AGENCY FOR INTERNATIONAL DEVELOPMENT

ENVIRONMENTAL HEALTH ACTIVITIES

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INDEX

The following documents represent environmental health activities being conducted by the various offices of AID. The list is not complete but it is believed that taken together it indicates the nature, scope and diversity of AID's effort in this field. Brief summaries of the programs of some other agencies are also included for comparative purposes:

THE RELEVANCE OF ENVIRONMENTAL HEALTH

TO

A.I.D. OBJECTIVES

Office of Health
Technical Assistance Bureau
Agency for International Development
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PREFACE

This staff paper by the TAB Office of Health reviews in brief the most prevalent environmental health problems of the LDC's, and explains their potential relationships with A.I.D. sectoral program areas and objectives. Evidence is presented to show that failure to recognize and resolve such problems could obstruct the attainment of A.I.D. objectives. Suggestions are offered for actions that would assist in countering such obstacles.

The definition of environmental health has been deliberately limited to consideration of the traditional facilities and conditions that are associated with lack of development. Problems stemming from urbanization and industrialization, as encountered in the more developed countries, are not treated in depth since they are not of primary concern to the masses of people in the LDC's who seek a better quality of life outside the urban centers.

There are numerous economic and sociological obstacles to the correction of basic environmental health deficiencies, but technology is available to proceed without delay in satisfying the essential needs. In the meantime, there is need for research and investigation in such areas as: (a) cost-effectiveness of environmental health programs; (b) indicators for measuring the impact of environmental health improvements on development; (c) obstacles to the acceptance of environmental health improvements, etc. Answers to such questions could facilitate progress toward the attainment of A.I.D. objectives.

THE RELEVANCE OF ENVIRONMENTAL HEALTH TO A.I.D. OBJECTIVES

I. The "Practical" Environment of Man in the Developing World

The typical rural family of the less developed countries receiving A.I.D. assistance does not share the industrialized nations' concern with the broad spectrum of environmental deficiences. The people are preoccupied with problems of subsistence under primitive conditions of poverty, malnutrition, illiteracy, overcrowded and crudely built shelters shared with animals and insects; with arduous daily trips for drinking water, bathing and laundry; debilitating disease and parasites that kill as many as one-half their children before age 5 and sap the energy of survivors; health care facilities that are limited and remote, if available at all; and no provision for excreta and other waste disposal.

The UN Economic Commission for Africa (ECA) described the situation as follows (1): "The rural areas of Africa, where most of the population live, have inadequate agricultural infrastructure, they lack proper water supplies for human and animal consumption and people have to walk several miles per day in search of water; the level of nutrition is low, both in quality and quantity---. Health facilities are meager as shown by acute shortage of doctors and supporting staff as well as hospitals and dispensaries."

Hughes and Hunter, in their study of disease and development in Africa (2), quoted Thomas (3): "---(man) is more heavily parasitized in the African continent than in any other part of the world--- (There) are on the average two infections per man. Schistosomiasis is the dominant form, affecting nearly half the population."

The LDC rural families who migrate to urban centers in search of jobs and a better quality of life too frequently find their new environment more antagonistic than the conditions they sought to escape. As reported by Dr. B. R. Seshachar, President of the Indian National Science Academy (4), the urban settlements of developing countries like India are faced with overcrowding, accumulations of refuse, lack of adequate water supply, pollution on an intensified scale and breakdown of services.

The populous squatter settlements common to the larger cities in developing countries actually present more serious threats to health and well-being than the rural poverty that drives so many to the cities and which accounts for much of the urban growth rates of 4 or 5 percent a year.

The urban migrant environment in Africa is described by the ECA as follows (5): "This depressed rural environment has led to an exodus of the rural folk into urban centres which have, in turn, found themselves unable to cope with masses of people who migrate in search of work. Housing construction has not kept pace with this

increase in urban population, resulting in overcrowded rooms; construction of slums both in urban and peri-urban areas; over-stretched eager water supplies; congested sewage facilities and/or lack of them altogether; alienation and loss of identity; juvenile delinquency and all the social ills associated with these poor living conditions like congested transport systems; discharge of human waste into lagoons and rivers. All this is aggravated by rapid rise in overall population which African countries have been experiencing."

It is recognized that the bulk of the world's population is still faced with basic environmental problems, largely of microbiological nature. Dr. Howard (6) has shown that "infectious diseases and parasite infestations, either separately or in combination with malnutrition, affect the well-being of developing populations on the order of fifty to ninety percent." Progress in environmental sanitation has not expanded on a sufficient scale to cover more than 10-15 percent of the developing population. Basic environmental health measures that have been shown to be effective in combatting many of the most prevalent communicable diseases are needed to overcome those conditions in the LDC's that contribute to the high rates of infant mortality, lowered production capacity, school absenteeism and drop-outs, and poverty due to such common communicable diseases as diarrhea and enteritis, dysenteries, cholera, schistosomiasis, onchocerciasis, malaria, filariasis, trachoma, tuberculosis and others. The communicable diseases also account for as many as

one-half of all hospital admissions. Among the environmental health problems commonly found in the "practical" environment of man in the LDC's are the following:

1. Lack of potable water supply for drinking, personal hygiene and household use. According to Dieterich and Henderson (7) less than 10 percent of the population of 75 developing countries were supplies with piped water in their homes in 1962, and it was estimated that at least 70% of these populations had no access to piped water at all within reasonable distances.

One serious consequence of growing importance is the resort to natural bodies of water, stock ponds and irrigation ditches for bathing, laundry and household water, thus contributing directly to the transmission of schistosomiasis. In this manner development measures are involved in the spread of disabling illness that is currently estimated to affect 180 to 200 million persons.

As stated by Dr. Howard (8), while extended irrigation systems make possible greater production for development, the people do not gain in well-being or quality of life since their health is chronically impaired, even though their death rate may not be substantially increased.

2. Lack of provisions for sanitary disposal of human wastes, with resulting soil pollution (hookworm), contamination of water sources (cholera, typhoid, schistosomiasis, enteric infections, etc.), polluted drainage ditches (filariasis, malaria).

3. Inadequate (if any) facilities for sanitary disposal of garbage and refuse, accounting for the breeding, harborage and feeding of insect and rodent vectors of disease.

4. Inadequate, overcrowding and unhygienic housing. These conditions are deplorable in the urban fringe squatter settlements, and contribute to the high incidence of tuberculosis, enteric diseases and infant mortality.

5. Prevalence of insect, rodent and other disease vectors, attracted by insanitary practices of waste and refuse disposal.

6. Urbanization, with inadequate sanitation services, overcrowding, pollution, lack of recreational facilities and many other problems.

Dr. René Dubos offers this forecast (9): "It can be taken for granted that industrialization and urbanization will soon become almost universal human phenomena. In view of the speed at which social and technologic changes occur, many of the environmental stresses that plague the affluent countries today are likely to spread to the rest of the world in the near future. In this regard, it is hardly an exaggeration to state that the future begins today even in the least developed countries. Wherever a new industry is established, there will soon be pollution of the water and the air, occupational dangers for the workers and their families, changes in nutritional habits and in other social practices, emotional upsets arising from unfamiliar working conditions and from disruption of ancestral customs.

Unless carefully watched and controlled, these disturbances will add their deleterious effects to those of malnutrition, tuberculosis, malaria, schistosomiasis, etc., and will create new kinds of physiological misery in the areas of the world undergoing industrialization."

7. Unhealthy and unsafe working conditions for those fortunate enough to find employments.

The World Health Organization in a 1967 report on the World Health Situation (10) named environmental deficiencies as the most important group of health problems, based upon reports and comments from 147 countries and territories for the period 1961-1964.

In order to develop adequate plans for correcting these problems, factual data and information on the extent and nature of the specific problems and their causes and the resources required for their solution will be needed for each country. A logical approach for obtaining this information would be a comprehensive analysis of the environmental health sector. A recommendation is included in Chapter IV, paragraph 7, that guidelines be developed for carrying out this type of sector analysis.

II. What is Meant by Environmental Health

Environmental health has been broadly defined by an expert committee of the World Health Organization (11) as "--the control, modification, or adaptation of the physical, chemical, and biological

factors of the environment in the interest of man's health, comfort, and social well-being."

Fredericksen (12) has recognized that concepts of environmental health problems differ in relation to the "state of society":

State of Society	Environmental Health Problems	Predominant Patterns of Disease, Mortality, and Fertility
Traditional	Largely rural environment with contamination of water and food; proliferation of insects and rodents; periodic food scarcities.	Endemic infections, parasitisms, infestations, nutritional deficiencies. High death rate and high birth rate.
Early Transitional	Largely rural environment with contamination of water and food; proliferation of insects and rodents; adulteration of foods and drugs; food scarcities.	Endemic infections, parasitisms, infestations, nutritional deficiencies. Intermediate death rate and high birth rate.
Late Transitional	Rural environment still resembles that of traditional society, whereas the urban environment resembles that of modern society.	Endemic diseases prevail at reduced levels in rural areas, whereas the disease patterns of urban areas resemble those of modern society. Low death rate and intermediate birth rate.
Modern	Largely urban environment with pollution of air, water, and food, plus hazards from use of cigarettes, alcohol, food additives, new drugs, and narcotics.	Bronchopulmonary and cardiovascular diseases, malignant neoplasias, mental illness, accidents, obsesity, low death rate and low birth rate.

In terms of the "practical" environment of man in the LDC's, we are concerned primarily with the interactions between man and the more traditional factors of the environment which directly affect basic survival and protection against disease and morbidity; in other words,

those conditions that must be overcome to maintain man's health, postpone death and assure some of the minimum comforts and amenities of living (as enumerated in Section I).

As economic development progresses in the LDC's the scope of environmental health problems is expanded. Agricultural and industrial development are likely to introduce new pollutants to the waters, the air and the land, and all too often may contribute to increases in the prevalence of disease.

Sanitary engineers have long been in the forefront of programs to correct the environmental deficiencies that contribute to the spread of enteric, vector-borne and parasitic infections which make up the leading causes of death and disability in the LDC's. The APHA's first establishment of a Section on Sanitary Engineering was in 1911. As Dr. John A. Logan explains (13), it is "the civil and sanitary engineer who pioneered such innovations as water-borne sewerage, municipal water treatment and distribution, sewage treatment, vector control, and air pollution abatement---. The civil engineer has been traditionally public works oriented, the sanitary and public health engineer has been essentially disease oriented."

The sanitary engineer receives his basic education in civil or chemical engineering, supplemented by graduate education in sanitary chemistry and biology, bacteriology, epidemiology, communicable disease control, public health statistics, public health administration, municipal and rural sanitation, hygiene of housing, etc. Specialized

curricula are also offered in Water Quality Control, Air Pollution Control, Solid Waste Management, Occupational Health, Radiological Health and others. More recently the discipline of Environmental Health Engineering has evolved, with the environmental engineer serving as a leading member of the multidisciplinary team of specialists required to cope with today's environmental health problems.

Environmental health engineers are, according to Logan (14), "well-being oriented," and should be "well grounded in the humanities, mathematics, the engineering sciences, and public health, with a sound understanding of their professional responsibilities and able to design and execute environmental control works using a broad system or resource-development approach." Environmental health engineering differs then from sanitary engineering in that adequate provision is made to take into account the economic and social consequences of programs and projects affecting the environment.

Mounting public interest in the quality of man's environment, generated initially in the industrialized countries, is now receiving broad stimulus through the preparations taking place for the U.N. Conference on Problems of the Human Environment, to be held in Stockholm in June, 1972. The agenda for this Conference is so broad and all-embracing, however, that it is unlikely to fully recognize that the focus on man, his health and well-being, is the distinguishing orientation that characterizes environmental health as a fundamental concern of most people.

III. How Environmental Health Problems May Impede the Attainment of A.I.D. Objectives

A.I.D. Administrator Dr. John A. Hannah offers this advice (15): "The well-being of people is central to the objectives of U.S. foreign assistance. Well-being depends, of course, upon a number of important and closely linked factors. Jobs, education, security, and sense of participation are all vitally important, but none have much significance without basic good health. Today, in the developing countries, progress is being hampered by a failure of many people to understand how to adapt to the world of disease and insecurity in which they live. Health programs, based primarily on transference of Western curative medicine, have not done much to reduce this basic problem. A new focus is needed where health efforts can do the most for the peoples of the poor countries - covering such fields as family planning, nutrition, preventive medicine, and environmental sanitation."

Paul G. Hoffman, long-time Director of the United Nations Development Program, made this observation recently (16): "I also did not fully appreciate, in 1959, the direct relationship between health improvement and economic growth. Healthy people can produce more than they consume. Sick people consume more than they produce. And while major improvements in disease prevention and medical treatment have been realized by the low-income countries, this remains a major problem area,---." "Yet I firmly believe that there is no irreconcilable conflict between development and environmental protection Quite to the contrary, they can and must be mutually supportive."

A.I.D. support of the modernization objectives of developing countries is, as a practical procedure, focused upon intermediate goals of sectoral development programs, i.e., agriculture, education, nutrition, family planning, health, industry, public administration, etc. The Key Problem Area (KPA) rationale by TAB (17) is an effort to "identify the most pervasive and important impediments to improvement of the well-being of the peoples of the LDC's, given their known wants". The KPA's selected for concentration reflect consideration of mutual support between KPA's and program sectors. It is in this context that environmental health problems merit critical examination --- how they impede program objectives, and what the environmental health activities and services are that could make positive contributions to the attainment of program objectives. Following are some examples of relationships to A.I.D. sectoral programs:

1. Agricultural Development

This sector is fundamental in the LDC's to economic and social development. Health and food production are so closely interrelated as to be interdependent. Adequate nutrition aids in production and resistance to disease, and conversely disease inhibits productivity and nutrition, due partially to food loss and wastage. Environmental health measures that reduce the incidence of endemic disease and prevent increases in disease transmission will contribute to increased productivity, improved nutrition and well-being of the peoples involved.

WHO calls attention (18) to the situation that, "In many tropical and subtropical areas, water development schemes are the key to economic and agricultural development. However, in increasing the number of breeding-sites of insect vectors, in attracting masses of migrant workers from or to infected areas, and in creating new agricultural communities, these projects are contributing to the spread of parasitic disease, particularly the water-related conditions of schistosomiasis and onchocerciasis." The A.I.D.-sponsored symposium on The Future of Schistosomiasis Control at Tulane University in February 1972 (19) submitted these recommendations, among others: "Schistosomiasis control should be a constituent element in the feasibility analysis of any major proposed water resources development scheme in tropical areas," and "Conscious environmental control of schistosomiasis should be an integral part of all water resources development schemes,--", also "Water supply and excreta disposal merit more attention as control measures."

The prevalence of preventable vector-borne diseases such as malaria, trypanosomiasis, schistosomiasis and onchocerciasis prevent optimum utilization of large areas of potentially arable land in many developing countries. Dr. Howard has cited some examples (20):

Malaria	:	Historically this disease has precluded land development where natural conditions permitted the breeding of mosquitoes under conditions which permitted a high potential for transmission. Anti-malaria programs have reclaimed the foothill area of north India and agricultural productive plains in Thailand.

Major settlement population in the inland hilly malarious areas of the Philippines has been possible only since major reduction of the parasite reservoir occurred within the general population.

Trypanosomiasis: Much of the Central African land is unused due to the tsetse fly and the sleeping sickness which it transmits. Agricultural efforts at vector control are being attempted because of the adverse effect of the fly on cattle.

The problem, far from solved, requires more effective methods of treatment and prevention. Research in this direction is limited.

Onchocerciasis : Forty million West Africans are precluded from farming fertile river valleys because of the Simulium fly and the filaria-like worm it transmits. The frightening complication of this disease, which has very little mortality, is blindness from migration of the parasite into the eye.

Dr. Howard concludes (21) that solutions to the problem of inefficient use of food energy due to widespread infections and fevers "--lie in improvement of man's environment through water protection, waste disposal, and public education regarding the consequences of continuous contamination of food, water, and soil with human intestinal wastes."

Programs to assist in agricultural development in the LDC's should take into account the environmental health and disease implications - in conducting sector and sub-sector analyses, in program planning, execution and evaluation. Consideration should be given to not only

the incorporation of safeguards against disease transmission, but as in water resource development projects, the provision of potable water supplies for adjoining communities.

Continuing research is needed to obtain more effective and economical measures for the control of diseases associated with agricultural development, i.e. schistosomiasis, onchocerciasis, trypanosomiasis, etc. The research program recently initiated, to study measures for reducing food wastage and energy losses due to intestinal infections, should provide information of value to the agriculture and nutrition as well as the health program sector.

2. Nutrition

The World Health Organization has summarized the relationship between malnutrition and certain parasitic diseases (22): "A relationship exists between malnutrition and such parasitoses as ascariasis, trichuriasis, ancylostomiasis, and schistosomiasis. Parasites of the intestinal tract live and grow in the human body at the cost of body protein, part of which is thus wasted. Widespread anemia due to bleeding from the intestines or bladder, often accompanied by hypoproteinaemia and other signs of disease associated with Ancylostoma or Schistosoma infestation, clearly indicates that protein loss in the inhabitants of countries afflicted with these parasites adds up to a problem of global significance."

A WHO Expert Committee on Nutrition and Infection has observed (23): "The evidence now available indicates that systemic and enteric infections are of major significance in precipitating acute nutritional diseases, such as kwashiorkor and keratomalacia. In most areas, infectious diarrhea makes a far greater contribution to morbidity than the intestinal helminthic infections, both as a primary cause of death in malnourished children and in precipitating kwashiorkor and other fatal malnutrition states."

Woolley makes the further point (24): "The relationship of malnutrition to enteric infections is a vicious cycle. The enteric infections themselves cause and intensify the malnourished state by means of malabsorption, altered food consumption, fluid losses and increased metabolism.---The addition of parasitic infections further burdens the already debilitated state of the population. The end result of this is manifested in excessive childhood disease and death, poor growth and development and ultimately decreased intellectual and physical productivity of the population."

René Dubos expresses his concern (25): "Both malnutrition and diarrheal diseases create medical problems that are especially dramatic in the young age groups. In fact, these disorders account for a very large percentage of infant mortality in destitute populations. But the importance of malnutrition and infection greatly transcends the damage revealed by mortality statistics. Children who have suffered from nutritional deficiencies or from prolonged infectious processes

during the early stages of their development commonly fail to grow into healthy, vigorous adults. Not only do the pathological experiences of early life tend to depress physical and mental activity during youth and the teen-age period; very frequently the unfavorable effects persist through adulthood and appear indeed irreversible."

The linkage of environmental health deficiencies with malnutrition is aptly stated by Dr. Howard (26): "The pollution of soil and water with human wastes, and the subsequent contamination of food and drink, produce infection which, in combination with malnutrition, lead to the largest single category of disease in children," and-- "The problem of malnutrition in developing countries, to be understood in true context, is a process which, most frequently in preschool children, is precipitated by environmental factors other than the availability of food."

Dubos also believes in the interrelationship between nutrition and environmental health factors, as suggested in this quote (27): "There are indications that general dietary improvement, better practices of infant feeding and handling, and simply an abundant supply of water would be a far more effective and less costly approach to the control of many intestinal disorders than are prophylaxis and treatment with drugs and vaccine".

Those environmental health facilities and practices widely recognized as essential in reducing the toll of enteric and parasitic infections, especially among children, are thus seen as a tool for achieving improved nutrition. A country nutrition sector analysis for strategy would be more meaningful if it included examination of the incidence and causes of childhood mortality and morbidity, and measures in process as needed to combat these conditions. The TAB Office of Nutrition has selected one KPA to focus on reaching pre-school children, to be tied in with MCH programs in the health and family planning sectors. These efforts afford an excellent opportunity for education of families in personal hygiene and basic sanitation of household premises.

3. Family Planning

Dr. Howard has postulated as one of the health problems that impede development (28): "The continuing high burden of disease and death in infants and children is an effective obstacle to the rapid acceptance of family planning services." Howard reminds us (29) "--that 30,000,000 out of the world's total annual deaths of 60,000,000 occur in children under the age of five. The high infant and child mortality indicate only a small fraction of the illness created by the twin forces of malnutrition and infection," and cautions that "to expect rapid progress in family planning acceptance

by those who are faced with the high levels of morbidity and mortality in their own environment is to discount the reality of experience. Fertility and infant mortality usually show a close positive correlation."

Notestein, Kirk and Segal support this with their observation (30): "No efforts of social-economic development can be useful in a disease-ridden population, nor will a desire for small families be likely to emerge. Better health and improved chances for survival of the individual child lie at the root of the motivational change we are seeking."

The noted ecologist Barry Commoner is reported to hold that (31) "---humans tend to view the procreation of several children as a kind of guarantee of immortality. 'What makes human populations turn off?' He asks. "If a father knows that his sons will survive, perhaps he will not feel the need for so many successors."

The report of the World Bank Commission on International Development makes the observation (32): "---the desire to have fewer children is closely linked to the conviction that they now have a better chance to survive."

Acceptance of the validity of these views, which are supported by many other authorities, leads to the logical conclusion that effective environmental health measures to reduce the childhood morbidity and mortality due to enteric infections could contribute to reducing the influence of this impediment to the acceptance of family planning.

Education and assistance to promote home sanitation and personal hygiene, by MCH workers engaged in family planning services, could be one of the most productive techniques for resolving this obstacle. There is a definite need for applied research to develop more effective methodology for the motivation of individuals and communities toward improved personal hygiene and acceptance of sanitation measures.

4. Public Health

The following is extracted from Dr. Howard's discussion of the High Burden of Disease, as one of the biological barriers to development in the LDC's (33):

> "The early stage of development of statistical services precludes accurate data on illness, but there is already enough data to suggest that infectious diseases and parasite infestations, either separately or in combination with malnutrition, affect the well-being of developing populations in the order of fifty to ninety percent. The following estimates illustrate the magnitude of deseasc prevalence:

Illustrative Magnitudes of Infectious Diseases

	Developing countries (order of magnitude)
Helminth (worm) infestations	3,500,000,000
Hookworm	700,000,000
Schistosomiasis	200,000,000
Onchocerciasis	40,000,000
Tuberculosis	40,000,000
Malaria	25,000,000
Leprosy	10,000,000
Trachoma (with 1% blindness)	400,000,000

Enteric diseases (intestinal infection plus malnutrition) occurs as repeated epidosdes in over half of the children in developing countries. Together, the malnutrition/infection combination accounts for approximately 15,000,000 of the total 30,000,000 children under five years who die each year.

Although disese reduction is a desirable end within improved levels of living, further decline is unlikely until modern knowledge and services are distributed beyond the average 10 percent of populations which have regular access currently to some form of health-producing service. Further progress will depend on solving problems in such categorical problem areas as poor environmental sanitation, inadequate water supply, lack of health education, malnutrition, inadequate health delivery systems, limited manpower, rapid population growth, and limited resource availability. Solutions to these problems, in turn, relate inevitably to progress in other key development sectors such as agriculture, education and public administration."

The A.I.D. Task Force on Cholera in its Interim Report of June 17, 1971 reported among its conclusion (34): "Cholera vibrios are tramsmitted from person to person principally by fecal contamination of drinking water and food; therefore, the major preventive effort must be directed toward improvement of water supplies and excreta disposal supported by health education which emphasizes personal hygiene."

Environmental health measures have been shown to be effective in reducing the toll of debilitating and killing diseases that constitute the major health problems of the LDC's, as in these accounts by Woolley (35) of improvements produced by the provisions of safe piped water supply: "....There are numerous examples that demonstrate the extent to which water-borne disease can be reduced by supplying safe piped water to areas where drinking water has formerly been obtained from unsafe sources. In Japan, a survey in 30 rural areas revealed that after installation of safe water supplies the number of cases of communicable intestinal diseases was reduced by 71.5% and that of trachoma by 64%, while the death rate for infants and young children fell by 51.7%. In Uttar Pradesh, India after waterworks sanitation, the cholera death rate decreased by 74.1%, the typhoid fever death rate by 63.6%, the dysentery death rate by 23.1% and the diarrheal disease death rate by 42.7%. Similar experience in reduction of intestinal disease rates following water supply development has been observed in Latin America, notably Cuba, Peru and Columbia.....The problems of secondary malnutrition could be reduced if clean water and sanitary means of excreta disposal were available to the population. If the load of parasitic infections and enteric infections could be reduced, the nutritional state of the population could be remarkably improved by simple dietary manipulation. This is not possible so long as these infections persist.....".

Dubos offers his opinion of the merits of environmental health measures in this quote (36): "Allow me to express here my deeply felt conviction that the extent of health improvement that ensues from building ultramodern hospitals with up-to-date equipment is probably trivial in comparison with the results that can be achieved at much lower cost by providing all infants and children with well-balanced food, sanitary conditions, and a stimulating environment."

Wolman makes these comments about the problem of environment-related diseases (37): "In spite of significant downward trends in some communicable diseases in some parts of the underdeveloped world, environmental-borne and associated diseases still remain among the leading causes of disability and death.---The obvious disease disabilities are so wide and deep in extent that refinements of attitudes and policies might well be deferred for a while. In the meantime, scientific knowledge and technological tools have long been sufficiently abundant to proceed apace with the modifications of the environment upon which the tens of millions of people wait with amazing patience and even docility!"

Environmental health is a critical basic component of the three Key Problem Areas in Health that have been accepted by A.I.D. for program support. The studies of methods to improve local health delivery systems should afford high priority to environmental health measures, many of which could be implemented or aided by MCH, agricultural extension or other workers trained for multi-purpose functions. Education and public works programs can also make significant contributions.

A national environmental health sector analysis will find widespread relationships with many other development programs, which in turn will prove useful in health program planning.

5. Industrial/Urban Development

The UN Economic and Social Council (ECOSOC), in defining problems of Human Settlements preparatory to the UN Conference on the Human Environment, had this to say (in part) about urbanization and industrialization (38): "For many countries, urbanization and industrialization have been a normal way of life for decades. The problems associated with these processes occur in an acute form in developing countries, where an economy based on agriculture and animal husbandry is being supplemented or replaced by intensive industrial development. Migration towards the towns is influenced by the prospect of employment, high rates of growth and large increments in rural population, educational and health facilities which are presumed to exist there, and by a desire for family reunion and company."

"In most developing nations, it has rarely been possible to provide in advance the urban planning and design that would lead to a rational arrangement of space for living, working, transportation and recreation, or to provide rapidly enough housing, water, sewage disposal, education, or the other necessities or amenities of urban life. The very time factor involved in development of urban facilities is a major aggravating factor. Migration into the cities is often associated with the importation of disease such as trachoma, tuberculosis, parasitosis and skin diseases. The influx of people tends to bring enormous

pressure on water supplies and the arrangements for waste disposal, with the consequent appearance of diarrheal diseases. Overcrowding of premises and sites is typical. Inadequate housing accommodation is accompanied by shanty type construction and further, unsatisfiable demands are made upon water supply and waste disposal facilities. Food supplies may be inadequate, badly distributed, or prepared and sold under unhygienic conditions. Malnutrition is not uncommon and in association with bowel infections is a common cause of death in young children born and living under those unsanitary conditions. Propinquity and overcrowding encourage upper respiratory infections and venereal diseases. This pattern in the propagation of disease overtaxes the whole medical care organization."

"In urban areas, pollution from human wastes is of primary concern in developing regions. However, pollution of other types is a problem that grows more severe as developing nations move toward their goals of economic development. Often the devices and regulations used in developing nations to control pollution are not applied to industrial processes in developing nations with equal efficiency or stringency. In the effort to provide increased economic well-being, the environmental safeguards are thus neglected. Water supplies are not only contaminated with human wastes, but grow increasingly toxic as they receive the effluent from burgeoning industries. Air pollution

increases with the material well-being of the urban population and derives from power plants, industries, space heating and the growing number of motor vehicles."

The AID/TAB Office of Science and Technology conducted a survey through USAID Missions in March 1970 of dominant environmental problems in 35 developing countries. The summary report included this statement about urban problems (39): "The survey of 35 developing countries revealed a close inverse relationship in nearly all the developing countries between human population pressure and urbanization on the one hand, and the quality of the environment on the other. In at least half of the countries, rapid urbanization has been associated with inadequate or non-existent sewerage systems, inadequate water supplies, air pollution, and crowded and badly deteriorated housing. The pollution of beaches and water systems commonly was attributed to municipal waste, industrial waste, and, in some cases, to oil and other wastes from coastal shipping. An objectionable level of urban noise was mentioned in a few instances."

Similar observations were reported by the Ad-hoc Committee of the National Academy of Sciences on Environmental Aspects of Foreign Assistance Programs in January 1970 (40): "Unprecedented population growth and the technological revolution have brought about a large scale migration from farm to urban areas in many less developed countries. This rapid urbanization has almost overwhelmed the sewerage, water supply and transportation systems, and the housing

capacities of the cities in these countries. One of the results has been a sharp increase in pollution of land, water and air. This growth of pollution has been intensified by industrialization."

The World Bank (IBRD) has recently expressed concern over the impact of economic development projects upon the environment and the health and well-being of people (41): "Economic development cannot be achieved without some disruption to man's environment. Economic development can, however, be carried out in a way that would minimize deleterious effects both upon the environment and upon the public health and welfare of man-kind.... and the developing world is now somewhat less convinced than before they must face the Hobson's choice between pollution and poverty..... It is also the policy of the Bank Group that careful and studied attention must be given in the planning of its development projects, for the consequences to the environment and to the health and well-being of affected peoples."

A.I.D. has throughout its history provided assistance (financial, technical, training, research, etc.) to projects and programs designed to improve environmental health facilities and services in both urban and rural areas. Recent years, however, have seen support for these programs declining to the near zero level, with an accompanying decline in technical personnel in this field. Yet, as Dr. Howard points out, at this time (42): "On the average, less than 10 percent of the populations in the developing world have ready access to health facilities or to the benefit of safe water and sanitation."

Since enactment of the U.S. National Environmental Policy Act in 1970, A.I.D. has initiated measures to mitigate possible undesirable effects on the environment of capital development projects or commodities financed under the Foreign Assistance Act (43). Implementation of these measures is apparently proceeding with minimal participation by environmental health specialists, which raises some questions as to the efficacy of these measures in assuring adequate treatment of the most vital and fundamental facet of environmental quality - the health of man.

It would appear that the TAB Office of Health has an obligation and a responsibility to assure due consideration of environmental health implications of all A.I.D.-supported programs, including technical as well as capital assistance. Similarly A.I.D. program managers and decision makers should invite environmental health input in the review and evaluation procedures.

6. Education

The importance of improved education, qualitative as well as quantitative, to national development is well recognized by A.I.D. as demonstrated by the allocation of about 1/3 of technical assistance funds (excluding population) to this field. The TA Bureau has selected for concentrated effort Key Problem Areas in Education designed to lead to solutions of the major problems to be overcome in education in LDC's (44). These KPA's are obviously addressed to high priority approaches to more effective delivery of better

educational services to more people. A close look at the other side of the coin might disclose significant obstacles to effective education in the form of impaired receptivity due to malnutrition and debilitating infections. As pointed out earlier this combination, so common among the people, especially children, of the LDC's is responsible for depressed vitality and lower productivity, including ability to learn, in comparison with people in good health. It may also be informative to ascertain what percentage of school absenteeism and drop-outs at early ages is due to illness among school age children and their families. Evidence has been cited earlier that a large majority of childhood infections in the LDC's are environmental-borne or associated, and susceptible to known environmental health control measures.

Dr. Howard has emphasized the critical role of health education of the public in combatting a broad range of health problems related to environmental deficiences. In discussing malnutrition due to malabsorption and loss of nutrient intake caused by intestinal infections, he concludes (45): "For this problem it would appear that solutions lie in improvement of man's environment through water protection, waste disposal, and public education regarding the consequences of continuous contamination of food, water and soil with human intestinal wastes."

In arguing that man's ability to adapt to his environment is handicapped by ignorance of disease causation and prevention, Dr. Howard maintains (46): "Enteric disease exists because much of the world

doesn't know that there is such a thing as a germ. Cleanliness, personal hygiene, prevention of food and water pollution can be taught."

Further, in his description of environmental pollution problems, Dr. Howard suggests (47): "Without waiting for these changes, however, major change in disease reduction can occur with effective health education, both as a specific activity of national health systems and as a component of the general education system."

A.I.D. has long recognized and continues to utilize health education as an important element of health programs such as malaria control, nutrition, family planning, etc. The dearth of public knowledge of the elementary environmental health measures and practices would seem to present an excellent opportunity then for the integration of this subject area into the OE/KPA approach. The transfer of relevant information whose effects in improved health could be observed by the subjects within a reasonable time period should help to elicit public support for this approach.

The key problem area of non-formal education presents an opportunity for research and pilot programs to promote numerous approaches in environmental health; i.e., supplementary training to develop multi-purpose workers, refresher training of paramedical personnel and health auxiliaries, instruction of homeowners in the construction of sanitary facilities, control of insect vectors, and others.

IV. Action Program Potentials in Environmental Health

Introduction

It is proposed that A.I.D. adopt an action program in environmental health, keyed to the modification of impediments to A.I.D. program objectives. The design of such a program should also take account of potentials for positive contributions to the attainment of sectoral program objectives. Environmental health should more appropriately be treated as support services and activities, and should not be isolated as a program sector within AID/TAB. The evidence previously presented clearly indicates the need to acknowledge the interrelationships to be fostered for environmental health programs to be most effective. A second basic principle essential to the maximum effectiveness of environmental health measures is the multidisciplinary character of staff requirements, i.e., engineers, epidemiologists, social scientists, human ecologists, biostatisticians, medical entomologists, parasitologists, biochemists, economists, and others, working closely with educators, nutritionists, agriculturalists, development planners, etc. As a practical measure it would appear that much of this requirement could be satisfied by developing close working relations with sectoral program specialists in A.I.D.

Summary of Actions Proposed

In view of the multidisciplinary nature of environmental health problems and the sectoral relationships within the A.I.D. framework,

it is considered to be of interest to list the actions being proposed for Agency consideration, followed by a narrative discussion of the significant element involved.

1. Implementation of the recommendations of the Task Force on Cholera Control (48), with modifications so as to include LDC's on a worldwide basis and to make them applicable to control of the entire group of enteric diseases transmitted as a result of poor sanitation.

2. Implementation of the recommendations in the "Work Shop" report (49) on environmental control of schistosomiasis at the Symposium on the Future of Schistosomiasis Control, Tulane University - 1972, and strengthening these proposals by adding the following to the five recommendations presented:

> Adoption of all possible measures (1) to prevent human excreta from entering water courses, canals, ditches, etc. and (2) to prevent human beings from entering snail infested water areas.

3. Establishment of a research project to study the possibilities of developing suitable designs for low-cost water treatment and distribution systems as well as for satisfactory low-cost excreta disposal facilities. A similar recommendation was included in the report of the Cholera Task Force.

4. Extensive use of health education techniques and devices as a means of promoting and increasing the effectiveness of environmental sanitation measures. The establishment of a pilot project is proposed

to evaluate current procedures, develop new techniques as needed and to devise methods for adapting health education measures to the cultural patterns of the LDC's and synchronizing these measures with environmental sanitation programs.

5. Establishment within A.I.D. of a policy calling for review of all capital development and technical assistance project proposals by qualified personnel (staff, consultants, or PASA) for the purpose of appraising environmental health implications.

6. Promotion and support of Regional Environmental Health Institutes with multidisciplinary staffs for scientific research, field studies, pilot projects, etc., relating to endemic environmental health problems in the respective regions.

7. Undertaking by A.I.D., possibly in cooperation with WHO and PAHO an in-depth study of environmental health problems, resources and needs for assistance in LDC's. As a first step, it is suggested that the in-depth study include the elaboration of guidelines by the Office of Health, TAB for a comprehensive environmental health sector analysis. Multilateral agencies such as WHO and PAHO should be invited to collaborate in the preparation of these guidelines.

8. Creation through university contracts of a program for "exporting" U. S. developed special training programs for inclusion in the curricula of educational institutions in selected LDC's, to make possible the training of environmental health personnel at the local or regional level.

9. Development of a program for assisting in establishing and improving monitoring and surveillance of environmental hazards in LDC's.

10. Close coordination of environmental health planning and activities with related sectoral programs: As an example the normal procedure of ongoing project evaluation in all program sectors might include an assessment of impact on environmental health.

Narrative Discussion of Elements Involved in Actions Proposed

1 (a) Cholera and the Cholera Task Force

Recognizing that acute diarrheal diseases are prevalent and constitute one of the most serious health problems in the LDC's and that effective control of these diseases is dependent on the provision of safe water supplies and the safe disposal of human wastes, it is proposed that the Health Office, TAB/A.I.D. undertake studies through pilot projects and research looking toward developing innovative approaches and new techniques for the control of those diseases which take such a heavy toll in morbidity and mortality. One of the more serious of these diseases is cholera which is endemic in various countries of Asia and the Middle East and which frequently occurs in epidemic proportions.

In September 1970, a Task Force was created by A.I.D. to study the world cholera problem and to suggest methods for preventing its epidemic spread which in recent years has taken the disease across

two-thirds of the world with cases occuring in countries in the Far East, Middle and Near East, Southern Europe and Africa and an advance to the Caribbean Islands and South America predicted unless effective control measures can be instituted.

Following are measures relating to the environment and to health education suggested by the Task Force for use in cholera control (50):

a. "Sanitary surveys of existing piped water systems, including plant operation, quality and quantity of water delivered and condition of systems in countries where cholera is epidemic or threatened with invasion.---"

b. "Research program for the design of efficient low-cost water treatment and distribution systems for small towns and hamlets."

c. "Research programs for the provision of safe water supplies in rural areas."

d. "Research programs for the design and development of an efficient and economical method for the disposal of human excreta in urban and rural areas."

e. "Evaluation of the effectiveness of sanitary measures as related to cholera control."

f. "Evaluation of health education methods and procedures for motivation of individuals and communities toward improved personal hygiene and the acceptance and use of sanitary measures."

g. "Appropriate health education programs which emphasize proper personal hygiene and the acceptance and use of sanitary installations."

h. "Educational programs for all levels of government and health personnel which emphasize the necessity of and the benefits to be derived from the development and efficient operation of programs of environmental sanitation for control of acute diarrheal diseases, including cholera."

It should be recognized also that the above measures as recommended by the Cholera Task Force would likewise be applicable to the control of other intestinal diseases, which although not generally possessing the degree of severity of cholera, nevertheless are much more widely prevalent and which cause extremely high morbidity and mortality in most if not all the LDC's. Among this group are the diarrheas and dysenteries which are so notoriously responsible for exceedingly high infant mortality rates in areas where proper sanitary facilities and good personal hygiene practices are lacking.

1 (b) Enteric Diseases in General

This program is concerned with the full spectrum of the enteric diseases and their occurrence in the LDC's in all regions of the world. Preceeding sections of this paper explain the significance of enteric disease control to A.I.D. program objectives and to Key Problem Area Programs including those in Agriculture, Education, Family Planning, Health and Nutrition.

In relating the activities proposed by the Cholera Task Force to the control of enteric diseases in general, extensive use of evaluation and research techniques is recommended. It is considered important to alter or avoid methods that past experience has proved to be unproductive, to recognize and continue to utilize those which have proved effective and to explore through utilization of pilot projects and other research techniques, the development of new approaches, more economical facilities, and more efficient ways of attaining the desired goals. These activities naturally will require an extensive review of reports and recommendations prepared by others working in this field. This approach hopefully will lead to eventual implementation of valid recommendations and will promote coordination with and support for related programs and projects of multilateral organizations, such as the World Health Organization.

2. Schistosomiasis

Many factors are involved in the transmission of schistosomiasis, a water related disease which affects an estimated 200 million people living in various parts of the world. Recently a symposium on the Future of Schistosomiasis Control was held at Tulane's Department of International Health at which time six Workshop reports (51) were prepared. One of the reports covered environmental control of schistosomiasis and includes recommendations by the Workshop group.

In addition to the five recommendations given it may be noted that safe disposal of human excreta to prevent contaminating of the water courses where the snail hosts are found will serve to break the chain of transmission. Another measure is to prevent people from wading in the snail-infested waters.

3. Economical and Acceptable Treatment of Water and Waste

The incidence of enteric diseases in a community is generally inversely proportionate to the economic level. This points up the need for devising ways for reducing the costs of supplying adequate quantities of safe water and sanitary disposal of human wastes in the poorer areas of cities as well as in small towns and hamlets. Of considerable importance in this connection is the need to develop designs for low-cost water treatment and distribution facilities that will provide efficient service in these areas.

The need for low-cost designs of suitable excreta disposal facilities for economically depressed areas must also be considered. Of particular importance is the problem of securing the utilization of sanitary sewerage systems in slum areas where sub-standard dwellings hardly justify the cost of connections to accessible sewers and where occupants are not able or otherwise fail to purchase water needed to operate the water carriage systems. In unsewered areas other types of excreta disposal facilities are generally employed. In such areas where pit privies have been installed in

organized programs for improving excreta disposal facilities another type of problem frequently develops. Due to lack of appreciation for the value of the facilities or ignorance, or perhaps other reasons the house occupants either refuse to use the facilities or allow them to be misused thus negating the whole purpose of the facility. An observation in this regard made by Dr. Abel Wolman, internationally recognized sanitary engineer and educator, in speaking of rural (LDC) problems and related human behavior, is as follows (52):

"In some areas of effort-excreta removal in rural populations is a striking example - there has been very little real success. The time seems long overdue to undertake deep inquiry into the human motivations that have prevented greater success."

4. Health Education

To solve the above mentioned problem, the need for health education is obvious. People must know why such facilities are provided and they must be used and maintained, if the facilities are to serve the purpose for which they are intended.

As highlighted previously herein, the Task Force on Cholera in its Interim Report (53) stressed the importance of health education as an essential element of any program aimed at controlling cholera. That report further states: "Health education programs in addition to motivating individuals and communities toward improved hygiene and their acceptance and use of sanitary measures are of paramount importance in obtaining---legislative and financial support of the

political administration echelon of government in improvements of environmental sanitation in both urban and rural areas, as well as in all other efforts directed toward the control and prevention of cholera."

Health education is equally as important an element in a program directed toward control of enteric diseases in general and for the same reasons. Hence health education procedures should be utilized in conjunction with all efforts to improve environmental sanitation conditions and personal hygiene practices. Some recognized health authorities have claimed that an essential element for controlling enteric diseases in the home is an ample supply of water readily available for thorough handwashing and for maintaining general cleanliness in the home with respect to food, clothing, dishes and especially all items used in caring for infants. Of course, health education measures are needed to assure that the prescribed procedures are followed after the water supply requirements have been met. A readily available water supply basically is one that is piped into the home - usually from a community system.

5. Appraisal of Capital Development and Technical Assistance for Environmental Health Implications

Reference has previously been made to recent initiatives by A.I.D., World Bank and other development organizations to provide for the review of capital development projects for environmental impact. From a review of a representative sampling of individual cases the impression is gained that these reviews have neither given adequate

attention to environmental health implications nor involved specialists qualified in that field. By way of contrast it is noted that the UN Development Program requires review of projects funded by UNDP by the World Health Organization, with its multi-disciplinary staff of well-qualified health specialists.

It is suggested that consideration be given to a contractual or PASA arrangement with an institution or agency for the review of both selected capital development and technical assistance projects with special emphasis on environmental health and disease implications. These reviews should include analyses of opportunities to incorporate positive environmental health measures rather than limiting their scope to the need for safeguard against adverse impact.

This action appears to be consistent with suggestions by the U.S. Government for the 1972 UN Conference on Human Environment (54).

6. Support of Regional Environmental Health Institutes

There are numerous successful precedents for the establishment of regional specialized institutes for research, training, data collection, information exchange, technical assistance and related functions. The Pan American Health Organization (PAHO) has made some progress in organizing a regional center of engineering and environmental science in Lima with the nucleus of a multidisciplinary staff. This center is engaged in research, field studies, pilot programs, technical assistance, etc. relating to a variety of environmental health problems in the Americas.

It is suggested that additional financial support, perhaps in the form of contracts or research grants, would enable the center to acquire additional staff and other resources to undertake specific projects of mutual interest to PAHO and A.I.D.

Possibly a more effective form of support, with consequent better potential for return to A.I.D., would be a U.S. university contract for reinforcing and backstopping the center's resources.

Another possibility for a regional center might be the SEATO Graduate School of Engineering in Bangkok, although it may now be lacking in health orientation and multi-disciplinary staff. Still another is the Sanitary Engineering Center in Rabat, Morocco, where an international sanitary engineering course at a graduate level has been initiated.

7. In-Depth Study of Environmental Health Problems, Resources and Needs for Assistance

Sufficient information of a general nature is available concerning this subject to suggest basic programs in environmental health that are pertinent to the basic problems of the LDC's. There is a recognized need, however, that many countries require assistance in developing a comprehensive program addressed to problems on a broad front, both rural and urban, including facilities and services, management and operation, education and training, institution building, planning, financing, etc.

In consideration of the complexity and nature of the basic problems, comprehensive environmental health sector analyses are

needed for the development of sound programs. These sector analyses should be made on the basis of guidelines to be formulated under the leadership of the Office of Health, Multilateral agencies, such as the World Health Organization and the Pan American Health Organization, should be invited to collaborate in the preparation of the guidelines. Such involvement by the multilateral agencies should serve to produce data and information useful to A.I.D. as well as to other donors and to the host countries. In view of the intersectoral relationships within the Agency, formulation and application of the guidelines should be carried out in close coordination with the other TAB offices concerned. Also the guidelines can be drawn on by the various offices of A.I.D. in identifying environmental health elements pertinent to their respective analyses. This will serve to stimulate linkage of programs having mutual interest in environmental health.

It is thought advisable to recommend one or two field trials of the guidelines and proposed methodology. Quite obviously further research will be needed to improve techniques for measurement of problems, refinement of control programs, and quantifying costs and corresponding benefits.

It is suggested that one or more countries be identified where such assistance is needed and desired, and that a pilot project be developed for an in-depth study of problems, resources and needs. Such a study should include other development program sectors, and

should preferably be integrated with an overall country development study.

8. Exportation of Training Programs

During the past four decades, U.S. universities have received large numbers of foreign students from LDC's throughout the world, many of whom have been recipients of training grants financed by the U.S. agencies participating in foreign aid programs aimed at assisting less developed, friendly countries to achieve a higher degree of economic and social development. As the program was expanded and made more responsive to specific needs of the LDC's, special training courses were developed to provide specialized training in selected technical fields, some of which fall in the environmental sanitation category. Examples of these are short courses for engineers and other professional personnel in Ground Water Development at the University of Minnesota, Management of Water Supply and Waste Disposal Facilities at the University of Akron and Engineering Design of Sanitary Engineering Works, known as IPSED, at the University of North Carolina. Subsequently the Ground Water Development Course was staged at several foreign locations to make the training opportunity available to LDC personnel not qualified, mainly because of language deficiency, to attend the course in the U.S.A. Under a special contract arrangement, faculty members of the University of North Carolina assisted in establishing a graduate level Regional Course in Sanitary Engineering which is offered in Spanish at the University of San Carlos in

Guatemala. This activity has now had several years of successful operation in training sanitary engineers who would be unable to study in the U.S.A. because of insufficient knowledge of English.

It is proposed that consideration be given to exporting segments of or perhaps the entire curriculum of the IPSED course in sanitary engineering design, thus making this course or selected parts of it available to professional LDC personnel who could not qualify for course attendance in the U.S.A. Also, and more importantly, the course could be established as a permanent part of the curricula at selected foreign universities and permit those institutions to undertake research programs which could assist in the development of urgently needed design standards for low-cost water treatment and distribution systems and low-cost excreta disposal facilities that might satisfactorily serve the needs of small towns and rural communities in the LDC's.

9. Monitoring and Surveillance

Modern technology, industrial development, international travel and other factors influencing life on the planet Earth have produced a wide variety of pollution problems, not only in the more highly developed countries but also in the developing countries, many of which are producing raw material for industrial processing and eventual worldwide consumption. The more advanced industrial nations have the technology and equipment to monitor pollution

levels and environmental hazards to health through organized surveillance programs, a service that is not available in the LDC's. It is recommended that a program be developed to study the problem and assist the LDC governments to establish facilities and train personnel for monitoring and surveillance of environmental health hazards.

10. Sectoral Relationships

As pointed out heretofore in this paper, the importance of coordination and development of sound working relationships with other sectoral program specialists within A.I.D. can not be over estimated. Environmental health activities should be coordinated with and lend support to other health programs and to programs in other sectors such as Agriculture, Education, Family Planning, Nutrition and Science and Technology.

The practice of periodic evaluation of projects could be utilized to determine in what manner and to what extent projects have contributed to the advancement or impairment of environmental health conditions, facilities or programs. The findings of such review would indicate modifications of project plan that should be made to maximize its contribution to environmental health.

Final Statement

The suggested program actions outlined here are not intended as all inclusive, but may be considered as representative of program approaches. Additional possibilities can and should be developed as needed.

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Environmental Health Sciences Workshop

DRAFT

ENVIRONMENTAL HEALTH IN DEVELOPING COUNTRIES

Gilbert F. White
Institute of Behavioral Science
University of Colorado

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SUMMARY

Environmental health implies a pervasive concern for human well-being in association with the environmental systems with which human life is associated. It is broader than the concepts of disease control and of health needs and delivery systems. The difference has special significance for developing countries where the difficulty of allocating sparse resources of personnel and capital are so severe and where new economic development is likely to have a profound effect upon environmental quality.

Notwithstanding the dramatic shortage of precise appraisals of the environmental impacts of development and their consequences for human health, it is possible to make a few generalizations about relationships between health and development planning and to note their implications for man power and for teaching and education in those countries. It is helpful to think of there being four different major types of environment in terms of the combinations of social, physical, and biological problems which they present.

Among the major problems are how to evaluate program alternatives involving both multiple ends and multiple means, how to assess the results of particular programs, and how to enable users to make risk-benefit analysis in the three major policy situations: independent action, regulated action, and wholly community action.

To deal with these problems in the future requires people trained in methods of participating in integrated teams, in understanding of the impacts of development projects, and in methods of sharpening consumer preferences. Among the more immediate issues are how to develop adequate short-term or in-service training for existing personnel, how to select and train new personnel to take part in integrated teams with concern for human welfare rather than the efficiency of delivery systems.

CONTENTS

CONCEPTS OF ENVIRONMENTAL HEALTH

For a long time activities in the public health field were organized principally around the concept of disease control. More recently, applications of this approach have tended to center upon efficiency analysis of health needs and cost effectiveness analysis of delivery systems, or on economic development. At the same time the idea of controlling environmental pollution gained prominence as a central concern of regulatory activities. A broader concept of human well-being in particular environments is now emerging. It draws together the other concepts and thereby emphasizes the harmonious relationship of human life to life-supporting systems, and thereby encompasses a wider range of human needs and of factors affecting their attainment.

The Disease-Control Tradition

The control of specific diseases, especially communicable diseases, and of certain types of accidents, especially industrial accidents, has been at the heart of a large proportion of public health analysis and of preventive medicine. Under this view environmental health is considered as being attained when the incidence of specific diseases and of accidents had been reduced to a level judged to be the lowest practicable within the limits of physical and social action available to curb them. Any case

of typhoid fever of life lost from hurricane flooding is seen as preventable and to be prevented. The appropriate action thus is open to a kind of benefit-cost analysis in which the cost of a preventive measure might be compared with the social benefits to be gained from reduction in the disease or accident.

A more positive view is taken in the World Health Organization of health as "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity." This shifts emphasis from the negative items of disease to qualities of daily life. It has the disadvantage, however, of directing attention to disease and to social indices of physical and mental health rather than at the fabric of individual and community life in which disease occurs and is generated. Moreover, when placed in practice it tends to be expressed in terms of operating programs rather than expected outcomes.

Delivery Systems to Meet Health Needs

The customary view of health delivery systems as revolving primarily around physicians, nurses, midwives, and para-medical personnel organized in offices, clinics, or hospitals also requires expansion to include the public services directly or indirectly administered under public agencies. These include: community water supply, community waste disposal, air quality control, food handling and storage inspection, housing quality regulation,

family and planning services.

Often, a delivery system is organized around the practicability of managing it rather than around the ultimate impacts upon the human population affected. For example, in recent years there has been lively and dramatic concern for the health affects of introduction of toxic substances into natural distribution systems. Public activity in halting the distribution of mercury in waters affected by pulp plant effuents is relatively intense in a number of countries. At the same time, concern for promoting breast feeding among mothers as a means of assuring adequate health on the part of infants is largely neglected. The social effect of toxic substances is several orders of magnitude less than those of practicing breast feeding during the first six months of life. Indeed, the introduction of health delivery systems patterned after those of Western countries discourages breast feeding even though this is the only satisfactory way - on grounds of cost, convenience and freedom from contamination - of assuring adequate nutrition for the young child in a developing country. Like the nocturnal car driver looking for his lost keys under the street light because the illumination is better, health workers tend to concentrate on those delivery systems lending themselves most readily to to whatever administrative and financial management is available.

Pollution Control

With the spread during the late 1960's of concern for the maintenance of the integrity of environmental systems, the concept of pollution control was added to the others. As voiced by the Special Meeting of Ministers of Health of the Americas in 1969 (Official Document, PAHO 89, p. 35), it holds:

> In the years ahead the governments will have to cope with environmental problems of greater magnitude and complexity. Advancing technology will leave in its wake a more sophisticated array of human stresses. Environmental contaminants will increase and will broaden from microbiological polutants to those having their origin in chemical substances. Long-term exposure to toxic substances will be more significant and more difficult to diagnose, with wide separation of cause and effect. The growth of cities will aggravate problems of traffic congestion, accidents, and noise hazards. Population densities and poor housing will increase the hazards of communicable diseases and problems of mental health. In industrial complexes, occupational health will require more focused attention and remedial measures.
>
> In the future, health agencies must expand their activities to include the health-related considerations of slums, poverty, and filth; of ignorance, delinquency, and crime; and of the effects these have on the total health of the people.

Here the view of health embraces the whole range of human activities. However, the emphasis continues to be somewhat pathological to focus on polluting actions, including stressful urban life, and their inducement of disease or social disruption.

Human Well-Being

When the view is taken that the primary concern is with the well-being of the entire community over the long-run, less

attention may be paid to delivery systems and disease rates than to measures which affect the interaction of human and natural systems. Three types of projects illustrate the point.

A remarkable feature of economic development in tropical Africa during the past fifteen years was the construction of a series of man-made lakes intended to provide water for generation of hydro-electric power and for associated purposes such as navigation, flood control, and irrigation. These include the Sadd el Ali on the Nile, the Kariba on the Zambezi, and the Kainiji on the Niger.

The Volta Lake in Ghana is the largest man-made lake in the world, accounting for about one-fifth of the total land area of that country. After a comprehensive period of planning it was constructed under a program which gave primary emphasis to electric power production and which planned to provide the relocation of more than 80,000 people living in the reservoir area (see Figure 1). Pressure for opening of the generating works was so intense that the reservoir flooding began before studies of the population to be relocated were completed, and there ensued a long period of difficult adjustment in the livelihood and living patterns of people dispossessed of land and heritage. The responsible relocation authorities did provide for housing, using a somewhat ingenious unit construction plan, and tentative arrangements were made to enable various groups of people to establish themselves in new agricultural

land above the level to be reached by the reservoir waters.

Within three years after the initial relocation, a substantial proportion of these housing units were unoccupied, more than half of all of the population were on food relief, and the disorganization of both community and family structure was severe. This was not because those planning the project had ignored the possibility of the impounded waters providing opportunitites for spread of schistosomiasis, nor of the need for new housing, or the vital role of highways connecting the new communitites, or the need for credit and technical assistance in developing farming on the upland areas. Careful attention had been given to local water supply and waste disposal. The basic disorganization occurred because the planning had centered upon physical features and had not been directed at means of lasting livelihood in a tropical environment where the maintenance of soils is a delicate process, where land clearing is expensive and tedious, and where community organization and process was not well adapted to rapid social change.

Another example found in pilot projects and plans for larger projects in the development of the the Lower Mekong Basin of Southeast Asia. There, the prevailing problems for generations to come will be those of growing food for the rapidly expanding population and of providing alternative sources of employment for people flowing

from rural areas into the burgeoning cities. There has been proper and intense concern with investigating possible ecological impacts of the dams which have been initiated or proposed for construction. This included consideration of more effective devices for promoting solid relocation of farmers. Decisions by government planners, as well as by the individual farmers who were required to move or to change their farming practices, hinged in part of the meeting of food needs and on adjustment to market conditions resulting from the new production. They also involved readjustment in soil and water management essential for the maintenance of a permanent agriculture. A healthy environmental condition will result in the long run in the Lower Mekong only if the combination of development and relocation measures produces a stable set of environmental systems as well as social activity assuring minimum income, family stability, community competency, and individual dignity and initiative.

Dramatic instances of the way in which concern for a segment of disease control or provision of delivery systems can fall short of contributing adequately to the promotion of human well-being is in water supply systems in numerous urban areas of Latin America. Many cities in the South American continent have a relatively well designed and constructed system for providing domestic water to a considerable proportion of the population. It is not uncommon to find city facilities operated so that domestic consumer cannot draw water from a tap with high confidence

that it will be free from serious contamination from infectious organisms. A city has a chlorination plant but it does not work full time or it does not work effectively. Or, the treatment is satisfactory but leaks in the pipes and defective distribution points lead to contamination before the water reaches the household A city may have elaborate arrangements to bring water into homes that have multiple taps and are in the high income bracket, but in the interest of providing those supplies it arranges only standpipe distribution for large parts of the urban worker population. In such instances a small marginal change in the operation of a system, in its construction, or in its planning in terms of land use arrangements would have a profound effect upon the physical health and aspiration of the city dwellers. The test of the efficacy of the power plant, storage dam or water system is neither its design nor its honest and reliable construction. It is in the effect which the daily operation of the system has upon the living patterns and quality of lifestyles among those served.

Lack of Searching Post-Audits

Much of what has just been asserted is subject to a singular circumstance that attaches to virtually all efforts at public health and environmental management. It is the lack of precise and searching appraisals of what the exact impacts are of different schemes of development. Post-audit of any social program is at best a highly speculative effort, and it is an especially troublesome exercise for health programs.

Schistosomiasis is one of the widespread infectious diseases in tropical and subtropical areas, and conservative estimates have placed the number of people affected by the disease as upwards of 200 million. It is known to be debilitating and to combine with unfortunate or fatal consequences with congenital weaknesses and other diseases. Given this information, the eradication of schistosomiasis as one of the great public health challenges. Yet there has been remarkably little effort to find out the precise consequences of schistosome infection among the affected people.

A pioneer and exhaustive study of the effects of schistosomiasis and four other parasites (hookworm, Ascaris, Trichuris, and Strongyloides) on the island of St. Lucia yields basically baffling conclusions. It fails to demonstrate significant association of parasite infection with death rate, academic performance of students, weekly earnings of laborers, or absentee rates. It suggests that the daily productivity of male laborers on plantations in schistosomiasis-infected sections of the island is decreased as a result of the infection, and that only one parasite - Strongyloides - adversely affects actual productivity for female farm workers. An equivocal set of findings comes out of one of the few careful efforts ever made to test the health effects of a particular environmental threat. We may exaggerate the consequences for working populations or we may have failed to find adequate measure of those consequences.

It would be whimsical to expect solid and definitive findings on matters such as this on the basis of less carefully controlled investigations. Thus, the investigation of the community of Zaina in Kenya where a new water supply was introduced in comparison with a nearby community (without such) improvements leaves doubt as to how much of the change in local health condition was derived from the water supply improvement and how much to other changes such as in health education, if, indeed, there was a genuine change in prevailing conditions.

Of even greater significance, as Howard has pointed out, we do not understand fully why the reduction in total death rate preceded modern health programs. (Howard, 1972, p. 75) He poses the question as follows:

> Since a very high majority of the population of the developing countries . . . currently have no ready access to modern health care; since only four major diseases have ever been seriously tackled on a comprehensive global scale; since the developing world does not yet have the health infrastructure or the manpower to cover more than a small fraction of its population, it is difficult to identify specific health factors which have resulted in the progressive world-wide decline in mortality with its consequent effect on population increase.

When information on the relationships between changes in the physical parameters of an area and well-being of its inhabitants is indecisive, how much do we proceed on faith? How much do we hold off certain measures until we are more confident as to their long-term implications? It is neither common, nor palatable to raise these questions. Unless they are explored with vigor in the months and years immediately ahead nations run the risk of launching

additional environmental health programs without any strong assurance of attaining the social aims in mind.

Health and Risk Bearing

The environment presents an immense array of hazards - natural and man-made - to human well-being. People make a wide variety of adjustments to these hazards and take quite different risks in dealing with them. Societies will not tolerate a hazard where loss of life is certain as with use of a deadly poison as a food additive but rarely do they provide assurance that a risk is eliminated entirely. In most instances the individual or the community adopts an adjustment that lies in the spectrum between complete vulnerability and complete prevention as when it permits air pollution that is generally harmless but might cause illness to vulnerability and complete prevention groups, such as the aged, in special circumstances.

The role of the expert in environmental health centers on helping society decide what combination and degrees of risk it is willing and able to bear. Inevitably this involves tradeoff among the various risks in judging what is a practicable approach to well-being at a given stage of economic development.

HEALTH AND DEVELOPMENTAL PLANNING

Two popular beliefs about economic growth and environmental health are sufficiently incorrect so as to have a profoundly misleading effect upon public policy. One is the belief that increases in national production of goods and services will usually be accompanied by proportionate improvements in health. The other is the notion that improvements in health are essential to economic development.

It already has been shown that augmentation of gross national product per capita will not necessarily be reflected in environmental health. As for Volta Lake, the opposite may occur. Likewise, the way in which health advances will be reflected in economic productivity, as in the case of parasitic diseases, is in doubt. There is a great deal of loose and unsubstantiated argument, for example, that upgrading the quality of water supply will accelerate economic growth. In these circumstances the planning for environmental health as a part of economic development programs should proceed with keen regard for differences in environment and culture and for the need to assess the national and regional planning aims in relation to alternative methods and of the preferences of the people affected.

Types of Environment

It is helpful to distinguish at least four major types of environment in developing countries upon the basis of patterns of population distribution and social organization. Each has a unique combination of conditions affecting the character and achievement of environmental health.

In urban areas those parts of the population ebing in a well organized social system with community government that provides basic social services are typical city dwellers in the Western tradition. They may be termed city in contrast to those parts of the urban area where the individuals dwell in temporary quarters (bidonvilles, shanty town, barrios, bustas) without formal political organization, with a highly temporary time horizon, with minimal provision of municipal facilities, and a transitory and disorganized social system. These urban peripheries account for as much as one quarter of the urban population of developing countries (Morocco, Nigeria, and Zambia are examples)

At the rural level those populations which are arranged in clustered communities with nuclei of and administrative land use, may be divided from those where the population is scattered across the countryside in irregular patterns and with commercial services concentrated in markets, market towns, and central places.

The world's population can be assigned very roughly to those classes as shown in Figure 2, and the proportion of each in developing countries can be estimated. The urban peripheries

are distinctively a product of urbanization in low income countries, and the cities of those countries present generally different conditions than do the high income cities. As pointed out in a recent review of urbanization in Nigeria, "Far from being prime movers and catalysts of change, towns and cities can only too easily degenerate into national liabilities" (Green and Milone, 1971, p. 36).

National and Regional Planning Aims

In addition to lacking incisive investigations into the relationships between health activities and health, we know very little about the effectiveness of administrative and political efforts to achieve national aims. The importance of such inquiry is illustrated by recent observations by a Swedish health expert who examined the experience in two countries having similar GNP - South Korea and the People's Republic of China - in dealing with child nutrition (Mellander, 1972a, 1972b). He found in South Korea a rather heavy commitment to medical faculties, nursing schools, and health centers which were dependent upon central financing and administration and had a relatively small impact upon the nutrition of the children. Percentage of total deaths among toddlers (aged 1-4) is 7.5. In the People's Republic of China where more than 80 percent of the total population of roughly 800 million lives in rural communes malnutrition is nowhere to be seen, and health activities have relatively little central government help in the direction of

organizing clinics or providing technical personnel. The political system and mode of planning operation is radically different between the two countries; some of the People's Republic activities obviously could not be managed under the social system prevailing in South Korea. So far, however, no developing country receiving Western aid has eliminated malnutrition. There is reason to believe that a crucial determinant of efforts to improve environmental health consists in the way in which local and regional groups see their contributions to long-term national aims. If they view their responsibilities as primarily operating specified delivery systems, their work may be quite different than if they feel responsible for achieving specified ends by whatever means seem suitable to local organization and resources. Mellander concludes his China report:

> It is easy to state that the results in China have been achieved without very much of nutrition minded activities. For example no international nutrition conferences or seminars, no unconventional proteins from single cells, leafs or oilseeds. No protein rich foods and apparently no applied nutrition projects and certainly no systems analysis, etc. What is behind the realities then? My answer would be: A genuine family level approach, providing simple food and simple advice to all families on a basis of absolute administrative priority for prevention in health service and medical and paramedical education (Mellander 1972b, p. 7).

Evaluating Program Alternatives

A characteristic of most economic development work is

that it rarely presents to those responsible for making program decisions a choice among the whole range of possible alternatives that might be used in dealing with a particular problem. An example is the treatment of crop disease in tropical countries. Usually, the public initiatives center on one or two technical measures. In some areas a particular pesticide may be strongly recommended, in other areas a mix of crops may be indicated, and in still others a different arrangement of crops so as to impede the growth of the pest. Each of these has social benefits and handicaps, but programs are presented as recommendations of a single measure rather than as a choice among options having different combinations of risks. The classic case of concentration on one technological fix is to be found in water development where the usual means of dealing with flood is to construct levees and dams to control flood flow. When these are proposed there usually is no mention of the practicability of flood-proofing buildings to resist flood damage or of readjusting land use to progressively encourage vulnerable property owners to move out of the flood plain. The result in countries as unlike as Canada, Hungary, India and Sri Lanka is that while new works are constructed the flood losses grow larger, more people are exposed to the hazard, and the stream channels degrade.

Similarly, in urban areas it is common to put forward a single plan for mass transport without the diversity of other kinds of measures which might attain the same general purposes of communication and transport. For example, decentralized

patterns of land use or small-scale devices for transport may entail lower construction costs than mass transport and avoid certain of the social costs of traffic delays, air pollution, and waste disposal (Koenigsberger et. al. 1971).

Neither education nor analytical method encourages a genuine canvass of alternatives in environmental management. It is a hard task and it demands a variety of skills and experience never found in one Technician.

User Preference and Risk-Benefit Analysis

Government agencies may take three basic stances in coping with the environmental hazards with which people contend individually or collectively in seeking well-being. They may: 1). leave the decision entirely up to the individual as in the case of rural water supply improvement in many developing countries; 2). guide the conditions in which individuals are able to exercise individual choice, as in the provision of information and materials for families interested in family planning; and 3). take direct responsibility for controlling individual hazard as when they prohibit effluents from a manufacturing plant or ban a pesticide or build levees to protect a village from floods.

In the first circumstance the user chooses with some kind of consideration - sometimes misinformed, sometimes ill informed - of the amount of benefit expected in relation to the risks involved. Where the choice is guided or controlled individuals may or may not exercise influence over what the government will do by supporting or opposing the proposed activity. Individuals as well as societies differ in the degree of risk they are willing to knowingly accept for each environmental risk at any given time.

The world situation with respect to domestic water supply demonstrates this point. There are only a few water systems that may be rated as absolutely safe from all contamination all of the time. At the other extreme, people do not use supplies that are certain to cause death. The world's population may be thought of as distributed along a scale of drinking water hazard extending from highly polluted to insignificantly polluted. Figure 3 gives a first approximation of the numbers of people sharing in each of ten degrees of health hazard from domestic water. We know that rural people when they learn the health consequences will pay substantial costs for avoiding polluted supplies, but that their perception of the benefits may be quite unlike those of a sanitary engineer. It would be misleading to assert categorically that a certain percent have "bad" water and the remainder have "good" water, or to go on and argue that an essential aim of environmental

planning is to provide all people with completely "good" water.

In some nations this formulation of the problem leads to very costly improvements for a small proportion of the rural population while a larger proportion enjoy no improvement. There will have to be a basic change in strategies of water improvements if the world is to avoid having as many rural people on the more hazardous sectors of the risk scale in 1980 or 1990 as in 1970. The change probably must be aimed at shifting population in the direction of insignificant hazard and at giving the people affected an opportunity to decide how much risk, as they come to understand it, they are prepared to bear at what cost. It seems likely that only by harnessing the concerns of individuals and local communities to enhance their well being as they themselves define that well being will rapid advances be made. In citites a central decision can determine the risk level. In most urban peripheries, smaller communities and rural areas the preferences of the users usually will set the limits of what can be achieved through self help, local initiative and local financing.

IMPLICATIONS FOR MANPOWER NEEDS

The Current Situation

A frequent complaint about the pace of development in low

income countries is that there is not enough trained staff in health agencies. This may seem most acute in regions such as with Latin American water supply where small, closely-knit groups may be expected to expand to wider areas at an accelerated rate (Donaldson, 1971). In a survey of the development of new African nations, Harbison concluded that their "growth, prosperity and viability will depend ultimately upon their ability to develop systematically and to utilize their human resources "(n.d. p. 23). He finds the most critical problems to be urban unemployment, rural underemployment shortages of skills, educational systems out-of-gear with needs, brain drain, and high growth rates. The corrective measures are seen as including labor-intensive urban employment, increased rural productivity, training in new skills, renovation of formal educational systems, and building the capacity of non-formal education.

These observations probably apply to most developing countries. However, in reviewing their relevance to environmental health they need to be made specific at three points.

Integrated Teams of Experts

Unlike some other development problems, the solution of environmental health questions inevitably calls for experts

from several fields. It never can be a lone engineer or a lone medical worker - however competent - if the full spectrum of alternatives is to be canvassed.

Teams of experts are difficult to assemble and harder to get to work together. Genuinely integrated teams are jewels of great variety. Yet, ways must be found to create them and use them. These will not come rapidly at higher echelons, and the experience in some areas is that it is far easier to cultivate integrated action at the level of community workers than among the administrators.

Understanding the Impacts of Other Measures

Implicit in the cooperative work of experts is the capacity to identify the numerous environmental impacts which may be expected to flow from concrete development measures. Unless they are recognized, whether or not they are measured, they will certainly be neglected. Even if identified nothing may be done about them: sometimes this is because people underestimate them as with livelihood at Volta Lake; sometimes because administrators don't know what to do about them as with certain pesticides and sometimes the corrective measures are considered too costly as with pure water for dispersed farm settlements.

Methods of carrying out "environmental impact statement", as required under tha National Environmental Protection Act of 1970 in the United States are just beginning to receive careful attention. In the absence of better methods, administrators must make long guesses or work out accomodating agreements not to challenge the guesses of others or admit to plain ignorance as to the probable effects of an environmental measure. None of these solutions is comfortable, and learning to live with the burden of uncertainty may be the most troublesome. But this is the lot of environmental health; it must persistently ferret out the possible consequences of proposed actions and frequently find them clouded with doubt.

Consumer Preferences and Education

The third aspect of such planning is the sensitive sounding of consumer preferences when people are given adequate information about the benefits and risks involved. It is not simply a matter of taking an opinion poll: there is not direct relationship between articulated opinion and behavior. Information needs to be presented as to risks and opportunitites. Then, the preferences of users need to be determined by observation or experiment or interview.

Skill in education and finding out what choices the consumers will make is not important where the planning is central

and there is little latitude for response, as in city water supply. In rural areas and where the consumer can choose it is crucial to effective environmental management.

Existing Personnel

Very little education for present workers in the field of environmental health prepared them to handle the appraisal of alternatives, the assessment of impacts, or the investigation of user preferences. Some workers in practice deal with these matters with sound intuition. Others avoid them because of feelings of incompetence or inappropriateness.

To help existing personnel two kinds of action may be helpful. Short-term or in-service training programs can be arranged. Condensed materials on methods and case experience can be developed to give both guidance and competence in tackling these new problems. Any efforts in that direction must be experimental: the experience is limited, and innovation and invention are in order.

New Personnel

The task of preparing new personnel for the work is more complicated. The approaches which it requires run counter to

most of the conventional training of professional and intermediate workers. They are encouraged to specialize and to respect disciplinary boundaries. Few clusters of professionals in Western countries have larger "No trespassing" signs on their occupational domain than do medical and engineering specialists. This is embedded in educational curricula and heirarchies which are slow to change. While in theory the place to start is in the colleges and universities, in practice the in-service of a field operation where the multiple impacts of one environmental change are obvious may be a more promising place.

THE OUTLOOK

To continue the present emphasis upon disease control and health delivery systems is to court the probability that after another decade or two of effort on a modestly expanded level of public funding the environmental health of a large proportion of the world's population will be little better than it is in 1973. Government financial support of organized health services is unlikely to expand faster than national income. The prospective date of growth in national product is generally small, and where it is rapid the inequities of income distribution may be so great and the side effects of manufacturing and urban development

may improve only slightly. Much of the current enthusiasm for curbing degradation of the natural environment is likely to spend itself and to sag under the weight of claims for accelerated income.

Even if economic development programs were to have no explicit component dealing with health they would inevitably affect it for good or bad through perturbations in both natural and social systems. The most challenging opportunity to improve environmental health lies in shaping the emphasis of development programs so as to contribute more directly to enabling the people affected by the many hazards of the total environment to choose how much risk they are willing to bear and how much reduction in risk they can achieve through their own efforts. There is no prototype for such a change in emphasis. However, there is enough experience to suggest that the types of action deserving imaginative exploration include the organization of integrated teams of experts, the systematic appraisal of the environmental effects of development measures, and the training of both existing and new personnel to apply a unified approach in situations in which the people involved have the opportunity to select in some degree the elementary quality of well-being and corresponding risk they will enjoy.

end

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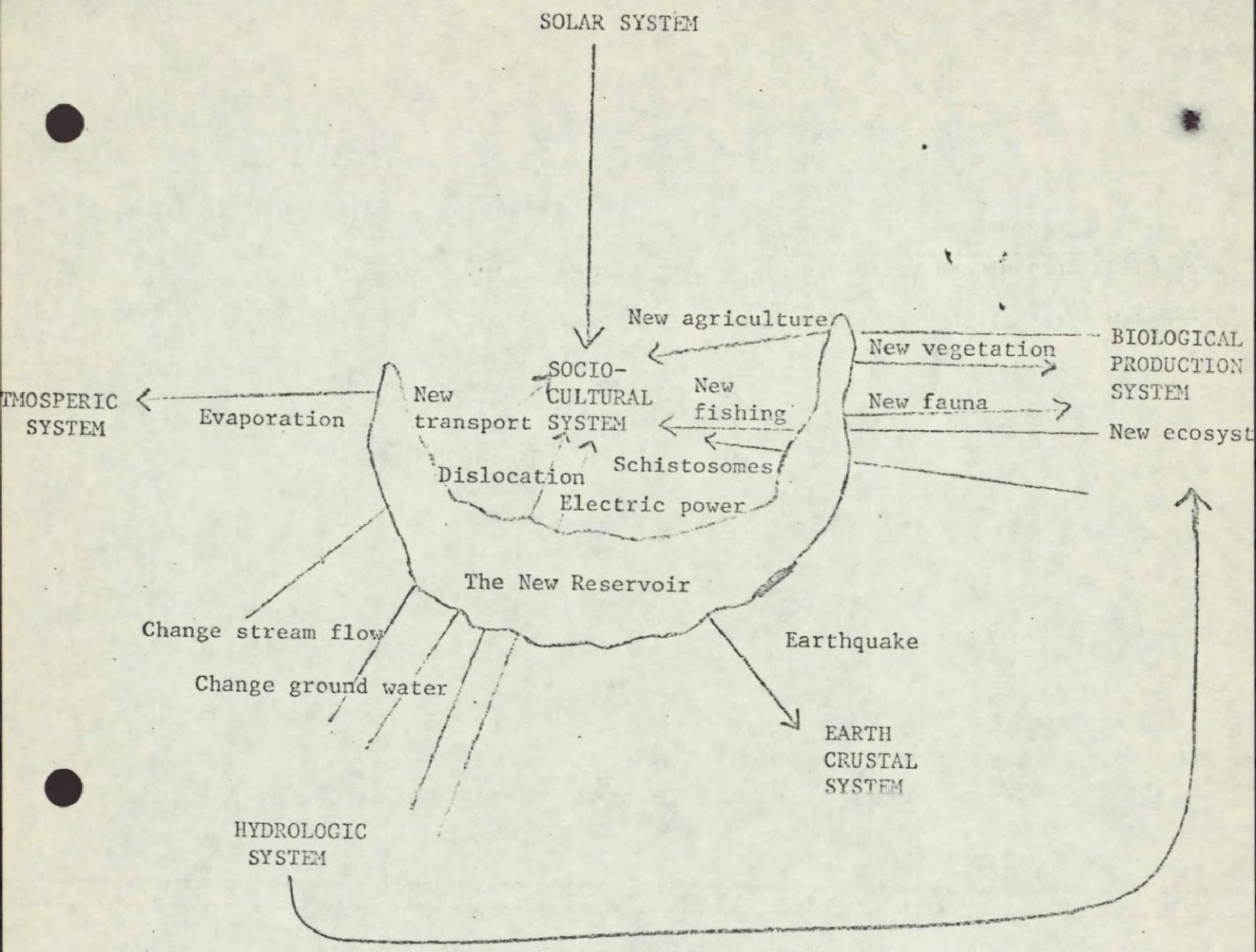

Figure 1 - Major alterations in ecosystem caused by Volta Lake

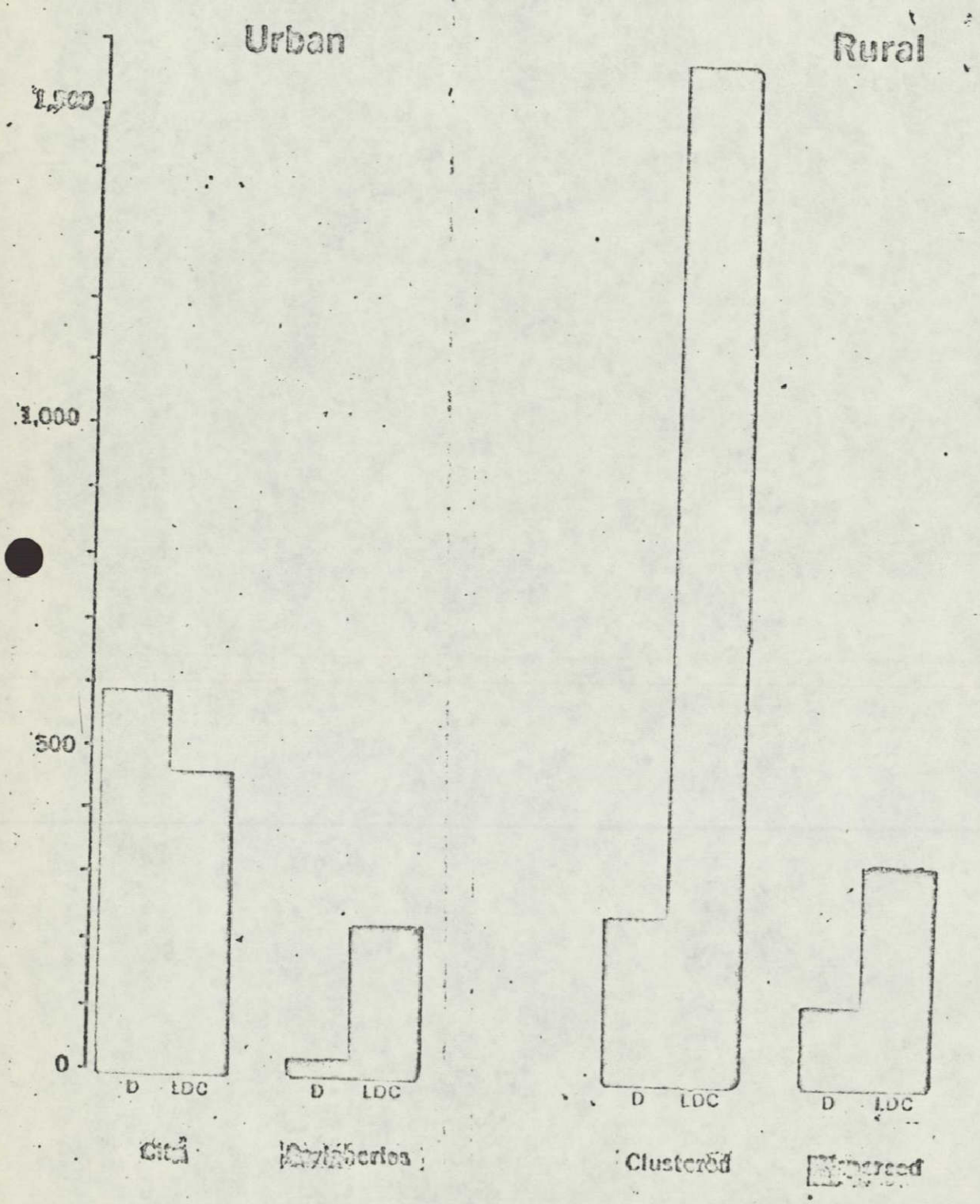

Figure 2 - Estimated distribution of world population among 4 types of

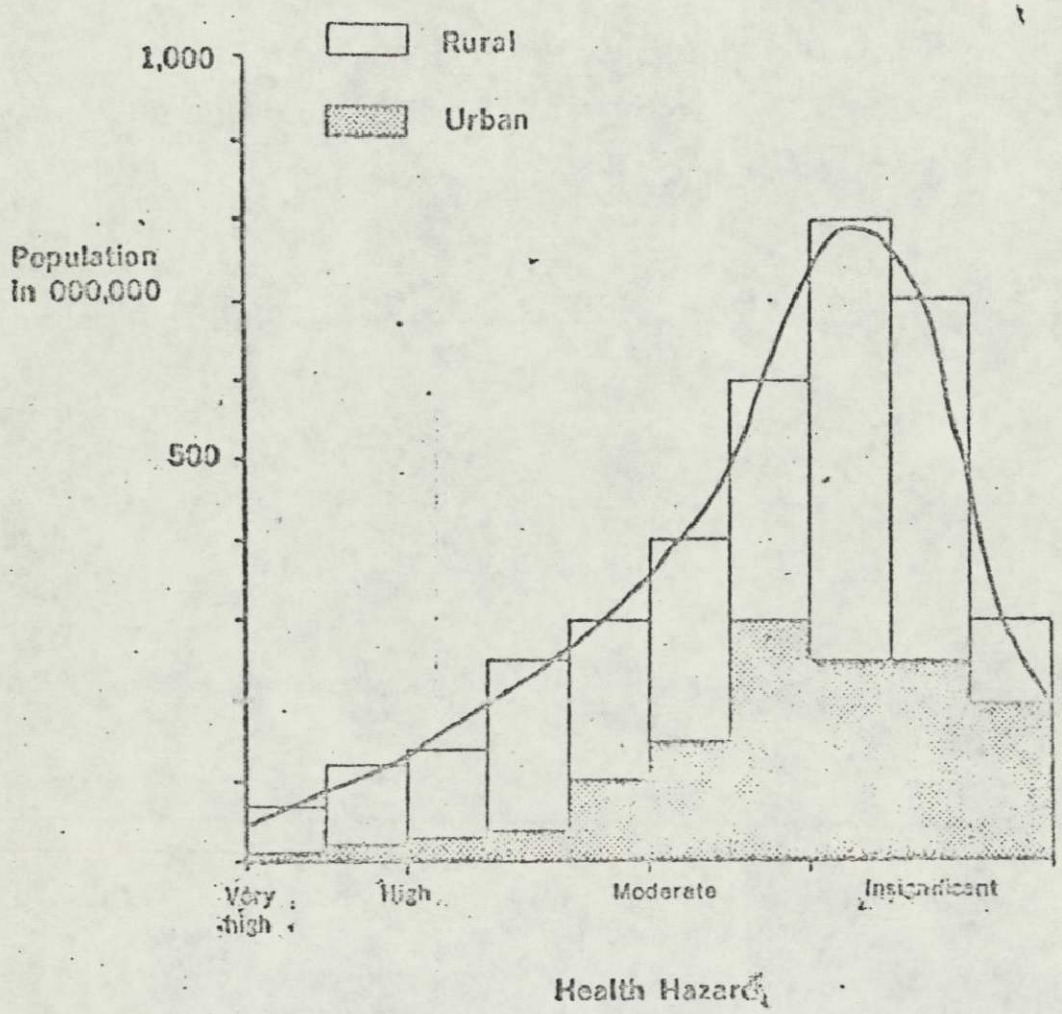

Figure 3 - Estimated distribution of world population on scale of health hazards, 1970 (White, 1973).

Activity* KEA #3 - Environmental Health

Project No. 520-563 Title Lower Cost Methods of Water And Waste Treatment in LDC's

Contract/PASA No. ta-13 University of Oklahoma Name Professor Reid

Project Manager A.D.Swisher Extension 79446

Contract/PASA Officer V.Perelli Extension 79368

RESEARCH AND SECTION 211(d)

FY 1975 Interregional Program Budget Review
Project and Budget Analysis Matrix

Major Country/Countries

To be determined (Peru, Panama, Morocco, Ghana, Thailand, Philippines)

Obligations: Begin FY 1973 End FY 1975
Work Begin FY 1973 End FY 1976
Approval Status RIGC Approved Thru FY 1976
RAC Approved Thru FY 1976
RAC Approval Required FY 19__

Estimated Submission Date __ (Month) ____ (Year)

Evaluation Schedule 11 (Month) 73 (Year) A (Type)

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to date
B1 PURPOSE: To devise and test simplified, lower cost approaches to the expansion, design and construction of water treatment plants for cities and for smaller communities, and to design and evaluate less complicated methods of handling sewage disposal problems in LDCs.	**B2 End of Project Status:** 1. Detailed information, guidelines on low-cost methods disseminated. 2. Training courses, seminars conducted; further studies stimulated at regional institutes. 3. Coordinated promotional assistance efforts by international agencies. 4. Newer approaches, techniques adopted by LDCs.	**B3 Assumptions for Achieving Purpose:** 1. Results of studies and tests will demonstrate advantages of newer approaches. 2. Water output can be increased with less capital investment by use of newer technology. 3. Water pollution abatement made feasible for LDCs by simpler, cheaper approaches. **B4 Progress to date:**
C1 OUTPUTS: 1. Comprehensive bibliography and compilations of available materials on newer technology. 2. Evaluation of newer techniques by research pilot-scale, and plant testing. 3. Preparation and dissemination of reports on results and manuals of procedure. 4. Cooperation with international organizations, lending agencies, regional institutes on application of findings.	**C2 Output Indicators:** 1. No. of bibliographies, reports, manuals produced and distributed. 2. Research projects initiated and conducted at regional and local sites. 3. Courses, seminars held; personnel indoctrinated in new approaches. 4. Local authorities, agencies utilizing new methodology. 5. International organizations supporting new approaches.	**C3 Assumptions for Achieving Outputs:** 1. Publications, manuals, seminar attendance made available to appropriate agencies, individuals in LDCs 2. Results applicable under varying climatic, technical, economic conditions. 3. New approaches will be adopted by LDCs facing water shortage, pollution problems. **C4 Progress to date:** 1. Contract signed 3/26/73. 2. Preliminary meetings with WHO, CEPIS, U. of Ghana, AIT etc., have been held.

D1 INPUTS:

AID Contractor: Obtain and assemble information on methods; plan and implement research, testing, and evaluation program; develop cooperative arrangements with regional institutes, prepare reports, manuals; promote seminars on findings.

AID/W funding monitoring, liaison reports; USAID's assist in field arrangements with LDCs.

D2 Budget Summary (in thousands of dollars)

	(1) Personnel		(2)	(3) Participants		(4)	(5) Commodities	(6) Other Costs	(7) Total	(8)** Expenditures	(9) June 30 Pipeline	Terminal Funding Date
	Dollars	MM		Dollars	MM							Month / Year
All Prior Years												
1. Thru FY 1972												
2. Actual FY 1973	71	41					7	4	82	10	72	June 75
3. Estimated FY 1974	46	29					10	10	66	138	0	Mar 75
4. Proposed FY 1975	112	70					4	5	121	80	41	Dec 75
5. All Other										41	-	
6. Total	229	140					21	19	269			

*Key Problem Area, Area of Concentration, or Field Support

**Expenditures are to be computed on an accrual basis.

A[illegible] KPA #3 - Environment Health
Project No. 521-454 Title Field Testing of
Hand Pump - Battelle Memorial Institute (AID/csd-3305)

Project Manager
A. Dale Swisher, P.E. Extension
Contractor/PASA Representative
Robert Fannon Phone No.(614) 299-3151
Project TAB Officer
V. Perelli Extension 79360

TAB - RESEARCH

FY 1974 Interregional Program Budget Review
Project and Budget Analysis Matrix

(HEALTH PROGRAM)

Major Country/Countries
Worldwide - Demonstrations in Thailand, Nigeria, Brazil

Prepared: July 13, 1972

218

Obligations : Begin FY 19 71 End FY 19 73
Work : Begin FY 19 72 End FY 19 74
Approval Status: RIGO Approved Thru FY 19 74
RAC Approved Thru FY 19 74
RAC Approval Required FY 19__
Estimated Submission Date ______ Month ______ Year
Evaluation Schedule 5 Month 73 Year B [illegible]

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to Date
A1 Purpose: Field test to determine durability, dependability and operating cost of a simple hand pump (design previously sponsored by AID).	B2 End of Project Status: Local manufacturers produce and distribute a dependable, rugged, simple, moderate cost hand pump (which serves to reduce prevalence of intestinal infections).	B3 Assumptions for Achieving Purpose: 1. Demand now exists for simple low cost locally manufactured pumps which require minimum maintenance. 2. Results of previous contractor bench tests will be confirmed by field test. 3. Foreign manufacturers will be commercially interested. 4. Anticipate commercial production, sales and distribution will meet demand. B4 Progress to Date: 1. Field testing underway in Thailand and Nigeria. 2. Contractor has received numerous inquiries re local manufacture.
C1 Outputs: 1. Current drawings and specifications. 2. NLT three complete pumps fabricated to current standards. 3. Production of contractor-designed pumps by foreign manufacturers. 4. Two year field test. 5. Test results. 6. Recommend any desirable changes in design or production technique.	C2 Output Indicators: 1. Delivery of set of reproducible drawings are specifications. 2. Demonstrate contractor produced pump. 3. Demonstrate foreign manufacturers produced pumps. 4. Statistics re: wear or breakage of each component due to two year field usage. 5. Final report with recommendations for changes in design.	C3 Assumptions for Achieving Outputs: 1. Extended field tests will confirm feasibility of basic design. 2. Overseas agencies competent to provide statistics. C4 Progress to Date. 1. Contract signed 6/30/71. 2. Reproducible drawings have been prepared. 3. Contractor has produced pumps under local conditions. 4. Statistical program has been organized.

BEST AVAILABLE

D1 Inputs:
AID Contractor: Professional research design engineers and support team; extensive manufacturing and testing facilities; management of contract; patent attorney on-site TA to foreign manufacturers; design and supervision of field test; analyses of test data.
AID/W: Funding, contract monitoring, USAID support officers.

LDCs: Local funds for procurement, manufacturers facilities, personnel and funds for test supervision.

D2 Budget Summary (in thousand of dollars)

All Prior Years	(1) Personnel Dollars	(2) MM	(3) Participants Dollars	(4) MM	(5) Commodities	(6) Other Costs	(7) Total	(8) Expenditures	(9) Cost to Complete	[illegible]	
1 Thru FY 1971	30						30	-	30	3	1973
2 Actual FY 1972	11						11	33	8	*3	1973
3 Estimated FY 1973	9						9	12	5	6	1974
4 Proposed FY 1974								5	-		
5 All Other											
6 Total	50						50	50	[illegible]	[illegible]	

*Supplemental

PLANNING SMALL WATER SUPPLIES IN DEVELOPING COUNTRIES. (628.72-L384)

Donald T. Lauria. 1972, 141p
North Carolina Univ., Chapel Hill, Dept. of Environmental Sciences and Engineering.

The research included two principal objectives: (1) develop a theoretical planning model for deciding water supply timing and scale in small communities of developing countries; (2) initiate field studies to obtain data on the parameters of the model to make it operational. The work of model development had to focus on several communities instead of only one. Additionally, time in the model had to be made discrete because budgets are imposed at fixed points in time. Finally, the model had to include the considerations of Manne's model pertinent to developing countries: economies of scale, water supply benefits, increasing demand, the discount rate, etc. While the first research objective is theoretical, the second is primarily applied. It was proposed to obtain at least preliminary information on water demand patterns in small communities, costs of water system construction, the economies of scale of water systems abroad, and by imputing, the benefits of publicly supplied water. All of the field data were obtained from Central America. (Author)

Activity* KPA #3 - Environmental Health
Project No. New Title Water Quality Management

Contract/PASA No. ____ Name ____

Project Manager A.D. Swisher Extension 79446

Contract/PASA Officer V. Perelli Extension 79368

TAB - GENERAL TECHNICAL SERVICES

FY 1975 Interregional Program Budget Review
Project and Budget Analysis Matrix

Major Country/Countries
WORLDWIDE

Obligation: Begin FY 1975 End FY 1977
Work Begin FY 1975 End FY 1977
PROP Status: PROP approved thru FY 19__
New/Revised Required in FY 19__

Estimated Submission Date 2 (Month) 74 (Year)
Evaluation Schedule 9 (Month) 75 (Year) A (Type)

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to date
B1 PURPOSE: To train LDC personnel through a non-degree university program in techniques of water quality management thereby permitting: 1. More effective operation of existing municipal utility systems. 2. Establishment of water quality surveillance system. 3. Evaluation of impact of agricultural and industrial operations on water used drinking and recreational purposes.	**B2 End of Project Status:** 1. LDCs capable of technical operation of facilities adequate to match the large capital commitment. 2. Satisfactory data collection systems in place. 3. Water quality laboratories functioning. 4. Loan requests to international financing agencies supported by factual data.	**B3 Assumptions for Achieving Purpose:** 1. Sufficient number of LDC chemists, biologists, engineers, etc. are desirous of water quality management training. 2. Multilateral assistance agencies will require training concommitant with approval of loan applications. 3. LDC governments, agencies or universities recognize need as part of national program development. **B4 Progress to date:**
C1 OUTPUTS: 1. Graduates more capable as: (a) Plant and systems control personnel; (b) Water quality management problem solvers; (c) Surveillance network designers and operators. 2. Graduates qualified to establish set up water quality laboratories outside the universities and to carry on suitable training program. 3. Graduates acquainted with U.S. professional practices and equipment.	**C2 Output Indicators:** 1. Countries have established local programs and are providing in-service training. 2. Change in level of expenditures for water quality management purposes. 3. Number of graduates involved in training others (multiplier effect). 4. Course director evaluation of students at academic and on-the-job level of training.	**C3 Assumption for Achieving Outputs:** 1. Contractor's personnel are (a) thoroughly familiar with LDC problems and (b) capable of modifying U.S. techniques to fit those problems. 2. LDCs will provide logistical and academic support to U.S. trained men returning home. **C4 Progress to date:**
D1 INPUTS: Contractor: Prof. faculty; backstopping (facilities, classrooms, laboratories, library, etc.); development & monitoring of the OST phase with water quality control agencies. AID: Funding monitorship. AID Missions: Publicity, recruitment, travel and participant per diem for sponsored students. WHO, PAHO, etc.: Sponsorship, travel and per diem for WHO and PAHO participants. LDCs: Mid-level personnel with training in the basic sciences (chemistry, biology, engineering).		

D2 Budget Summary (in thousands of dollars)

All Prior Years	(1) Personnel Dollars	(2) Personnel MM	(3) Participants Dollars	(4) Participants MM	(5) Commodities	(6) Other Costs	(7) Total	(8)** Expenditures	(9) June 30 Pipeline	Terminal Funding Month	Terminal Funding Year
1. Thru FY 1972											
2. Actual FY 1973											
3. Estimated FY 1974											
4. Proposed FY 1975	55	32					55	55	0	June	1975
5. All other	115	64					115	115		June	1977
6. Total	170	96					170	170			

*Key Problem Area, Area of Concentration, or Field Support.

**Expenditures are to be computed on an accrual basis.

Water Quality Management

General:

Purpose of this project is to develop an applied postgraduate non-degree program for chemists, biologists and engineers who have the responsibility within the LDC's for operation of water and wastewater treatment plants and for the management of water quality surveillance programs in the natural waters of their countries. The program would be presented at the University of North Carolina two or three times and then "exported" to cooperating universities or agencies located in the LDC's.

Data:

This is a proposed three year program beginning in 1975. Estimated costs are: FY 75 $55,000; FY 76 $55,000; FY 77 $60,000. Resources required are approximately 20 man-months/year of professional faculty time with supporting clerical and administrative personnel; university facilities, classrooms, laboratories, library etc.; plus suitable sites for field training with state and federal agency water quality programs. Proposed contractor: University of North Carolina.

Work Plan:

The program would be administered by the Water Resources Engineering and the Environmental Chemistry and Biology program areas of UNC. Several participants (5-10) from forwign countries would undergo a two to nine months period of academic and laboratory instruction including a period of field work with appropriate cooperating agencies. A special effort would be made to recruit participants from university faculties and to include individuals who have some educational responsibilities in chemistry and biology. These personnel would be expected to teach in their home institutions and/or prepare the groundwork for UNC faculty to present the same or similar course

in LDC institutions (N.B. The present proposal does not include costs associated with exportation).

TAB or Bureau Relationship:

Regional Bureaus (and international lending agencies) approve requests for water, sewerage and other water resource projects without ascertaining that qualified personnel are available to operate the completed projects. This practice accelerates deterioration of the facilities and results in waste of scarce capital development funds. The presence of personnel trained to assess the quality of water supply from polluted sources will contribute to improved amenities and advance the quality of life found in the LDC's - a tenet of the AID policy. The project also contributes to the TAB research project on lower cost water and waste treatment methods in the developing countries.

Dissemination:

Recruitment of participants will be accomplished jointly with WHO, PAHO and the World Bank. Availability of the course and its potential for exportation will be through UNC and its 150 graduates of the discontinued International Program in Sanitary Engineering Design. A further means of dissemination will be through the proposed Environmental Health Science Institutes (if the latter project is approved).

Activity* KI \ #3 - Environmental Health
Project No. New Title Self-Instructional Modules

Contract/PA A No. ___ Name ___

Project Manager A.D.Swisher Extension 79446

Contract/PASA Officer V. Perelli Extension 79368

TAB - GENERAL TECHNICAL SERVICES

FY 1975 Interregional Program Budget Review
Project and Budget Analysis Matrix

Major Country/Countries
Worldwide - Field testing centered
~~Philippines~~ - Peru (?)

Obligation: Begin FY 1975 End FY 1975
Work Begin FY 1975 End FY 1975
PROP Status: PROP approved thru FY 19__
New/Revised Required in FY 19__

Estimated Submission Date 1 Month 75 Year

Evaluation Schedule 10 Month 75 Year ___ Type

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to date
A1 PURPOSE: 1. To improve quality of life in LDC's by training personnel to competently operate and maintain municipal water and sewerage facilities. 2. To achieve economies in training professional personnel by using local rather than foreign institutions for training purposes, and by use of self-administered stury courses.	B2 End of Project Status: 1. Availability of a body of water resources knowledge in the local language based upon most modern foreign techniques. 2. Elimination of necessity for transporting students or professors to transfer knowledge of basic sanitation techniques. 3. Reinforcement of educational activities in LDCs with consequent multiplier effect in educational areas other than public health. 4. Students can reliably and effectively perform functions required commensurate with responsibilities of their position.	B3 Assumptions for Achieving Purpose: 1. That LDC's and Missions require personnel trained in water and wastewater techniques to improve local health and sanitation conditions. 2. That a sufficient number of adequately trained personnel are available to supervise this self-administered program. B4 Progress to date:
C1 OUTPUTS: 1. A series of approximately 25 self-instructional modules in the English language dealing initially with elements of municipal water supply, sewage stabilization ponds and groundwater. 2. A similar series, same subjects, in Spanish language. 3. An equivalent of one-half year of instruction at master of science level.	C2 Output Indicators: 1. Magnetic tapes each containing one lecture, with tones to cue slide changes. 2. Sets of color slides each illustrating and supplementing a taped presentation. 3. Pre- and post-test questions to determine extent of informational transfer. 4. Additional references and/or reprints to support basic tapes. 5. Use of technique by other agencies (WHO, IBRD, etc.).	C3 Assumption for Achieving Outputs: 1. Contractor's staff are (a) thoroughly familiar with LDC problems and (b) can focus tapes on those problems. C4 Progress to date:
D1 INPUTS: AID Contractor: Professional educational staff; A-V reproduction facilities; knowledge of LDC problems and DC solutions. AID/W: Funding, monitoring; consultants. LDC: Previously trained professionals; cooperative institutions (University or national level operating agency); student candidates. Others: Review of draft modules; dissemination & utilization of modules. N.B. Above proposal based on production & testing of 25 tapes at $60,000. Funding at that "high" level will permit some 20 additional man/mos. of effort & completion of field testing within proposed 18 mo. time span.		

D2 Budget Summary (in thousands of dollars)

	(1) Personnel		(2)	(3) Participants		(4)	(5) Commodities	(6) Other Costs	(7) Total	(8)** Expenditures	(9) June 30 Pipeline	Terminal Funding Date
All Prior Years	Dollars	MM		Dollars	MM							Month Year
1. Thru FY 1972												
2. Actual FY 1973												
3. Estimated FY 1974												
4. Proposed FY 1975	40	20							40	40	-	June 75
5. All other												
6. Total	40	20							40	40		

*Key Problem Area, Area of Concentration, or Field Support.

**Expenditures are to be computed on an accrual basis.

Self-Instructional Modules

General

This proposal envisions preparation of a series of modules designed specifically for use by engineers in developing countries to enhance their competence in the water supply and sanitation field. Each module will encompass approximately the scope of a technical paper or lecture which reasonably could be delivered in the developing country in an engineering seminar. However, its content and supporting materials will be much more detailed to facilitate self-teaching capability. Thus the modules will be useful under two different circumstances: individual self-study, at home, office or school; and presentation by a local professor before seminars or classes.

Data

Total project requires 12 months for module preparation plus 6 months for field testing and requires $60,000. Partial funding from FY 75 funds in amount of $40,000 means reducing number of tapes produced and deferring the field testing. An additional $20,000, either from FY 75 or FY 76 funds, will be required to complete project as originally planned.

Contractor University of North Carolina which will supply following resources: personnel (project director, faculty, draftsmen, translators and secretarial service); commodities (tape, slides, printing); field supervision of testing.

Work Plan

Twenty-five pairs of modules will be prepared. See page 3 for proposed titles. Each module will consist of the following elements:

1. A magnetic tape of the "lecture," with tones to cue slide changes.
2. A set of color slides illustrating and supplementing the taped presentation, including tables, figures, and color pictures of actual installations, as may be appropriate.
3. A script of dialogue on the tape, which can be used to help overcome difficulties in pronunciation and to provide a basis for possible translation into other languages.
4. A set of black and white reproductions of the slides, to use in self-study or where it may be difficult to use a slide projector.
5. A set of pre- and post-test questions, where appropriate, to help the user or instructor evaluate whether material in the module has been learned.
6. Additional references and reprints of selected articles or reports, as might be appropriate.
7. Detailed instructions and recommendations for use of all materials in the module.

Items 3-7 will be in a booklet, which could be used alone, with tape, or with tape and slides as might be desired.

TAB or Bureau Relationship

This method of training will result in a substantial reduction of costs both direct and indirect. The reduction in the number of students sent to the U.S. for training saves Bureau participant training funds and host country foreign exchange and local currency costs. Self-instructional feature reduces AID costs of supplying bi-lingual teachers on short term assignments. Also, as a means of reducing over-all costs of provision of adequate municipal utility services, the project has a direct tie-in with the TAB research project "Lower Cost Method of Water and Wastewater Treatment in LDC's".

Dissemination

Description, objectives and procedure will be publicized by UNC through articles in professional engineering and educational journals. Module distribution will be by AID utilizing both internal and external organizations including the various national-level agencies for water and sewerage, the World Bank, Pan American Health Organization, WHO, and LDC universities, such as San Carlos in Guatemala, the University of Ghana at Kumasi, Pakistan University of Engineering and Technology, Lahore, Pakistan, etc.

PROPOSED INSTRUCTIONAL MODULES

SELECTED TOPICS ON MUNICIPAL WATER SUPPLY

1. Water and Health
2. Water Quality Standards
3. Optimal Scale of Water Supply Systems
4. Regional Planning of Water Supply Systems
5. Special Considerations in Design for Developing Countries
6. Disinfection of Water - Concepts and Processe
7. Disinfection of Water - Chlorination
8. Disinfection of Water - Design of Facilities
9. Disinfection of Water - Operation and Control
10. Water Distribution

STABILIZATION PONDS

1. Biological, Physical and Chemical Processes in Ponds
2. Key Variables, Process Kinetics and Design Concepts
3. Applications, Limitations, Practical Evaluation
4. Plant Design and Construction
5. Plant Operation and Monitoring

GROUND WATER

1. Ground Water Movement and Storage
2. Aquifer Characteristics and Formation Constants
3. Well Hydraulics - Confined Aquifers
4. Well Hydraulics - Water Table Aquifers
5. Well Hydraulics - Leaky Aquifers
6. Prediction of Drawdowns and Spacing of Wells
7. Well Design - Casing and Pump Selection
8. Well Design - Screen: slot size, dia. and length
9. Well Design - Gravel-pack wells
10. Well-Production Tests and Prediction of Performance

Project No. ____ Title Food Waste/Sanitation Cost-Benefit Methodology

Contract/PASA No. 29[illegible] Name University of North Carolina

Project Manager Dr. Stockard Extension 79445

Contract/PASA Officer L. Perelli Extension 79368

TAB - GENERAL TECHNICAL SERVICES

FY 1975 Interregional Program Budget Review
Project and Budget Analysis Matrix

Major Country/Countries
Worldwide
Guatemala

BEST AVAILABLE

Obligation: Begin FY 1971 End FY 1975
Work Begin FY 1969 End FY 1977
PROP Status: PROP approved thru FY 1975
New/Revised Required in FY 1975

Estimated Submission Date 8 (Month) 74 (Year)

Evaluation Schedule 1 (Month) 74 (Year) A (Type)

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to date
B1 PURPOSE: Produce a manual based upon a field tested quantitative methodology which will assist national planners to determine, in cost-benefit terms, the impact of environmental improvements upon food waste and morbidity under prevailing standards and practices of food supplementation.	**B2 End of Project Status:** 1. Methodology is determined to be inappropriate for accomplishing purpose or found appropriate and has been adopted by one or more countries. 2. Published results of field tests have stimulated national governments to make rational decisions concerning expenditures for health improvements.	**B3 Assumptions for Achieving Purpose:** 1. Intestinal malabsorption of fat, protein, and carbohydrate is a significant cause of food waste in LDC's. 2. Malabsorption can be reduced by improved sanitation. **B4 Progress to date:** Methodology changes suggested by external review team have been incorporated.
C1 OUTPUTS: 1. Cost-benefit appraisal of the independent and synergistic effectiveness of prevailing dietary supplementation and sanitation in reducing food waste and morbidity. 2. Epidemiological data describing health and environmental status of field test communities. 3. A two volume manual describing the methodology. 4. Workshop review of data and manual.	**C2 Output Indicators:** 1. Summarized results of completed health and environmental surveys. 2. Scientific publications describing the field trial. 3. The published manual.	**C3 Assumption for Achieving Outputs:** 1. Significant differences in food waste can be determined. 2. Necessary comparability of the villages can be maintained. **C4 Progress to date:** 1. Baseline data collection completed. 2. Intestinal malabsorption testing started. 3. Water supply nearing completion. 4. Economic protocol completed.

D1 INPUTS: A.I.D. Contractor: Methodology, technical and administrative monitoring, training of field personnel in laboratory & survey techniques 2. Subcontractor: Provides background data, LDC facilities & personnel & local labor to establish present levels of sanitation, 3. AID: Funding, equipment & supplements & monitoring, 4. Government of Honduras: Potable water supply technical consultation & test villages, 5. San Carlos University: Laboratory facilities and engineer consultant.

D2 Budget Summary (in thousands of dollars)

All Prior Years	(1) Personnel Dollars	(2) Personnel MM	(3) Participants Dollars	(4) Participants MM	(5) Commodities	(6) Other Costs	(7) Total	(8)** Expenditures	(9) June 30 Pipeline	Terminal Funding Date Month	Terminal Funding Date Year
1. Thru FY 1972	275	220					275	72	203	3	73
2. Actual FY 1973	194	158					194	195	202	3	74
3. Estimated FY 1974	296	230					296	300	198	3	75
4. Proposed FY 1975	305	244					305	300	203	3	75
5. All other	171	137					171	374	-	3	77
6. Total	1241	995					1241	1241			

*Key Problem Area, Area of Concentration, or Field Support.

**Expenditures are to be computed on an accrual basis.

Project No. ____ Title Enteric Disease Vaccines

Contract/PASA No. ____ Name University of Maryland

Project Manager J.I. Stockard Extension 79445

Contract/PASA Officer ____ Extension ____

FY 1975 Interregional Program Budget Review Project and Budget Analysis Matrix

Major Country/Countries

To be determined - Probably Brazil and Ecuador

Obligations: Begin FY 1974 End FY 1978
Work Begin FY 1974 End FY 1978
Approval Status RIGC Approved Thru FY 19__
RAC Approved Thru FY 19__
RAC Approval Required FY 1974

BEST AVAILABLE

Estimated Submission Date 9 (Month) 73 (Year)

Evaluation Schedule 9 (Month) 75 (Year) A (Type)

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to date
B1 PURPOSE: To evaluate new methods for reducing diarrheal disease morbidity and mortality and to develop additional new approaches for the control of diarrheal diseases.	**B2 End of Project Status:** Oral attenuated vaccines reduce typhoid fever and dysentery attack rates at least 75 percent, progress is made in the identification of other important causes of diarrhea and the feasibility of treating diarrhea with simple fluids which can be easily prepared and administered by mouth under village conditions is demonstrated.	**B3 Assumptions for Achieving Purpose:** 1. The high disease incidence which is the basis for site selection does not drop below the critical level for statistically significant differences. 2. New pathogens susceptible to attenuation to immunizing types exist and can be isolated. **B4 Progress to date:** 1. Preliminary testing of attenuated vaccines completed and safety demonstrated. 2. Other pathogens have been found.
C1 OUTPUTS: 1. Determine acceptability of attenuated oral shigella and typhoid vaccination to an indigenous population. 2. Estimates of the efficiency of these vaccines in reducing diarrheal disease incidence. 3. Determine whether immunity presents a minimum of 3 years without booster immunization. 4. Comparison of oral and I.V. treatments. 5. Further clarity etiology and pathogenises of diarrhea.	**C2 Output Indicators:** 1. Percentage of selected study groups accept the vaccines. 2. Percentage of cases of bacteriologically confirmed disease in control and vaccinated groups. 3. Time trend of the disease attack rate over a three year period. 4. Number of persons started on oral treatment who have to shift to I.V. therapy. 5. Results of pathogenicity testing of organisms isolated from diarrheal cases.	**C3 Assumptions for Achieving Outputs:** 1. Vaccines are acceptable and immuization schedules can be maintained. 2. Disease risk and surveillance will be comparable for the control and vaccine groups over a three year period. **C4 Progress to date:** 1. Attenuated oral typhoid vaccine has reduced attack rate up to 85 percent in human volunteers. 2. Feasibility of oral treatment of cholera has been shown.

D1 INPUTS: AID/W: Funding, consultants, liaison with PAHO and AID Missions. PAHO: Vehicles, administrative and epidemiological support including data for site selection. Gorgas Institute: laboratory space, equipment and field support as required. AID Missions: Assist agreement negotiations. Host Governments: Subject to negotiation.

D2 Budget Summary (in thousands of dollars)

All Prior Years	(1) Personnel Dollars	(2) Personnel MM	(3) Participants Dollars	(4) Participants MM	(5) Commodities	(6) Other Costs	(7) Total	(8)** Expenditures	(9) June 30 Pipeline	Terminal Funding Date Month	Terminal Funding Date Year
1. Thru FY 1972											
2. Actual FY 1973											
3. Estimated FY 1974	370	524			30	100	500***	84	416	10	74
4. Proposed FY 1975	235	350			8	57	300	636	80	3	77
5. All Other	1089	1620			37	257	1383	1463		6	70
6. Total	1694	2494			75	414	2183	2183			

*New Problem Area, Area of Concentration, or Field Support.

**Expenditures are to be computed on an accrual basis.

***Forward Funded for [illegible] of 15 months

Enteric Disease Vaccines

Purpose:

It is the purpose of this project to develop new methods for the control of diarrheal diseases which will be suitable for delivery to LDC populations through Integrated Health Delivery Systems. Particular attention is to be given to identifying more fully the etiology and pathogenesis of these diseases in children and infants because of the adverse effects which repeated attacks of diarrhea have upon human growth and development. Immunization with existing, and development of new, oral attenuated live vaccines is a keystone in the disease prevention effort. In the diarrheal disease treatment program, efforts will be made to employ replacement fluids which can be administered by mouth rather than traditional administration of fluid directly into veins.

Project Justification:

Two promising oral typhoid vaccines now exist and have been tested in human volunteers under conditions quite different from the natural environment in LDC's. Post immunization challenge of control and vaccinated volunteers with 10^5 virulent typhoid organisms has given an 85 percent reduction in the attack rates among vaccinees. Properties which characterize virulent shigella, i.e., bacillary dysentery, organisms have been defined and avirulent strains used as vaccines have proven both safe and effective in human volunteers.

Other organisms recently have been implicated in the causation of diarrhea. These include strains of E. coli which produce a "cholera-like" toxin and a group of viruses.

The feasibility of treating moderately severe cholera by mouth using a glucose containing electrolyte solution has been demonstrated. Such solutions have been successfully used among Apache Indians in the treatment of non-cholera infantile diarrhea.

This project supports two Agency activities. Since diarrheal diseases have an important negative impact upon nutritional status and are a major cause of death in infancy and childhood, reduction in the incidence of the diarrheas would be beneficial to the Agency's efforts to improve nutrition and hopefully would encourage parents to want smaller families, as a consequence of greater assurance of infant survival, thus supporting the population program.

Research Plan:

Sites in Latin America which most consistently have a high incidence of shigella dysentery and typhoid fever will be selected for the vaccine trials by University of Maryland personnel with the assistance of PAHO. School children 5-12 years of age will be divided into two groups, size to be determined, one of which will receive oral typhoid vaccine and the other oral shigella vaccine. Vaccines cultivated by the University of Maryland will be freeze dried by either the Walter Reed Army Institute of Research or the Torluk Institute of Belgrade, Yugoslavia. Local surveillance personnel will record all episodes of diarrhea and collect material for diagnostic study at the Gorgas Institute, backstopped by the University of Maryland, for a three year post vaccination period.

Integration:

This project utilizes the results of work at many institutions, including the AID supported Cholera Research Laboratory, and brings the

earlier results closer to practical application. In addition, the project is a counterpart to the Food Waste/Sanitation project at INCAP which as part of its mission, endeavors to reduce diarrheal disease through sanitary improvements.

Potential for Utilization:

Oral vaccines and replacement fluids can be incorporated into the planned integrated health delivery systems with much greater ease than can injectable vaccine or replacement fluids. Furthermore, living immunizing organisms may become self-sustaining in polluted environments.

THE A.I.D. TASK FORCE ON CHOLERA

In September 1970, as the result of widespread epidemics of cholera, first in the Near East, then in Europe and Africa, many of which produced frantic calls for disaster relief assistance from the United States, the Administrator of the Agency for International Development directed the establishment of a Task Force on Cholera to serve as the focal point for Agency response to the emergency. The Task Force is headed up by a Coordinator named by the Administrator and is located in the A.I.D. Bureau for Technical Assistance, Office of Health, with staff support and administrative assistance provided by the Bureau.

The functions assigned to the Task Force are to mobilize the resources of the U. S. Government and to coordinate with the World Health Organization and other donor organizations on emergency measures to combat cholera outbreaks, and to develop and recommend a long-range A.I.D. strategy for the prevention and control of cholera.

In spite of large amounts of direct assistance contributed by the U. S. Government in cholera emergencies prior to the establishment of the Task Force, the Agency had no policy on cholera per se. Nevertheless, the basic position has been established that the social, emotional, health and economic problems created by cholera constitute valid reasons on humanitarian grounds alone for the U. S. Government to respond positively to requests for assistance in cholera emergencies. Agency experience in coping piecemeal with cholera emergencies during the current Pandemic led the Task Force to the conclusion that the effective management of anti-cholera measures can only be achieved through coordination of resources on a world-wide scale by

a multilateral agency having recognized international health responsibilities. In this context the Task Force recommended that every effort would be made by A.I.D. to strengthen the leadership role of the World Health Organization in the world-wide anti-cholera effort.

In recognition of the magnitude of the task, as well as the U. S. Government's intent that the World Health Organization assume leadership in the world-wide anti-cholera effort, U. S. Missions abroad have been advised that the Agency's policy is to avoid bilateral response to cholera emergencies by channeling all such requests to WHO. This permits maximum coordination by WHO of donor resources when responding to multiple requests for assistance. A.I.D. supplements WHO's resources upon formal request by the Director-General. Thus, during 1970-71 A.I.D. supplied WHO with 10 million mililiters of cholera vaccine and drugs, needles and syringes valued at $236,000. In June 1971 an urgent appeal was again made by WHO for cholera vaccine and A.I.D. made a cash contribution of $200,000 to WHO to be used for the purchase of cholera vaccine. Cash contributions of this nature are made to the WHO Voluntary Fund for Health Promotion, Special Account for Cholera.

In order to approach the problem of formulating an economically feasible long-range plan for the eventual world-wide control of cholera, the A.I.D. Cholera Task Force assembled advisory panels of expert consultants. These principal identified and focused on four/problem areas: Vaccine Production, Control of Transmission, Surveillance and Therapy. The conclusions reached by the Task Force are based on the recommendations of these expert panels and are contained in the Interim Report of the Task Force on Cholera* which was published in

*See accompanying copy

June 1971. They emphasize that cholera is essentially a problem of pollution of the environment by human excreta and its control requires a coordinated attack on enteric diseases by improved sanitation practices, particularly as they apply to water supplies, excreta disposal and food handling.

With the publication of the Interim Report and its review by WHO, the A.I.D. Cholera Coordinator was invited to Geneva by WHO to develop a procedural approach in the formulation of a world-wide strategy and plan aimed at the eventual control of cholera and supported by multination donors as indicated in the Interim Report.

WHO has accepted in principle their role of leadership and A.I.D. has provided $35,000 to be used by WHO to employ consultants to assist in the formulation of a plan for a global attack on cholera. The consultant team, which included Dr. Abel Wolman, has met twice in Geneva with WHO staff members during 1973. Based on data collected by WHO fact-finding teams who visited 13 countries in Africa, Asia and Europe, a Plan of Work for the EPCC was outlined by the consultant team and projections for implementation are currently being developed in Geneva. The recommendations which, in the view of the Director-General of WHO, offer a sound and practical basis for the development of an intensified program for the control of cholera and related research activities on an immediate and long-term basis have been submitted to A.I.D. with the hope that A.I.D. would assist in the implementation of the program.

In A.I.D. the strategic planning of the Cholera Task Force is considered to be an important element of the Environmental Health Key Problem Area and there is close coordination with programs and objectives of the environmental sanitation activities. In WHO/Geneva planning is being conducted on an inter-divisional basis and the WHO Environmental Health Division under Dr. Bernd Dietrich is a major participating element which integrates its program objectives with those of the EPCC.

In addition to the functions assigned to it by the Administrator, the Task Force provides a liaison between the Agency and the National Institutes of Health which has the responsibility for the scientific direction of the research program of the Cholera Research Laboratory located in Dacca, Bangladesh. This laboratory serves as the institution for the implementation of a cooperative program of cholera research between the Government of Bangladesh and the Government of the United States acting through A.I.D. and NIH. The prime mandate of the laboratory is the field testing of cholera vaccine and a newly developed cholera toxoid. Support of this laboratory serves the interests of the Agency to expedite the development of an improved cholera vaccine as an important component of a world-wide strategy to control cholera.

AIRGRAM

DEPARTMENT OF STATE

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SUBJECT - AID Policy on Malaria Programs

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SER
AFR 25
LA 28
ASIA 15
SAB 20
PPC 4
GC
GCFLD
GCAF
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Purpose

This airgram is intended to restate and clarify the AID malaria policy in light of current conditions. This policy does not advocate that AID resume the major external support role which it has provided during the past 15 years, but it does clearly provide flexibility to support malaria programs under certain specified conditions. (See Attachment A.)

Current Situation

Since the adoption of current Agency policy in support of world-wide malaria programs, the following events have taken place which have a considerable bearing on AID support.

1. In the past two years, there have been serious outbreaks of epidemic malaria and/or a return to a high level of continuing malaria transmission in a number of countries where malaria had been reduced to a very low level with AID assistance. These countries include Pakistan, Thailand, India, and Indonesia.

2. In Vietnam, Cambodia and Laos, the cessation of hostilities and the subsequent movement of large numbers of people is likely to aggravate the malaria situation.

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DRAFTED BY	OFFICE	PHONE NO.	DATE	APPROVED BY:
ESmith:mab	TA/H	79425	6-25-73	JAHannah, Administrator

AID AND OTHER CLEARANCES

SER/PM:HBHopkins(Draft) ACallahan TA/H:LMHoward(Draft) GC:AJRichstein (Draft)
AA/PPC:RPodol(Draft) TA/MGT:JMcCardell(Draft) CM/PAS:ERawson(Draft)
AA/TA:DEAnderson(Draft) AA/LA:HKleine(Draft)
~~AA/SA:JGudney, (Draft) for Breecher~~
GC:AZGardiner

UNCLASSIFIED
CLASSIFICATION

AID-5-39 (11-65) (Do not type below this line) PRINTED 8-65

4. The HEW/Center for Disease Control (CDC), the major source of malaria expertise previously available to AID, will terminate its AID PASA arrangements on 7/1/73. Arrangements have been made for the transfer to WHO of one or two of the remaining CDC malaria advisors.

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6. In many country programs, the management/logistics advisors required to increase the LDC managerial capability have not been made available from multilateral sources.

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Clarification of AID Policy

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1. To provide for selective assistance to worldwide malaria programs on a case-by-case basis when a country demonstrates its own interest and concern for malaria through the provision of an adequate budget and staff to carry out the program.

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USAID Actions

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RUSH

Clearances: PPC/IA:MGallop(Draft)

/ASIA:AShakow(Draft) AFR/DS:PLyman(Draft) AFR/ESA:JKnoll(Draft)
AA/ASIA:AWhite(Draft) IO/HDC:CJNee(Draft)
AA/SER:JWilliams(draft)

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(C) AIDTO Circ A-1727
(D) State 066886

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1. LDC's who demonstrate a willingness to help themselves by providing whatever resources they have available to carry out the program.

2. Realistic assessment of assisted projects to obtain a sharper definition of those targets which can be reasonably expected to be reached within a time-limited effort and those which are likely to be delayed due to administrative, technical or political problems.

3. Retention of malaria eradication as the ultimate objective for projects which meet and maintain the minimum WHO and AID conditions (as expressed by the Fourteenth WHO Expert Committee on Malaria, 1968, and in conformance with the Twenty-second World Health Assembly resolution on malaria, 1969).

4. Maintenance of the option to support malaria control activities where projects do not currently meet eradication criteria, if the economic, social, or political value of the project merits support.

5. Promotion of multilateralization of technical services through encouraging assisted governments to request advisory services from WHO while effecting an orderly withdrawal of U.S. scientific advisory technitians.

6. Continuation of support in the context of foreign assistance policy to research, commodities, local costs, and evaluation; cooperation with other U.S. agencies and WHO is assisting multilateralization of technical services; and consideration of interim provision of staff assistance in managerial areas where WHO may not be able to provide such staff.

7. The A.I.D. Office of Health, Technical Assistance Bureau (TA/H) has an overall central responsibility for development of AID policy for malaria eradication and assuring its implementation. TA/H has a direct responsibility for AID central support to malaria research projects. Assistance to the country projects is implemented through the AID Regional Bureaus.

(Under a 1970 Memorandum of Understanding between AID and HEW, the Center for Disease Control of the Public Health Service has worked directly with AID in carrying out the responsibility for the Malaria Eradication Program. This responsibility has included provision of staff, expediting commodity assistance, planning and participating in evaluations and providing headquarters backstopping for these activities.)

The above-mentioned Memorandum of Understanding which established AID/HEW relationships is to be terminated June 30, 1973 and on July 1, 1973 AID will resume responsibilities delegated to HEW/CDC which are required to carry out current AID policy on malaria.

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AID assistance to country malaria programs will be considered when:

1. the country demonstrates its own interest and concern for malaria through the provision of an adequate budget and staff to carry out the program;

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3. the country provides a malaria plan which is technically, administratively, and financially sound and is based on an AID review of the recommendations of a joint WHO/LDC evaluation team;

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Unclassified AIDTO Circular A 7.33

CLASSIFICATION

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CAPTIONS

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NAIROBI FOR USAID AND REDSO/EA

BANGKOK FOR USOM AND RED

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3/9/73

AIRGRAM

DEPARTMENT OF STATE

UNCLASSIFIED
CLASSIFICATION

570P

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DATE REC'D. JUL 5 TA/H 3 25 PM '73

DISTRIBUTION
ACTION
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INFO

DATE SENT 7-3-73

TO - AIDTO CIRCULAR A 733

LIST P

FROM - AID/W

E.O. 11652: N/A

SUBJECT - AID Policy on Malaria Programs

REFERENCE -

DM
EXSEC
MP
PA
SER
AFR 25
LA 28
ASIA 15
SAB 20
PPC 4
GC
GCFLD
GCAF
GCLA
GC[illegible]
G[illegible]IA
AATA
TA/MGT
CDC
HEW
NSC
HEW
STATE

ATT.

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PAGE 1 OF 3 PAGES

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ESmith:mab	TA/H	79425	6-25-73	JAHannah, Administrator

AID AND OTHER CLEARANCES
ACallahan
SER/PM:HBHopkins(Draft) TA/H:LMHoward(Draft) GC:AJRichstein(Draft)
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RUSH

Clearances: PPC/IA:MGallop(Draft)

/ASIA:AShakow(Draft) AFR/DS:PLyman(Draft) AFR/ESA:JKnoll(Draft)
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Unclassified AID Circular A 7.33

CLASSIFICATION

LIST P FOR A.I.D. AIRGRAMS AND TELEGRAMS SEND TO:

LIST P

7 AMMAN	13 KABUL	10 PANAMA CITY
3 ABIDJAN		* PHNOM PENH
8 ACCRA	8 KATHMANDU	10 QUITO
7 ADDIS ABABA	5 KINGSTON	7 RABAT
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ACCRA FOR USAID AND RPO

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* Telegrams Only

Unclassified AID Circular A 7.33 REV.

CLASSIFICATION

3/9/72

AIRGRAM

DEPARTMENT OF STATE

UNCLASSIFIED
CLASSIFICATION

For each address check one ACTION | INFO

DATE REC'D. JUL 5 1973 TA/H

570P

DATE SENT 7-3-73

DISTRIBUTION
ACTION
H
INFO

TO - AIDTO CIRCULAR A 733

LIST P

FROM - AID/W

E.O. 11652: N/A

SUBJECT - AID Policy on Malaria Programs

REFERENCE -

DM
EXSEC
MP
PA
SER
AFR 25
LA 28
ASIA 15
SAB 20
PPC 4
GC
GCFLD
GCAF
GCLA
GCEA
GCASIA
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CDC
HEW
NSC
HEW
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ESmith:mab	TA/H	79425	6-25-73	JAHannah, Administrator

AID AND OTHER CLEARANCES
ACallahan
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RUSH

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		10	LA PAZ	20	RIO DE JANEIRO
15	BOGOTA	13	LIMA	10	SAIGON
10	BRASILIA			9	SAN JOSE
10	BUENOS AIRES	7	MBABANE	8	SAN SALVADOR
3	COLOMBO	10	MANAGUA	10	SANTIAGO
5	DAKAR	6	MANILA	10	SANTO DOMINGO
5	DAR ES SALAAM			7	SEOUL
8	DJAKARTA	2	MEXICO	8	TEGUCIGALPA
		10	MONROVIA	10	TUNIS
	GEORGETOWN	8	MONTEVIDEO	10	VIENTIANE
9	GUATEMALA	12	NAIROBI	3	USUN
18	ISLAMABAD	10	NEW DELHI	4	YACUNDE
3	DACCA	3	NIAMEY		

CAPTIONS

ACCRA FOR USAID AND RPO

DAR ES SALAAM FOR USAID AND RDOEA

GUATEMALA FOR USAID AND ROCAP

NAIROBI FOR USAID AND REDSO/EA

BANGKOK FOR USOM AND RED

* Telegrams Only

Unclassified AIDTo Circular A 73 3 REV.

CLASSIFICATION

3/9/73

Activity: AID #3 Environmental Health

Project No. _____ Title: Malaria Immunity and Vaccination University of New Mexico

Contract/PASA No. csd-3685 Name: Dr. Paul Silverman

Project Manager: Edgar Smith Extension: 79425

Contract/PASA Officer: Virginia Perelli Extension: 79365

RESEARCH AND SECTION 211(d)

FY 1975 Interregional Program Budget Review
Project and Budget Analysis Matrix

Major Country/Countries

All countries with malaria

Obligations: Begin FY 19 72 End FY 19 75
Work Begin FY 19 73 End FY 19 75
Approval Status RIGC Approved Thru FY 19 75
RAC Approved Thru FY 19 75
RAC Approval Required FY 19 76
Estimated Submission Date _____ (Month) _____ (Year)
Evaluation Schedule July (Month) 1973 (Year) _____ (Type)

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to date
B1 PURPOSE: Development of a vaccine for use against human malaria.	B2 End of Project Status: Demonstration of the practical feasibility of a vaccine for human use.	B3 Assumptions for Achieving Purpose: That it will be possible to develop and mass produce a vaccine against human malaria. B4 Progress to date: The biological feasibility of artificial immunization against malaria has been demonstrated and various methods of antigen preparation have been developed and compared.
C1 OUTPUTS: 1. Development of a standard parasite-mosquito mouse model. 2. Development of a standard parasite-mosquito-monkey model. 3. Develop practical method for preparation of antigens. 4. Develop a practical method of growing parasites in vitro. 5. Development of a vaccine. 6. Development of an in-vitro test to measure productivity.	C2 Output Indicators: 1. Use of the rodent model system in controlled experiments. 2. Use of the monkey model system in controlled experiments. 3. Availability of antigens for controlled experiments. 4. Establishment of a cell line through mosquito tissue culture. 5. Use of in-vitro test to check results.	C3 Assumptions for Achieving Outputs: That results obtained in rodent model systems can be repeated in primates and eventually in humans; that in-vitro (tissue culture) methods will lead to successful mass production of the antigens required for development of a vaccine. C Progress to Date: 1. Rodent model system has been used to demonstrate that sporozoite antigens can produce broad protection against infection and trophozoite antigen can be used to suppress erythrocytic (symptom-producing) phase of malaria. 2. Monkeys have been immunized with trophozoite antigen but optimum monkey model system is still being developed. 3. Mosquito tissues have been cultivated.

D1 INPUTS:
1. Dev. of laboratory facilities. 2. Training of research personnel. 3. Dev. of technicians. 4. Establishment of a mosquito colony. 5. Provision for the use of an already established animal laboratory. 6. A sub-contract with Rush-Presbyterian-St. Lukes Med. Center, Chicago to develop a parasite mosquito-monkey model system Aotus monkeys and human malaria. 7. Provision of a Director, 5 Research Associates, 13 Research Technicians and an administrative assistant at U. of N. Mexico & 4 Research Associates, 2 Research Technicians & a Secretary (1/2 time at Rush-Presbyterian-St. Luke)

D2 Budget Summary (in thousands of dollars)

	(1) Personnel		(2)	(3) Participants		(4)	(5) Commodities	(6) Other Costs	(7) Total	(8)** Expenditures	(9) June 30 Pipeline	Terminal Funding Date
All Prior Years	Dollars	MM		Dollars	MM							Month / Year
1. Thru FY 1972							107	33	628			Nov. 30 1973
2. Actual FY 1973	190	252					265	87	145	330	443***	Mar. 31 1974
3. Estimated FY 1974	248	300					120	283	600	520	523	Mar. 31 1974
4. Proposed FY 1975	272	324							675	640	558	June 30 1975
5. All Other										558		
6. Total									2048	2048		

**Expenditures are to be computed on an accrual basis. ***See Other Side

Malaria Immunity and Vaccination Project - University of New Mexico

Project Summary

The scope of work of the project will be amended to provide for an expansion of the effort and concentration on the priority areas requiring technological breakthroughs.

Changes include the following:

1) Phasing out the in vivo sporozoite/rodent model test system inputs of the University of Illinois Sub-Contract as no longer required.

2) Adding a research associate and a research assistant to speed up the urgent work on the development of the best methods of in-vitro production of sporozoite and trophozoite antigens.

3) Concentration and expansion of the efforts to find solutions to the problems of bacteremia and anemia in vaccinated monkeys, and the problem of finding a suitable replacement for Freund's Adjuvant for human use.

4) Adding a sub-contract with Rush-Presbyterian-St. Lukes Medical Center, Chicago to develop a parasite-mosquito-monkey model system using Aotus monkeys and human malaria. This will pave the way for vaccine trials with humans at the earliest possible date.

Explanation of the Funding

This project was forward funded for the maximum period of 21 months in two increments i.e., $627,623 from FY 72 funds and $145,600 from FY 73 funds.

An increase in the funding to provide for an enlargement of the scope of work is included in the estimated FY 1974 budget summary. This increase is to provide for a sub-contract with the Rush Presbyterian St. Lukes Medical Center, Chicago to develop a parasite-mosquito-monkey model system using Aotus monkeys and human malaria, and to increase the staff at the University of New Mexico to expand the work in in-vitro antigen production.

This increase amounts to $116,000 annually for the sub-contract and $80,000 annually for the expanded effort on in-vitro antigen production.

Activity* KPA #3 Environmental Health

Project No. ____ Title Development of Biodegradable DDT

Contract/PASA No. ____ University of Illinois Name Dr. Robert Metcalf

Project Manager Edgar Smith Extension 79425

Contract/PASA Officer Virginia Perelli Extension 79365

RESEARCH AND SECTION 211(d)

FY 1975 Interregional Program Budget Review
Project and Budget Analysis Matrix

Major Country/Countries

Worldwide

Obligations: Begin FY 19__ End FY 197__
Work Begin FY 19__ End FY 197__
Approval Status RIGC Approved Thru FY 19__
RAC Approved Thru FY 19__
RAC Approval Required FY 19__
Estimated Submission Date ____ ____ (Month Year)
Evaluation Schedule ____ ____ ____ (Month Year Type)

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to date
B1 PURPOSE: To improve the quality, performance and method of formulation of selected biodegradable analogues of DDT.	**B2 End of Project Status:** When one or more of the biodegradable analogues of DDT are identified as effective, reasonable in cost and safe, and when commerical production is assured.	**B3 Assumptions for Achieving Purpose:** That one or more of these DDT analogues will have a broad spectrum of effectiveness, be environmentally safe and have a low cost of production. **B4 Progress to date:** Two of the analogues have shown promise against mosquitoes and are safe environmentally.
C1 OUTPUTS: 1) Synthesize at least 5 biodegradable analogues of DDT. 2) Test these compounds as residual sprays for mosquito control. 3) Pond tests of effectiveness against mosquito larvae and beneficial insects and fish. 4) Evaluate compounds against other disease vectors.	**C2 Output Indicators:** 1) Testing samples available. 2) Mortality of mosquitoes in sprayed huts. 3) Mortality of mosquitoe larvae and beneficial insects and fish in ponds. 4) Mortality of other disease vectors resulting from tests.	**C3 Assumptions for Achieving Outputs:** 1) That one or more compounds would be effective as a residual wall spray against anopheles mosquitoes. 2) That one or more compounds would be effective against mosquito larvae, but not against fish. 3) That one or more compounds would be effective against a variety of other disease vectors and agricultural pests. **C4 Progress to date:** Two compounds show promise in meeting these criteria.

D1 INPUTS:

1) Utilization of lab facilities.

2) Construction and utilization of ponds and field huts for use in simulated field tests.

D2 Budget Summary (in thousands of dollars)

All Prior Years	(1) Personnel Dollars	(2) MM	(3) Participants Dollars	(4) MM	(5) Commodities	(6) Other Costs	(7) Total	(8)** Expenditures	(9) June 30 Pipeline	Terminal Funding Date Month	Terminal Funding Date Year
1. Thru FY 1972											
2. Actual FY 1973											
3. Estimated FY 1974						18	18	18		6	74
4. Proposed FY 1975								4			
5. All Other											
6. Total						18	18	22			

*Y[illegible] A[illegible] f C[illegible] t[illegible] F[illegible] * ** E[illegible] a[illegible] be r[illegible] on an accrual basis

Activity* Environmental Health

Project No. _____ Title Development of Fenitrothion

Contract/PASA No: Grant Name WHO

Project Manager Edgar Smith Extension 79425

Contract/PASA Officer V. Perelli Extension 79365

TAB - GENERAL TECHNICAL SERVICES

FY 1975 Interregional Program Budget Review
Project and Budget Analysis Matrix

Major Country/Countries

All countries with malaria

Obligation: Begin FY 1973 End FY 1974
Work Begin FY 1973 End FY 1975
PROP Status: PROP approved thru FY 19__
New/Revised Required in FY 19__

BEST AVAILABLE

Estimated Submission Date ____ (Month) ____ (Year)

Evaluation Schedule ____ (Month) ____ (Year) ____ (Type)

Narrative	Objectively Verifiable Indicators	Important Assumptions and Progress to date
B1 PURPOSE: To develop Fenitrothion as a replacement residual insecticide for DDT in malaria programs.	B2 End of Project Status: Approval of Fenitrothion by WHO for use as a residual insecticide and substitute for DDT in malaria programs where required as a substitute for DDT.	B3 Assumptions for Achieving Purpose: That Fenitrothion will be approved by WHO and will be used by national malaria programs where DDT resistance is a technical problem. B4 Progress to date: In the WHO scheme for evaluation of insecticides for vector control, Fenitrothion has already met the criteria for six of the seven stages of testing and development.
C1 OUTPUTS: 1. Toxicological evaluation of the safety of using Fenitrothion. 2. Operations evaluation of large-scale field use. 3. Epidemiological evaluation of effectiveness in interrupting transmission of malaria.	C2 Output Indicators: 1. Successful large-scale use with no safety problems. 2. Successful large-scale use with no major operational problems in the field. 3. Completion of epidemiological surveys after proving its effectiveness for the interruption of transmission of malaria.	C3 Assumption for Achieving Outputs: That Fenitrothion used as a residual wall spray in LDC village situations will present no serious safety or operational problems and will be effective against Anopheles mosquitoes and successfully interrupt transmission of malaria. C4 Progress to date: 1. Completed in the Stage VI trial 2. Partially evaluated 3. Entomological evaluation virtually complete in stage VI trial.

D1 INPUTS: WHO/Vector Biology and Control

1. Demographic survey and geographical reconnaisance.
2. Epidemiological investigations.
3. Entomological investigations.
4. Selection and training of local staff.
5. Establishment of headquarters and field offices and organizations.
6. Spraying and evaluation

D2 Budget Summary (in thousands of dollars)

All Prior Years	(1) Personnel Dollars	(2) Personnel MM	(3) Participants Dollars	(4) Participants MM	(5) Commodities	(6) Other Costs	(7) Total	(8)** Expenditures	(9) June 30 Pipeline	Terminal Funding Date Month	Year
1. Thru FY 1972											
2. Actual FY 1973					160		160	160	—		
3. Estimated FY 1974						215	215	215	—		
4. Proposed FY 1975											
5. All other											
6. Total					160	215	375	375			

*Key Problem Area, Area of Concentration, or Field Support

**Expenditures are to be reported on an accrual basis (GRANT)

Development of Fenitrothion

Project Narrative

Project Title	:	Grant to WHO for Malaria Control
Duration	:	2 years
Estimated Cost	:	$375,000
1st year		160,000*
2nd year		215,000

In July 1972 WHO initiated a 3-year program to combat the mosquito vector resistance problems encountered in many parts of the world. This program provides for an epidemiological evaluation of Fenitrothion as a residual wall spray in lieu of DDT or other insecticides. The initial phase provides for the collection of base-line data to be completed by June 1973. WHO plans to begin spraying in July followed by additional cycles every three months for two years. Evaluation will continue for at least one full year after completion of spraying.

WHO had originally planned to finance the total 3-year program from its own budget. However, because of currency devaluation and inflation, an additional $375,000 is required from other sources if the program is to be implemented as originally planned. Needed immediately is $160,000 for the purchase of Fenitrothion for the July spraying.

This activity is extremely important to A.I.D. as recent events emphasize the need for a new substitute for DDT. Resurgence of malaria in Pakistan has reached epidemic proportions with over 200,000 reported malaria cases in one month.

The vector mosquito in Pakistan is already resistant to DDT. The population in India living in areas where the vector mosquito is resistant to DDT and other insecticides is increasing each year. DDT is virtually useless in most of Central America. USAID Mission Directors from Pakistan and the Philippines have expressed their concern to AID/W over the threat of malaria. AID health officials for S.A. Bureau have expressed similar concern for the Indo-Chinese peninsula countries.

Another supporting factor in developing an effective substitute for DDT is that the Environmental Protection Agency or the Congress may challenge the worldwide use of DDT in the fight against malaria.

* Already allocated from FY 1973 funds

AID-DLC/P-1067
February 6, 1973

HEALTH SECTOR LOAN

SUMMARY AND RECOMMENDATIONS

A. Borrower and Implementing Entities

The Borrower will be the Government of Colombia (GOC), represented by the Ministry of Finance. The implementing agency will be the Ministry of Health, and the Minister of Health will be a signatory to the loan. To formalize its responsibilities for monitoring and evaluating implementation of the program, the National Planning Department (DNP), will also sign the loan. The following are sub-implementing agencies: Malaria Eradication Service (SEM), National Special Health Projects Institute (INPES), Colombian Family Welfare Institute (ICBF), and the National Hospital Fund (FNP).

B. The Loan

1. Amount: Not to exceed $19.4 million, of which up to $1 million will be used for procurement of vehicles.

2. Terms: Interest in dollars at 2% during first ten years, 3% thereafter. Repayment shall be in dollars over 40 years, including a ten-year grace period.

Note: Peso amounts shown in this document for use in calendar year 1973 are calculated on basis of 24.0 Colombian pesos as equalling 1.0 U.S. dollar; for 1974 the exchange rate is estimated at 26.4 Colombian pesos as equalling 1.0 U.S. dollar.

C. Purposes

To support a major expansion of GOC investment and new policy initiatives in the health sector including the extension

of public health coverage through improved and increased maternal/child care; a regionalized scheme of services which will permit unified direction and coordination of all public health activities, preventive and curative; greater delegation of function and more rationalized location of facilities; expanded training for health; improved rural sanitation; enlarged preventive campaigns of disease control and eradication; expanded operational research; increased production of medical inputs, and improved sector planning and administration.

D. Background

U.S. assistance to the public health sector in Colombia dates from the 1950's. It was accelerated in 1965, when grant-funded technical assistance was supplemented by provision of program loan-generated counterpart funds. The equivalent of U.S. $36 million in local currency was allocated to the health sector between 1965 and 1971. In addition, approximately $120 million of Title II PL-480 food was donated and distributed through voluntary agencies during the past 18 years.

In order to expand dramatically the impact of public health activities as part of the National Plan's emphasis of social development objectives, the GOC has submitted a formal loan application for U.S. $35 million to assist the GOC finance sectoral investment during 1973-1975. The present CAP proposes authorization of a loan of up to U.S. $19.4 million for the first two years of the investment program.

E. Reasons for Selecting the Sector Loan Technique

Consonant with A.I.D. experience in other sectors in Colombia, the sector lending technique is considered to be preferable to either project loans or program loans at this time. Unlike a project loan which covers only a small area, generally is expended over several years, is mainly concerned with the end-use of loan funds and is relatively rigid in its application once negotiated, the sector loan permits assistance to essential elements in the entire area of concern,

especially improved policies, planning and management, and is under constant attention, through review and negotiation, allowing refinement of assistance and strategy as sector problems arise. Also, a sector loan has many of the advantages of a program loan, such as its effect on helping to meet balance of payments problems and spurring on more adequate fiscal performance. However, in the main, it addresses directly the crucial sector issues and seeks improved efficiency and utilization of applicable resources.

F. Loan Description

The loan will provide A.I.D. assistance for the expansion of public health investment primarily in the field of "prevention" (nutrition and maternal/child care), protection (disease control), facility remodelling and construction, personnel training, rural sanitation, research and planning. The sub-projects have been designed to support a strategy encompassing the following five elements:

1. Broadening the coverage of services through regionalization (which permits greater delegation of responsibility and increased efficiency), priority attention to maternal/child care, and, generally, increased emphasis on preventive medicine as opposed to curative services;

2. Expanded personnel training, together with revised curricula, increased incentives and greater delegation of functions;

3. Strengthened operational and applied bio-social research;

4. Increased, more rational investment in hospital construction and equipment through a reinforced single mechanism for channelling funds, and a strengthened central supply agency, and

5. Improved mechanisms of intra-and-inter-sectoral coordination, especially related to nutrition, maternal/child care, health education, urban development, and rural sanitation.

SECTION II THE PROJECT

A. Project Description

The project to be supported by the proposed A.I.D. loan consists of the entire Central Government public health sector investment budget during 1973 and 1974.

The total level of investment required over the three-year period 1973-75 is estimated at about U.S. $210 million (Col.$5,537.4 million), of which A.I.D. has been requested to finance U.S. $35 million, or 16%. The loan requested in this CAP is to cover the first two years of the Plan. Examination of the GOC fiscal situation and prospects for the pertinent years supports the conclusion that the overall financial level can not be reached in this time frame without external assistance. The breakdown by programs, pursuant to the GOC request, is detailed on the following table.

Central Government public health investment expenditures, as planned, would increase 80% in 1973 over 1972 and continue upward over the succeeding two years. The largest programs are "prevention", (nutrition, maternal/child care, welfare), which would receive food contributions but only limited loan support,[1/] and recuperation (hospital construction and equipping). Substantially increased financing is programmed for personnel training and the rural sanitation program.

As justification for the heavy investment in recuperation facilities, the GOC Plan establishes that "the hospital is today thought of as the center of all health activity." That activity is to be organized along regional lines, with the hospital as the key organism of the scheme. The hospital thus assumes a leading role in training and in the supervision of satellite health centers and health posts which have been established to deliver health services in outlying areas. A referral system is contemplated which will provide a succession of progressively sophisticated health services from the simple care

1/ Maternal/child care includes a family planning component, but A.I.D. loan financing will not be used for this program.

at health posts manned by auxiliary nurses with scheduled visits by doctors, through health centers with auxiliary nurses and part-time medical service, then higher levels of care at local hospitals (primarily for emergency hospitalization and maternity care), to the specialized care provided at regional hospitals in departmental capitals and other intermediate cities, and, finally, to the apex or center of the system, with highly skilled medical service available in university medical faculty hospitals. Conversely, training, supervision, and outreach medical services emanate from the university and regional hospitals through the local hospitals to the centers and posts. The hospital, therefore, will serve not only as a center for curative medicine, but also as a key element for organizing, stimulating, and supervising preventive health measures and for implementing the stated priority of maternal/child care. The National Hospital Plan will assign investment resources for hospital construction in line with the regionalization scheme. The Plan recognizes the need for equipment and transporation, and the priority attached to finishing hospitals already started, before building others, except for missing or obsolete key elements of the network.

The Hospital Plan currently aspires to finish, remodel or construct 141 institutions, at a cost of 1.5 billion pesos during 1972 - 75. (One hundred twenty-two of these projects are to be carried out during 1973-75). The National Hospital Plan is the cutting edge of the policy to consolidate public health services into a servicio unico, the mechanism selected to achieve greater internal efficiency. The Hospital Plan is also conceptually and physically linked to the AID-supported urban/regional focus on intermediate cities.

Broadening of basic health services in rural areas and marginal urban zones will be assisted by construction of approximately 330 health centers and posts in 1973 and 1974, an increase of about 25% over the current number of such facilities. The cost of this program will be up to 50 million pesos of which approximately 20 million pesos will be allocated for creation of some 130 centers and posts associated with "areas of rural concentration" in which the Ministries of Education, Agriculture and Health jointly will provide coordinated services of rural primary education, agricultural extension and credit, community development and health. Approximately 30 million pesos are to be allocated for construction of some 200 centers and posts in other rural areas and marginal urban zones.

Several important health personnel bottlenecks are to be alleviated through a human resources program which includes new incentives, new organizational structures, and greater investment in training. Perhaps the most important element of the program is the increased delegation of functions to auxiliary technical and para-medical personnel, an integral part of the regionalized system. Training is to be provided for selected professional categories in short supply (anesthesiologists, pathologists), auxiliary and practical nurses, maintenance personnel and administrators.

The various immunization and disease control campaigns that comprise the protection program appear to be well planned. Short-term goals are precise, quantified, and costed out; procedures have been established in fair detail and coordinated among the projects. Control efforts for malaria, yellow fever, and yaws are to be continued with special emphasis on agrarian colonization areas. New campaigns will be devoted to venereal disease control and measles and polio immunization.

Similarly, the rural environmental sanitation program is well conceived and involves basically the acceleration of on-going efforts. The goals have been costed out through 1980. The current plan, 1973-75, is consistent with the longer range planning goals. Priority in project selection will go to rural development concentrations in order to reinforce the advantage of multi-sector programming within selected rural areas. These projects also are partially self-financing. Local communities provide about 20% of the costs through donated labor and materials and repay the remainder of the investment costs to an INPES revolving fund, at subsidized interest rates.

Research, information, and planning projects have been developed which are consistent with the most pressing needs of the sector. Research is directed to operational problems in order to determine more efficient health services delivery mechanisms. The information program focuses on Colombia's substantial deficiencies in vital statistics.

Centralized supply of medical inputs is one of the Plan's mechanism by which more efficient organization in the sector is to be accomplished. The complementary inputs program will increase the scope of central supply services, in large part through increased production of medical inputs by agencies attached to the Health Ministry. The purchase of vehicles will be financed through the AID loan dollar input.

In addition to the sectoral investment program described above, the Ministry of Health and the DNP are preparing to sponsor and will require supplemental external, technical, and financial assistance for two studies

which should affect future sectoral strategy and programs. The first of these studies is the analytic model of comparative cost-benefits of alternative strategies, which has been proposed by LA/DR/SASS. The second is an operations research study of the regionalization scheme as it has been implemented in the Department of Valle.

B. Description of Key Levels of Impact and Anticipated Results

The program is described in Section II A above, and expected results are recapitulated in Annex B.

1. Health "Prevension" (Fomento)

This activity, an important and integral part of the whole, and one of the largest in the sector program, will be financed largely from GOC resources. The following results from the expansion of GOC support to the activity are expected:

a. Provision of the complete range of maternal/child care services to an additional 50 municipalities in 1973, and an additional 65 municipalities in 1974.

b. An increase in those pregnancies which are aided by the MCC program, estimated at 25,000 additional cases annually in both 1973 and 1974.

c. An annual increase of approximately 20% in the number of children who receive well-baby care and medical consultations under the MCC program.

d. An increase of 7,000 in the number of promotoras engaged in the program by 1974.

e. Social assistance and treatment of minors reaching approximately 430,000 persons by 1974.

f. Nutritional supplementation for 170,000 mothers, 510,000 pre-school children, and 1,730,000 school children annually by 1974.

g. Nutritional education for approximately 1,600,000 persons annually by 1974.

h. Repair or remodelling of 25 geriatric facilities in 1973 and 52 facilities in 1974.

2. Health Protection

a. Control of malaria in areas containing 9,700,000 inhabitants, and direct treatment and eradication measures benefitting 2 million persons.

b. Control and eradication of yaws in areas containing 430,000 persons.

c. Control of aegypti (yellow fever) through mosquito eradication in 450,000 households.

d. Smallpox and tuberculosis vaccination of 80% of the nation's infants.

e. DPT vaccination of 60% of newborn infants.

f. A massive campaign to vaccinate 80% of children one to four years old against measles and polio during 1973.

3. Health Recuperation

a. Completion, remodelling, or construction of 122 hospitals during 1973 and 1974.

b. 1,528 additional beds to be added to public hospitals during 1973, and 804 additional beds during 1974.

c. Additional hospital capacity is expected to generate an increase in hospitalizations annually of approximately 48,000 persons in 1973 and 28,000 persons in 1974.

d. The public hospitals will be incorporated into regionalized systems of stratified health care functions.

4. Human Resources Training

Approximately the following numbers of health sector personnel are to complete training by 1974:

Type	Number to be Trained
Health Planners	65
Medical Doctors	1,549
Public Health Doctors	60
Public Health Nurses	60
Professional Nurses	630
Auxiliary Nurses	6,012
Health Promoters	7,000
Sanitary Engineers	75
Sanitary Promoters	1,200
Dentists	824
Public Health Dentists	90
Dental Assistants	607
Equipment Maintenance Personnel	150

5. Research

a. Studies currently under way, to be completed during 1973:

- health planning in Colombia
- institutions of medical attention
- rural community environmental sanitation
- food and nutritional policy

b. New studies which will commence:

- human resources in health institutions
- comparative model of alternative health care delivery systems
- venereal diseases
- health sector financing
- Taylor-Berleson study of MCC

6. Complementary Inputs

a. Equipment is to be provided for tuberculosis detection, rabies control, and pure food inspection.

b. Fluoridation is to be instituted in 140 communities containing 9 million inhabitants.

c. Home water filters for 1,500,000 persons are to be produced.

d. Biological materials sufficient for most of the nation's vaccination programs are to be produced at the National Health Laboratory.

7. Improved Planning

a. Fifty hospital statisticians will be trained annually.

b. Improved administrative procedures, including standardized procurement, contracting, personnel, training, and financial procedures will be designed and implemented.

c. Construction of an administrative center for all units of the Ministry of Health will begin in 1974.

8. Rural Sanitation

a. One hundred sixty-one rural community water projects will be completed during 1973, and 288 projects will be completed during 1974.

b. Seventy-eight sewerage projects will be completed during 1973, and 148 projects will be completed during 1974.

As a consequence, it is expected that approximately 35% of the rural population will be served by water and sewerage projects by 1974.

C. Priority of the Sector Loan Project

In adopting the new health policy and strategy described herein, the Colombian Government significantly elevated public health on its scale of national priorities. Current Colombian policy characterizes health as "an end in itself, an indispensable component of well-being and an important means for achieving economic development." The policy also asserts the principle that "health is a right which extends to each person, transcending any institutional or financial limitation." The heightened emphasis on providing health services to an increasing proportion of the population is fully consonant with the Colombian Government's general orientation of reordering public expenditures to serve more directly the basic needs and aspirations of the majority of the people, especially the most deprived groups. This same orientation applies to other current AID sector loans, hence the proposed health sector loan would strengthen AID's role in the improvement of the quality of life for large numbers of Colombians. Health, it can be argued, is probably the most basic determinant of well-being and life itself. The priority of investment in health can also be justified economically by the increased productivity of a healtheir labor force, and by its effects on income distribution, where, as has been shown in Colombian studies, it is among the most redistributive of all public expenditures. Tangible evidence of the priority of this project includes the promulgation of the new health policy and the increasing share of the Colombian national budget already being allocated to public health.

D. Environmental Aspects

The one part of the program with direct measurable environmental impact is the rural sanitation project component dealing with sewerage and water projects for communities of 2,500 inhabitants or less. Besides directly improving health conditions, the rural sanitation project is

expected to improve environmental conditions by collecting and distributing water from safe sources and by collecting and discharging wastes in a manner that lessens environmental contamination of water sources and the soil, and lessens the growth of dangerous and bothersome pests. Under the program, wastes are being discharged to areas where sufficient clean water and oxidation will render the wastes harmless. The Loan Agreement will require that the Agency which supervises these projects consider carefully the downstream effects of waste discharge, carefully monitor downstream water purity, and where harmful effects are to be expected, take such steps to treat the wastes or otherwise prevent their contamination of water supplies.

On all projects the Borrower will be obliged to take ecological considerations into account, or cause that they be taken into account by the sub-implementing agencies, where appropriate, among other factors to be taken into consideration in approval of any specific project under the Sector Loan.

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : TA/H, Mr. Dale Swisher

THRU : ASIA/TECH, John S. Alden

FROM : ASIA/TECH/PSD, Sue Gibson

DATE: 13 November 1973

SUBJECT: Environmental Health

Per our recent conversation, I have attempted to summarize the current Asia Bureau thinking on health below.

The Asia Bureau has been actively pursuing the possibilities for creating and extending viable low-cost health services focused on preventive health that would include, where practicable, a family planning and nutrition component.

Because of the inadequate pool of doctors and highly skilled health technicians and their maldistribution within most LDCs, we believe such low-cost programs as may evolve will necessiarily be keyed to an expanded use of trained auxiliaries. We envision explorative programs in selected Asia Bureau countries which have an emphasis on innovative new approaches and which avoid or minimize the problems and bottlenecks traditionally encountered in health sector programs while maximizing the cost effectiveness and impact on low income, disadvantaged groups. The Asia Bureau has fielded consultants and TDY visits to assist in planning and developing viable projects. Expanded attention to preventative environmental health programs through low-cost systems clearly falls within the scope of Asia Bureau interests. We are, therefore, encouraging proposals for multi-purpose systems designed with a capacity to meet local health and nutrition needs, particularly for rural low income population groups, which are within local LDC resource availabilities. Using these criteria, basic program elements could and probably should include preventative community health interventions such as immunizations against communicable diseases, establishment and maintenance of potable water systems and adaption of effective sewage disposal procedures as well as measures to increase the availability and use of effective family planning methodologies. In reality, programs will need to focus on key interventions packaged and balanced to maximize relative impact; this may mean excluding desirable but less cost-effective program elements.

Any ideas or strategies which evolve from your consultations with environmental health experts which can assist the Asia Bureau in systematically developing and implementing such programs will be greatly appreciated.

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

October 23, 1973

TO: Advisory Ad Hoc Committee on Environmental Health

The Office of Health, AID, recognizes that other national and international agencies have interests of varying degrees in the field of environmental health and that any AID program must give due consideration to those other programs.

For your information, and to permit comparison, the boundaries of the World Health Organization program are set forth. This information has been excerpted from a WHO document entitled THE WHO PROGRAMME IN BASIC SANITARY SERVICES COMMUNITY WATER SUPPLY AND WASTES DISPOSAL (CWSS/73.2).

The WHO long-term programme for the promotion of environmental health has been formulated giving due emphasis to the pressing needs in developing countries for basic sanitary services. The overall objective of the basic sanitary services is the prevention and control of water- and filth-borne diseases and the promotion pf physical, mental and social well-being through the provision of safe and adequate water supplies, sanitary collection and disposal of excreta, liquid and solid wastes, healthful housing, and the proper application of sanitary principles in the production, processing and distribution of food.

Over the years the World Health Assembly has recognized these needs and endorsed the continuing emphasis given by WHO to this area as reflected particularly in resolution WHA25.35 of the Twenty-fifth World Health Assembly which requested the Director-General, inter alia, to:

"(1) prepare guidelines, manuals and codes of practice on the planning, design and management of community water supply and sanitation services with emphasis on the public health aspects and particular attention to rural areas;

"(2) intensify the research and development efforts of the Organization in the light of the needs and possibilities of developing countries; ...

"(4) give consideration to the related problems of waste-water disposal."

Further emphasis was given to the importance of basic sanitary services by the United Nations Conference on the Human Environment, Stockholm, June 1972, which recommended, inter alia, that "water supply, sewerage, and waste-disposal systems adapted to local conditions" be designated as priority areas for research and that WHO should be the principal responsible body.

In connexion with the above, the major thrust that is being exerted - and needs further reinforcing - is the transfer of existing knowledge and adaptation and refinement of known methods to suit the cultural, social and economic conditions of developing locales.

BASIC SANITATION

Relationship to Health

In any consideration of water supply and wastes disposal, a fundamental premise to the irrefutable relationship between environmental sanitation and the incidence of enteric disease.

There is no viable alternative to good sanitation in a programme intended to raise the level of health and increase social and economic well-being through the elimination of endemic and preventable disease.

Whilst most enteric diseases respond favourably to proper medical treatment, and a measure of protection from some enteric diseases may be obtained by regular vaccination, there is no known immunization procedure for the enteric diseases in which the causative agent is a virus, protozoa

or helminth. The only known effective preventive measure, even for those diseases for which there is an immunization procedure, is the complete elimination of any possibility of faecal-oral transmission.

A compounding factor of more recent recognition is chemical pollution. Each year industries are producing hundreds of new organic chemicals; some of them are persistent, nondegradable substances. They include new plastics and plasticizers, synthetic detergents and solvents, food additives, drugs and pesticides. Many, if not all, may reach surface and underground water supplies. Furthermore, many of these toxic and nuisance-causing chemicals are not removed by conventional wastewater treatment processes, such as settling and biological treatment. Some of the new substances may be toxic, carcinogenic, or mutagenic.

The evident needs are remarkably similar to those for control of enteric disease, i.e. to inform people of the dangers associated with chemical or other contamination of drinking-water resulting from residues and wastes disposal practices and to assist in the provision of facilities necessary to overcome these problems. Another element of great importance is evident here; the need for study and research on the toxic effects of the myriad compounds that are in use and eventually appear as waste materials in the environment - especially as they relate to drinking-water quality. Most of this research should yield results of immediate benefit to the industrialized countries with impact on developing countries in the longer term.

Conditions and Needs in Developing Countries

In many of the developing countries sanitary conditions are extremely bad in order to promote good health there is a fundamental need for the introduction of basic sanitary services. Basic sanitary services include the provision of essential environmental sanitation in rural and urban areas for the prevention and control of communicable disease and to promote physical, mental and social

well-being. While basic sanitary services include housing, community sanitation, food sanitation and vector control, special interest is directed to water supply and the disposal of wastewater and human excreta.

The progress report of the Director-General on the Community Water Supply Programme to the Twenty-fifth World Health Assembly outlined the status of community water supply in 90 selected developing countries and projected the needs for the decade 1971-1980. In 1970, of the total population within the selected countries, only 23% had access to safe water. Within urban communities 50% of the population obtained water through individual house connexions while 23% used public standposts. In rural areas more than 85% of the population - more than one billion people - did not have safe water available to them. Furthermore, in many of the piped urban supplies, service was intermittent - a situation which rendered a water system potentially hazardous to health.

The situation at the end of 1970 is bad but the prognosis for the end of 1980 is perhaps worse - especially in rural areas. The Director-General's report allocates goals for the decade which would see water services to 100% of the urban population (60% by house connexions - 40% by public standposts) and to 25% of the rural population. Total investment necessary to reach these goals is estimated at $13.2 billions. However, in rural areas the anticipated growth of population outstrips the growth of water facilities and even if the goals are met there will be 50 million people without safe water in 1980 than in 1970. Since population increase will inevitably result in increased waste production it is safe to predict increased problems in the disposal of excreta and other wastes. This wastes disposal problem could well be reflected in the contamination of water supplies which had previously been satisfactory.

The overall picture of sewerage and excreta disposal in the 90 selected countries is even worse than water supply. On the basis of data currently available to WHO it is estimated that only 28% of urban people are served with public sewerage systems and a further 45% have household systems. In rural areas it is estimated that 91% of the population has inadequate excreta disposal facilities - more than 1060 million people following primitive excreta disposal practices which lead to unnecessary illness, debility and death.

In developing countries the infrastructure required for the planning, implementation, management, administration and evaluation of national programmes for the provision of basic sanitary services needs considerable strengthening, and it is perhaps this area that needs the greatest attention. In some countries, notably in Latin America, the provision of rural water supply and sanitation is the responsibility of the ministry of health. The provision of urban water supplies and wastewater disposal systems is, as a rule, the responsibility of many governmental agencies (ministry of public works, a water resources board, water and sewerage authorities, local authorities, special agencies, etc.) and very little coordination exists between agencies. The ministry of health has, however, final responsibility for the health and well-being of a nation and consequently should be directly involved in the planning, implementation and evaluation of programmes for the provision of basic sanitary services. The institutional needs can be briefly listed as follows: (1) establishment and/or strengthening of environmental health units in ministries of public health; (2) coordination to ensure that the various components of environmental health work performed by other agencies and departments form a unified whole; (3) establishment of the role and responsibilities of the various agencies in the planning and implementation

of programmes; (4) enactment of comprehensive legislation establishing public policies and responsibilities for specific governmental agencies including the delineation of inter-relationships between levels of government and between agencies of governments for the provision of basic sanitary facilities, and provision for the financing of the functions; (5) enactment of administrative and regulatory legislation; (6) establishment of modern methods of organization and management to ensure both efficiency of operation and effectiveness in achieving the objectives of programmes; (7) development of criteria and standards for the provision of basic sanitary facilities including guidelines, or codes of practice, for the planning, organization, implementation, operation, maintenance and surveillance of water and wastes disposal systems, food sanitation, hygienic aspects of housing, and for the prevention and control of insect vectors of diseases.

Clearly, there is an urgent need for basic sanitary measures; for the greater availability of pure, safe water; for improved practices in the disposal of excreta; for the sewering of urban areas; for the sanitary collection and disposal of other wastes, and last but not least for strengthening institutional and manpower capabilities.

In the attempt to overcome the inadequacies of sanitary services a number of constraints are recognized. These resolve into two basic problems: the difference between cost of the services and the ability to pay for them; and the lack of people with the necessary skills to design, construct, operate and manage the systems. The WHO programme for the advancement and transfer of knowledge and methods in community water supply and wastes disposal strives to overcome both of these basic problems.

Excerpts from

UNITED NATIONS ENVIRONMENT PROGRAMME

PROGRAMME DOCUMENT

WORKING DRAFT OF 15 OCTOBER 1973

Main headings of the document:

1.(a) Human Settlements and Habitat

Some detailed objectives (p.2):

"To promote, encourage and support the development of new low-cost technologies with potential for widespread application in waste disposal and water treatment, particularly in tropical areas.

"To assist developing countries, in co-operation with appropriate agencies, in developing and applying low-cost methods for meeting the environmental aspects of their housing needs. Emphasis should be laid on labour-intensive measures and methods utilizing local materials;

"To help in providing adequate potable water supply in urban and rural settlements;

"To ensure that due attention is given to the environmental aspects of population densities."

Background (p. 2, 3):

WHO has recognized the importance of the relationship between health and sanitation, on the one hand, and habitat, settlement and regional planning on the other; the Organization has accordingly expanded its activities. It plans establishment in 1974 of a WHO International Reference Centre of Environmental Health Aspects of Urban Planning and Housing, and has many

research and technical assistance projects concerned with basic sanitary services. WHO is also giving attention to subsidiary aspects of environmental health problems such as consideration of the consequences of overcrowding and its effects on mental health. This Organization is concentrating its studies more and more on the multifaceted nature of disease, particularly in regard to important environmental elements, including environmental pollution, overcrowding, bad housing, malnutrition and poor hygiene. Assistance is being provided to governments in the evaluation, formulation and implementation of programmes for the provision of community water supply and waste disposal facilities, and the Organization has established two International Reference Centres (one for community water supply and one for waste disposal) for the purpose of fostering this programme.

Human Settlements Technology (p. 5, 7, 8, and 10):

The idea behind this portion of the programme is the work on the engineering and technical elements of human settlements, to provide better physical materials to be used with comprehensive ideas of human settlements planning in the improvement of human settlements. In regard to water supply and treatment systems, a number of speakers at the Governing Council meeting referred to the need for lower cost systems, particularly for developing countries. In order to develop lower cost systems, it is necessary to identify those engineering and construction elements which account for the costs so that the proper

technological development of lower cost elements will, in fact, to be lower cost systems. As a first step in reaching this goal, WHO will assemble a handbook of all of the elements of water supply systems that have been developed and used in various parts of the world over the past few years. These include piping, storage, pumping, treatment etc. techniques. Given such a catalogue, it will be possible to do engineering analyses, particularly relating to specific situations, leading to cheaper overall water system designs. The catalogue and some initial analyses should also indicate which elements of water supply systems require further development work before it will be possible to provide markedly cheaper systems.

While UNEP believes that it should be possible to start the engineering analysis work immediately, WHO believes that this must be left until the catalogue is complete, and hence has not been willing to undertake a project on the analytical side at the present time.

The same approach should be taken to waste disposal technology but we have not yet an appropriate set of detailed projects for this purpose.

The haphazard and unco-ordinated development of infrastructure facilities - water, transport and energy - aggravates the existing problems of poor facilities already responsible for water, air, noise and land pollution in most of the major

cities of the developing countries. Studies and seminars on the identification of problems created by the lack of planning and co-ordination and for the formulation of assistance and training programmes to control or minimize environment damage are essential.

There is therefore an urgent need for the organization and implementation of integrated infrastructure projects which are closely co-ordinated with other development efforts in urban and rural settlements.

UNESCO, through its intersectoral programme on the environment, the MAB programme and more particularly the Department of Social Sciences, is currently engaged in a pre-programming stage of a long-term study on the interactions between rural and urban ecosystems.

Although for many years UNICEF has been supporting services for children and mothers in the urban setting, it was in 1971 that the UNICEF Executive Board adopted an explicit policy for UNICEF to assist in the creation of services for the improvement of the conditions of children and mothers in urban slums and shanty towns on a comprehensive scale.

The ECE itself is planning to organize a seminar in Yugoslavia in 1975 on the planning and development of the tourist industry, taking fully into account the environmental aspects.

Initiated and Planned Action (p. 13, 15, 16):

Human Settlements and Habitat:

UNEP, in collaboration with WHO, is to examine population density effects through the development of guidelines for the protection of man, by the means of environmental control, against health hazards resulting from overcrowding.

Water Supply and Treatment Systems:

UNEP is working with WHO in the field of basic environmental sanitation for the control of endemic disease resulting from a deficient environment, particularly lack of adequate water supply and waste disposal facilities. A programme for the transfer of knowledge and methods is being implemented with the assistance of an international network of reference centres and collaborating institutions for both community water supply and wastes disposal.

UNEP is supporting WHO within the framework of its international network of research institutions to:

(a) collect, appraise and disseminate technical and scientific information on all aspects related to the planning, implementation, evaluation and management of water supply and wastes disposal systems;

(b) accelerate the programme for the preparation of guidelines, codes of practice, training manuals, and the conduct of training courses on this subject; and

(c) conduct developmental investigation on simplified technology for community water supply and wastes disposal systems, with particular attention to resources existing in developing counties.

Waste Disposal Technology:

At the time of preparing this first draft, it was not possible to be explicit concerning initiated or planned action in this programme activity area.

1.(b) Human Health and Well-Being

Detailed objectives (p. 19):

"To encourage and support programmes aiming at raising the level of health and eliminating endemic diseases which are due to environmental conditions, especially those relating to under-development;

"To anticipate and prevent threats to human health and well-being posed by contamination of food, air and water; and to cooperate with organizations concerned with the establishment of criteria for the relevant pollutants;

"To support and encourage national and international efforts for assessing environmental effects of agricultural chemicals on man and ecological systems and for avoiding their undesirable effects."

Background (p. 19, 20):

In the area of environmental health criteria, the primary agency concerned is the WHO. Its programme for the establishment of criteria for environmental pollutants in air, water, food and work places has been accelerated and expanded in collaboration with national institutions. In addition to the evaluation and assessment of the existing scientific information on health effects of environmental agents (including physical factors, such as noise and radiation) the programme is concerned with the identification of new environmental hazards to public health and with coordination and promotion of relevant national and regional research.

The IAEA is concerned with programmes aiming at the protection of human health against radio-active materials.

UNIDO has given some consideration to the subject of toxic chemicals in connection with measures for control of pollutants from manufacturing industries.

Initiated and Planned Action (p. 22, 23, 24, 25, 26, 27):

Endemic diseases:

The Executive Director believes that the endemic diseases to be addressed in this programme are those which might be described as ecological diseases in which the configuration of the environment, frequently including man-made

components of the environment, are key factors in the epidemiology. Outstanding of such diseases are schistosomiasis, onchocerciasis and malaria. While some attacks on these diseases have been made and are being mounted, based upon the ecological peculiarities of the disease cycle, it is believed that a great deal more could be done in development planning and in environmental management to combine with medical measures and anti-vector measures to attack these diseases. It appears that in each case the measures taken have generally emphasized that one particular aspect of the disease cycle at a given time, but not many attempts have been made to coordinate all of the ecological and disease aspects in a single attack on the problem.

In our disucssions to date, WHO has interpreted the endemic disease mandate to refer to the gastro-entero diseases with a consequent emphasis on water quality and waste technology. It was therefore not possible at the time of writing this document, to develop programmes specifically related to this area.

Contamination of Food, Air, Oceans and Water:

The pollutant monitoring programme is aimed at the early establishment of the beginnings of a global pollutant monitoring network. The initial stages of picking pollutants and suggesting how to begin the network have been undertaken.

Action has been started with the WHO to stimulate its programme in the development of environmental health criteria.

A monograph on "Health Hazards of the Human Environment" was prepared by the WHO as a contribution to the Stockholm Conference.

Support was extended to the FAO/WHO Codex Alimentarius Commission on international food standards for pollution in food.

It is planned to continue work in this area by stimulating the collection, processing and storage of data, providing assistance to collaborating laboratories, organizing expert meetings to review techniques and disseminating to governments appraised data and results of assessments and possibly designating additional collaborating laboratories.

Environmental Health Problems in Latin America:

Arrangements were made together with WHO to organize visits by experts on environmental health to individual countries to survey environmental pollution problems and available scientific sources to monitor each situation in Latin America. This would lead to the establishment, by expert groups, of priorities for investigations.

Radioactive Waste:

IAEA has an on-going programme in this area and the expected rapid growth of nuclear power throughout the world has led to increased emphasis on international cooperation in this field. It was, therefore, agreed to support this programme initially in the areas of developing geological criteris for the selection of sites for the long-term storage of radio active wastes and in undertaking a study on the feasibility of establishing a register of significant quantities of such wastes committed to storage or disposal in Member States.

Agro-chemical Effects:

Agreement with FAO was reached to start action for the elaboration and finalization of a global UNEP/FAO research and training programme in integrated pest control, with special reference to the preservation of the environment quality.

2. Land, Water and Desertification

a. Soils and Deserts

An objective (p. 31):

"To help countries prevent the loss of productive soils caused by pollution and to help them abate existing soil pollution.

Initiated and Planned Action (p. 42):

Use of waste in arid and semi-arid areas--A preliminary study will be initiated in a group of less-developed countries like those of the Sahara-Sahelian zone with a view to evaluating the quality and type of waste available; to examine through a pre-investment study the possibility to use the waste and waste waters for the production of composts, and fertilizers, recycling water, making animal feed with blood, bones and slaughter house wastes, etc.

b. Water and Waste Technology

Detailed objectives (p. 59):

"To help countries prevent or remedy the pollution of water and to develop safe methods of waste recycling;

"To help the development of water resources to meet the present and future requirements of water of high quality;

"To support and encourage national and international efforts for assessing environmental effects of agricultural chemicals on man and ecological systems and for avoiding their undesirable effects."

Background (p. 61, 63, 70, 71, 73):

WHO's ongoing programmes include urban and rural community water supplies and monitoring, development of water quality criteria and management of water bodies, particularly

those used as sources of community water supply and for recreational purposes.

As a matter of policy, UNICEF has concentrated its assistance on the development of supplies of potable water for rural communities which are often neglected under large internationally financed schemes. Initially, the UNICEF aid was limited to a pilot scale with the intention of encouraging sources of larger investments to follow-up on a national scale. This policy has recently been modified and UNICEF is currently assisting some very extensive projects. UNICEF provides general planning and logistical advice, in addition to equipment, supplies and transport, as well as technical advice for the operation and maintenance of equipment such as drilling rigs and pumps. An effort is made to incorporate activities for the safe disposal of human wastes in these projects. In this field, UNICEF works in collaboration with WHO and the IRBD.

The question of suitable activities for the UNEP programme in the area of water and waste technology, with particular reference to quantity, is complicated by the large amount of activity underway by the various

specialized agencies and under the auspices of UNDP. For this reason, and despite the importance of the subject, a cautious exploration of appropriate activities has been undertaken.

WHO provides guidelines for the planning, implementation and evaluation of national environmental health and pollution control programmes. The WHO/IBRD Cooperative Programme for Water and Sewerage provides assistance to Governments for the conduct of sector studies and assessing the current status of these facilities, the constraints in reaching national targets and the suggested alternatives for solutions to the problems. These sector studies are inputs into the country programming and national planning considerations of each country.

UNIDO in co-operation with USAID is presently implementing in the U.S.A. a programme of training national decision makers concerning integrated planning and management.

ICSU/SCOPE has released in 1972 a publication entitled "Manmade lakes as modified ecosystems". SCOPE also plans to assist developing countries in identifying major environmental problems at national regional levels, particularly in the scientific and research fields.

3. Education, Training and Information

Detailed objectives in training and education (p. 78):

"To support and encourage the development of effective mechanisms for collecting, analysing and disseminating information bearing on environmental problems available in scientific, technical and legal literature and in various research institutions, keeping in mind the special needs of developing countries;

"To support and encourage the training of experts in various environmental fields, especially in developing countries to help in development of local expertise;

"To support and encourage the development of relevant research capabilities in developing countries on environmental problems;

"To promote and support the organization of national, regional and international symposia, seminars and workshops for techniques of environmental education and research."

Background (p. 80):

On the operational level, the training of experts from developing countries in environmental management and planning utilized two appraoches. The first was to support ongoing training courses for training of specialists from developing countries in the rational and integrated management of the natural environment. These courses have traditionally been

held outside the developing world. Thus the second approach was to encourage the holding of training seminars in countries of the developing world, in order to ensure that the training is relevant to national and regional situations, problems, interests and priorities.

Initiated and Planned Action (p. 83):

The UN African Institute for Development and Planning has designed a project to provide training activities related to the environmental problems of Africa. It involves training seminars and conferences, preparation and distribution of documentation on environmental problems, publication and distribution of textbooks on African environmental problems and advanced training to African research assistants.

Training activities in the environmental field have been carried out for a number of years and it is with a view to reinforcing these existing activities that UNEP is suggesting two UNESCO projects. These are on the post-graduate level in (a) the Netherlands, and (b) France. Both are intended for specialists from developing countries and concentrate on integrated surveys and rational management practices. In addition to existing activities there are planned training activities in the regions. UNESCO is being assisted in two projects located in developing areas:

(a) a regional training course on tropical ecology in the Philippines; and

(b) a Latin-American training course on systems ecology in Venezuela.

4. Trade, Economics and Transfer of Technology

Technology and its International Transfer

Some detailed objectives (p. 100):

"To encourage the exchange of information and co-operation in the field of low-waste and non-waste technology;

"To encourage comprehensive studies designed to safeguard against possible negative effects of the international transfer of technology particularly from the developed to the developing countries and to evaluate the effectiveness of such safeguards as may be devised."

Background (p. 102, 103):

Protection of the human environment requires new technology. UNEP contributes wherever possible to the development of such new technologies. In particular it emphasizes the promotion of low-waste and no-waste technology. Activities have begun in this area which will lay a foundation for new

concepts in the meaning of low-waste and no-waste technology and will also provide the basis for attack on the question of the costs of environmental defects, at least in the industrial sector.

The foundation for this work is being laid by UNIDO projects which are examining and cataloguing total inputs and outputs of certain industrial processes. These catalogues will, in themselves, be useful as guides for what to expect when certain industries are established in a new place, and they will also provide the basis for cost analyses of environmental defect mitigation on a process-by-process basis.

5. Oceans

Marine Pollution

Some detailed objectives (p. 111):

"To carry out objective assessments of problems affecting the marine environment and its living resources in specific bodies of water;

"To assist nations in identifying and controlling land-based sources of pollution, particularly those which reach the oceans through rivers;

"To stimulate international and regional agreements for the control of all forms of pollution of the marine environment and especially agreements relating to particular bodies of water."

Background (p. 112, 113, 116):

The principal action of UNEP in this area primarily consists of supporting and co-ordinating activities of the programmes of various organizations, in particular the GIPME and its related programmes.

In its own field of competence GESAMP studies and gives advice on pollution of the sea through the atmosphere, specification of parameters to be monitored in developing marine pollution monitoring system, dispersion and movement of pollutants in the sea by natural physical processes and other subjects related to marine pollution.

GIPME and GESAMP are also active in the field of land-based sources, including rivers. GIPME plans multidisciplinary studies of coastal injections of pollutants into the oceans through outfalls, rivers and coastal runoff. GESAMP has given much attention to sewage and industrial waste management in addition to other aspects of the problem of land-based sources.

8. Earthwatch

EARTHWATCH is a programme whose purpose is to assess the state of the environment and provide the basis for its proper management, especially the capability for early warning of harmful effects to be issued sufficiently in advance to enable corrective measures to be taken in good time. EARTHWATCH has four components: monitoring, evaluation and review, research, and information exchange. EARTHWATCH is conceived as a global system composed of the national facilities, services and research provided by individual members, coordinated by the UNEP and, in some cases, supported by UNEP and other international organizations.(p. 159)

Background (p. 160, 161):

Many agencies are active with regard to monitoring of pollutants and their effects in water. As to rivers and lakes, WHO has responsibilities in the area of water quality and, through its national, regional and international reference centre is concerned with monitoring those aspects of inland waters which are most closely related to human health and welfare (e.g. drinking water contamination sources, quality of water for recreational use, etc.). Monitoring of inland waters is also an integral part of the UNESCO International Hydrological Decade (IHD), the WMO programme on hydrological monitoring, and FAO activities in the surveillance of water use at

local and national levels and in fishery research. FAO is particularly involved in monitoring the use of lands for agriculture and forestry which includes concern with food contamination and soil degradation. UNESCO, through its Man and the Biosphere Programme (MAB), has a role in monitoring and establishing baseline values for certain synthetic compounds (e.g. DDT, PCB's, PVC's) and heavy metals (such as lead and mercury) and also has a series of on-going biomes studies.

The primary non-governmental organization concerned with monitoring contaminants is the International Council of Scientific Unions (ICSU). Through its Scientific Committee on Problems of the Environment (SCOPE), ICSU prepared a report on Global Environmental Monitoring for the Intergovernmental Working Group on Monitoring and Surveillance (IWGMP), convened in 1971 in preparation for the UN Conference on the Human Environment: it has since been continuing these investigations.

Governing Council of UNEP, First Meeting, 1973

A recommendation (p. 173):

Scientific and technological studies should be directed towards:

(a) development of cheap water-purification and waste recycling technologies particularly suitable for rural settlements in developing countries;

(b) development of environmentally and socially sound methodologies for combating water-associated epidemic diseases.

COMMITTEE ON INTERNATIONAL ENVIRONMENTAL AFFAIRS

August 23, 1973

MEMORANDUM

TO: ALL CIEA MEMBERS

FROM: Christian A. Herter Jr., Special Assistant to the Secretary for Environmental Affairs

SUBJECT: UNEP Priorities for Action.

Enclosed are the results of our effort to identify items warranting most immediate attention from the list of priority topics developed by the UNEP Governing Council.

The document, U.S. Views on UNEP Priorities for Action was compiled from comments of governmental agencies and suggestions of NGOs. Contributions from government agencies were particularly helpful in the selection of priorities for the document. In order to keep the list within bounds, selections were made from the items mentioned most frequently. I would like to extend my thanks to those of you who contributed by sending in your comments.

U.S. Views on UNEP Priorities for Action was sent to Maurice Strong and to twenty-two NGOs for their information. The letters to Strong and to NGOs enclosed herein endeavor to point out that our suggested priorities are not a formal U.S. position on future UNEP activities, but a list of programs which the U.S. believes merit attention in 1974.

A copy of UNEP/GC/10, the Report of the Governing Council of the United Nations Environment Programme is also enclosed. This is the final report of the June 12-22, 1973 Geneva meeting.

Enclosures:
As stated.

BUREAU OF INTERNATIONAL SCIENTIFIC
AND TECHNOLOGICAL AFFAIRS

August 23,1973

Mr. Maurice Strong
Executive Director
United Nations Environment Programme
Palais des Nations
Geneva 10, Switzerland

Dear Maurice:

We have recently completed a survey of Federal agencies and concerned non-governmental organizations to develop the enclosed paper entitled "U.S. Views on UNEP Priorities for Action" (taken from Annex 1, pages 7-11 of document UNEP/GC/10). We believe that implementation of the items selected, along with the monitoring and information referral programs already accorded priority by the Governing Council, would result in a balanced program for improving the global environment.

I am sending the paper as an indication of our present views and not as an expression of the U.S. position on any of the future activities of UNEP. I hope it will be useful to you in the development of your plans for further action.

Sincerely,

Christian A. Herter, Jr.
Special Assistant to the Secretary
for Environmental Affairs

Enclosure:

U.S. Views on UNEP Priorities
for Action.

August, 1973

U.S. Views on UNEP "Priorities" for Action

A. Human Settlements

iii. to encourage and support programmes aiming at raising the level of health and eliminating endemic diseases which are due to environmental conditions especially those relating to underdevelopment;

iv. to anticipate and prevent threats to human health and well-being posed by contamination of food, air and water; and to cooperate with organizations concerned in establishing criteria for the relevant pollutants;

v. to promote, encourage and support the development of new low-cost technologies with potential for widespread application in waste disposal and water treatment, particularly in tropical areas.

B. Land Water, and Desertification

i. to mount a concerted programme to help countries control the loss of productive soil through erosion, salination, desertification, and laterization, and to help them in land reclamation, which is ecologically compatible, with special emphasis to be laid on arresting the spread of deserts;

vi. to help countries prevent or remedy the pollution of water, and to develop safe methods of waste recycling;

vii. to help the development of water resources to meet the present and future requirements of water of high quality;

viii. to support and encourage national and international efforts for assessing environmental effects of agricultural chemicals on man and ecological system and for avoiding their undesirable effects.

C. Education, Training, Assistance, and Information

ii. to support and encourage the traini ng of experts in various environmental fields, especially in developing countries to help in development of local expertise;

iv. to support and encourage the development of relevant research capabilities in developing countries on environmental problems.

D. Trade, Economics, Technology, and Transfer of Technology

vi. to assist countries, as appropriate, in the formulation of guidelines for project appraisal which take into account the environmental aspects;

viii. to encourage training of personnel in the techniques of incorporating environmental considerations into development of planning, and of identifying and analysing the economic and social cost benefit relationships of alternative approaches.

E. Oceans

iii. to assist nations in identifying and controlling land-based sources of pollution, particularly those which reach the oceans through rivers;

iv. to stimulate international and regional agreements for the control of all forms of pollution of the marine environment, and especially agreements relating to particular bodies of water;

v. to urge the Intergovernmental Maritime Consultative Organization to set a time-limit for the complete prohibition of intentional oil discharge in the seas, as well as to seek measures to minimize the probability of accidental discharges;

vii. to urge the International Whaling Commision to adopt a ten-year moratorium on commercial whaling.

F. Conservation of Nature, Wildlife, and Genetic Resources

i. to promote the protection and conservation of plants and animals, especially rare or endangered species;

v. to support regional and national institutions in developing countries for promoting the collection evaluation and conservation of gene pools of plants and animals for maintaining genetic diversity for the future use of mankind.

PAN AMERICAN HEALTH ORGANIZATION

WORLD HEALTH ORGANIZATION

III SPECIAL MEETING OF MINISTERS OF HEALTH OF THE AMERICAS

SANTIAGO, CHILE 2-9 OCTOBER 1972

GOALS OF THE TEN-YEAR HEALTH PLAN FOR THE AMERICAS, 1971-1980

2. ENVIRONMENTAL SANITATION PROGRAMS

2.1 Water Supply and Sewerage

- Provide water services with house connections for 80% of the urban population, or as a minimum, supply half the population at present without services.

- Provide water for 50% of the rural population, or as a minimum, supply 30% of the population at present without services.

- Install sewerage for 70% of the urban population, or as a minimum, reduce by 30% the proportion of the population at present lacking such services.

- Install sewerage systems and other sanitary facilities for the disposal of excreta for 50% of the rural population, or as a minimum, reduce by 30% the number of inhabitants not possessing any adequate facilities.

2.2 Solid waste:

- Establish adequate systems for the collection, transport, treatment and disposal of solid wastes in at least 70% of cities with 20,000 population or more.

2.3 Environmental pollution:

- Establish policies and carry out programs for the control of water, air and soil pollution, noise abatement, etc., in line with basic environmental sanitation and industrial development and urbanization.

2.4 Regional development:

- Ensure the active and systematic participation of the health sector in the formulation and execution of regional, national and multinational development plans.

2.5 Occupational health:

- Ensure protection for 70% of workers exposed to presumed or recognized occupational hazards in countries already having programs fully operating, and 50% in countries which still have not developed programs adequately.

5. DEVELOPMENT OF HUMAN RESOURCES

5.4 Train 3,200 professionals in the course of the decade in postgraduate programs and 30,000 professionals and technicians in short courses in sanitary engineering and other environmental sciences.

The XIII Inter-American Congress on Sanitary Engineering convened in Asuncion, Paraguay, August 1972, gave support to the improvement of environmental health services by recommending the establishment of a Latin American Basic Sanitation Plan. This Plan contains specific proposals for action by each country, by the Pan American Health Organization, and by the Inter-American Development Bank and the World Bank. The proposals in the formal resolution of the Congress were considered and supported by the III Special Meeting of Ministers of Health. The resolution in question follows:

XIII INTER-AMERICAN CONGRESS ON SANITARY ENGINEERING

CONSIDERING:

1. That the urban and rural sanitation program at the continental level emanating from the Charter of Punta del Este has had positive benefits in improving the sanitary condition of the peoples;

2. That this program should be continued not only to maintain the advances achieved in line with population growth, but also to expand the goals laid down in it; and

3. That for this purpose it is urgently necessary to organize a Latin American Basic Sanitation Plan,

RECOMMENDS:

1. To the Governments of each country that they:

   a) Establish an overall dynamic and realistic program, with a view to the constant up-dating of the solutions to problems of basic sanitation in their respective countries.

   b) Establish a system grouping together all bodies concerned with problems of basic sanitation, coordinate their efforts and resources under the direction of a central agency at the national level, responsible for the establishment of standards, planning and evaluation, set up specialized groups, and decentralize executive activities through regional agencies, wherever there are several bodies in the country involved in the problem.

   c) Mobilize manpower and financial resources to meet the demand and the time schedule envisaged in the program, in order to maintain a constant balance between supply and demand in regard to services.

   d) Establish a just and realistic rate policy, adequate for families of low income but producing sufficient revenue to cover financial, operational and maintenance costs, as well as the cost of modernizing and expanding the plans.

e) Facilitate the installation of services for any urban group in the country, irrespective of income or economic level, by means of: a single compensatory fund, national or regional, the rational distribution of grants and loans, and the differentiation of interest rates in inverse proportion to the purchasing power of the area.

f) Promote a permanent inflow of financial resources adequate for programming in each country through the establishment of revolving funds for regional or national investment, designed to increase with the demand, and maintaining their real value through the adjustment of both the level of rates and of outstanding loan balances, in countries subject to currency devaluation.

g) Ensure the high quality of human resources to meet demand as projected in the overall programming by means of personnel instruction and training, and technical assistance to the bodies responsible for executing the program.

h) Seek continually to reduce costs and hence the real value of rates through economies of scale, increased productivity, technological advances, and greater rationalization of technical projects and operation of the systems.

i) Keep the operation of the systems in the hands of the smallest possible number of concessionaires of the highest repute calculated to make the best use of human and financial resources, by applying economies of scale and linking together communities that offset one another economically, thus coming close to providing optimum services with reduced costs and making it possible to serve the poorer urban groups of the country.

2. To the Pan American Health Organization that it:

a) Stimulate in each country the application of the principles listed in item 1, with a view to organizing and developing a Latin American Basic Sanitation Plan that will ensure the continuity and expansion of the program which emanated from the Meeting of Punta del Este.

b) Present at the III Special Meeting of Ministers of Health in Santiago, Chile, this recommendation and supporting studies aimed at solving the basic sanitation problems in Latin America.

3. To the World Bank and the Inter-American Development Bank, that they:

a) Ensure in each country the complementary resources required for the execution of national plans for the permanent solution of the problem of water supply and water pollution control, through the installation and operation of water supply and sewerage systems and the adequate disposal of waste waters.

b) Finance on a preferential basis national programs taking into account the basic characteristics of these recommendations.

c) Promote the establishment and development of revolving funds for investment to give permanent support to national programs.

d) Offer long-term, low-interest loans for the implementation of basic sanitation programs.

e) Give preferential consideration to the countries with lowest income levels and greatest deficit of basic sanitation services.

EFFECT OF MARINE POLLUTION ON THE TOURISM INDUSTRY AND HEALTH IN TROPICAL COUNTRIES

1. Purpose of Project: To explore methods of evaluating marine water pollution problems as they may affect human health by the study of bacteria and virus concentrations in recreational, near-shore fishing and bathing waters in tropical countries, since tourism income to many developing countries may be threatened by improper methods of dealing with sewage contamination.

2. Project Justification:

(a) State-of-the-Art: Considerable despoiling of beaches with sewage slicks, refuse, and high coliform counts is evident in many countries. Tremendous capital investment for tourism purposes in places such as the Virgin Islands, Barbados, Brazil, Uruguay, Ivory Coast, etc. may be lost unless immediate consideration is given to the protection of coastal recreational waters. The engineering design of outfall sewers is often made on very little oceanographic study and without data on detection and natural die-away of pathogens in sea waters, and the cheapest rather than most effective solution may be specified. Sewage and sewage-contaminated storm water run-off from communities in tropical countries are comparatively richer in human pathogens than in developed temperate-zone countries. Sufficiently reliable testing procedures are available to enable field surveys of the presence of pathogenic organisms to be carried out.

(b) Relevance to AID Objectives: Economic development of countries dependent upon or having a potential for a tourist industry will be enhanced by making sure bathing waters are safe and clean, and that they will not have to be closed by health authorities as public health hazards.

3. Summary Research Plan: The Johns Hopkins University School of Hygiene and Public Health, through its Department of Environmental Health, would use tracer virus techniques developed by them for study of virus dispersion from outfalls, attempt to relate common indicators of pollution to the presence of pathogens, determine the type and concentration of pathogens, and to develop a rational health hazard model for wide applicability and estimation of extent of hazard. Cooperation with PAHO, and with the McGill University Bellairs Institute in the Barbados in oceanographic and marine biology aspects, to study ocean outfall characteristics and problems. In the course of one year, the scope and seriousness of the problem should be clear, and further studies, if needed, could then be planned.

4. Integration with Other AID and LDC Projects: The Chief Engineer, Public Works, USAID/Brazil, suggested the need for a project such as this. Requests to PAHO for technical advisory assistance have been received from several Latin American and Caribbean countries, and close cooperation would be expected from both PAHO and the individual countries.

5. Potential Utilization of Results: Costly off-shore sewage and surface drainage outfalls may or may not be the answer to beach and resort sanitation problems. Perhaps only disinfection could be utilized in some places, perhaps sewage treatment is the answer. Study of the problem is very much needed in order to intelligently and economically approach the problem, and this study could suggest promising avenues of approach.

Program: Research

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1974 to FY 1975
Total U.S. Funding $25,000
Date Prepared: 1 May 1973

Project Title & Number: Effect of Marine Pollution on the Tourism Industry and Health in Tropical Countries

NARRATIVE SUMMARY	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goals: The broader objective to which this project contributes: To evaluate the inhibitory effect of environmental contamination on development and success of the recreational water-based tourist industry in tropical countries, income from which may constitute a major part of the country's economy.	Measure of Goal Achievement: 1. Determination of reliability of tests for presence of pathogenic organisms in sea waters 2. Estimate of hazards to health through contact or ingestion of contaminated bathing waters 3. Efficacy of offshore outfalls in avoiding pollution and closing of beaches to the public	1. Statistics and information gleaned from the literature, consultant's reports, etc. 2. Results of Contractor's on-site surveys, studies, questionnaires, etc.	Assumptions for achieving goal targets: 1. Beach area pollution is a widespread problem threatening tourism development and income in many countries. 2. Large sums of money are being spent on planning and construction of sewer interceptors and ocean outfalls without much knowledge about dispersion and disinfection needs.
Project Purpose: To explore methods of evaluating marine water pollution problems as they may affect human health by the study of bacteria and virus concentrations in recreational, near-shore fishing and bathing waters. The results should suggest the adequacy or failure of current methods of dealing with wastes entering these waters.	Conditions that will indicate purpose has been achieved: End of project status 1. Development of health hazard model to indicate extent of problems faced by tourism industry in typical situations 2. Requests by countries for studies of their situations and their proposed solutions 3. Recommendations by Contractor and AID/W monitor relative to need for further research on subject	1. Reports prepared by Contractor 2. Monitoring and evaluation of findings by AID/W	Assumptions for achieving purpose: 1. Equipment and techniques for field detection and identification of virus in sea water are reasonably reliable. 2. Suitable sites for studies can be found.
Outputs: 1. Determination of fate of bacteria and viruses issuing from existing sewage outfalls in selected tourist areas. 2. Relation of commonly used indicator organisms to actual presence of pathogens in bathing waters. 3. Development of health hazard model based on contact and possible ingestion of infective doses of pathogens	Magnitude of Outputs: 1. No. of sites visited and studied. 2. No. and types of pathogens encountered, illnesses reported. 3. Requests received by Contractor, AID, PAHO, etc. for further work or additional studies	Data and information obtained by Contractor; testing of model developed	Assumptions for achieving outputs: Sufficient information is obtainable for development of health hazard model and for recommending additional kinds of studies needed.
Inputs: AID Contractor: Obtain, assemble, and evaluate information and data on techniques used for bacterial and viral testing; conduct exploratory studies of hazards in selected resort-type areas; determine future action needed AID: AID/W, funding, monitoring, provide liaison between contractor and PAHO, other [illegible]	Implementation Target (Type and Quantity) Budget Summary ($000) Total $ / Personnel $ / Personnel MM / Commod. $ / O/C $ FY 1974: 25 / 18 / 8 / 5 / 2 (Proposed project is in nature of a probe rather than a full-scale research program)	Accounting and evaluation of project by AID/W	Assumptions for providing inputs: Cooperation will be offered by PAHO and local institutions for carrying out field tests.

ENVIRONMENTAL MANAGEMENT SYSTEM FOR UTILIZING COMMUNITY WASTES TO INCREASE AGRICULTURAL PRODUCTIVITY

1. Purpose of Project: To make economically feasible the improvement of environmental sanitation and reduction in enteric disease in LDC's by utilizing liquid and solid wastes from communities as irrigants and soil improvers for the increased production of high protein crops for human and animal nutrition, approaching the problem as an integrated system.

2. Project Justification:

(a) State of the Art: Considerable work has been done and is under way on separate components of this project. Simpler, less expensive methods of handling wastes are being studied; isolated efforts at land disposal of sewage, sewage sludge, composted refuse, agricultural residues have been successful; studies of optimum loadings for various soil types are being conducted; great promise is shown for producing tonnage amounts of protein by extraction from alfalfa and grasses which could be grown on sewage-irrigated lands. Packaging this varied technology and experience has been lacking; a unified approach has great potential.

(b) Relevance to AID Objective: More rapid economic development of LDC's could be realized if crop and animal production and improved nutrition could be accomplished simultaneously with environmental improvement and disease control.

3. Summary Research Plan: The University of Wisconsin, through its various component departments in the College of Agricultural and Life Sciences, the Food Research Institute, etc., and in collaboration with institutions overseas, specifically in Brazil, Nigeria, and Indonesia, and possibly Peru and the Philippines, would study, devise, and conduct field trials of an

environmental management system approach, utilizing its already extensive experience and know-how in individual aspects of the work.

Integration with Other AID and LDC Projects:

The University of Wisconsin already has AID supported field research projects underway overseas which could contribute significantly to the project envisaged here, as well as land disposal projects in the U.S., as at Janesville, Wisconsin. This project would also dovetail nicely with the AID global research project on lower-cost water and waste treatment methods currently being conducted by the University of Oklahoma.

Potential Utilization of Results:

Both LDC's and international aid and lending agencies could utilize an effective, integrated management system as a basis for greatly accelerated planning and funding activities for waste control efforts, which are now receiving minimal support in competition with road building, industrialization, dam building and other presently more economically attractive projects. Ways of turning wastes into a valuable resource are vitally needed in all of the developed as well as developing countries, and results of this project could aid the U.S. immeasurably.

LOGICAL FRAMEWORK

From FY 1974 to FY 1978
Total U.S. Funding $460,000
Date Prepared 1 May 1973

Project Title & Number: Environmental Management System for Utilizing Community Wastes to Increase Agricultural Productivity

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: To make economically feasible the improvement of environmental sanitation and reduction in enteric disease by utilizing the liquid and solid organic wastes from communities in LDC's as irrigants and soil improvers for the increased production of high protein nutrients for humans and animals, approaching the problem as an integrated system.	Measures of Goal Achievement: 1. Decrease in enteric disease cases, improved environmental conditions 2. Decreased rodent and insect pest populations, improved public health 3. Increased tonnage of economic crop, livestock production 4. Increased protein availability, consumption 5. Increased grassland, reduced soil erosion and stream pollution	1. Statistics on environmentally related disease incidence 2. Determination of volum and tonnage of wastes collected 3. Records of acreage of land irrigated, tonnage of crops produced, amount of protein obtained	Assumptions for achieving goal targets: 1. Technology is available in the fields of public health and agriculture for utilizing waste materials in soil and plant nutrition 2. A sound and effective system, designed to suit the capabilities of LDC's, will attract the interest and support of international agencies, local educational and governmental institutions, and the local citizenry
Project Purpose: To combine the knowledge and technology of the fields of public and environmental health with those of the plant, animal, and soils scientists to turn an environmental hazard into an economic resource for community advancement. Both laboratory and field studies and trials would be used to determine and evaluate viable approaches.	Conditions that will indicate purpose has been achieved: End of project status. 1. Acceptance of system approach by national and international agencies, increased planning for waste control 2. Local establishment of demonstration projects, dissemination of manuals, conduct of seminars, incorporation in institutional training programs	1. Reports prepared, manuals produced 2. Performance of cost/benefit analysis 3. Degree of acceptance by international agencies, local planning boards and ministries 4. Monitoring of progress, achievements by AID/W, USAID's	Assumptions for achieving purpose: 1. Basic knowledge and technology in waste collection, irrigation, soil science, protein extraction, and public health surveillance of land disposal of sewage, considered separately, are sufficient to form the basis for an integrated approach. 2. Cost/benefit studies will be conducive to easing the burden of justification of expenditures for improved community waste control and sanitation if favorable.
Outputs: 1. Development and testing of practical management system 2. Preparation of manuals of procedure for integration of appropriate waste control and agricultural practices 3. Assistance to international agencies, local institutions in field demonstration projects, training, follow-up studies, planning operations	Magnitude of Outputs: 1. No. of manuals distributed, seminars conducted, personnel indoctrinated 2. Extent of support from lending agencies for projects 3. Increased acreage cultivated, crops produced, volume of wastes safely disposed of.	Records and statistics compiled by AID Contractor and AID/W monitor on project	Assumptions for achieving outputs: 1. Results of studies and manuals of procedure will be made available in LDC's 2. Systems can be adapted to differing geographical, economic, and social conditions 3. New approaches will be adopted by LDC's facing pollution, health, and food shortage problems
Inputs: AID Contractor: Assemble pertinent available information; plan and conduct studies needed in cooperation with LDC institutions; evaluate results, prepare reports, manuals; promote application of findings. AID: AID/W, funding, monitoring, liaison with international agencies, printing manuals; USAID's, assistance in field arrangements with LDC's.	Implementation Target (Type and Quantity) Budget Summary ($000) Total $ / Personnel $ / Personnel MM / Commod. $ / O/C $ FY 1974: 75 / 60 / 20 / 10 / 5 FY 1975: 125 / 90 / 30 / 25 / 10 FY 1976: 175 / 115 / 38 / 35 / 25 FY 1977: 85 / 60 / 20 / 5 / 20 Total: 460 / 325 / — / 75 / 60	Accounting and evaluation of project by AID/W	Assumptions for providing inputs: Counterpart contributions in way of personnel, facilities from LDC's; assistance and cooperation of international agencies such as WHO, FAO, Banks, etc.