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An assessment of environmental problems in 35 developing countries, based on responses by the AID missions to a request that they identify the most important environmental problems in their respective countries. The survey revealed a close inverse relationship between the quality of the environment and the human population pressures and urbanization in the developing countries. In at least half of the countries, rapid urbanization has been accompanied by inadequate or non-existent sewerage systems, inadequate water supplies, air pollution, and crowded and badly deteriorated housing. The pollution of beaches and water system was commonly attributed to municipal waste, industrial waste, and, in some cases, to oil and other wastes from coastal shipping. In rural areas nearly two-thirds of the AID missions expressed concern over the heavy use of chemical fertilizers and insecticides, along with the lack of any monitoring mechanisms. At least half of the countries noted soil erosion and destruction from deforestation, overgrazing, burning, mining, and farming, coupled with the associated problems of flooding, water degradation, and reservoir siltation. Countries of Equatorial Africa frequently noted problems of aquatic weeds and water-related diseases, such as schistosomiasis. In general the peoples and government officials of developing countries evidence little awareness of environmental problems. Many countries are preoccupied with development. To the extent they are concerned about environmental problems, they are apprehensive that costs may well outweigh the benefits of solving them.

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**ENVIRONMENTAL PROBLEMS**  
**IN**  
**SELECTED DEVELOPING COUNTRIES**

**Office of Science and Technology**  
**Bureau for Technical Assistance**  
**Agency for International Development**

**July 1971**

## INTRODUCTION

In very recent years man has become increasingly aware that his environment is limited. The air, water, and soil in many parts of the world already are seriously degraded, and it is now evident that these basic elements of life are not indestructible. With the continued proliferation of man, the direct relationship between his well-being and the quality of his environment becomes crucially important.

President Nixon has repeatedly stressed that there is "no challenge more urgent than that of bringing 20th century man and his environment to terms with one another", and of finding "new ways to use technology to enhance our environments, rather than destroying them." The President has emphasized that "the task of protecting man's environment is a matter of international concern" and has pledged "new international initiatives toward restoring the balance of nature, and maintaining our world as a healthy and hospitable place for man."

Recent actions by the Congress also have stressed the importance of environmental quality considerations in program planning and implementation by Federal agencies. At the same time, the values attached to environmental quality vary significantly at different stages of a nation's economic development, and in different cultural settings. Within this context, the Agency for International Development (A.I.D.) requested its overseas Missions to assess the environmental problems in 35 developing countries. The Missions were asked for a preliminary identification of the most important environmental problems in their respective countries.

Responses by the A.I.D. Missions revealed a growing awareness of the deleterious effects on local ecologies that often accompany economic development programs, and the potential for environmental degradation that exists in carelessly planned projects. A general problem in most countries is the dearth of personnel trained in the fields of ecology and environmental control. The magnitude of environmental problems varies significantly from one country to another, depending for the most part upon the extent of economic development, urbanization, and population pressures in each case.

For example, in some areas of Africa no significant environmental problems, resulting from man's activities, have been perceived due, in large measure, to the fact that the inhabitants live in predominately rural societies. Many other new nations in Equatorial Africa have reached a point, in terms of industrialization and population pressure, where environmental problems are either latent or approaching serious proportions. In most Latin American, North African, and Near East countries, economic development and population pressures have had a severe impact on the environment, especially in the urban centers. The same is true to an even greater degree in many densely populated Asian countries.

The principal environmental problem areas in the developing countries are characterized by population pressures that are adversely affecting -- or in some cases just beginning to adversely affect -- land use patterns. The rapid growth of population centers is occurring without adequate land-use planning, industrial pollution control, or satisfactory provision for potable water supplies and sewage and solid waste disposal. These deficiencies, coupled with a very critical shortage of housing accommodations, lead inevitably to the slum conditions that are widely associated with urbanization.

While these are the seeds from which environmental problems grow in most of the developing countries, such problems take many forms, depending upon climate, topography, natural resources, culture, population density, and degree of economic development. For the purposes of this report, specific environmental problems are considered for each of four regions, comprising Latin America, Equatorial Africa, North Africa and the Near East, and Asia.

It is hoped that the report will provide interim guidance for those organizations concerned with development, pending the preparation of more thorough and authoritative analyses by the developing countries themselves.

LATIN AMERICA

Argentina	Ecuador	Jamaica
Brazil	El Salvador	Nicaragua
Colombia	Guatemala	Panama
Dominican Republic	Guyana	Peru
		Uruguay

The rate of growth of Latin American countries, including the Caribbean, is the most rapid in the world -- about 3 percent annually (See Appendix I). At this rate the current population of 280 million could reach 756 million by the year 2000. Population pressure is most critical in the cities, where the annual growth rate is about 7 percent, sufficient to double the urban population in only 10 years.

The explosive character of urbanization in Latin America is reflected in the environmental problems reported for those countries. Among the problems identified most frequently for the urban areas in Latin America were: air pollution, degraded surface water supplies and water systems, contaminated ground water, inadequate sewage disposal, polluted beaches, and objectionable noise levels.

The smog problem in some Latin American cities has been comparable to that in the worst smog problem areas of the United States. The causes include increasing numbers of cars, the burning of more coal, increased volume of emissions from industrial and power plants, mines and smelters, and the burning of fields after harvesting.

The degradation of water supplies and water systems is associated with such circumstances as inadequate or non-existent sewerage systems, absence of sewage treatment plants, siltation, salt water intrusion, contamination with industrial wastes and agricultural chemicals, and the use of absorption pits for individual houses which jeopardizes the quality of ground water.

For the most part the pollution of beaches is the result of indiscriminate municipal sewage and solid waste disposal into bays and rivers, coupled with the dumping of oil and other wastes by ships. Objectionable noise levels are attributed to the increasing use of aircraft and to heavy vehicular traffic on narrow streets.

The rural environmental problems cited most frequently included erosion and destruction of the soil due to: deforestation, open pit or strip mining, and other unwise land uses, i.e., overgrazing, the burning of vegetation and harvested fields, and poor land cultivation techniques. The indiscriminate use of chemical fertilizers and pesticides was reported in many countries.

Deforestation is occurring in much of Latin America as large areas are completely cleared of trees by lumber companies, or slashed and burned to make way for farms and urban developments, frequently in remote areas where the timber cannot be utilized. In most cases, such deforestation is followed by soil erosion, flooding, and siltation of streams. In some sections, erosion is so severe that reforestation becomes exceedingly difficult.

Adverse effects from the widespread use of pesticides and chemical fertilizers included some deaths, the contamination of water supplies and some food products, and the reduction of bird populations which, in turn, has contributed to insect invasions. In most countries the problem with the use of such chemicals is linked to the absence of environmental quality standards and monitoring mechanisms.

Other general environmental problems identified in Latin American countries included inadequate land-use planning, resulting, for example, in the location of industrial activities in residential areas; the delayed planning of streets and community services in rapidly growing cities; and the deforestation of watersheds where subsequent flooding was inevitable. The exploitation of fish and wildlife resources in several countries has prevented maximum sustainable yields of commercially valuable fishery resources and of fur animals; has brought several wildlife species to the point of extinction; and has resulted as well in unfavorable predator-prey relationships in the case of some pest species.

Concern has been expressed that a unique ecological laboratory comprising the Galapagos Islands may be lost to the world due to the incursions of tourism and colonization. The introduction of exotic species of plants and animals presents another environmental problem of unknown proportions. Carp and Talapi mozambique have been introduced in inland waters, and a number of exotic trees now pose native plant disease problems.

On a regional level, the countries of Argentina, Uruguay, Paraguay, Bolivia, and Brazil share a common interest in the siltation and flooding problems, as well as the hydro-electric power and transportation potentials, of the River Plate and its tributaries. Another environmental problem of international proportions involves the transmission of plant and animal diseases. The recent appearance of the African coffee rust in South America is one example. The zoonosis animal diseases, communicable to man, and the foot and mouth disease result in heavy economic losses (estimated at \$500,000,000 annually), and major health hazards to countries in the southern portion of South America.

EQUATORIAL AFRICA

Democratic Republic of the Congo	Nigeria Somalia	Uganda Zambia
Ethiopia Ghana	Tanzania	

Taken as a whole, Africa's present estimated population of about 309 million could double by 1996 at the current 2.7 percent rate of growth (Appendix I). Of even greater significance, from the standpoint of population pressure on the environment, is the fact that Africa's urban population is growing at the rate of five percent annually. The ratio of urban population to rural population is far less, however, than in Latin American countries.

Preliminary reports from Tanzania and Somalia identified no significant environment problems at present, aside from the natural scarcity of water in the latter country. In both countries rural societies predominate; pesticides and chemical fertilizers are not used extensively; and industrialization has not reached the point where environmental pollution is a serious problem.

In six other countries in Equatorial Africa the most frequently mentioned urban problems were inadequate sewerage systems, degraded community water supplies, and existing or latent industrial pollution. In many instances the planning and construction of sewer and water supply systems has lagged far behind the growth of population centers. In some areas heavy clay soil precludes the effective use of septic tanks or absorption pits. In many small communities the need exists for relatively simple means of providing potable water from local water systems, and for eliminating excessive fluorides in ground water supplies.

Industrial pollution is present in areas where livestock industries have developed, and threatens to become a problem in other areas where the petroleum industry is growing.

The two environmental problems most frequently identified in rural sections of the countries in Equatorial Africa were land erosion and destruction, and water related diseases such as schistosomiasis and malaria. Land use problems that have resulted in serious erosion include deforestation by logging or burning, overgrazing, and the common practice of burning vegetation to speed the development of pasturage. Population pressure has led to efforts to settle and cultivate the hill country and this, in the absence of terracing, has resulted in widespread erosion and the degrading of water systems. Open pit mining also has contributed to the destruction of arable land.

The increasing development of water systems for irrigation and power has stimulated the spread of schistosomiasis and malaria and other water-related diseases in Equatorial Africa, as well as the development of aquatic weed problems. Relatively little is known at present about the relationship between water bodies and water-related disease and pollution problems in tropical countries. Cattle diseases, transmitted by ticks and the tsetse fly, also are a significant problem.

Efforts to control both human and livestock disease vectors through the application of insecticides have resulted in still other problems of uncertain dimension, relating to the residual effects of the insecticides on humans, animals, and plants. Moreover, pesticide residues in cocoa and other agricultural products are not being monitored, despite the increasing use of agricultural chemicals and increasingly stringent food standards in international trade. Another environmental problem in much of Equatorial Africa concerns the destruction of wildlife, through the widespread clearing and burning of natural wildlife habitat.

NORTH AFRICA AND THE NEAR EAST

Morocco  
Tunisia

Turkey  
Jordan

Afghanistan

The populations of these five countries in North Africa and the Near East are increasing at annual rates of 2.3 to 3.3 percent, as shown in Appendix I. Here, as in other countries of Latin America and Equatorial Africa, the populations -- at present rates of growth -- can be expected to

double in 20 to 30 years. With the exception of Afghanistan, the ratio of urban population to rural population is significantly higher in these countries than in most of the A.I.D.-assisted countries in Equatorial Africa. Moreover, a strong migration trend, from rural areas to urban centers, is adding substantially to the natural growth of population centers and to urbanization problems.

The countries of North Africa and the Near East are among the oldest in terms of civilized development. For the five nations surveyed, the most frequently reported urban environmental problems were inadequate or polluted water supplies, sewage and solid waste disposal, pollution of beaches and water systems and associated disease problems, industrial pollution and air pollution.

In large arid sections of these countries, the increasing size of population centers poses serious problems in supplementing very limited local ground water supplies. Urban population pressure is severely taxing the available sewer and water facilities. The discharge of industrial waste and untreated municipal sewage into waterways is a growing problem. Pollution of water systems has resulted in reported cases of typhoid, and frequent cases of hepatitis from contaminated seafood.

Industrial as well as municipal waste fouls many Mediterranean beaches, and this problem is compounded in some sections by oil and other waste materials from coastal shipping. Apprehension is particularly keen concerning the effect such pollution problems may have on tourist trade. While air pollution is not a general problem in these countries, it has reached objectionable levels in some sections where low quality fuels are used in large quantities.

In the rural areas of the five countries, the most common environmental problems involve soil erosion and the degradation of water systems, and the as yet undetermined residual effects of insecticides on humans, plants, and animals. Through hundreds of years of history this area of the world has suffered from overgrazing and deforestation and the resulting erosion problems. In more recent years, with the construction of water impoundments and irrigation systems, widespread erosion has resulted in siltation problems, and in some areas, soil salinity conditions. Programs have been started in several countries to control erosion through reforestation and other means.

The general use of insecticides, including large quantities of DDT to control disease vectors, has created concern over the residual effects of these chemicals on humans as well as plants and animals. The benefits in terms of agricultural production and disease control are obvious. However, as in most developing countries, insecticides have been used thus far without monitoring programs to determine the impact on the environment. Information is lacking, for example, on residual accumulations in fish, which is a significant item in the diet of those living near the Mediterranean coast. Another matter of concern to farmers in the western Mediterranean area is the heavy losses of grain crops (estimated as high as 10 percent annually) to noxious birds such as the Spanish Sparrow.

ASIA

Ceylon	Pakistan	Thailand
India	Indonesia	Republic of Viet-Nam
Nepal	Philippines	Republic of Korea

While a number of the Asian countries have made notable progress in recent years in reducing population growth rates, the large populations of India, Pakistan, and Indonesia can be expected to double within the next 27 years at present rates of increase (Appendix I). Population density in most Asian countries is a major cause of both economic and environmental problems in these largely rural societies.

The environmental problems of greatest concern in the urban centers of the nine Asian countries are air pollution, sewage pollution, industrial waste, and degraded water supply systems.

Serious air pollution was attributed to a variety of causes, including heavy concentrations of motor vehicles, industry, low quality fuels, the open burning of refuse, and, in some sections, innumerable wood fires for domestic purposes. In some cities, the intensity of atmospheric pollution was cited as a major health hazard comparable to air pollution at its worst in the United States.

Problems with sewage disposition and industrial waste also were reported as widespread. Many crowded urban areas are virtually without sewer facilities; the raw sewage being discharged into natural drainage channels or on open fields. In some countries the waterways and coastal areas are so heavily polluted that seafood from such waters presents a health hazard, and the purification of local water supplies for domestic use is exceedingly difficult. As a result, urban populations are plagued with hepatitis and intestinal diseases.

As population pressure has increased in many Asian cities potable water supplies have become scarce to such a degree that each dry season threatens to create a major disaster. In urban areas that rely on ground water supplies, the draw-down has increased to the point that salt water intrusion threatens. Still other cities are faced with the contamination of their surface water supplies by the large quantities of chemical fertilizers and insecticides being used to boost food production on nearby fields, and by sewage and industrial waste from cities further upstream.

The rural areas of Asian countries are confronted with much the same environmental problems as in other developing countries around the world. Survey reports for the nine countries in Asia listed the heavy use of pesticides and chemical fertilizers, deforestation and erosion, and destruction of fish and wildlife, as major areas of concern.

Population pressures in already densely populated Asian countries have spurred the use of chemical fertilizers, pesticides, and herbicides in large quantities in the production of rice and other food crops. At the same time, DDT has been used on a large scale for malaria control and is credited with saving 750,000 lives annually, in India alone. Little or no information is being obtained on the residual impact of such chemicals on the environment. In certain developed countries the use of DDT has been prohibited because of the tendency of residual amounts of this substance to accumulate in relatively large concentrations in the tissues of fish and domestic animals, which are used for human food. The risks as well as the benefits of using pesticides and agricultural chemicals are great. As yet the tools are not available for weighing the benefits in terms of disease control and food production, as opposed to environmental pollution.

Population pressures in the rural areas of Asia also are largely responsible for widespread over-grazing and deforestation through indiscriminate logging and burning. The incentive to sustain life outweighs rational land use management, and the result in most instances has been soil erosion, flooding, drought, the loss of arable land, and the degradation of water systems and reservoirs with sediment. The widespread use of irrigation has created major soil deterioration problems from water-logging and salinity due to poor drainage, coupled in some cases with insufficient water supplies.

The deterioration of ecosystems, together with pollution, has decimated fish and wildlife resources in many Asian countries, and the process has been hastened in some instances by indiscriminate fishing practices, including the incursions of foreign fishing fleets.

#### SUMMARY OF ENVIRONMENTAL PROBLEMS

The survey of 35 developing countries revealed a close inverse relationship, in nearly all of 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.

In rural areas nearly two-thirds of the A.I.D. Missions expressed concern over the heavy use of chemical fertilizers and insecticides and the absence of any monitoring mechanisms. Soil erosion and destruction from deforestation, overgrazing, burning, mining and farming was noted in at least half of all countries, coupled with the associated problems of flooding, degradation of water systems and siltation of reservoirs. Water-related diseases, such as schistosomiasis, and aquatic weeds which choke water transportation were mentioned frequently in the countries of Equatorial Africa. The destruction of fish and wildlife also was noted frequently, associated with the degradation of ecosystems and widespread pollution.

There is little evidence of awareness of environmental problems among the peoples of developing countries, or among their government administrators, although these problems are widely recognized in the scientific communities. Many countries are preoccupied with the development of their natural resources and, to the extent that concern does exist for the environment, there appears to be apprehension that social and economic costs of environmental protection may very well outweigh the benefits.

## ENVIRONMENTAL PROTECTION

Positive actions, suggested or implied, in the responses from A.I.D. Missions included measures for protecting and strengthening ecosystems and for the abatement of pollution along the following lines:

1. Develop an increasing awareness of the close relationship between environmental quality and the well-being of people through increased publicity, introduction of natural resource conservation in school curricula, symposia, specialized training in environmental control, lecture tours by world renowned conservationalists, and a greater degree of international action.
2. Encourage family planning to slow population growth as an initial step in achieving a population pattern in each country compatible with its natural resources and desired standard of living.
3. Encourage land use planning and zoning to utilize natural resources most effectively, to minimize erosion, and to systematize the development of urban areas.
4. Establish air quality standards and apply restrictions as necessary, over time, on the emissions of internal combustion engines, industrial plants, power plants, and mines.
5. Develop and enforce ordinances to protect the environment, i.e., to control the disposition of sewage and solid wastes by merchant vessels as well as by shore-based industrial installations.
6. Provide acceptable water supply systems, including treatment as necessary to assure satisfactory quality.
7. Provide acceptable municipal sewerage systems and disposal facilities.
8. Manage water systems to prevent degradation and to minimize the incidence of water-related diseases and the occurrence of aquatic weeds.
9. Control the use of pesticides, herbicides and chemical fertilizers, and monitor the effects of these substances on humans, plants and animals.
10. Institute programs for reforestation, soil conservation, and rational management of fish and wildlife resources, including control over the international shipment of exotic plants and animals.

It is evident that not all of these environmental protection measures are necessary or practicable in each country. It is hoped, however, that a better understanding of the environmental problems experienced in developing countries will emphasize the importance of environmental protection measures as development proceeds. To the extent that man understands the direct relationship between the quality of his environment and his own well-being, he is able, by rational planning, to improve both.

APPENDIX I  
Population Estimates for Selected Countries  
by Regions - 1970<sup>1</sup>

Country	<u>Latin America</u>			No. Years to Double Popu- lation at Present Rate
	<u>Estimated Population, Jan. 1, 1970</u>	<u>Percent Urban 1970</u>	<u>Rate of Natural Increase, 1969 (%)</u>	
1 Argentina	24,150,000	71	1.4	50
2 Brazil	92,226,000	54	3.0	23
3 Colombia	20,790,000	55	3.2	22
4 Dominican Republic	4,169,000	37	3.4	20
5 Ecuador	5,990,000	38	3.4	20
6 El Salvador	3,318,000	40	3.4	20
7 Guatemala	5,281,000	37	2.8	25
8 Guyana	(not available)	--	---	--
9 Jamaica	1,954,000	36	2.6	27
10 Nicaragua	1,888,000	44	3.1	22
11 Panama	1,398,000	47	3.3	21
12 Peru	13,301,000	46	3.0	23
13 Uruguay	2,874,000	84	1.4	50
	<u>Equatorial Africa</u>			
1 Democratic Republic of the Congo	17,447,000	13	2.4	28
2 Ethiopia	24,987,000	5	2.3	30
3 Ghana	8,973,000	18	3.0	23
4 Nigeria	54,000,000	15	2.4	26
5 Somalia	(not available)	--	---	--
6 Tanzania	13,119,000	5	2.7	26
7 Uganda	9,621,000	3	2.6	25
8 Zambia	4,095,000	27	2.7	25

APPENDIX I (continued)

North Africa and Near East

<u>Country</u>	<u>Estimated Population Jan. 1, 1970</u>	<u>Percent Urban 1970</u>	<u>Rate of Natural Increase, 1969 (%)</u>	<u>No. Years to Double Population at Present Rate</u>
1 Morocco	15,592,000	27	3.3	21
2 Tunisia	5,155,000	26	2.8	26
3 Afghanistan	16,700,000	7	2.3	30
4 Jordan	2,315,000	44	3.0	22
5 Turkey	34,855,000	31	2.5	28

Asia

1 Ceylon	12,404,000	17	2.4	29
2 India	544,000,000	19	2.6	25
3 Nepal	11,141,000	5	2.0	35
4 Pakistan	128,500,000	16	2.7	26
5 Indonesia	118,056,000	18	2.5	27
6 Philippines	37,766,000	23	3.5	20
7 Thailand	36,898,000	13	3.3	21
8 Republic of Viet-Nam	18,158,000	26	2.6	27
9 Republic of Korea	31,431,000	39	2.2	32

✓ Taken from "Population Program Assistance" issued by the Agency for International Development, October 1970.