on two broad fronts: strengthening schools of engineering (especially in sanitary-engineering curricula) and establishment of a continental network for professional and technical training. Both actions involve close collaboration with and between universities, and both have been quite successful.

The program for undergraduate education integrates sanitary engineering curricula into schools of civil engineering. This practice is now being followed at 28 universities throughout Latin America. Nine universities now offer graduate programs in sanitary engineering. An interesting by-product has been the growth in full-time faculty at schools of engineering, from less than ten in 1962 to about 50 at the present time.

Three projects (Brazil, Chile, and Venezuela), funded by the United Nations Development Program, are pioneering major advances on the education and research front. Six additional projects of this type are in various stages of processing.

Concurrently with these developments, a coordinated system has evolved for continuing professional education. This system also provides technical training for sub-professional personnel. The favorable response to this program is indicated by its growth and expansion. In the first year (1963), four refresher courses were conducted at two universities, financed largely by PAHO. There are presently 37 universities in 22 countries in this network; they are conducting 60 to 70 training activities benefiting some 2,000 professional and subprofessional personnel annually.

These brief references to program operations and to education and training are cited to illustrate the range and magnitude of the tasks in Latin America and in the Caribbean Area, and the efforts being made to maintain order and balance within the overall mission.

With respect to research needs, the gaps in intelligence relate to the technical, social, and economic factors in massive programs of water and

sewerage and other environmental measures. Response from governments and institutions to the education and training effort has created an atmosphere of optimism as to what might now be stimulated and accomplished in the field of mission oriented research.

Thus far the research effort has concentrated on the application of basic principles to the problems and conditions in Latin America. For the immediate future it seems impractical to expend much energy on fundamental inquiry, since the per capita drain on modest resources for the improvement of living standards and the well-being of peoples is so great. These programs - together with those for water pollution and air pollution control, for river basin development, for housing, solid waste disposal, industrial hygiene, and related environmental needs - will require complex engineering works involving huge expenditures (about \$3 billion over the next decade). We believe that the influence and the modest resources available to PAHO/WHO might better serve the peoples if they are used to further the programs rather than being submerged in basin research.

There are reasons for being optimistic about the research potential in Latin America. The continental training network has stimulated an extremely close liaison between the ministries responsible for health and public works and the university systems. In many instances, these ministries are supporting service and teaching laboratories which function under the jurisdiction of the universities. In other instances, they are supporting full-time faculty members and providing student fellowships. Three ingredients - full-time faculties, laboratories, and students - operating in newly formed frameworks of graduate education, not only make research possible, but provide the driving force for it.

The next logical step, it would seem, is to demonstrate the capacity of the university structure for sound investigative work. To assist in this, PAHO is now providing modest support for research training and for 20 research projects embracing a wide range of environmental engineering problems.

It is likely that the day is not too distant when many universities will serve as an applied research arm for governmental agencies responsible for providing, operating, and maintaining environmental facilities and services. In instances where universities respond with quality work, they will undoubtedly attract broader internal sources of support, just as they have already done with the training and education networks.

At Lima, Peru, the new Center for Engineering and Environmental Sciences constitutes the third extremely important cog in the PAHO machinery for training, education, and research. In addition to its other functions, the Center's mission includes a major role in the development of the research potentials of the universities. It will continue to assist Member Countries in establishing and developing quality research and teaching centers.

For the next few years, PAHO/WHO plans to gear its actions to support practical research; to clarify design criteria; to devise approaches and practices within the bounds of the administrative capacities and the economic realities governments must face; to strengthen central intelligence on emerging problems in this technological age; and to provide clearer perspectives of the physical, mental, and social impacts being created by the rapidity of change. If this can be accomplished effectively, a much needed service will have been rendered the peoples of the Americas.

Foci of basic research will emerge in Latin America. This is inevitable - and it is proper. The extent to which such foci emerge will of course depend upon the dedication, competence, and capacity of individual investigators. Such individuals should not be discouraged, rather to the contrary. In fact, the association of biologists, chemists, physicists, and other scientists with engineers in the solving of practical problems in our environment will stimulate their imaginations to conceive the basic questions to which they and their colleagues will be seeking answers.

The same fundamental principle followed in the network for education and training is now being applied in research to stimulate rather than to underwrite the development of indigenous, self reliant institutions. Thus concepts, approaches, and motivations take precedence over international dollar supports.

An overview of trends shows that health related problems of the environment are still being viewed largely in terms of morbidity and mortality rather than in the context of their broader health, social, and economic significance. To the extent that this is true, the cardinal principle now followed seems not only realistic, but imperative.

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The foregoing comments - particularly those concerning "education, training, and research" - are set forth because they discuss the "heart" of the PAHO/WHO ongoing environmental programs. Although the comments reflect, for the most part, the experiences, trends, and conditions in the PAHO/WHO Member Countries, it would seem that there are common denominators among all regions of the world. PAHO/WHO's mission is to stimulate, support, and assist Member Governments with programs which will improve the health and well-being of their peoples. We must constantly remind ourselves that the WHO definition of health is quite broad, extending as it does beyond the mere control of communicable diseases and preventable infirmities. Authority and responsibility for programs rest exclusively within the national governmental structures. Thus it would seem imperative that PAHO/WHO resources be used primarily for the development of sound organizational structures; improvement of administrative practices; strengthening of national institutions, especially those responsible for education, training, and research; and development of appropriate systems of international liaison and informational exchanges. The keystone is technical assistance, provided on request.

Some Observations Relating to PAHO/WHO Activities

The magnitude and complexity of environmental change will most likely continue to be more pronounced in North America than in Latin America. For the predictable future, the time factor favors Latin America, since the rate of change is at a slower pace. Obviously, this is a continental generalization. In some areas in Latin America, environmental degradation is about as severe as in North America. There is merit in the general observation that overall levels of environmental pollution follow the trends of economic development. As affluence increases, so does air, water, and land pollution, since the potential for per capita pollution follows the standard of living.

There is increasing concern about the changing patterns and character of environmental influences and the resultant impacts on the general health and well-being of peoples. The task of statesmanship will be to set forth clearly and emphatically the positive and negative influences of environmental determinants and to provide aggressive leadership in attaining an optimum environment.

1. Parameters of environmental stresses. Modern environmental stresses now require new parameters to assess total effects. The status and progress of public health have long been expressed in terms of such traditional parameters as life expectancy, infant mortality, and the statistics of mortality and morbidity as they relate to communicable diseases. These parameters and related indices do not measure the health related effects of environmental impacts, with the exception of such broad generalities as water supply, waste disposal, food sanitation, and general cleanliness. In urbanized, highly mechanized societies the impacts on people of many environmental stresses are subtle, with a wide separation of cause and effect.

For environmental factors relating to disease transmission and certain toxic effects (principally inorganic toxicants), there are well established indices.

2. Pollution potentials. Considering the speed of change and the character and magnitude of environmental pollutants, there is a real need to develop methods which will predict pollution potentials, based on projected growths.

Pending development of realistic methods of measuring environmental hazards, general indicators will have to be used. Pollution of the environment and resultant deterioration involve all of man's activities and the wastes resulting from these activities. Parameters for predicting pollution potentials must take into account such factors as the affluence of the area. In other words, a simple index might be expressed as some exponential of the product: population multiplied by the standard of living expressed perhaps as per capita energy consumption. For a major area, such a product is a crude expression of industrial and personal pollution potential.

By way of example: If the population of a given country is expected to double in 25 years, and if the projected standard of living is expected to increase by four, then the potential for environmental pollution will rise by at least 800 per cent. This, in turn, means that an overall corrective or remedial action, reducing the pollution impact by 90 per cent, would be required just to stay even. As we ponder such realities, we must keep in mind that we are dealing with a pollution removal base which is becoming increasingly difficult to achieve - in terms of efficiency and economy - since these figures represent all-encompassing pollution contributions, not just those which are discharged through sewers, smokestacks, and vehicular tail pipes. Another point: Since PAHO/WHO interest is hemispheric (largely Latin American), advanced technology for developing countries will increase by as much as several orders of magnitude, so that an additional multiplication factor will need to be applied.

The purpose of inserting this concept is that, in the future, environmental degradation must be approached on a systems analysis basis; it must take into account the fantastic rates of change; and it must consider the environment in its totality. Furthermore, problems such as noise pollution, tensions, congestion, and the like will increase in approximately these same ratios.

Organizational structures and administrative policies are also important in considering environmental factors. Health agencies are most likely to be effective in achieving their aims when they are adroit and flexible in adjusting their working relationships and when their actions are relevant to economic and political realities.

3. Channels of communication. It is obviously important to follow established channels through which international agencies operate. PAHO/WHO's channel for responding to Member Governments' requests for assistance is the ministry of health concerned. In most countries, however, programs to regulate or control environmental hazards are under the purview of ministries other than health. Over the past decade, PAHO/WHO established, via its zone and country staff structures, effective working relationships with a series of agencies, boards, and ministries having regulatory responsibilities over developments affecting the physical environment.

Throughout the Americas, health ministries have been most adept in using the PAHO/WHO mechanism. The strength of PAHO/WHO's environmental programs has been its ability to use all appropriate channels of operation to move forward with its mission.

Man now has within his grasp some of the technological potential not only to mold his environment to human needs, but to mold nature itself. Thus far this potential has been sparsely applied to conservation of environmental resources - or even to avoid excessive degradation. Advancing science and technological capacities are being applied primarily to pioneer new frontiers; to change matter; to broaden and speed up transport and communications services; and to expand global production and distribution of goods and services.

Man's restless preoccupation with the emergence of new technologies and his insatiable thrust to probe, discover, and exploit new natural resources have now far exceeded the applications to protect and conserve his irreplaceable environmental resources.

4. Environmental coverage by the health sector. Sharp debate continues among health professionals on a proper and realistic course of action for organized health structures to take on the changing problems of the human environment. First, it must be remembered that there is no single environmental problem; rather, there is a multiplicity of questions, some of which are localized or national in scope; some are international, even global. There is a growing awareness that environmental change must be considered in the totality of the world's ecological system.

Over and beyond geological considerations, the health professional must keep in proper perspective the biological, physical, chemical, and social components of man's environment, and their respective roles in the ecosystem shared by man and other living organisms. For the most part, health agencies have grappled with peripheral issues, principally the biological components of the environment, avoiding confrontations with core problems. To broaden the influence of health professionals, the health administrator, within the area of jurisdiction, must first assess the true nature and magnitude of environmental change, both for the present and the future. He must equate these findings in terms of effects on the health and well-being of peoples and other urgent health needs. While he must define well-being as more than the mere absence of disease, he must nevertheless avoid devising programs in hasty response to the hysteria of unwarranted and unrealistic pressures. This is not a simple task to accomplish.

5. Stress induced diseases. About mid-century and earlier, before the rapid advances in immunization and drug therapy, man threatened the community by spreading infectious diseases such as tuberculosis, venereal diseases, and so forth. Today, with the advances in vaccines and drugs, man does not threaten the community. Instead, the community threatens man by air pollution, noise, poor housing, radiation, et cetera. Thus the cycle of disease transmission has been reversed.

During the 1970's the patterns of diseases, now rapidly changing from infectious to stress induced phenomena, will reflect our changing environment. The stress induced diseases - some due to the pressures and hysteria of the present time, others produced by an increasingly complex chemical environment - are going to take a relatively larger toll. At a time when a synthetic environment defying assessment in terms of its biological significance is being created, a generation is coming into being whose total life span will have been spent in technologically created surroundings. The little evidence available, largely through classical approaches, indicates that this is not all good. There is a need to enlarge the role being played by the life scientists who are now probing the secrets of the cell; who are mapping the genetic structures of chromosomes;

and who are advancing understanding of the cell's chemistry and biology. Recent studies have shown how the in vivo addition of a chemical may alter the sequence of nucleotides in the DNA molecule. These scientists will soon begin to manipulate genetic material, guided, we hope, by social needs. Such skills, applied to the questions raised by chemical and physical technology, should provide highly sensitive and powerful tools with which to measure the near and long-term biological impacts of the changes we are now undergoing and will be facing in greater measure in the future. It is a foregone conclusion that such types of guidelines are urgently needed.

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The ongoing programs of PAHO/WHO - quite broad, with rather extensive coverage - are moving in reasonable order. Actions taken by the Organization's Governing Bodies have strengthened and supported approach. Accordingly, PAHO/WHO is in a position to pursue, with vigor, whatever specific program directions its Governing Bodies might prescribe.

There are hard choices to be made. In terms of the environmental challenge, the choices are coming to us now with alternatives heavily disguised. For those who would restrict the health sector to environmental problems of known personal health consequences, there is the disturbing question, "Can we wait for the suspected agent, be it chemical, physical, or biological, to be proven guilty beyond reasonable doubt?" For those who opt for a complete environmental utopia, there are very obvious questions of reality. Needless to say, the selected choices will vary among countries. Overpopulation, economics, and other hard facts of life will influence decisions.

Blueprint for the 1970'sGeneral Analysis

Whatever set of environmental activities health agencies choose to pursue in the 1970's, the focus must continue to be on people - on their health and on their well-being. This is the characteristic which distinguishes health agencies from other agencies seeking their "ecological niche" in the environmental universe.

In setting goals for the upcoming decade, the objectives need to be clear. What is the specific condition of peoples or of environment that is to be obtained? What are the specific activities through which the goals can be attained? What are the time sequences? These are the kinds of specifications necessary. Some hard choices are involved in their determination.

Man in his environment constitutes a vast continuum, as broad as the horizon and stretching as far as the galaxies. The spectrum of possibilities for meaningful activity is vast, from providing a glass of clean water to providing almost, quite literally, a utopia of physical and mental well-being.

The total of environmental health is greater than the sum of its parts. It embraces engineering, medicine, economics, law, sociology, and many other disciplines. Individually, their contributions are significant; collectively, they cannot be measured precisely, adding up to an indefinable quality of life.

Man's environment is both internal and external, fed and sustained by life systems and life support systems. The health insult may be direct or indirect. In either case, however, man is the target and the victim of the degradation of an environment increasingly hostile to his aspirations for a better life.

In PAHO/WHO, the ongoing programs for environmental quality control are broad and soundly based. Through the 1960's, Member Governments responded aggressively and effectively in achieving this unprecedented progress. National institutions were strengthened and close liaison established between the several national ministries involved in control activities. As indicated in the report, the foundations for education, training, and research are well established and working smoothly.

Needless to say, all of these national and international mechanisms will be needed in the 1970's. Outstanding progress in environmental health is being accomplished; national and continental programs are staffed; and the operational machinery is flexible.

What is needed is the development, adoption, and commitment - including financial and human resources of physicians, engineers, and other professionals - of a definite action program, complete with tangible, practical sub-programs.

This will entail a change in attitudes of all concerned as well as alterations of traditional ways of doing business in public health. But the key word is action - action in a broad spectrum of environmental activities from epidemiology and monitoring to regulation and control. No aspect of the program can be played off against another, each is essential.

If public health is to survive as an entity, and, more particularly, if environmental health is to survive within it, some aggressive actions need to be taken:

Regional networks for monitoring major environmental impacts need to be established and operated by health agencies. These networks should be linked to global networks having common bases for sampling, analysis, and interpretation of data.

National plans for environmental programs should be synchronized with national economic and social plans, and they should have the concept and mechanism for inter-country joint action built into them. This is particularly important since pollution, most often, does not respect boundary lines.

PAHO/WHO should make integrated use of its resources to achieve maximum impact. For example, in a given program area such as water supply the Washington Office staff, the zone and country staffs, and the sanitary engineering center staff should be used in a coordinated fashion to achieve jointly developed, and commonly understood, program goals. The PAHO/WHO-sponsored, university based training, education, and research network should be used to its full potential, and fellowships should be programmed with other resources.

New technology must be brought to the countries more effectively and more extensively. Critical reviews of literature should be made to produce "summaries of knowledge" and "state of the art" documents in each program area or sub-area (such as air pollution monitoring, water treatment, industrial-hygiene surveys). Manuals of reference, handbooks, and other technical informational materials need to be produced. As necessary, research should be conducted or supported to adapt basic knowledge developed elsewhere to regional conditions. Technical consultation should be available on problems of unusual difficulty. The Center for Sanitary Engineering and Environmental Sciences should provide the leadership in bringing new technology to the countries and in providing expert technical assistance.

Continued support should be provided for the development of university graduate centers for teaching, technical training, and research. A modest research training grant program should be reestablished. The future progress of Latin America in improving the physical environment will depend, in significant measure, on the quality of its university centers for environmental sciences and engineering.

Mechanisms for action, such as river basin development projects, should be supported and utilized fully by the health agencies. These projects offer excellent opportunities for incorporating necessary health programs in overall basin development.

External resources should be sought more vigorously. The Organization should provide greater assistance to the countries in obtaining external financial support for facilities and services. Included in such assistance would be the development of basic information for loan applications, pre-feasibility studies, determination of optimum period of design, and programing of construction to make maximum use of loan funds. The same type of assistance should be provided Member Governments in developing applications for UNDP funds, for bilateral assistance funds, and for support from foundations and other institutions.

Because the action program must be narrow enough to be specific, yet broad enough to cover a multitude of programs and administrative arrangements, the Blueprint for the 1970's herein is expressed in terms of "approaches" and goals for the decade, all submitted for consideration by the Organization's Governing Bodies. In view of the wide divergence among the countries as to environmental control needs, it is expected that each country will continue to adjust program content to its facilities and requirements. Accordingly, a specific country may use ideas from each of the three suggested approaches.

One approach might be to concern ourselves with the hard core of the environment, the physical environment. In concept, this approach would be a continuation of the traditional role of public health agencies. In dimension, however, the approach would be greater; in content it would be more varied and more intricate. The principal elements might be considered somewhat as follows:

a. Basic activities

Water supply
Sewerage
Solid wastes
Food protection
Occupational health

The basic epidemiology of these environmental determinants is fairly well delineated. Refinements are needed in the assessment of the chemical segment and in the viral segment.

b. Supplemental activities

Air pollution
Water pollution
Hygiene of housing
Ionizing radiation

For these, the epidemiology is less well delineated, except of course with respect to microbiological contaminants. The significance of chemicals, especially complex organics, in air and water pollution; the health effects of substandard housing; and the damage caused by lower dosages of radiation over longer periods of time also need better quantification.

c. Total well-being in an optimal environment, esthetically pleasing surroundings, open space, and leisure time facilities. In sum, restful, stimulating, or vigorous conditions at fingertip control.

If such an approach were selected, primary emphasis would be placed on activities in (a) and (b). The existing structure, provided with appropriate resources, could do the job.

A second approach would be to pursue a broad attack, viewing environment as a pervading factor in each of the several programs of PAHO/WHO. In this case, a major change in concept would be involved. Environment would become the conceptual center around which activities in the categorical programs would revolve. Significant changes in structure, especially to achieve coordination, would be required. Unless major increases in resources were provided, the effort would be thinly spread across a broad front. This would leave health agencies vulnerable to the criticisms by other agencies sponsoring strong programs in separate categorical phases of environmental control.

In order to implement this approach, it would be necessary to examine each program to see how environmental considerations should be incorporated into it. Specific program activities would need to be planned and resources provided. Some sort of overview would need to be established to coordinate the separate program elements.

If this second approach were selected, heavy initial emphasis should be placed on defining health relationships; on assessing health effects; and on developing the criteria necessary to plan and carry out preventive or corrective measures. This is the greatest gap in environmental programs today, and is a main reason why the health agency has become a progressively weaker partner in the environmental business. The key to regaining a position of influence lies in relating environmental conditions to the health and well-being of peoples, in a quantitative way. It is in this area that the health agency should be the expert and the unquestioned authority. Entailed in this is a clear definition of the term "health."

A third approach is a compromise, giving primary emphasis to the physical environment as the hard core program, but beginning to build environmental considerations into other programs, wherever significantly applicable. This approach would require minor changes in structure, principally to provide a coordinated effort. The additional resources required for this alternative would be less than for the second approach.

The medical programs should give major emphasis to defining the health effects of environmental conditions and in assessing such effects. In view of the rapidity of change, environmental epidemiology must be both retrospective and prospective.

International health agencies by their very nature are obliged to consider health problems from both a regional and a global point of view. For a regional organization such as PAHO/WHO, there is the primary responsibility to look inward at the health problems and needs within the Hemisphere and, secondarily, to look outward at the relationships between regional health and world health. These latter relationships are reciprocal: Activities of the Region can affect health both intra- and inter-regionally. Conversely, activities outside the Region can affect health within the Region. There are imperative obligations to be met in each case.

Program Objectives and Elements

FIRST APPROACH. This approach focuses on what is the hard core of any environmental program, the physical environment. It proposes that major resources be devoted to the most basic and better understood elements of activity, with descending orders of resources devoted to the elements less well defined epidemiologically. An outline for this approach follows:

Water Supply, Urban - Objective for the 1970's: Piped water under continuous pressure for each dwelling unit.

Major activities:

- Extend to medium sized and smaller cities the assistance that has been provided to larger cities.
- Assist Member Governments to conduct pre-feasibility studies and assemble other information needed to obtain external financial assistance.
- Encourage and assist in the development of national water supply plans, in relationship to national development plans.
- Add executive administration to the administrative management training program.
- Develop and provide training for water treatment plant engineers and operators.
- Stimulate water quality monitoring through laboratory controls.
- Bring new water treatment technology to the water supply industry.
An example is the new technology of water treatment which can save millions of dollars by expanding the capacity of existing treatment

facilities through relatively low cost modification of sedimentation, filtration, and coagulation processes.

Water Supply, Rural - Objective for the 1970's: A community water supply in each place where "centers for community services" exist or are to be established. Support should be given to the concept and design of community service centers where the basic requisites for modern rural living are provided. A secondary objective would be to provide off premise water supplies for the use of dispersed rural populations.

Major Activities:

- Continue to improve, and assist in, the installation of "mass-approach" rural water supply programs.
- Develop and publish information on simplified, low cost rural water supply systems.
- Evaluate revolving fund mechanisms and incorporate improvements based on experience. Assist in the establishment of new revolving fund systems.
- Develop basic information guides for use in preparing applications for external financial assistance.

Sewerage, Urban - Objective for the 1970's: Water carried waste services for each dwelling unit in the consolidated and incorporated urban areas, and a minimum of sanitary latrine services to unincorporated urban areas.

Major Activities:

- Sponsor the application of the same principles of organization, management, finance, operation, and maintenance which have proved effective for urban water supply services. Promote the concept of a combined water supply and sewerage administration.
- Encourage and assist in the development of national plans for sewerage services.
- Assist in obtaining financing.
- Provide training according to the most urgent needs in each country.
- Translate and publish industrial waste treatment guides for all major industries.
- Sponsor research into the adaptation of sewage lagoons and other low cost treatment methods.

Sewerage, Rural - Objective for the 1970's: Water carried waste systems for all new "community service centers" parallel with the provision of community water supply and for 75 per cent of existing ones; a minimum of sanitary latrine services for dispersed and unorganized dwelling units.

Major Activities:

- Develop low cost sanitary waste disposal systems for rural communities.
- Develop a "mass approach" for such systems, and a revolving fund mechanism to sustain financing.
- Develop information for use in obtaining external financial support.

Solid Wastes - Objective for the 1970's: Regular waste collection and sanitary disposal systems for all large and intermediate sized cities; regular waste collection and regulated disposal systems for other cities.

Major Activities:

- Assist in the development of sound and self-supporting institutional structures for providing solid waste services.
- Assist in obtaining initial financing for such services.
- Bring new solid waste treatment technology to countries.

Occupational Health - Objective for the 1970's: A viable national occupational health program, geared to industrial development in each country. (Smaller countries might wish to pool certain services and facilities, such as laboratories, or to obtain services from larger countries.)

Major Activities:

- Assist countries which do not have programs in preparing them - including legislation, structure, staffing and other resources, training, sequence of program activities, and methods of financing.
- Develop technical manuals and other materials for making surveys of industrial hygiene problems, for sampling and analysis, for control methods, and for evaluation.
- Conduct, upon request, evaluations of ongoing programs.
- Design and sponsor training programs.
- Seek the support of institutions financing industrial development in providing occupational health protection as a condition of such assistance.

Food Protection - Objective for the 1970's: Assessment of the health significance of the respective stages of food handling from source through processing, distribution, storage, preparation, and serving under conditions existing in the respective countries; development of realistic health protection for each stage; integration of these measures into practical programs; and sponsoring their adoption by national, state, and local agencies.

Major Activities:

- Design, conduct, or support epidemiological studies of microbiological and chemical contaminants (including additives) in food, and the health significance of food handling operations.
- Translate epidemiological findings into practical preventive and monitoring measures.
- Train personnel at the professional and other levels in the techniques of preventing food-borne illnesses, including surveillance and monitoring.
- Devise special programs for alerting tourists to the hazards of foods, and for protecting them especially against the more serious food borne illnesses such as hepatitis, the dysenteries, typhoid fever, and undulant fever.

Air Pollution - Objective for the 1970's: A viable national air pollution program for each major country and an active control program for each major and intermediate sized city having a significant air pollution problem.

Major Activities:

- Develop and demonstrate the use of a manual for making a municipal air pollution survey.
- Sponsor an expanded regional air pollution surveillance network and continue to assist in the establishment of national and local monitoring systems.
- Continue to develop and distribute manuals for sampling and analysis of air pollutants.
- Bring new air pollution control technology to the countries.
- Sponsor seminars and assist in the design and conduct of technical training courses.

Water Pollution - Objective for the 1970's: A viable national program in each major country and an effective pollution control program in each large and intermediate sized city having a significant water pollution problem.

Major Activities:

- Prepare and distribute guides for conducting water pollution surveys.
- Develop and make available model laws and ordinances for water pollution programs.
- Prepare industrial waste guides for each major industry.
- Encourage and assist in the development of comprehensive water quality management plans geared to national development goals.
- Assist in the development of university water pollution control curricula.
- Encourage and support studies and investigation of water pollution problems, especially those having broad significance.
- Sponsor a regional water quality network, with associated analytical laboratories.
- Prepare and distribute a manual on sampling and analytical procedures for network participants and others interested.

Housing - Objective for the 1970's: Determination of the health significance of various kinds and arrangements of dwelling units and neighborhoods and, on this basis, development of a program in housing appropriate to the health agency.

Major Activities:

- Conduct studies of the health significance of housing to determine the order of importance of the several elements of housing to the health and well-being of the occupants, as judged by the occupants.
- Develop mutual self-help manuals containing simple drawings, illustrations, and instructions for making improvements which will substantially overcome the unhealthful and undesirable features of inadequate housing.
- Develop mutual self-help programs for the progressive improvement of housing units in an order of priority framework that is synchronized with the availability of resources.

- Participate in pilot-scale projects for demonstrating the mutual self-help approach under several prototype situations, and varying degrees of guidance and assistance.
- Assist in planning, and in obtaining financial support, for housing improvement programs.

Noise, Vibration, Congestion, Tempo, and Other Physical and Social Stresses - Objective for the 1970's: Development of criteria, based on effects on health and well-being, for the practical regulation of these stresses and the initiation of control measures.

Major Activities:

- Assess the harmful effects of noise, and recommend criteria for individual and community exposure.
- Examine the more prevalent types of industrial vibrations and other vibrations to which workers and the public are exposed, and set criteria for exposure.
- For other physical hazards such as lasers, ultra-high frequency, and similar radiation, keep abreast of uses and of literature regarding hazards, so that proper protective measures may be instituted as necessary.
- In collaboration with other social agencies, study congestion, tempo, and similar characteristics of urban living, with a view to understanding their effects on physical and mental health sufficiently to identify preventive or corrective measures.
- Provide, via medical education programs, for basic training of physicians and associated technicians in the use of X-rays and radiography so as to minimize possible human radiation exposure.
- Develop criteria, via occupational health, cancer and chronic disease programs, for chemical exposures and their effects, singly and in combination. The combined effects of environmental chemical exposure and mass medication (such as aspirin, tranquilizers, antihistamines, and perhaps alcohol) should be studied.
- Define the housing and spatial arrangements necessary to promote mental health. The effects of tempo, congestion, and delinquency should also be defined.

In summary, the several categorical health programs should be engaged extensively in epidemiological investigation and research to define qualitatively and quantitatively the health effects of environmental conditions. The health agencies should establish the criteria, if not the standards, for human health. This would do much to reestablish the environmental health leadership in the health agency. In the absence of such actions, the health agency can expect to be progressively less influential in the environmental health arena.

SECOND APPROACH. This approach - namely that of pursuing a broad attack on the environment and man's interaction with it - would retain the physical environment as the hard core. Added to the first approach would be a set of activities aimed at an optimum environment for human growth. The second approach would provide the best balanced and most effective environmental program. It will require new coordinative mechanisms, substantial additional resources, and interdisciplinary approaches with all professionals participating on a parity basis. Most important of all, medical leadership will have to support fully the concept and philosophy.

The second approach would emphasize better knowledge about the man-environment relationship. Instead of the "crisis" concept, in which action is taken only when a situation reaches serious proportions, the program would feature preventive action based on better intelligence of cause-and-effect relationships. In order to acquire such intelligence, a series of well-designed studies will need to be conducted, in some cases extending over a number of years. The difficulty of designing and conducting such studies should not be underestimated. For example, assessment of concurrent exposures to chemical contaminants through air, water, food, and occupation is a difficult research task. Larger numbers of modified chemical structures are annually coming into production and use. Until research can provide definitive information, best professional judgments will have to establish criteria. Both activities, however, are clearly the primary responsibility of the health agency.

In implementing this approach, each major health program would need to examine the impairments to man resulting from environmental stress. Some examples may serve to illustrate:

1. Communicable disease programs would need to establish more clearly the conditions under which viruses are conveyed to man through water, food, or other preventable circumstances. For example, infectious hepatitis, now widely endemic in a number of areas is an increasing threat to native populations and may have increasingly important economic consequences, insofar as tourism is concerned.

2. Nutrition, communicable diseases, and environmental sanitation programs need to study jointly the loss of efficiency of food utilization through preventable diseases such as the dysenteries and other bacterial or parasitic diseases.

3. Medical care programs should be the source of information on the hospitalization burden resulting from preventable water- and filth-borne diseases and should be an active participant in the prevention of such diseases.

THIRD APPROACH. This approach is a compromise between the other two and is the one recommended. It implies essentially the same commitment to the physical environment as the hard core program of the first approach but a less intense commitment by the other categorical health programs.

Minor changes in structure are indicated to achieve coordination. Additional resources requested would be much less than for the second approach. Each categorical program would examine the environmental implications for its activities; would take cognizance of the implications by initiating specific measures in areas of greatest significance; and would plan a continuing program to accomplish the most important tasks in a reasonable period of time. This might be considered as a multi-stage approach, geared to available support. Its tempo would be in phase with its resources.

Regional Imperatives

As national and regional economic and social developments change, and as research and technology produce new problems and new means for meeting them, the international health agency must also change. It must change not only its technical procedures, but it must also be prepared to change its concepts, its institutional form, and its basic philosophies.

Perhaps the most important question - for environmental health as well as for the other categorical programs - is whether public health can survive as a significant entity in the medical care world, or whether, like the Mayan civilization, it will disappear in the jungle.