

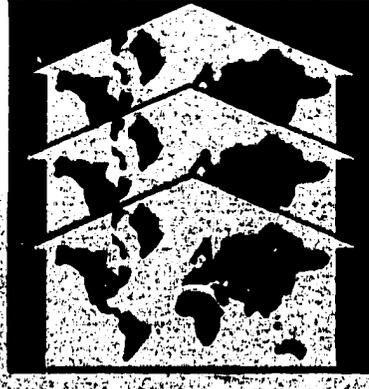
PA-ABG-449

# Urbanization and the Environment in Developing Countries

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PN-A BG-449

10/15/89

# ■ Urbanization and the Environment in Developing Countries

Background papers from the Roundtable Conference  
on Urbanization and the Environment in Developing Countries  
held in Washington, D.C., on November 21, 1989

■ compiled by  
Office of Housing and Urban Programs  
U.S. Agency for International Development  
Washington, D.C. 20523

- Published in July 1990 in Washington, D.C., by the Office of Housing and Urban Programs of the U.S. Agency for International Development. The views expressed in this publication are those of the authors and do not necessarily reflect those of the Office of Housing and Urban Programs or the U.S. Agency for International Development. Prepared in compliance with PIOT 934-2156 and project no. 940-1008.95.

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## ABSTRACT

### *Urbanization and the Environment in Developing Countries*

This report is a compilation of three research papers presented at a day-long roundtable conference on urbanization and the environment in developing countries in November 1989. The conference was sponsored by the USAID's Office of Housing and Urban Programs (PRE/H); the Office of Forestry, Environment and Natural Resources (S&T/FENR); and the World Resources Institute. It was designed to examine the linkages between urbanization and environmental decay and to identify more effective methods of urban environmental management. Among the conclusions to emerge from the papers and discussion are the following:

- The most immediate environmental problems facing urban areas of developing countries are a lack of potable water, inadequate sewage and solid waste disposal, and insufficient land use planning. Such problems have serious consequences for human health and productivity as well as sustainable economic development.
- To gain support for environmental programs, countries can carry out low-cost, low-technology programs that will have immediately visible results in order to demonstrate that an investment in environmental improvement is worth the cost.
- The public sector has an indispensable role to play in implementing national or regional level programs. Limited resources necessitate that donors work with public and private agencies, NGOs and the informal sector to strengthen local capacities to address environmental challenges.
- Donors need to focus on strengthening long-term political commitment to the environment within the host country. Multi-year funding instruments such as PRE/H's Housing Guaranty Loans are useful for promoting policy and institutional reform.

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## ■ Abstract

This report is a compilation of three research papers presented at a day-long roundtable conference on urbanization and the environment in developing countries in November 1989. The conference was sponsored by the U.S. Agency for International Development's (USAID) Office of Housing and Urban Programs; the Office of Forestry, Environment, and Natural Resources of USAID's Bureau for Science and Technology; and the World Resources Institute. It was designed to examine the linkages between urbanization and environmental decay and to identify more effective methods of urban environmental management. Among the conclusions and recommendations to emerge from the presentations and discussion are the following:

- The most immediate environmental problems facing urban areas of developing countries are a lack of potable water, inadequate or improper sewage and solid waste disposal, and insufficient land use planning. Such problems have serious consequences for human health and productivity as well as for sustainable economic development.
- To gain support for environmental programs, countries can carry out low-cost, low-technology programs that will have immediately visible results in order to demonstrate that an investment in environmental improvement is worth the cost.
- Although privatization is often prescribed as a solution to urban environmental problems, the public sector has an indispensable role to play, especially in implementing national or regional programs. Limited resources necessitate that donor agencies work with public and private agencies as well as nongovernmental organizations to strengthen local capacities to address environmental challenges.
- It is critical to address environmental issues from a long-term perspective. Donor agencies can go beyond a project-based approach and focus on strengthening long-term political commitment to the environment within host countries. Multi-year funding instruments, such as loans provided under the Housing Guaranty Program, are useful for promoting policy and institutional reforms. Reforms in the areas of infrastructure financing, land use planning, and municipal management can contribute to sustainable resource use and better environmental management in the context of rapid and continuing urbanization.

## ■ Preface

In examining environmental problems caused by rapid urbanization in developing countries, it is necessary to resist the temptation to view the growth of cities as an entirely negative phenomenon. From an economic standpoint, urbanization is often associated with desirable outcomes, such as the development of larger markets, enabling producers to take advantage of economies of scale; job creation and higher levels of household income, leading to an improved standard of living; and the centralization of capital, technology, and labor in one area, resulting in greater productivity.

Urbanization may also have positive impacts on the environment. Urbanization has historically been associated with declining birth rates, which—among other things—reduce the pressure for unsound use of agricultural lands. The per-capita cost of providing energy, transportation, water, sewage disposal, and other public services decreases as population densities increase. Waste treatment is more affordable in urban areas, where higher incomes combine with lower per-unit treatment costs. More efficient and environmentally sound energy sources are available in urban areas, and the use of excessively polluting fuels is less.

Despite these positive effects, urban growth in many developing countries over the last few decades has been accompanied by myriad environmental problems. Inadequate urban services have contributed to land, water, and air pollution. Rapid urbanization has led to the depletion of natural resources needed for sustainable development. In addition, the majority of the poor live in large and growing squatter settlements with little or no access to basic services. Such problems have serious consequences for human health and productivity as well as social and economic development.

In response to the growing recognition of the environmental degradation associated with rapid ur-

banization, the U.S. Agency for International Development's (USAID) Office of Housing and Urban Programs (HUP) has made it a priority to develop a more focused strategy for addressing urban environmental concerns. In an effort to understand better the positive and negative impacts of urbanization in developing countries, HUP commissioned the three studies included here. The papers were presented and discussed at a roundtable conference on urbanization and the environment in developing countries held on November 21, 1989, in Washington, D.C.

The conference was sponsored by the U.S. Agency for International Development's Office of Housing and Urban Programs; the Office of Forestry, Environment, and Natural Resources of USAID's Bureau for Science and Technology; and the World Resources Institute. The first half of the roundtable conference centered on the presentation and discussion of the three research studies, while the second half was devoted to examining potential strategies for addressing urban environmental issues within donor agencies' programs.

The authors of each of the three research papers begin with the premise that urbanization in the developing world is irreversible and has been beneficial to the extent that economic output, investment, and income growth have been stimulated. Urban growth, however, has outstripped the capacity of authorities to manage development and respond to the need for infrastructure, services, and land. The resulting environmental degradation and depletion of natural resources now threatens to undermine the productivity of cities and hamper economic growth.

The interrelationship between economic growth and environmental protection emerges as a central theme of the research. The question is not how to stop urbanization but how to protect the resources necessary to support sustainable economic growth. The

authors are unanimous in suggesting that the solution lies in improving urban management in order to institutionalize the capacity to meet the needs of urban areas as they arise. However, each offers a somewhat unique perspective and approach to the problem of urban environmental management.

In the chapter based on a paper by Blair Bower, Eric Hyman, and Rodney White, the adverse impacts of urbanization on environmental quality are identified and the response of governments in developing countries is analyzed. The factors affecting governmental responses to environmental problems are also examined, including structural characteristics, financial capacity, and the inadequacy of existing management capacity to cope with the challenges of rapid urbanization.

Among the key management problems identified are fragmented governmental structures, inadequate staffing, the lack of incentives, poor quality information and data bases, and an inadequate understanding of the costs and benefits of implementing environmental protection programs. To dispel the concern that improving environmental quality is necessarily expensive, examples are offered of affordable measures that can be adopted as part of an urban environmental management strategy.

In their study, Royce LaNier, Stephen Reeve, and April Young emphasize the need for cities in the developing world to be perceived both as engines for economic growth and intricate environmental systems. The complexity of urban environmental systems in the developing world requires that economic development policy, environmental management, and urban investment decisions be closely linked and also necessitates the development of new urban management tools, methodologies, and principles to address the need for greater policy coordination.

The authors propose five principles to guide urban environmental management:

- Enhance urban economic growth through such measures as revising settlement policies; strengthening agricultural markets; and rationalizing subsidy, tax, and pricing policies.
- Develop strong institutions by, for example, clarifying jurisdictions and decentralizing authority.
- Create better guidance systems for decision making through the use of improved informa-

tion and data bases, increased public involvement, and enhanced flexibility of regulatory controls and standards.

- Direct urban growth with land delivery and infrastructure investment by means of carefully instituted land development policies and improved provision of urban services.
- Encourage private initiative by offering small business credits, enacting regulatory reforms, and releasing public lands to the private sector.

In his paper, David Foster presents a review of basic environmental concepts, including carrying capacity, buffering capacity, and related economic terms, and examines the advantages and disadvantages of alternative approaches to environmental protection. His central tenet is that environmental protection should be treated as any other investment in urban infrastructure and measured in terms of potential dividends or losses. To support this approach, Foster suggests that donor agencies incorporate appropriate training, planning, financial analysis, technology, and cost recovery strategies into their environmental management efforts.

In addition to examining the linkages between the economy and the environment and suggesting ways to improve urban environmental management, the authors also survey the response of international donor agencies to the environmental problems faced by urban areas in the developing world. Each suggests new approaches or programs that may help alleviate environmental decay and strengthen long-term capacity to deal with ongoing challenges to environmental quality. Among the recommendations emerging from the review of existing donor policies are

- the need for increased coordination and improved information dissemination among donor agencies regarding their environmental programs and
- the need to develop new tools and methodologies, including new environmental assessment techniques to identify environmental needs and management capacities within a given country.

# ■ Urbanization and Environmental Quality

■ based on a paper by

**Blair T. Bower, Eric Hyman, and Rodney R. White**

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## ■ Introduction

The rapid urbanization in developing countries in the latter half of the twentieth century is a well-documented phenomenon. All analyses project a continuation of the trend. Figure 1 shows the levels of urbanization estimated for 1950 and 1987 and projected for 2025 for USAID's Africa, Asia/Near East, and Latin America/Caribbean regions. The projections represent the midrange variant developed by the United Nations (UN) Department of International Economic and Social Affairs.

The actual extent of urbanization among countries is clouded by differences in definitions of urban areas and inaccurate or nonexistent censuses of population. For example, the last census in Nigeria was in 1973. Definitions of what comprises an urban area have changed. Boundary changes have occurred as a result of political decisions, typically resulting in areal expansion. In some cases, the boundaries of a metropolitan area have become contiguous with the boundaries of a province or a state.

Virtually all statistics and projections of population in developing countries, in whatever agency reports they are found, are based on analyses by the UN Department of International Economic and Social Affairs. As those involved in population projections in developed countries such as the United States are wont to state, the only certainty about the projections is that they will be wrong. However, it makes little difference if the rate of increase is 2.8 percent, 3.1 percent, or 3.3 percent; the problem of managing environmental quality in urban areas will continue, and environmental quality conditions in urban areas will continue to decrease unless such management programs can be put in place and maintained.

Much of the analysis, planning, and development aid has been oriented to primary cities and megacities. Yet the phenomenon of urbanization extends far beyond those foci. For example, by 2000, between 60 and 70 percent of the population of Latin America

will reside in about 2,000 areas, with 20,000 or more inhabitants in each. At least 50 percent of this urban population will be in about 46 major metropolitan areas.

With respect to the spatial distribution of the remainder of the population in Latin America, it is useful to distinguish between transitional population settlements, referred to as rural-urban settlements, and clearly rural settlements. Between 10 and 15 percent of the total population of Latin America in 1980 was estimated to reside in settlements that had between 2,000 and 19,999 inhabitants, i.e., the rural-urban settlements. It was estimated that, between 1950 and 1970, approximately 430 settlements of this size were reclassified as urban areas because their populations reached 20,000. The increase in these settlements was a function of natural increase and in-migration.

With respect to settlements with populations less than 2,000, it was estimated that about one-third of the 1980 population in Latin America resided in settlements in this size category. For these settlements, it is useful to distinguish between two types based on size of population. The first type consists of settlements or small centers with between 500 and 1,999 inhabitants. In such settlements, some service, transport, and communication functions tend to be established. About one-fourth of the clearly rural population in Latin America was estimated to have resided in these settlements in 1980. The other type, accounting for about three-fourths of the clearly rural population, consists of small villages, hamlets, and dispersed inhabitants.

Based on a variety of analyses, the following conclusions with respect to urbanization in developing countries appear valid:

- Urbanization in developing countries is irreversible. In addition, urban areas—especially the megacities—are sufficiently large that the

natural increase in those areas will ensure an increasingly urban population over time, given that migration is an age-selective process and that most migrants are in the childbearing age range. Net out-migration from urban areas to rural areas is highly unlikely.

- The inability of governments of urban areas to provide adequate services, e.g., water supply, sanitation, transport, and solid waste disposal, has contributed significantly to the development of the "informal" sector of economies in many, if not most, developing countries. The informal sector has become an increasingly important part of the overall economy, in terms of outputs, employment, and utilization of available natural resources. Although the informal sector has been able to provide some services to areas of cities not otherwise served, the existence of such efforts has added to the fragmentation—and hence to the inefficiency—of the provision of urban services.

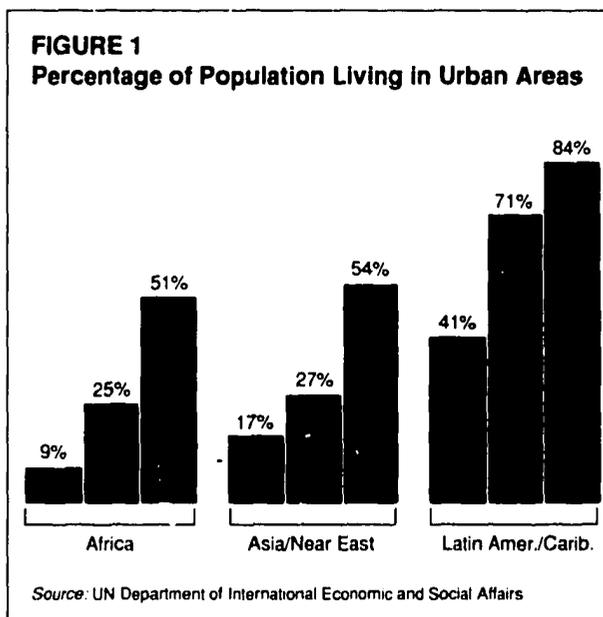
One index of the inability of governments to provide infrastructure services is the nonachievement of the goals of the UN's International Drinking Water Supply and Sanitation Decade.

- Although urban areas on the average have been estimated to contribute on the order of two-thirds of gross domestic product, an increasing portion of that contribution represents expenditures to cope with or prevent the adverse effects of discharges to the environment. In addition, traffic congestion and the unreliability of utility systems often associated with rapid urbanization add to costs of producing goods and services. Further, national accounts and the calculations of gross domestic product do not take into account the monetary damages resulting from water and air pollution in urban areas.
- Urbanization and the environmental effects related to urbanization cannot be analyzed, and measures to cope with urbanization and related environmental problems cannot be implemented, in isolation from the international, national, and regional contexts of urbanization. Thus, if there is to be urban development, it must be an integral part of national development.
- Putting more money into the sites-and-services projects typical of the last decade is not likely to result in long-term net benefits. What is needed is better understanding of how different strate-

gies and emphases would affect outcomes and how strategies are sensitive to different levels and types of financing. The recent shift in the programs of some donors toward institution building and longer term, consistent technical assistance reflects these facts.

- Urban bias in the policies and programs of many governments of developing countries has been a major factor in stimulating migration from rural to urban areas. The bias is reflected particularly in the subsidization of food prices, and often housing prices, in urban areas as well as the maintenance of a fixed rate of foreign exchange above market level. The result has been a continued decline in the domestic rural-urban terms of trade, which leads, in turn, to an undercutting of domestic agriculture and the importation of artificially lower priced food. In effect, rural areas are subsidizing urban areas.
- Achieving a stable world population is not likely to be accomplished for at least another generation, e.g., by about 2135. Thus, as urbanization continues, the problems of managing environmental quality within urban areas will be exacerbated.

The basic point is that, regardless of the past configuration of factors leading to rapid urbanization, the growth of urban areas will continue. The fundamental problem, then, is how to improve the management of environmental quality in those urban areas.



## *Urbanization and Environmental Quality*

The objectives of this paper are

- to identify the types of adverse environmental effects typically stemming from urbanization in developing countries;
- to indicate the types of responses governments have made in attempting to cope with the adverse environmental effects of urbanization and the efficacy—or lack thereof—of those attempts;
- to indicate the factors that affect the capacity of governments in urban areas to manage environmental quality; and
- to review the role of major donors in assisting, or not, governments of developing countries to address the adverse environmental effects of urbanization.

# ■ Driving Forces of Urbanization

The rapid increase in urbanization in developing countries has been fueled primarily by rural to urban migration. That migration is stimulated by the pull of presumably more desirable conditions in urban areas combined with the push of deteriorating conditions in rural areas. Thus, migration is a function of the perceived difference in opportunities and quality of life between urban and rural areas, regardless of the reality. In some cases, in-migration to a designated urban area occurred even before streets were laid out and before public services were available.

The driving forces of urbanization in developing countries can usefully be discussed in relation to the attractions of urban areas and the deterioration of conditions in rural areas.

## Attractions of Urban Areas

Urban areas have traditionally been centers where manufacturing, financial, and governmental activities of a region or a country are concentrated. The advantages of an urban area stem from at least three characteristics. One is the synergism which stems from the variety of services (and products) available. This variety enables the production of "packages" of inputs to different activities. For some types of activities, interaction among sources of different inputs is essential, which requires proximity.

Second, urban areas represent concentrated centers of markets for goods and services. These markets in turn stimulate the development of additional, more specialized, activities. As the complexity of an urban area increases, there are more niches to be developed and occupied by entrepreneurs.

Third, concentrated markets enable the development of economies of scale, both within the urban area and in relation to activities outside of, but supplying, the urban area. However, there are limits to agglomeration economies. At some level, dis-

economies begin to be significant, e.g., congestion and deterioration of environmental quality. The size at which diseconomies begin is a function of the capacity of the urban government to provide services and maintain adequate levels of environmental quality.

Advantages of an urban area represent attractions in terms of perceived opportunities. The wide range of activities yields demands for a wider range of skills than is the case in rural areas. On the supply side, urban areas offer a wider range of goods and service than do rural areas.

A very important attractant is the fact that, in most societies, the dominant power structure for decisions for allocation of resources is located in the urban area that is the capital of the country. National governments concentrate activities in capital cities. Given that the governmental structure of most developing countries is highly centralized, the capital typically is the prime locus of activity. Concentration of governmental activities in turn draws private sector activities. A few regional cities may achieve substantial status, usually when based on exploitation of a natural resource of the region.

## Deterioration of Conditions in Rural Areas

The factors resulting in deterioration of conditions in rural areas can be divided into two categories. One consists of those factors that reduce productivity of existing systems on agricultural, pastoral, and forest lands. The other consists of those factors that have resulted in change in existing production systems.

### Factors Resulting in Reduced Productivity

Population increases in the twentieth century in rural areas in many developing countries have re-

sulted from decreases in mortality resulting from reductions in the prevalence of malaria and other vector-transmitted diseases. As mortality declines and birth rates remain approximately the same, population increases to a level that exceeds the carrying capacity of the land under traditional agricultural systems. (This is not to imply that modern agriculture would improve the situation; the contrary is often the case, as indicated below.) Pushing the systems beyond the sustained yield level typically results in reducing productive capacity, e.g., because of soil loss. Population increases in some forested areas in sections of Nepal reached a level about two decades ago that exceeded the sustained yield of the forest resources for fuel, grazing, and building materials. The basic trend has not changed.

The development of irrigation technology, e.g., tube wells, methods of irrigation, and dam construction for water storage, has resulted in large increases in irrigated areas around the world in the last half century. Irrigated acreage continues to increase, but at a slower rate. At the same time, as much acreage or more is going out of production or has sharply reduced its yield because of improper irrigation practices leading to waterlogged and saline soils.

The green revolution spawned a shift from extensive to intensive agriculture, with concomitant increases in required inputs—water, fertilizer, pesticides—in order to achieve high outputs. Often, this has meant continuous monoculture, rather than crop rotations and crop-fallow systems. This, in turn, has resulted in reduced yields over time, particularly as resistance to pesticides evolved. The result has been reduced carrying capacity of the land.

Where farm land has been divided among a number of family members, the resulting size of parcels has sometimes become so small that farming is no longer economically viable.

More frequent and longer periods of drought in areas such as the Sahel of Africa have reduced available grazing lands because of desertification. With little reduction in the demand for grazing, productivity and carrying capacity have decreased.

A major factor that affects the economic feasibility of agriculture in rural areas is the inefficient or absent systems for the storage, collection, transport, and marketing of outputs. A substantial portion of outputs at the farm level never reaches consumers in urban areas, thereby reducing the returns on farmers' efforts.

Although not directly related to the changing productivity of agriculture, two aspects of demand for agricultural products have significant impacts. One is the urban bias on the part of many governments in developing countries—subsidized prices for agricultural products for urban dwellers combined with fixed prices to farmers—which has stimulated out-migration. As prices of factor inputs to farmers have increased and prices for outputs have remained essentially fixed, farming has become increasingly less feasible economically.

Another factor on the demand side is the change in tastes in urban areas, partly or predominantly as a byproduct of urbanization. For example, in some places in Africa, demand has shifted from maize, cassava, and other traditional crops to rice and wheat. The latter are less amenable to cultivation by traditional modes and more amenable to large-scale agriculture with consequent reduction in labor requirements. Similarly, a concomitant of urbanization has been the increasing substitution of nonbiodegradable materials, e.g., plastics and metals, for more biodegradable materials, e.g., wood and local ceramics. The durability of these materials can result in adverse impacts on the environment, if they are not disposed of properly.

### Factors Resulting in Changed Production Systems

Factors operating at international and national levels have resulted in drastic changes in agricultural lands in some areas, depriving substantial segments of rural populations of their livelihood. Agribusiness operates on an international scale, with capital moving to locations where larger profits can be generated by shifting the technology of agricultural systems or utilization of forest lands.

Mexico provides clear examples of such shifts. In the La Laguna region, a shift from subsistence agriculture with some marketing of outputs to surrounding areas began at the end of the 1950s. Capital external to the region outbid the local farmers for land on which to grow sorghum for animal feed. This output was produced by intensive monoculture, with improved seeds, new types of fertilizers, pesticides, and mechanization. The shifts were aided by actions of the national government. By the beginning of the 1980s, the acreage used for production of maize—the typical crop from local agriculture—had declined by about two-thirds. Acreage used for pro-

duction of sorghum had increased from essentially none in 1960 almost to the level of maize acreage in 1950. By 1982, sorghum was grown on 90 percent of the lowlands and 50 percent of the highlands.

Adverse consequences resulted for both human populations and natural systems in the region. The advance of sorghum production increased the rate of migration to urban areas in the region. The farmers remaining in the area were forced from the bottom lands and from the plateaus to relatively steep and much more erodible lands. Soil erosion increased. Returns to farming efforts declined substantially, accompanied by a decline in nutritional level and in access to capital. A downward spiral began, and still continues, with the remaining population moving to more and more marginal land.

In the Tabasco region of Mexico, an analogous trend occurred, also stimulated by external capital. In this case, the shift in the production system was from traditional annual and biannual crops and forest lands, both providing a livelihood for local peoples, to cattle raising. By 1980, virtually all forest lands and annual and biannual crop lands had been eliminated.

In addition to technological changes, agrarian reform efforts have displaced rural labor. As a result, large numbers of people from rural areas have moved to urban areas.

Areas of prime agricultural land have been inundated by reservoirs developed primarily for hydroelectric energy generation, flood damage reduction, and water supply for urban areas, usually areas which are far downstream. Even where some of the managed water is allocated to irrigation, the alternative areas are less productive than the inundated lands and, hence, support fewer families or require movement of the population to unknown areas with corresponding social dislocation.

# ■ Environmental Effects of Urbanization

Urban areas exert demands on the environment for disposal of residuals (wastes) from activities in urban areas and for inputs into activities in urban areas, e.g., food, fuel, land. The environmental effects of the former occur within the urban area and downstream and downwind from the urban area. The off-site environmental effects can occur very long distances away, as a result of transport processes in the atmosphere and in water bodies.

Environmental effects related to residuals discharges refer primarily to effects on ambient environmental quality as measured by such indicators as concentrations of particulates, sulphur oxides, hydrocarbons, and carbon monoxide in the atmosphere; dissolved oxygen, total dissolved solids, total suspended solids, nitrates, phosphates, pesticides, metals, synthetic organic compounds, and algae in surface water bodies; total dissolved solids, nitrates, phosphates, pesticides, metals, and synthetic organic compounds in ground water aquifers; noise levels in terms of decibels; and garbage, obsolete vehicles, and appliances indiscriminately dumped on land and in stream channels.

Concentrations in the environment impinge upon receptors, i.e., humans, plants, animals, building. In the case of humans and for some other species, exposure is through multiple pathways, e.g., inhalation, ingestion, imbibing, and dermal contact. The results of exposure may include morbidity, mortality, and reduced capacity for physical activity and reproduction.

Environmental effects can also be considered in relation to occupational health or industrial hygiene and so-called indoor pollution. The former relates to exposure to various materials in the work place through inhalation, dermal contact, and audio pathways. To the extent that agricultural operations occur in urban areas, the work place includes agricultural operations where exposure can be to pesticides in

their application to crops or to pathogenic organisms in water used in irrigation. Indoor pollution refers to exposure within residences or other non-work locations.

## Demands for Disposal of Residuals

Residuals are generated and discharged within urban areas by all types of activities, e.g., residential, commercial, institutional, industrial, agricultural, transportation, and by the urban area as a whole in the form of storm runoff. The effects on ambient environmental quality resulting from the discharges are a function of the types and quantities of residuals discharged; the time pattern of discharges, i.e., daily, weekly, or seasonally; the topographic setting; and the meteorological and hydrologic conditions. Examples of sources, residuals discharged, and effects follow:

- The built environment of urban areas transforms the natural environment into impermeable areas that preclude infiltration of precipitation. For the same distribution of precipitation, the increase in impermeability increases the magnitude and frequency of flood flows, increases discharges of suspended sediment and dissolved constituents into water bodies, changes the time pattern and water quality characteristics of streams within the urban area, and reduces the recharge of ground water aquifers within the urban area.
- In many, if not most, urban areas, storm runoff is a major contributor to discharges to water courses and, hence, to deterioration of ambient water quality. This is true even in many arid areas because such areas often are characterized by high-intensity precipitation, even though such events are relatively rare. The adverse environmental effects of urban storm runoff are exacer-

bated by inadequate management of solid wastes, with the resulting litter, human and animal feces, septic tank overflows, and garbage in street gutters available for transport by the increased runoff.

- Inadequate transport systems in most urban areas result in a proliferation of thousands of private vehicles, which—as with the vehicles of public transport systems—typically have no devices to reduce gaseous discharges to the atmosphere. A lack of maintenance and the operation of vehicles until they literally fall apart results in high unit emission coefficients. Typically, there are no vehicle emission standards and no inspection/testing facilities. These characteristics of vehicle fleets in combination with traffic congestion result in high concentrations of particulates, carbon monoxide, and hydrocarbons within urban areas, as well as high ozone concentrations under certain atmospheric conditions.
- Residential, commercial, industrial, and institutional activities discharge gaseous residuals—particulates, sulphur oxides, and metals—into the atmospheres of urban areas following fuel combustion for space heating, process steam, energy generation, cooking, and incineration of infectious materials.
- Various industrial and institutional activities discharge oils and grease, organic materials, synthetic organic compounds, and heavy metals in liquid waste to water courses.
- Where urban areas are located on estuaries, major rivers, sounds, and bays, significant discharges of various liquid, solid, and gaseous residuals occur from vessels anchored along shores or moving through navigation channels. Discharges from point and nonpoint sources occur directly into coastal waters.
- In many urban areas, the provision of infrastructure services, e.g., water supply, sewerage, and solid waste management, is inefficient. Poor construction of water supply distribution systems results in large leaks, e.g., 30 to 40 percent of gross input to the system, which means that more materials and energy are required for the same level of service provided. Inadequate construction of water supply systems, e.g., pipes on the surface of the ground and inadequate connections, result in infiltration of contami-

nants into the water supply system. Inadequate construction and management of landfills can result in leaching of chemicals into ground water aquifers.

In sum, the effects on ambient environmental quality within a given urban area are a function of the mix of activities within the urban area; the production processes and raw materials used and the nature of products produced; the constraints imposed on discharges, if any, and methods of managing solid wastes; the fuel types used; the topography and elevation; and meteorological and hydrologic conditions. The effects are reflected in the spatial and temporal pattern of concentrations in the urban airshed and in the spatial and temporal patterns of concentrations in surface and ground water bodies in the urban area. These effects on ambient environmental quality within the urban area have impacts on activities within the urban area, e.g., exposure to high levels of particulates, water quality from wells such that additional treatment is necessary before use, and increased morbidity resulting from exposure to septic tank overflows.

Gaseous residuals discharged in an urban area are often carried substantial distances downwind. Dry or wet deposition occurs on land and on water bodies. If the former, subsequent precipitation and resulting runoff transport the materials into water bodies. Acid precipitation can have adverse effects on vegetation and fish species. Deposition of airborne phosphates can contribute to increased eutrophication in water bodies. Ozone can reduce yields of agricultural crops. The geographic scope of the environmental effects of discharges of gaseous residuals depends on the type of residuals, the topographic and elevation setting of the discharges, and meteorological conditions.

Discharges of liquid residuals from urban areas include organic materials, suspended sediment, heavy metals, oils, synthetic organic compounds, plastic, and acids. Either singly or in combination, organic materials, oils, grease, and some chemicals can reduce dissolved oxygen in streams to zero, thereby virtually eliminating aquatic life. Deteriorated water quality affects in-stream uses such as recreation and fisheries as well as withdrawal uses such as irrigation and water supply for municipal and industrial purposes, thereby imposing additional costs for intake water treatment before use. Untreated waste water discharged from urban areas is often only slightly diluted by existing streamflow,

so that when it is used for irrigation downstream, adverse impacts on humans occur from concentrations of pathogenic organisms on the food crops.

Suspended sediment discharged into water bodies from urban areas typically results in sedimentation downstream. This, in turn, may reduce fish populations by increasing turbidity and covering habitat, may impose additional costs for dredging, may exacerbate flooding because of aggradation in stream channels, and may smother riparian vegetation.

Where urban areas are located directly on estuaries or bays, discharges enter coastal waters directly, without the decomposition that can occur in river channels between urban areas and downstream coastal waters. High concentrations of heavy metals, synthetic organic compounds, and pesticides are often found in the water column, sediments, shellfish, and finfish in coastal water bodies receiving discharges directly from urban areas.

## **Demands for Inputs to Urban Areas**

Demands for inputs to activities in urban areas are imposed on upstream areas, on downstream areas, and on the urban areas themselves. With respect to the first, examples are demands for wood for fuel; wood for building materials; sand and gravel for building materials, including roads; coal for combustion for process steam, energy generation, and space heating; fiber for textile manufacturing activities; hides for clothing manufacturing; and crops and livestock for food. Urban areas also impose demands on upstream areas for land for reservoirs for generation of hydroelectric energy, for flood damage reduction, and for water supply. Indirectly, urban areas impose demands on upstream areas for crops and raw materials for export in order to provide foreign exchange for supporting activities in urban areas.

These demands typically exceed the sustained yield capacity of renewable natural resources, e.g., crop lands, pasture lands, and forests, which leads to increased soil erosion; lower productivity; and deterioration of water quality in streams, lakes, and ground water aquifers. These adverse environmental effects affect the upstream areas where the natural resources are exploited, the transition areas between the source areas and the urban areas, the areas of urban demand, and areas downstream from the

urban areas. Major contributions from upstream areas to the urban areas include suspended sediment, nitrates, phosphates, and pesticides.

The construction and operation of reservoirs upstream from an urban area can have major, adverse environmental effects, both in the reservoir area and downstream from the reservoir. Increased prevalence of vector-related illnesses, e.g., schistosomiasis and malaria, have occurred in reservoir areas. Operation of a reservoir results in some degree of change in the natural flow of the river, depending on the size of the reservoir in relation to mean annual streamflow and to mode of operation. Downstream from the reservoir, the water temperature, riparian habitat, and assimilative capacity are all likely to change, sometimes drastically. This, in turn, affects the productivity of the stream and, hence, the resource base of the population dependent upon it. Retaining silt in the reservoir may deprive downstream flood plains of nutrient replenishment and may result in degradation downstream from the dam as a result of the increased carrying capacity of the flows after sediment has been dropped in the reservoir.

Urban areas also impose demands for inputs on downstream areas, particularly from coastal waters, i.e., bays, estuaries, and near-shore coastal areas. The types of demands are similar to those imposed on upstream areas, e.g., finfish and shellfish for food; sand, gravel, and coral for building materials; wood for charcoal production; and offshore petroleum and natural gas for varied uses. Through its demand for food, the urban area may exert a demand for shallow water areas to convert to aquaculture, thereby eliminating habitat for certain native species.

Water and land are the two common inputs imposed by an urban area upon itself. Water for self-supplied users and for public water supply systems is often obtained from ground water in urban areas. Given the absence of or inadequate regulation of withdrawals and the lack of charge for withdrawals, the sustained yield of aquifers is typically exceeded. This, in turn, results in a larger and larger cone of influence, which induces flow from more distant portions of the aquifer. Very often, this results in salinity intrusion in urban areas that are on or adjacent to coastal waters and/or to inducing inflow of waters contaminated by discharges within the urban area. In addition, withdrawals exceeding recharge have often resulted in land subsidence.

As an urban area expands, the demand for land for various uses and the often typical urban sprawl that

results can lead to the drastic decrease or elimination of agricultural use of lands in areas peripheral to urban areas. For example, between 1955 and 1980, the urban area of Santiago de Chile increased from about 19 thousand hectares to about 44 thousand hectares, while the irrigated area within the city decreased from about 63 thousand hectares to about 37 thousand hectares. It was estimated that, by about 2000, the urban area would increase by about another 30,000 hectares, and the irrigated area would decline by about the same amount. Most of the land in the urban area that shifted from agricultural to urban use consisted of agricultural lands. The same phenomenon has occurred in Mexico City, São Paulo, and Quito. One significant result of this process of urbanization of peripheral urban land is a substantial increase in the prices that urban area residents have to pay for the agricultural products formerly produced in these areas. The process is one in which the urban area reaches farther and farther into rural areas for the basic goods of water, food, and wood to meet its demands.

Table 1 lists some of the consequences of the continuing concentration of population and activities within urban areas.

It is important to emphasize that the environmental effects of urbanization are not imposed equally on all segments of the population in urban areas. The prevalent lack of financial and institutional capability in urban areas for providing services results in inadequate provision of water supply, sewerage, and solid waste management. Typically, lower income groups are subject to the worst conditions. For example, in São Paulo, about 65 percent of the population in downtown, higher income areas is served by sewers, whereas only about 20 percent of the population in the peripheral, low-income areas is served by sewers. The failure to provide public water supply throughout urban areas often results in low-income groups paying five to ten times the unit rate for water from private vendors as they would pay for water from the public system in the same area. Depending on the housing pattern in an urban area, lower income groups may be exposed to substantially higher concentrations of gaseous residuals for more of the time than higher income groups.

Aside from limited data on the access of lower income groups to public water supply and sewerage and even less data on access to private water supply, detailed, quantitative data on the exposure of lower income groups to environmental effects is meager.

**TABLE 1**  
**Consequences of Population Concentration in Urban Areas**

Phenomenon	Consequences
overloaded land	<ul style="list-style-type: none"> <li>• higher population densities</li> <li>• higher land prices</li> </ul>
overburdened urban infrastructure	<ul style="list-style-type: none"> <li>• diminished service quality</li> <li>• decreased service accessibility</li> </ul>
overloaded natural resources	<ul style="list-style-type: none"> <li>• increased pollution</li> <li>• decreased environmental quality</li> </ul>
overwhelmed urban institutions	<ul style="list-style-type: none"> <li>• decreased institutional responsiveness</li> <li>• decreased public participation</li> <li>• fragmented bureaucratic action</li> </ul>
overconcentrated economic activity	<ul style="list-style-type: none"> <li>• depleted resources</li> <li>• increased prices</li> <li>• increased economic disparities</li> </ul>
abandoned rural areas and small towns	<ul style="list-style-type: none"> <li>• depleted human resources</li> <li>• diminished maintenance of infrastructure</li> </ul>

## Factors Affecting Environmental Problems

The nature, extent, and severity of environmental problems in urban areas are a function of geographic location; topographic setting; meteorological conditions; mix of activities; and spatial pattern. An inland location in a valley surrounded by hills or mountains with meteorological conditions that result in inversions for significant portions of the year is likely to experience substantial air quality problems, particularly as private vehicle use increases. If the temperature regime is moderate, requiring little space heating and cooling, and if activities in the urban area are primarily residential, commercial, institutional, and light industrial, then air quality problems will be directly related to vehicle emissions. If there is substantial heavy industry in the urban area, the mix of gaseous discharges will be substantially different,

with greater possibility of discharges of so-called toxic or hazardous air pollutants. If the urban area is located on a coast, with offshore breezes transporting the gaseous discharges away from the urban area, water quality problems in the bay or sound are likely to be more critical than air quality problems. Thus, in some urban areas, the incidence of diseases relating to air quality, such as bronchial problems, will be greater than the incidence of diseases relating to poor water quality, such as gastroenteric diseases. In other urban areas, the reverse will be true.

The effects of ambient environmental quality conditions on humans are a function of the stresses imposed via different pathways, the nutritional levels of the receptors, and the age composition of the population. Thus, no hierarchy of environmental problems exists for all urban areas. The relative importance of different types of ambient environmental quality problems must be assessed in each area and will vary from area to area. This assessment is one of the most important purposes of analysis of ambient environmental quality problems in an urban area.

For any given topographic setting, meteorological conditions, mix of activities, and spatial pattern in smaller cities, lower concentrations of air quality indicators would be expected related to vehicle emissions than that found in larger cities simply because the number of vehicle miles is less. The "heat island" for a medium-sized city is smaller than that for a large urban area. If a medium-sized city has a concentration of industrial activities, particularly heavy industrial activities, certain air quality and water quality problems can be substantially worse than in a large city with predominantly governmental, commercial, and residential activities. For the same size watershed in which an urban area exists, a smaller urban area would presumably have less impermeable area within the urban watershed than a large urban area, and hence would have lower storm runoff for the same meteorological conditions.

The spatial pattern of an urban area is an important variable affecting environmental problems. Higher densities decrease the cost of providing water supply, sewerage, and solid waste disposal services, provided that these infrastructure investments are made as the urban area grows and do not have to be put in place by retrofitting. Per-capita consumption of energy can be less, thereby decreasing the adverse environmental effects of energy generation. On the

other hand, increased density can lead to increased traffic congestion, especially where jobs and economic activities are concentrated in the center of the urban area. This result can occur even though denser urban areas have more of the total vehicle movements made via public transit. Increased congestion can result in a substantially reduced speed of travel and much increased emissions of air pollutants from vehicles.

Some of the adverse environmental effects of growing urban areas can be mitigated by imposing multinodal patterns of urban development. Such patterns would reduce the unidirectional flow of goods and people within the urban area. Those patterns could make possible utilization of less capital intensive methods for handling waste water, such as neighborhood septic tank systems, multilagoon systems, and spray irrigation.

One might argue that the factors contributing to deterioration in environmental quality are less in medium-sized cities than in large cities, although very little rigorous analysis has been done on the relationship between city size and environmental problems in developing countries, if such a relationship exists. However, it is likely that the capacity for environmental quality management is even less in medium-sized cities than in large cities; both professional capacity and financial capacity are likely to be smaller.

# ■ Governmental Responses to Environmental Degradation

Many developing countries have recognized the past and continuing deterioration of environmental quality in urban areas. (There appears to be substantially less recognition of the relationship between urbanization and deterioration of terrestrial and aquatic ecosystems in rural areas.) Governments at the national level have responded in various ways. A few urban governments have also attempted to develop programs to cope with the multifaceted problem. This section characterizes the types of responses and appraises their effectiveness.

## National Responses

Various approaches to environmental protection have been adopted at the national level, with the focus not limited solely to urban areas. Typically, the problems lie in the implementation of those policies. In addition, little is known about the degree of effectiveness actually achieved.

Many countries have established ministries or departments of the environment. Some countries have assigned responsibility for environmental effects to existing agencies, e.g., marine pollution, agriculture, energy, industry, and health. Some have attempted to make existing legislation work more effectively by establishing a coordinating committee at a high level of authority. Coordinating mechanisms among individual agencies can also be established at the local level.

Typically, the separate environmental ministries, environmental sections within existing ministries, and coordinating entities have little or no staff to carry out the responsibilities assigned. Within line agencies, the environmental section is typically staffed with lower level individuals and shunted to the side in terms of decision-making procedures. Staffs of coordinating committees usually function primarily as administrators.

Some countries have passed comprehensive legislation relating to the environment and have promulgated detailed ordinances. These ordinances often include ambient air quality and ambient water quality standards and liquid and gaseous discharge standards developed by the World Health Organization or the U.S. Environmental Protection Agency. There is little or no recognition of the problems involved in implementing such ordinances. Consequently, these laws and ordinances are generally not enforced because the responsible agencies have very few trained staff; insufficient authority for inspecting activities; little or no equipment for measurement and analysis; inadequate transportation facilities; and weekday-only work hours, which means that many activities do not have to worry about inspections for over three-fourths of the year. In addition, no sanctions typically exist for noncompliance, or the sanctions that exist on paper are not applied.

Recognizing the shortcomings of formal institutional mechanisms, a few attempts have been made to encourage voluntary compliance with regulations by meeting with industrial leaders. However, even if this approach were to be successful, it will not be very effective if industrial activities represent only a small portion of the problem of discharges to the environment, which is the case in some urban areas.

Some countries have attempted to decentralize responsibility for environmental quality management to urban governments of the largest cities and to capitals of provinces. However, devolution has typically not been accompanied by a real transfer of power and by the allocation of funds to the lower levels of government for implementation, nor by the granting of financing authority to local and provincial levels to enable them to raise funds for environmental quality management.

Recognizing the adverse impacts occurring on forested lands, many governments have embarked on

afforestation programs. In virtually all cases, the rate of afforestation is much less than the rate of logging. New plans for afforestation are continually being developed, but the net growth of forest resources is still negative. In some cases, reliance is being placed on locally managed wood lots involving the local populace rather than arbitrary directives from the central government. This may achieve positive results, at least in circumscribed areas.

A few governments have relocated the capital of the country to another, sparsely populated or unpopulated section of the country. This strategy has had no discernable impact on the rate of growth of the former capital and on the associated environmental problems.

Many governments have passed legislation requiring the preparation of environmental impact statements, at least for government projects. Even where the capacity to prepare such statements exists, the procedure typically is to prepare the statement after the project has been formulated. This virtually guarantees that the environmental impact statement will have no effect, particularly in the absence of any reasonably powerful, independent environmental group. The fundamental problem is to incorporate environmental considerations directly into economic development projects and programs.

A related problem is that the typical environmental impact statement considers single projects instead of analyzing a set of projects that affects an urban area. For example, one development in a single watershed in an urban area may have insignificant effects on the urban area as a whole, but a set of installations on several watersheds can have very significant environmental impacts in the urban area.

Some governments have developed and attempted to implement integrated rural development programs in the hope of reducing the rate of urbanization. Even where locally effective programs have been implemented, they have affected such a small portion of the rural population that they have had essentially no effect in terms of reducing the rate of migration from rural areas to urban areas. The scope of such programs has simply been too small.

## Local Responses

Two responses at the local level merit mention. In some large urban areas, the local government has established so-called independent enterprises to

provide certain services, such as water supply and sewerage. These entities are supposed to be self-supporting and, hence, self-financed. Often, such agencies are not completely self-supporting, so that the governments of general jurisdiction must subsidize them to some extent, and they skim off the customers able to pay, leaving the lower income segments of the population with little or no service.

The separation of these agencies from the basic structure of local government results in two difficult problems. First, it is difficult to integrate their activities with each other, e.g., water provided by a water supply enterprise results in waste water which must be handled somehow for disposal. Second, it is difficult to integrate their activities with the urban planning agency of the local government because they are no longer an integral component under the authority of the executive or council.

An all-too-frequent response to water quality problems in urban areas is to consider construction and operation of a capital intensive sewage treatment plant and the associated sewerage collection system, if one does not exist. This is often done prior to analysis of the sources of discharges, which is necessary in order to know that the plant will actually improve the situation; with little or no recognition of the problems of operating the plant once it is constructed; and without consideration of alternatives that would reduce generation of liquid residuals at the sources, very likely at much lower cost. This response is aided and abetted by consulting firms—local and expatriate—whose profits are directly proportional to the capital intensity of a project. In contrast, what is needed is consideration of the whole range of options available, many of which involve relatively small capital investments.

Privatization and pricing of service provision have been tried in various places. Results have been mixed, as privatization depends on the management capability of the private firm and pricing depends on the level of charge for the service and the equity with which it is collected.

## Shortcomings of Responses

Shortcomings in the typical developing country's responses to environmental problems associated with rapid, large-scale urbanization may be summarized as lack of planning, lack of resources, and lack of commitment to possible solutions.

- *Lack of planning.* Even in those cases where comprehensive new laws have been enacted, there is little evidence of an integrated view of the economic, technological, social/institutional, and environmental systems involved. For any type of environmental quality improvement program, a country must first develop a set of resource plans, e.g., water plan, energy plan, and forestry plan, and make explicit the linkages and interdependencies among those plans. A national water plan cannot be developed by having a set of river basin plans each developed by different consultants under separate bilateral programs.

In addition to natural resources plans, a comprehensive risk management strategy needs to be developed that links the problems of residuals management, occupational health, community safety, and low-waste technology. The preparation for such a strategy should begin with the delineation of the industrial profile of a city. However, regardless of the desirability of those goals, it must be recognized that the capacity to develop such plans and strategy rarely exists. Most developing countries have difficulty in developing a reasonably comprehensive plan for a single sector.

- *Lack of resources.* By the time environmental quality became recognized as an important, lasting issue, a great many developing countries were hopelessly in debt. Consequently, new ministries and departments are largely stillborn. Overseas training for environmental specialists is still discussed as a novelty; few local universities offer adequate training. Salaries are insufficient in competition with the private sector and more influential government agencies to attract and retain competent individuals.
- *Lack of commitment.* There have been countless initiatives to clean up the streets, conserve water, and plant trees in cities, but generally the commitment fades once the initial enthusiasm has passed. Relations with international agencies are one element of this spasmodic mode of operation. Most agencies still favor support for projects rather than long-term support. Unfortunately, environmental issues cannot be solved by a few projects. Assuring environmental quality management is a continuous task. Many donor agencies still cherish the belief that, if the government is serious, the government will

continue to support environmental projects once agency funds have been disbursed. Given the financial state of at least the poorest half of developing countries and the many needs in addition to environmental improvement, this attitude is completely unrealistic.

Other problems of commitment surface when an environmental initiative runs up against an entrenched policy, e.g., when a property tax is proposed in an urban area in Africa to raise revenues to support environmental quality programs. The official answer often is that the land is nationalized. The real reason is that the government does not want to risk taxing those urban dwellers who actually have property rights, i.e., the wealthiest members of the community.

Analogous problems with respect to entrenched policies occur in rural areas. For example, in southern Senegal, villagers formerly planted trees to be assured of wood for fuel and construction. Since the land has been nationalized, they are not allowed to cut what used to be their own trees. Instead, the central government allocates licenses to produce charcoal to people from other regions who cut but do not replant. The villagers do not replant either. In fact, during a recent visit by the president, they set fire to whole sections of the forest in protest of the policy. One could find many examples of decline in environmental quality that began with the denial of land and water security to local people who had the most to gain by ensuring that their practices were sustainable.

# ■ Factors Affecting Environmental Quality

In addition to the problems described in the preceding section, other factors affect the capacity of local and national governments to cope with environmental problems in urban areas. These factors can be divided into those related to the structural characteristics and financial capacity of urban area governments and inadequate understanding and perception of environmental quality management and efficient strategies for carrying out such management.

## Structural Characteristics and Financial Capacity

- *Fragmented local and regional governmental structure.* Typically, several agencies have responsibility for one or more tasks of environmental quality management in urban areas. Lines of authority and responsibility are not clear. Very often there has been no identification of the existing institutional milieu and of the linkages—or lack thereof—among the various agencies and entities.

Of course, restructuring government authority requires time and political will, and the latter is often in short supply. It should be emphasized, however, that it is not necessarily essential to eliminate agencies. The critical condition is to achieve integration of activities, which means providing some integrating authority rather than requiring that a single agency perform all of the tasks.

- *Inadequate staffing.* Local, regional, and usually national governmental agencies do not have staff trained either in integrated environmental quality management or in individual disciplines of which such management is comprised, e.g., economics, technology, ecology, and institutional analysis. A critical problem is obtaining staff with the competence to integrate these facets of

management in analysis, in presentation to decision makers, and in implementation.

The local government agency or the provincial agency will have at best one or two individuals with adequate training and some experience. These individuals are often spread so thin that it is impossible for them to supervise adequately the wide range of tasks involved.

One result of this type of situation is that decisions are made even before rough analyses are done. Another not unusual result is that decision makers succumb to the blandishments of consulting firms advocating capital intensive solutions. The capital intensive option is often stimulated by bilateral and multilateral lending programs in which the objective is to provide work possibilities for local firms. In general, it is also much simpler to design and construct a major project, even if it cannot be operated adequately, than it is to develop long-term institutional capability for implementing low-cost alternatives.

- *Centralized authority.* Weak, poorly functioning local governments are often associated with a high degree of centralization of authority and fiscal control in the national government. In addition, the power to raise substantial revenues is not given to local government units in most cases, and disbursements to local governments from central governments are insufficient and often irregular. Thus, even where there is decentralization of authority on paper, it becomes meaningless without the power of the purse.
- *Inadequate revenue raising capacity.* Even where local governments have been given authority to levy property taxes, inadequate records of land and building ownership in urban areas and inadequate procedures for appraising values

result in much less revenue being raised from property taxes than should be possible. In addition, inadequate consideration has been given to other possible sources of revenue, such as a document tax on property transfers and broader use of user charges, including effluent charges, directed at particular groups of users of services.

- *Inadequate funding from central governments.* The economies of many developing countries had stagnated or were actually declining in absolute terms by the early 1980s. This resulted from the large increase in oil prices in the mid-1970s; the recovery and subsequent increase in value of the U.S. dollar; falling world prices for primary goods, the main exports of the developing countries; and the increased level of debt requiring diversion of most of the net returns—if any—to debt repayment. Thus, funds available from central governments to local governments for environmental quality management have declined, with no change likely in the near future.
- *Inadequate maintenance of existing facilities.* Lack of financial resources has resulted in situations in which infrastructure facilities are inoperable because of lack of foreign exchange to buy spare parts and chemicals, e.g., for water supply and water treatment systems, or because electric energy is lacking to operate pumps. Charges for provision of urban transport on public systems are typically insufficient to provide resources for maintenance and replacement. Lack of maintenance results in higher emissions per kilometer than would occur with adequate maintenance.
- *Inability to control land uses.* Governments of urban areas are often unable to control land uses. At least two important results stem from the lack of control. First, development is not prevented on environmentally fragile or erosion-prone areas, such as steep hillsides. Elimination of native vegetation and decreasing permeability results in more erosion for the same intensity of precipitation. In addition, these areas typically have no facilities for handling waste water and solid waste, so that storm water runoff transports more contaminants to adjacent water courses.

Second, speculators often purchase land in an urban area and hold it undeveloped for some years, so that a patchwork evolution of the urban area occurs. This, in turn, results in ineffi-

cient provision of urban services, e.g., water supply, sewerage, transportation.

- *Emphasis on sectoral projects and programs.* Many of the multilateral and bilateral aid programs have focused on sectoral projects, e.g., for water supply, urban transport, housing, or sewerage. The physical, technological, and economic interrelationships among environmental quality management sectors have essentially been ignored, e.g., a project to improve air quality by imposing constraints on certain gaseous discharges from power plants neglects the liquid and solid secondary and tertiary residuals generated by the physical measures to reduce the gaseous discharges. In addition, the single sector, single medium approach often overlooks alternatives that would result in reducing discharges into more than one medium, e.g., by changing production process rather than by installing a physical intervention.

Two additional common results of the sectoral focus are a failure to achieve integration between urban planning and the sectoral projects and programs and a failure to achieve integration of sector projects and programs in regional economic development programs. Formal or informal linkages among relevant agencies rarely exist.

## Inadequate Understanding of Environmental Management

Basic to improving the capacity for environmental quality management in urban areas in developing countries is the elimination of the common lack of understanding of and incorrect perceptions about environmental quality management. This pertains to decision makers, technical staffs, environmental groups, and users of the environment, e.g., industry, institutions, governments, and individuals. The situation is endemic in developing countries and is not uncommon in so-called developed countries.

- *Measures to improve environmental quality.* Given the principal objective in developing countries of economic development in order to improve the standard of living of the inhabitants, allocation of resources to protect the environment or improve environmental quality have rarely received much support. A basic reason for this lack of support is a lack of understanding that

such expenditures are essential for economic development. This reflects the fact that gross national product (GNP) or GNP per capita has been used as a measure of the status of an economy without incorporating environmental aspects. For at least two decades, attempts have been made to devise systems of national accounts that modify GNP to account for expenditures and damages relating to environmental effects.

As noted previously, the contribution to GNP attributed to urban areas excludes damages from the adverse environmental effects of urbanization and includes so-called defensive expenditures that are made to try to counter the adverse effects on activities. That is, these defensive expenditures are those which would not have been necessary if there had been no deterioration in environmental quality. The funds could have been used for productive investments. Thus, instead of an objective function for an economy being to maximize GNP, a more appropriate objective function would be to maximize GNP after subtracting production costs, defensive expenditures, discharge reduction costs, and the damages to human and nonhuman species and to materials as a result of concentrations in the environment.

- *Cost of reducing discharges.* There is a common perception that pollution control or improving ambient environmental quality is very expensive. One important result of this misperception is a failure to impose constraints on discharges from new activities, even those of multinational firms for whom meeting standards would be no problem.

Numerous studies have shown that there are multiple measures for reducing discharges. This is particularly true for the industrial sector because production typically involves a set of unit processes and unit operations. Changing a single unit process or operation can reduce discharges significantly. Some of these methods have resulted in net savings rather than in net costs. The basic thrust behind the idea that pollution prevention pays is finding internal ways to minimize the cost of reducing discharges.

A basic reason for the myth of inevitability of high costs to improve ambient environmental quality is that the typical approach has been to

consider that the only option is to install some physical measure at the pollution source, e.g., a scrubber or a waste water treatment plant. Such measures are typically expensive and add to the total material and energy residuals discharged to the environment because they require inputs to modify the waste streams discharged into them. Their function is simply to shift the mix of residuals discharged to a mix that is presumably less harmful than the unmodified original mix. Therefore, the emphasis should be, first, on reducing or preventing generation of residuals and, second, on materials and energy recovery.

An even larger gap in understanding relates to how changing product characteristics can reduce both material and energy inputs required and wastes generated and discharged. An example is the production of unbleached consumer paper products rather than the white paper products of the developed world. All too often the managers of the tourist sector in developing countries think that the nature of the products in developed countries must be adopted in order to attract their clientele. There is no recognition of the environmental implications of that view. Thus, the myth of high costs for environmental quality improvement impedes constructive action.

- *Environmental interrelationships.* One of the basic facts often overlooked in relation to environmental quality management is the interrelationship among liquid, gaseous, solid, and energy residuals and the three environmental media: atmosphere, water bodies (surface and ground), and land. There are technological and economic tradeoffs between the environmental constraints imposed and the forms of residuals generated by an activity, i.e., very different mixes of residuals are generated and discharged depending on the mix of raw materials, production processes, and product characteristics chosen. In addition, subsequent to discharge from an activity, there are likely to be movements from one medium to another.

These interrelationships mean, for example, that in developing a program to reduce liquid discharges, one must be cognizant of the solid residuals, e.g., sludge, that will likely be generated and will have to be disposed of somewhere. One must be cognizant of the possibility of leaching from landfills used for the disposal of solid

residuals. Also, one must be cognizant of the problem of disposing of scrubber sludge generated in reducing discharges from power plants.

In addition to the above interrelationships, there are relationships between measures designed to improve conditions inside work plants and resulting effects on ambient environmental quality. For example, reducing exposure to fumes inside a plant could be done by collecting the fumes with fans and discharging them into the outside air, thus degrading ambient air quality. Or the gases could be scrubbed out of the internal atmosphere with a water blanket and discharged into the sewer or an adjacent stream. Thus, measures to improve occupational health may exacerbate environmental quality problems. Institutional mechanisms must be developed in urban areas to take these relationships into account.

- *Information requirements.* There is a common perception that nothing can be done in terms of improving ambient environmental quality because information is lacking, and that obtaining the relevant information requires extensive, detailed, and sophisticated analysis. In reality, in many—if not most—cases, rough calculations can provide sufficient data for initial efforts. Hence, a beginning can be made in terms of applying simple measures to improve ambient environmental quality while building the capacity to obtain additional data and achieve the next level of analysis. One can think of a continuum of urban areas based on the level of detail needed to initiate efforts, from essentially no analysis to increasingly extensive analysis.

Just as there tends to be infatuation with capital intensive, high-technology measures presumed to improve ambient environmental quality, there is infatuation with computers, software, and sophisticated analyses. The fact that the data are often lacking or are grossly inaccurate and that the results are often not relevant does not seem to deter the desire to proceed in that manner.

- *Implementation incentives.* Improvements in ambient environmental quality are only achieved by inducing activities to modify their behavior in relation to their use of the environment. Various implementation incentives can be imposed to induce action. Typically, there is virtually a complete lack of understanding of the problems

of implementation and the range of implementation incentives available.

For example, with respect to the problems of implementation, a governmental agency will adopt a set of discharge standards without considering how such standards will be implemented, i.e., imposed and enforced. What is actually needed is an implementation incentive system. Such a system consists of

- a set of implementation incentives (e.g., rules or procedures that an activity must follow, a set of discharge limitations which must not be exceeded by a specified amount, a set of charges related to inputs to or outputs from the activity, specification of the quality of inputs that can be used, specification of types of equipment that must be used);
- a system for measuring and monitoring performance of the activity (e.g., monitoring the quantities of materials discharged, the qualities and/or quantities of material and/or energy inputs, the quantities of residuals removed from the discharge streams and their disposal, the qualities of product outputs);
- a system of on-site inspection (e.g., determining if specified equipment is in place and operating, the system for measuring performance is in place and operating, the analysis of the samples taken is accurate, the results of performance monitoring are as reported); and
- a set of sanctions (e.g., fines, fees, withdrawal of operating permits, exclusion from government contracts or imprisonment for failure to comply with procedures or failure to pay charges).

Implementation incentive systems must be developed with respect to specific residuals that are generated and discharged by classes of activities and the entity or set of entities (agencies) that will apply the incentives. Developing and maintaining an effective implementation program requires that the responsible agency or agencies have the following capabilities:

- technical capability to review permit applications, aid activities in selecting measures to reduce discharges, and define noncompliance explicitly;

- technical capability to inspect activities and measure performance; and
- legal/political capability to apply sanctions.

The last primarily involves political capability or—more accurately—political will on the part of politicians to impose sanctions for noncompliance. This is particularly difficult in developing countries where many productive activities are government owned. Typically, it is very difficult for one government agency to regulate another government agency or entity, particularly when both agencies have the same level of authority. If sanctions cannot be imposed, behavior will not be modified.

A typical decision in a developing country in initiating a program to improve ambient environmental quality is to adopt a set of discharge standards from elsewhere. What should be done, however, is to set forth the range of implementation incentives which, conceptually at least, are possible. Implementation incentives can be divided into economic and noneconomic incentives. The former category can be roughly divided into subsidies and nonsubsidies. A subsidy is any provision that results in an activity's paying less than the full resource cost of the measures adopted. Examples of economic incentives are shown in table 2.

Noneconomic implementation incentives can be characterized as specification of action, specification of performance, specification of procedure, provision of technical information, presentation of performance to the public, and judicial incentives.

Experience in various countries, particularly in western Europe, has shown that a mix of incentives is likely to be most effective and efficient in achieving the desired improvement in environmental quality.

**TABLE 2**  
**Economic Implementation Incentives**

**Fees**

- fees for pollutants discharged
- fees for pollutants used in production
- fees for sale or use of items whose production requires the use of or results in pollutants
- deposit fees to promote recycling

**Fines**

- fines for failure to install pollution control equipment
- fines for improper operation of pollution control equipment
- fines for use of prohibited pollutants

**Subsidies**

- subsidies for each percentage of pollutant removed above the level mandated
- subsidies for pollution control activities (e.g., low-interest loans, tax benefits, grants)

**Additional economic incentives**

- earnings bonuses tied to pollution control performance
- tax benefits for locating polluting activities at specified sites
- performance bonds with refunds tied to pollution control performance
- withheld subsidies pending compliance with pollution control requirements

# ■ Implications for Donor Programs

## Common Problems in Donor Programs

The urban development programs of donors have generally paid little direct attention to environmental impacts. Common problems include an overemphasis on a sectoral approach; donor financing restrictions; failure to conduct timely environmental analysis, monitoring, and mitigation; and inadequate attention to implementation. Another issue that is seldom raised but equally important is the relationship between neglect of rural development and environmental deterioration in other areas.

Donor efforts have overemphasized a sectoral approach. Separate projects are usually developed for housing, energy facilities, roads, water supply and sanitation, and industrial development. For example, without consideration of how road construction or new industrial employment induces changes in housing patterns or how planned and squatter housing affects the demand for water supply and sanitation, it is difficult to engage in good urban planning. In the absence of integrated planning, service quality and the environment are likely to suffer. Further, there is little coordination among donors.

Donor financing restrictions also have unintended effects on environmental quality. The choice of technology is often skewed toward expensive, complicated solutions that are inappropriate for the skills and resources available in developing countries. Donors—including the multilateral development banks—often insist that consultants from industrialized countries be hired, as they are likely to be most familiar with high-technology processes and equipment. Bilateral donors sometimes tie aid to the purchase of goods and services from their own countries, even when these are not the ones most suitable to the needs of the recipient countries. Many donors

only finance initial capital costs or foreign exchange components of project costs and expect that governments or users will bear the operating and maintenance costs. This provides developing countries with an incentive to choose technologies that are more capital intensive, less labor intensive, and more dependent on imported components, even though the developing countries will have a difficulty time affording the operating and maintenance costs.

Few donors conduct timely assessments of the environmental impacts of development projects. In fact, the environmental impacts of urban projects have received even less attention than projects in some other sectors. Although techniques exist for combining factual information on projected impacts and values, donors are not using these techniques in their decision making.

Most donors have not even systematically gathered information on the likely physical, chemical, biological, and ecological effects of urban development, nor have they developed frameworks for doing so. Where environmental assessments have been made, they are usually prepared too late to be of any real usefulness in project design. Once the projects have been approved, there is rarely any monitoring or mitigation of the impacts that occur.

Failure to match the amount and type of aid to the absorptive capacity of institutions in developing countries is another common weakness of donor funding. Increasingly, the World Bank has expressed an interest in providing assistance for institution building to help improve the efficiency and effectiveness of its projects. However, this is made difficult by the usual litany of administrative problems in developing countries, including political favoritism, poor financial management, lack of political will, lack of employee commitment to the goals, and a shortage of skilled personnel and the inputs they require to do the job.

Even the best-laid plans of bankers and bureaucrats can go astray in implementation, resulting in unfavorable environmental impacts. Often, mistracking is due to inadequate consideration of social, cultural, and economic factors that affect the responses of people to a changing situation. Market incentives and disincentives, as well as the regulatory and policy environment, provide the context for behavioral responses, while local skills and resources are the constraints. Often, there is a lack of understanding of the multiple factors that affect the decisions of a given activity.

From the post-World War II period through the mid-1970s, conventional development theories emphasized rapid national economic growth over regional development and income distribution objectives. The prevailing view was that underdeveloped areas and disadvantaged groups would eventually gain as the benefits spread geographically from the center to the periphery and from the more affluent to the poor.

The neglect of regional balance had negative effects on both rural and urban areas by accelerating rural-urban migration. Rural migrants often are more productive, better educated, and have better skills and motivation than the ones who stay behind. This drain of human resources also pulled capital out of rural areas. In turn, the growth of the labor force in the urban areas outstripped the absorptive capacity of the formal economy, and governments found it difficult to meet the rapidly increasing demand for social services and physical facilities.

The resulting urban problems, such as an increase in slums, a lack of safe drinking water and sanitation, and crime, were considered in donor policy documents beginning in the early 1970s. Some of their responses have been counterproductive. Governments of developing countries were encouraged to expand the centralization of administration and to incur expenditures on large-scale urban infrastructures. Yet the roots of the urban problems that lie in the underdevelopment of rural areas have not been addressed.

## U.S. Agency for International Development

Governments are the clients of USAID. As the foregoing litany of environmental problems in urban areas and inadequate governmental responses show,

governments have to be convinced to change their approaches to management of the urban environment. This must be done in relation to the omnipresent issue of allocating resources to competing demands and particularly in relation to the pressure for economic growth. One important function USAID can perform is to aid in improving the capacity of governments to make those allocation decisions with explicit inclusion of environmental quality considerations. That capacity is a function of understanding the relationship between urbanization and ambient environmental quality and developing the capacity to generate information relevant to those decisions. The latter includes information with respect to the cost and consequences of not implementing measures to improve and protect ambient environmental quality; the cost of achieving different levels of ambient environmental quality; the distribution of costs and gains, i.e., who benefits from and who pays for improved ambient environmental quality; and the institutional implications, including administrative costs and necessary bureaucratic modifications of alternative strategies.

To aid the development of understanding and capacity, USAID could undertake the following activities:

- Integrate environmental quality management with urban planning. Develop a guide for analysis of environmental quality management in the context of urban planning, including multimedia, multisource, multipollutants, alternative spatial patterns, alternative scenarios, and alternative management strategies. Include specific examples of applications. Develop and hold courses for top staff members responsible for analyses in individual countries. Develop an example to be used as the case study in each course in terms of the local context.
- As a necessary corollary to the above, develop a simplified method of analysis to identify the sources, nature, and level of environmental quality problems in an urban area. Illustrate when minimal calculations are sufficient and when increasing levels of complexity are necessary.
- Develop a simplified guide for analysis for regional economic development that explicitly incorporates ambient environmental quality and measures to change ambient environmental quality in the analytic method. This is important in order to be able to demonstrate the positive

aspects of measures to improve and/or protect ambient environmental quality.

- Develop and apply, as illustration, a simplified method for analysis of the distribution of environmental effects in urban areas, e.g., exposure to various levels of air quality in relation to levels of income.
- Develop a guide for analysis of activities, e.g., industrial, commercial, and institutional. Illustrate application of the guide, including compilation of examples for specific activities.
- Develop and illustrate the application of a guide for formulating and analyzing alternative systems for management of environmental quality in urban areas. It is particularly important to illustrate the entire range of measures for improving ambient environmental quality, e.g., changing product characteristics and using simple technologies. Simple technologies yielding desired performance levels can be utilized even in very densely populated areas. For example, about 40 percent of the 20 million people who lived in Tokyo in 1980 utilized septic tanks or on-site storage tanks for waste water disposal.
- Develop a guide that describes in detail the different types of incentives that can be imposed on activities to induce desired behavior, e.g., location in particular areas or reduction in discharges. Incentives include subsidies, standards, charges, and technical assistance. All existing systems for air quality management and water quality management in the United States and Europe include a mix of incentives. What needs to be made clear is how different combinations are logical for different types of activities. Particularly difficult is developing mixes of incentives that will be effective in inducing changes in behavior by public agencies and activities.

Improving the understanding of urbanization as it relates to environmental quality problems and improving the capacity to generate relevant information for decision making will not occur overnight, nor through a large infusion of money. Rather, it will require consistent, rigorous, relevant technical inputs over time, including a combination of economic, technological, ecological, and institutional assistance. Technical assistance for at least five years at a time will be required, preferably by a full-time team of two or three professionals (with short-term

specialists as required) working jointly with host country professionals. Continuity of inputs from individuals working within a common framework will be essential. What must be avoided is a succession of short-term consultants who provide different views of how to tackle the management problem.

As background for implementing program activities, at least two caveats should be mentioned. First, any American aid agency has a credibility gap to overcome. That is, it is not difficult for those in developing countries, when listening to suggested steps to improve environmental quality in their countries, to point out that the American record is not all that good. Several thousand toxic waste sites are yet to be cleaned up, thousands of leaking underground storage tanks exist, various bays and estuaries have substantially reduced productivity as a result of pollutant discharges, about 100 urban areas do not meet ambient air quality standards, and thousands of acres of forest vegetation are apparently adversely affected by acid precipitation.

Second, a significant amount of the resources necessary to improve ambient environmental quality in urban areas will have to be raised from users in the area, by one means or another. But 100 percent cost recovery, or anything close to it, is an illusory goal, at least if sophisticated technology is involved. Where willingness to pay exists, that willingness can easily be dissipated by erratic or failing service and by the fact—readily observable by individual users—that government entities do not pay their bills and/or do not abide by the environmental regulations which the government itself has established.

## World Bank

Until recently, environmental considerations received little attention in the World Bank's work plans and policy statements concerning urban development. Most of the internal attention to environment was devoted to industrial pollution. Much of the external pressure on the World Bank from environmental organizations surrounded rural development activities that cleared forests for roads and commercial agriculture or resulted in inundation of large areas of land for reservoirs.

More recently, however, the possibility has been raised of adverse environmental impacts in the urban sector, mostly through pollution and encroachment on land and other natural resources. Nevertheless,

the following conclusions regarding World Bank operations involving urbanization and environmental quality seem warranted:

- The World Bank appears not to have developed an overall framework for analysis of environmental quality management in urban areas or as a basis for integrating sector programs.
- The World Bank appears not to have given explicit attention to the problems of developing and applying implementation incentives in relation to inducing activities to modify behavior in terms of reducing discharges to the environment and/or in terms of making more efficient use of the natural environment.
- Although recent World Bank reports and statements have noted the need for institution building, as yet there is little indication of how the World Bank will aid that process, especially given the length of time required to develop institutional capability.

# ■ Appendix A: U.S. Agency for International Development Activities

The U.S. Agency for International Development (USAID) has been in the forefront among the bilateral donors and multilateral development banks in its concern for environmental quality. However, most of this attention has been directed to rural environmental issues such as deforestation, loss of biological diversity, agricultural chemicals, and sustainable land use. At present, USAID defers most of the major infrastructure development projects in developing countries in transportation, road construction, power supply, and urban water supply and sewerage to the multilateral development banks. For the most part, USAID equates urban environmental issues with solid and liquid waste disposal and industrial pollution.

In 1976, USAID adopted environmental assessment procedures and also began to devote special attention to pesticide use. In 1977, Foreign Assistance Act amendments gave USAID a mandate to strengthen the capacity of developing countries to manage their natural resource base and take environmental consequences of development into account. Further amendments in 1978 identified environment and resource issues as critical targets for sustained growth and noted that deforestation posed a threat to improving agricultural productivity. USAID revised its pesticide use guidelines in 1980 and established the Office of Forestry, Environment, and Natural Resources. The first formal agency policy on forests was adopted the following year.

In 1983, section 118 of the Foreign Assistance Act was amended to encourage conservation of endangered plant and animal species and habitat management. Two policy determinations were issued, one on the environment and natural resource aspects and development assistance and the other on forestry policy and programs. A sector strategy was also released that year on the environment and sustainable development.

A sector strategy on forestry was issued in 1984. In 1985, the Overseas Private Investment Corporation was given a congressional mandate to comply with sections 118 and 119 of the Foreign Assistance Act. The following year, the Foreign Assistance Act was amended to place a high priority on conservation and sustained management of tropical forests. USAID's missions were required to analyze actions to conserve natural forests and biological diversity in their country development sector strategy reports. An annual report on the implementation of measures to conserve natural forests was also required.

USAID issued a natural resources management plan for sub-Saharan Africa in 1987, emphasizing forestry, agro-forestry, and biological diversity. A biological diversity consultative group composed of private foundations and USAID was also formed in 1987. The Foreign Assistance Act of 1988 directed USAID to monitor the economic and environmental soundness of the programs of the multilateral development banks. That same year, USAID released the *Manual for Project Economic Analysis*, which includes a discussion of issues involved in valuing environmental effects.

Despite this attention to the rural environment, the urban environment has not been given much attention in the authorizing legislation or agency policy statements.

## Environmental Guidelines and Procedures

In 1976, USAID adapted federal regulation 16 to incorporate environmental quality considerations in decision making. The regulation was revised in 1980 and made part of the Foreign Assistance Act in 1981. Each bureau was required to assign an envi-

ronmental officer to oversee implementation of these procedures. There are also environmental officers in USAID's regional offices and country missions, as well as an agency environmental coordinator. The general counsel also monitors the process.

An initial screening of the potential for significant environmental impacts is done by project designers. Twelve types of projects are presumed to require an environmental review:

- river basin dams
- irrigation or water management
- agricultural land leveling
- drainage projects
- large-scale agricultural mechanization
- new land development
- resettlement
- road building or improvement
- power plants
- industrial plants
- large-scale potable water and sewerage systems
- procurement or use of registered pesticides

A second category contains projects that generally do not require environmental reviews. These projects support research, training, extension, or institution building. Also exempted are projects funded by multiple donors or implemented by private voluntary organizations in cases where USAID's contribution is less than \$1 million or 25 percent of the total project cost. This amounts to a rather large loophole, since USAID has increasingly emphasized the role of private voluntary organizations and donor cooperation in development assistance. By this rule, a \$10 million project with \$2 million in USAID funding and potentially large environmental impacts would escape agency environmental review. Regulation 16 also does not apply to activity supported through local currency funding.

A third category of projects has been added to include items on the second list that might have negative environmental impacts. For these projects, a written statement is required that the impacts will be insignificant. If information is not sufficient to demonstrate this, an initial environmental examination is necessary. Many projects on the third list support intermediate credit institutions that may

finance environmentally damaging activities, allowing USAID to impose environmental conditions on the projects. In one example, a tannery in Kenya had to install an effluent treatment plant before receiving financing.

The agency employs three types of environmental reviews for differing circumstances: initial environmental examinations, environmental assessments, and environmental impact statements. An initial environmental examination is a preliminary study by the USAID mission or project designers to identify foreseeable impacts. The authors submit a recommendation for a negative or positive threshold decision. A negative threshold decision requires no further environmental review, while a positive one requires preparation of an environmental assessment or an environmental impact statement. The decision is made by the bureau's environmental officer.

An environmental assessment is a detailed study to identify impacts of proposed actions, possible mitigation measures, and alternatives with fewer negative impacts. A detailed study plan for an environmental assessment is produced through a process that involves agency personnel, contractors, and host country officials. Two factors that must be considered in environmental reviews are the impacts of proposed pesticide use and the likely effects of the project on endangered species. The bureau's environmental officer may request written comments on the environmental assessment from other federal agencies in the United States. The recommendations of the environmental assessment are reviewed as part of the project paper after being cleared by each bureau's environmental officer.

An environmental impact statement examines broader impacts on the global or American environment or on areas outside the jurisdiction of a specific country. The procedure for an environmental impact statement is similar to that for an environmental assessment except that the USAID administrator may also hold public hearings in the United States and the document must be cleared by both the agency environmental coordinator and the general counsel.

When environmental questions have been raised about a particular component of a project, funds may be withheld for that component while the rest of the project proceeds. Any project that requires an environmental assessment or environmental impact

statement must contain provisions for data collection and analysis of significant environmental changes that occur during project implementation. If significant adverse effects occur, a subsequent environmental assessment or environmental impact statement must then be prepared.

Typically, environmental assessments cost less than one percent of the USAID investment in a project, usually \$100,000 to \$400,000 for large-scale development projects and \$10,000 to \$30,000 for small projects. The environmental review process has resulted in changes in project design. For example, the environmental assessment for a waste water project in Cairo determined that construction should be implemented in phases and that certain alternatives should be adopted.

For housing projects, sector-specific environmental guidelines were prepared by the Office of Housing and Urban Programs in 1977 for use in the field together with the agency's general environmental guidelines.

## Housing

USAID's Office of Housing and Urban Programs within the Bureau for Private Enterprise has regional housing and urban development offices (RHUDOs) in the field which provide assistance to country missions. USAID has supported sites-and-services and urban upgrading projects in over 50 countries.

Some of the earlier projects in this sector have suffered from inattention to environmental concerns. For example, a Dakar housing project in Senegal built housing on unstable sand, and some houses were damaged as the sand shifted. The Umoja housing project in Kenya experienced cost overruns because of unstable soils that had not been surveyed early enough in the siting process.

In recent years, USAID has been changing its focus from financing housing construction to mobilizing initiative and financial resources from the private sector as well as reforming policy constraints that affect the shelter sector. One common policy constraint in many countries is that housing construction standards and materials requirements are inappropriate for the urban poor and lower middle class. Also, government restrictions on land availability for housing frequently increases the cost required to acquire land.

The small towns project in Kenya is an example of the new approach. Instead of funding site-specific construction, this project focuses on strengthening government planning and the ability to deliver urban infrastructure and services. A project in Tetuán, Morocco, involved delivery of residential infrastructure to an area with steep slopes.

In the mid-1980s, several new tools were developed by USAID to analyze the housing sector. These tools include shelter sector assessments, site selection criteria, land development and subdivision standards, and environmental checklists.

Broader urban issues also began to be addressed through studies to support urban policy dialogues, housing need assessments, urban development assessments, municipal management audits, and private sector capacity studies. This new emphasis appears in a grant for urban development policy in Jordan and in a recent urban project in Nepal.

## Water Supply and Sanitation

Although USAID has supported large-scale infrastructure construction for water supply and sanitation, the agency's current emphasis in this sector is on smaller systems for urban households and villages. Since 1973, more than 700 water supply and sanitation projects have been funded, including major urban projects in Egypt, Jordan, and Oman. Large waste water treatment projects are underway in Cairo and Alexandria. At the other end of the scale, there is a self-help, gravity-fed water supply project in Malawi and a well construction project in Togo that connects to public taps. Other activities in this sector include a project for sewer infrastructure for small towns in Tunisia, a study of alternative technologies for areas where sewer systems are not suitable in Tunisia, and adoption of measures for controlling storm water runoff and on-site domestic sewage contamination in San Miguelito, Panama.

In 1980, USAID began funding Water and Sanitation for Health (WASH). Since then, the organization has provided short-term technical assistance in 60 countries through a consortium that includes the University Research Corporation, International Science and Technology Institute, Research Triangle Institute, and Training Resources Group. The primary focus was originally technical, but now there is an increasing emphasis on the social, institutional, and financial aspects of water and sanitation. WASH's work in

urban areas includes a study of water vendors in squatter settlements in Nigeria and development of a comprehensive institutional development program for the water and sanitation sector in Sri Lanka.

## **Industrial Pollution Control**

Other than water supply and sanitation, industrial pollution control is the other urban sector in which USAID pays close attention to environmental impacts. Environmental reviews usually are required for large-scale industrial development projects.

In 1982, USAID and some American corporations formed the International Environment and Development Service, administered by the World Environment Center. The purpose of the service is to strengthen managerial and technical capabilities for industrial health and safety. More than 35 American firms and federal/state agencies have cooperated in this activity. Examples of assistance provided includes control of the environmental and health effects of small-scale gold mining in the Philippines and pollution abatement at an iron and steel mill in Jordan.

Other USAID activities in the industrial sector include an industrial safety and health development project in India for the establishment of a computerized data base system; a workshop on hazardous and toxic waste management carried out by the World Environment Center; a seminar on risk assessment held at the East-West Center; and creation of the Indonesia Environmental Management and Information Center. USAID has recently submitted a report to Congress on how to reduce industrial pollution in developing countries.

USAID has also devoted increasing attention to pesticide use and disposal. Although most of the direct impacts of pesticide use are in rural areas, other impacts can affect urban land, water resources, and consumers. In 1970, world sales of pesticides amounted to \$2.7 billion; they increased to \$11.6 billion in 1980 and are projected to be \$18.5 billion in 1990. The largest growth in pesticide sales has been in developing countries.

In 1978, USAID established a policy on pesticides that is now being reviewed to emphasize integrated pest management. In 1984, USAID funded a six-year, \$6 million integrated pest management research project at CATIE, an international agricultural research facility in Costa Rica. The agency has

also supported work in this area at the American School for Agriculture at Zamorao, Honduras. In 1989, the Conservation Foundation prepared a report under contract to USAID on opportunities to assist developing countries in the proper use of agricultural and industrial chemicals.

## **Energy**

Commercial energy demand is largely an urban problem that often has major impacts on air quality. The availability and cost of fuel for transportation and industry have a major effect on urban development patterns. In rural areas, biomass is the predominant form of energy used. The relationship between biomass energy sources and environmental quality has received much attention. However, USAID, like many donors, tends to treat energy projects as a separate sector, without fully considering the linkages to environmental quality and urbanization.

In 1970, developing countries used 10 percent of the world's consumption of fossil fuels and electricity. By the year 2000, this is expected to increase to 25 percent. In 1984, energy imports consumed more than 50 percent of total export earnings in India, Kenya, and the Dominican Republic. In many developing countries, electricity supply takes up a quarter of the development budget, yet shortages of electricity are a major constraint to economic growth in most developing countries.

Although developing countries comprise 75 percent of the world's population, they consume only 18 percent of the electricity generated. Per-capita consumption is only 250 kilowatt-hours (kwh) in USAID-assisted countries, compared to 10,500 kwh in the United States. Electricity consumption is much lower outside the largest urban areas than the national averages. The unmet demand for electricity in developing countries typically ranges from 10 to 15 percent of total generation capacity, which can reduce industrial production significantly.

The situation is expected to worsen. An estimated 1,500 gigawatts of electric power capacity is needed in developing countries between 1988 and the year 2008, assuming an economic growth rate of 4.5 percent per year. Using conventional systems, this would require a capital investment of \$125 billion per year. Even with massive end-use conservation, improvements in power plant efficiency, and reductions in

transmission and distribution losses, 700 gigawatts would be needed. The conservation improvements and production investments for that would cost \$75 to \$110 billion per year. In comparison, only \$50 to \$60 billion per year is now being spent, including donor and development bank funds.

Although most of the investment in electricity infrastructure has been for urban areas and large-scale industry, electrification is also important for small-scale rural industries. For lack of an affordable and reliable supply of electricity, firms often do not locate in smaller towns or areas on the urban periphery even though they would be closer to raw material sources and would face lower labor costs.

USAID is continuing its Energy Policy Development and Conservation Program, begun in 1982, which has assisted more than 25 countries in conservation of energy in industry, transportation, buildings, and electricity generation facilities. Since only 10 to 20 percent of the population in USAID-assisted countries has access to electricity, the agency is continuing to invest in this sector for urban and rural areas. In the area of renewable energy, there is the ongoing Business Energy Systems and Technology Project.

There are also country-specific projects in the energy sector. For example, there is a project in India to transfer American combustion and conservation technologies. There is a large energy project in Morocco, a science and technology project in Egypt, and a major program of electrification in Pakistan.

## **Survey of USAID Mission Activities**

In 1989, a survey of selected USAID missions was conducted to determine current activities in the urban sector and establish future priorities. Some missions specifically mentioned concerns about urban environmental quality, which are discussed below.

Urban environmental quality is a particular problem in Brazil. The program in Brazil, not a full-scale mission, directs its small level of resources in this sector to large and medium-sized cities where urban services have been declining. It emphasizes training officials in urban planning techniques and the transfer of public and private resources to municipalities.

The mission in Costa Rica identified housing as a priority and also mentioned urban infrastructure and urban land use planning.

The mission in Sri Lanka listed environmental impacts of development as one of its main concerns along with land tenure and titling; urban infrastructure, transport, and communications; housing; and urban unemployment.

Previously, rural poverty was the main focus of the USAID program in Thailand. With increasing incomes and urbanization, the priority is shifting to urban issues. The mission noted particular problems from the environmental impacts of industry, especially in and around Bangkok. It also cited the need for off-farm employment, development of agro-industries, and municipal management of taxation. In the next decade, it anticipates the priorities to be funding of municipal infrastructure and services, private provision of urban services, employment generation, and environmental degradation. The government's next five-year plan will include an assessment of urbanization.

Egypt is the only country where USAID is involved in large-scale infrastructure development. It has four large urban infrastructure development projects. The mission is preparing an urban strategy for its action plan. The strategy will emphasize population growth, employment generation, urban encroachment on arable land, environmental concerns, urban infrastructure, housing, social services, and urban administration and financing.

Jordan is unusual for a developing country in that it is 70 percent urban. The USAID mission lists managing infrastructure and services, environmental quality, and land use conflicts between agriculture and urban growth as the most important urban issues in the country over the next decade. The mission in Morocco mentioned the urban environment, specifically disposal of solid and liquid waste and the management of waste water facilities.

The mission in Tunisia cited degradation of the urban environment. Its country development sector strategy in 1990 will contain a full urban assessment.

Gambia has experienced a particularly high rate of urbanization, 15 percent per year from 1979 to 1983. Policies favoring urban areas are largely responsible for this growth. The new focus of the USAID program there will be on agricultural productivity and rural development.

The mission in Liberia listed macroeconomic stabilization and food security as the most critical issues and noted their implications for preservation of infrastructure and social services. Solid and human

waste disposal in the capital city was also identified as a problem.

The rate of urbanization is high in Kenya, 8 percent per year, while employment, infrastructure, housing, health, and community services in urban areas are already strained. Urban investment has been declining. The mission in Kenya currently has four housing programs, one enterprise development project, and one agricultural marketing project directly targeted to urban areas. The next country development sector strategy will examine urban issues in detail. Important needs include policy reforms, self-financing of infrastructure, and development of the urban informal sector.

A separate survey of USAID missions has been conducted to examine the relationship between agriculture, industrialization, and urban pollution. Issues addressed include pesticide use and disposal, industrial effluent treatment, and solid waste management.

In addition, the Bureau for Latin America and the Caribbean has developed a strategy statement for its environmental programs. Five priority areas were identified for this region:

- sustainable agriculture, including agro-forestry, soil and water conservation, land use, and integrated pest management;
- production from natural forests;
- management of wildlands and protection of biological diversity;
- management of critical watersheds for maintenance of hydropower, municipal water supplies, and irrigation, as well as coastal resources protection; and
- policy formulation, institutional strengthening, and environmental education.

## **Environmental Project Funding**

USAID funding of environmental activities increased in fiscal year 1990 (FY90) over the previous year and decreased in FY91, but remained higher than in FY89. Adjusted for inflation, the real increase over the period is small.

The largest category of support in this area is for environmental management, planning, and policy. The funding for forestry is one-third or less of that

amount. The financial assistance provided for agricultural land development and soils together is less than the amount devoted to forestry. About half as much is spent for water quality and health as for agricultural development. A relatively small sum has been allocated for hazardous waste control.

Portions of the allocations for institution building and training, water quality and health, and hazardous waste assist activities in urban areas. However, almost all of the environmental funding has been directed toward rural areas. In particular, deforestation, desertification, waterlogging and salinization, watershed management, soil conservation and land management, and water supply and sanitation have been the focus within the environmental sector. In addition, the large, centrally-funded Natural Resources Policy Analysis Project has a total budget of \$12 million through FY94, although funding was only \$650,000 in FY90.

Most of USAID's environmental funding is provided through the private sector energy and environment (PSEE) account, but some relating to public health and safety, hazardous waste, and environmental problems associated with urbanization is also provided through the agricultural, rural development, and nutrition (ARDN) account. The total spent from the PSEE account was approximately \$15 million in FY88, \$129 million in FY89, and \$138 million in FY90.

## ■ Appendix B: World Bank Activities

World Bank activities involving the relationship between cities and environmental quality include urban development, transportation, water supply, sanitation, municipal waste disposal, and industrial development. The urban development category includes urban infrastructure, urban administration and policy, land management, and housing.

During the period from fiscal year 1983 (FY83) to FY88, the bank increased the proportion of its portfolio involving urban development from 4 to 10.5 percent. These figures do not include urban-based activities that fall into other categories, such as development finance companies, education, energy, nonproject lending, industry, population, health and nutrition, small-scale enterprises, technical assistance, telecommunications, transportation, and water supply and sewerage. Also excluded are disaster relief and reconstruction, because the inclusion of emergencies would skew analysis of trends.

In FY88, total urban lending by the World Bank and International Development Association was \$2 billion in 19 new loans, for an average loan size of \$106 million. The amount of urban lending per new urban dweller, an indicator of the increase in the demand for new urban services, is relatively small. It varies considerably across regions, e.g., \$1.14 in East Africa; \$44.38 in West Africa; \$26.34 in Europe/Middle East/North Africa; \$40.25 in Asia; \$11.94 in South Asia; and \$40.45 in Latin America/Caribbean in FY86-87. The amount provided to Africa is low relative to the great need. The urban sector's share of total regional lending in FY86-87 was 0.5 percent in East Africa, 11.5 percent in West Africa, 14 percent in East Asia, 3.5 percent in South Asia, 4 percent in Europe/Middle East/North Africa, and 7.3 percent in Latin America. The last excludes a loan for earthquake reconstruction in Mexico.

The composition of urban sector lending has shifted. Housing finance lending made up 34 percent of total

urban lending in FY88, but it began only six years ago. The annual investment in shelter and basic infrastructure has been \$100 to \$150 million in recent years. Lending has also increased for municipal infrastructure and urban management as the ability of governments to support these activities has increased. About \$450 million was loaned for non-emergency municipal infrastructure and \$250 million through municipal development funds in FY88. In FY89, total lending in the urban sector, \$1.2 billion, was much lower than the level in FY88 and slightly below the levels of FY86 and FY87. Only 12 urban projects were approved in FY89. About 80 percent of the loans were through the World Bank and 20 percent through the International Development Association, the latter mostly for low-income African countries.

The World Bank's FY89 annual review listed the following aims for urban projects:

- developing the economic base of cities by providing infrastructure services;
- improving urban administration;
- increasing domestic resource mobilization and cost recovery;
- improving access to housing through financial policies;
- improving the functioning of urban land markets; and
- upgrading the urban environment.

A joint program between the World Bank and the United Nations Centre for Human Settlements (UNCHS) is involved in applied research and information dissemination on urban development and shelter issues. It has provided technical support assistance in coordination of donor aid and held seminars and supported publications. Its future

agenda is to conduct more case studies and prepare more analytical and synthesis reports and guidelines. These activities and expenditures have an increased emphasis on operational applications, such as the testing of guidelines and preparation of models of urban management for dissemination.

The bank sees the urban agenda shifting from sporadic interventions to broader financial and institutional issues, including linking investments to national economies. Increased emphasis will be on urban productivity rather than urban poverty alleviation on the grounds that the basic cause of urban poverty is the low productivity of jobs and that the urban poor suffer most from distortions in the markets for land, housing, and finance. There is also a move from a single-city orientation to a regional focus that reaches more medium-sized cities. The bank also reports placing a greater emphasis on efficient land use to decrease the direct cost of land in projects and the cost of building and maintaining infrastructure.

Land management has been a part of housing sites-and-services and upgrading projects since 1973. The main land management activities include settling land tenure, registering land ownership, reforming land use regulation and zoning approvals to improve the operation of the market, conducting urban spatial planning, developing flexible performance standards, and developing a system of land information management.

The bank has four priority areas for policy changes in the urban sector:

- rationalizing public expenditures to increase local resource mobilization and cost recovery;
- reforming municipal, regional, and central government administrations;
- stimulating private investment; and
- enabling secondary cities and towns to support better agriculture and rural development.

On the topic of urban infrastructure policies, it has been recommended that regulations restricting the ability of manufacturers to trade infrastructure services be relaxed; private sector participation in infrastructure supply be increased through subcontracting, franchising, and districting; and pricing be restructured to reflect capacity limits and congestion.

The bank has identified the following areas for further research on urban services and infrastructure:

- the response of firms to deficiencies in services;
- alternatives available and their costs;
- causes of the failure to meet demand;
- the appropriateness of pricing policies;
- private versus public provision of infrastructure; and
- options for more efficient production and delivery of services such as investment, technology, regulations, and financing.

## Housing

In developing countries, the investment in housing is 2 to 8 percent of gross national product, 15 to 30 percent of gross capital formation, and between one-quarter and one-half of capital stock. Housing is usually the single largest form of household wealth, consuming 25 to 30 percent of household incomes. Housing uses more urban land than any other land use. The number of inhabitants of squatter settlements in urban areas is increasing much faster than the general rate of population growth.

The World Bank has been involved in the shelter sector for over 16 years, with 99 projects in 50 countries. Direct production of housing through the public sector has proven to be expensive and too slow relative to the large unmet demand. Consequently, the current areas of emphasis of World Bank shelter projects are the upgrading of existing squatter settlements and provision of sites and services rather than complete housing units. Moreover, housing finance has become a much larger priority than housing production.

Sites-and-services projects may include

- securing land tenure;
- providing trunk connections to existing utilities and roads;
- building core houses, usually a simple structure with utility connections;
- establishing on-site infrastructure for water supply and sanitation, roads, drainage, and electricity;
- constructing social facilities such as schools, health clinics, and community centers; and
- providing financing for the purchase of land, core houses, and building materials.

Sites-and-services projects were first tried in the 1940s and 1950s in Chile, Peru, Kenya, and South Africa without external assistance. The first World Bank project of this type was in Senegal in 1972. Since then, the bank has financed around 100 of these projects. Between 1972 and 1989, 11.7 percent of total shelter lending went for sites-and-services projects. The average obscures the high rate of 42 percent in the early 1970s and the decline to 8 percent in the late 1980s. In some cases, governments have opposed the lower design standards of this approach.

In FY88, the World Bank provided \$1 billion for housing. Conventional shelter projects fell to 15 percent of total urban lending, but the \$300 million provided exceeded the annual lending for sites-and-services projects and squatter settlement upgrading of the late 1970s and early 1980s. More than half of the shelter projects experienced delays due to problems in land acquisition.

Housing finance lending increased from one project at \$60 million in FY83 to six projects totalling \$680 million in FY88. This represented an increase from 11 to 34 percent of total urban lending. The average housing finance loan size in FY88 was \$112 million. Some loans categorized under development finance also have housing components.

The bulk of housing finance loans are in Asia and Latin America/Caribbean; relatively little is in Africa. Since 1972, the World Bank has financed 80 shelter projects and 55 integrated projects with shelter components at a total cost of \$15.6 billion, which represents about 60 percent of urban operations. In FY89, loans for urban shelter projects, including land, totaled \$2.24 billion, with \$341 million in Africa, \$31.5 million in Asia, \$187 million in Europe/Middle East/North Africa, and \$1.68 billion in Latin America/Caribbean. However, the bank estimates that sheltering all of the poor by the year 2000 would require \$150 to \$200 billion in 1988 dollars, excluding the cost of any public subsidies provided.

Currently, most of the borrowers for housing finance loans are financial intermediaries rather than public housing agencies. Many of these intermediaries obtain most of their loan funds domestically. The average arrears rate is 12 percent among housing finance projects and 16 percent among development finance institutions. An arrears rate less than 6 percent would be considered commercial quality.

An internal review of the 17 housing finance projects since FY83 includes the following:

- Fiscal and financial policy dialogues are important.
- Projects have increasingly relied on financial intermediaries to channel funds because of their ability to raise domestic revenues, administer loans more effectively, and reduce contingent liability on the part of governments.
- Improvements are needed in charging for foreign exchange risk.
- More emphasis is needed with respect to financial expertise by the World Bank staff.

Because direct government expenditures for housing are relatively small, they have less effect on the sector than the regulatory framework, macroeconomic policies, and financial sector policies. Thus, the World Bank is placing increased emphasis on policy dialogues with governments as a way of increasing the housing stock.

The impact of housing policies on the economy may be significant. For example, over one-fifth of the inflation in Columbia has been attributed to credit policies to support housing. The income distribution effects may also be unfavorable; in many countries, subsidized programs for housing development or finance have mostly benefited middle and upper income households.

## Transportation

World Bank lending in the transportation sector has fluctuated considerably. It amounted to \$2.1 billion in FY87 and \$2.6 billion in FY88. A large part of these expenditures is for road construction outside of urban areas. The urban share is much smaller, amounting to about \$3 billion in FY89.

The World Bank has identified five key issues in the urban transport sector:

- strengthening public institutions involved in urban transport;
- developing low-cost solutions including demand management, traffic control, road improvements, and better maintenance;
- providing access and priority for public transport;
- improving public transport systems; and
- increasing private sector participation in the provision of services and facilities.

## Water Supply and Sanitation

Estimates of the coverage of water and sanitation services vary. The World Bank's Water and Sanitation Division has stated that 40 percent of the world's population does not have safe and convenient drinking water and that just 25 percent has adequate sanitation facilities. The proportion is even lower in rural areas. The unserved population was two billion in 1980. Providing these services through conventional, large-scale alternatives would cost \$600 billion, or \$300 per person. That sum is a large portion of per-capita gross national product in many countries.

Others report that 65 percent of the rural population in developing countries does not have a safe and convenient water source, and 75 percent lack a satisfactory means of disposal for human waste. Other estimates are that 30 percent of the world's population, 1.5 billion people, lacks safe drinking water. Currently, governments are spending \$1.5 billion per year on rural water supply. Some progress has been made; the proportion of rural people without access to safe water has fallen from 80 percent in the 1960s to less than 60 percent at the end of the 1980s.

The number of urban households without sewage connections is increasing rapidly, and less than one-quarter of the sewage collected is treated before discharge. Sewer services in cities reach only 12 percent of the urban population in Africa and 41 percent of the urban population in Latin America.

Most of the World Bank's lending in this sector goes to urban projects. For example, in FY85, \$772 million was loaned for urban projects and only \$108 million for rural water supply. Through 1984, the bank loaned a total of \$530 million for rural water supply. Over the period from 1974 to 1980, 92 percent of the bank's lending in this sector was urban-related, and the proportion only decreased to 86 percent during the period from 1981 to 1985. In FY86-87, the urban share of water and sewerage lending was 76 percent.

Total World Bank and International Development Association lending for water supply and sewerage has fluctuated from \$781 million in FY85, \$605 million in FY86, \$1.114 billion in FY87, and \$535 million in FY88. These figures do not include water supply and sanitation components of agriculture or infrastructure projects. Urban and rural lending for water and sewerage as a proportion of total regional lending varies considerably. In FY86-87, the proportion

was 3.2 percent in East Africa, 0.6 percent in West Africa, 5.2 percent in East Asia, 4.8 percent in South Asia, 12.6 percent in Europe/Middle East/North Africa, and 2.2 percent in Latin America. Over the same time period, World Bank loans for water and sewerage per new urban dweller were \$9.14 in East Africa, \$2.50 in West Africa, \$14.92 in East Asia, \$14.60 in South Asia, \$82.93 in Europe/Middle East/North Africa, and \$12.02 in Latin America. Thirteen of the 17 new projects in this sector in FY87 were for large-scale conventional alternatives.

In FY89, water supply and sanitation lending increased to \$791 million in 10 projects. About 72 percent of the loans were through the World Bank and 28 percent through the International Development Association. These figures exclude two urban projects that have water supply and sanitation components. Stated characteristics of some of the FY89 loans include:

- rehabilitation and management of existing facilities;
- provision of services to low-income groups;
- promotion of water conservation through pricing;
- direct investment by private companies in urban water supply; and
- calculation of a demand curve for water.

Smaller environmental health components are also included in some projects under other categories.

The World Bank is also involved in some other activities in the water supply and sanitation sector. Since 1978, a joint program between the United Nations Development Programme (UNDP) and the World Bank has developed and tested appropriate technologies and innovative implementation strategies to extend coverage to low-income groups. This program has spent \$45.3 million over 18 years and has a balance available of \$28.7 million for 1989-92. It also carries out demonstration projects and currently operates in 12 to 15 priority countries. The UNDP/World Bank program has focused on poverty alleviation and participation by local people, including women. It has operated in over 40 developing countries. The program involves applied research; information promotion, dissemination, and exchange; management; and donor coordination.

Its achievements include laboratory and field testing of 2,700 pumps of 70 types in 17 developing coun-

tries; promotion of the concept of village-level operation and maintenance of hand pumps; low-cost pilot and demonstration projects for sanitation; promotion of policies for low-cost alternatives to conventional sewerage; assistance in project appraisal and leveraging of funds from other United Nations sources; and preparation of publications and training materials on integrating women in community water supply and sanitation projects.

Some of the experience gained in this program is incorporated as a small component of the large loans. For example, low-cost urban water supply and waste water disposal for Jakarta was included in a loan to Indonesia. In Nigeria, a \$5.5 million community-level program was part of a \$400 million large-scale project. Low-cost sanitation in four cities was part of a Bolivian project. Two large demonstration projects for hand pumps are underway in China.

The World Bank has also established regional water and sanitation groups in Africa and South Asia. Others are planned for East Asia and Latin America/Caribbean. The groups are technical cooperation groups based in World Bank missions that assist governments in planning and implementing projects in this sector.

An international training network for water and waste management has been created with eight centers; fifteen centers are planned. The network provides audio-visual and printed materials for dissemination of information in English, French, and Spanish.

The World Bank has also produced various technical reports on topics such as latrine construction, design and siting of ocean outfalls for waste water from coastal cities, and water supply and sanitation project preparation. Some of the activities underway now include preparation of a handbook on urban sanitation, a study of alternatives to conventional sewerage, a study of the relationship between technology choice in sanitation and socioeconomic characteristics of the target population, and experiments with social marketing to stimulate the demand for sanitation.

Some important lessons have been learned in the World Bank's activities in water and sanitation. Both urban and rural populations are often willing to pay for convenient sources of safe drinking water; however, heavily chlorinated water is not popular in some areas. The time savings in water collection can be substantial. Yard taps are preferred over more

distant community standpipes or wells that still require that substantial amounts of water be carried. Water consumption usually increases when the convenience of supply is better, but the increased consumption may have a lower marginal value than the basic level of consumption.

The perceived need of local people for sanitation systems is much lower, especially outside of urban areas. Many water supply and sanitation systems have not charged user fees commensurate with costs. As a result, maintenance services have often suffered. Also, users have not had a sufficient incentive to conserve use. The connection between health improvements and water supply is more complicated than originally thought.

The World Bank's Water and Sanitation Division has identified the following key issues in this sector:

- making water resources available at an acceptable cost for domestic, industrial, and agricultural uses;
- establishing incentives for effective institutions and sustainable management and maintenance of facilities;
- ensuring environmentally safe collection and disposal of municipal waste and waste water; and
- providing the increased financial resources needed.

The stated new directions for the program for the period from 1988 to 1990 emphasize community-based water supply systems for rural areas instead of centralized systems, the importance of considering social and cultural standards for water and sanitation, inclusion of health professionals and social scientists with engineers in project decision making, and participatory financing of low-cost systems by communities.

Some researchers recommend financing piped water systems for higher income developing countries in Southeast Asia and Latin America and hand pumps in sub-Saharan Africa. Others suggest that the primary role of governments and donors must change from being direct providers of water and sanitation services to being facilitators through training; information dissemination; technical and managerial assistance; and decreasing the barriers to private suppliers for equipment, drilling, and maintenance services.

Grants and soft loans to parastatal utilities have often been ineffectually used and projects have been too complex. Demand or capacity use projections have often been inaccurate. A review of 60 completed water supply projects found that over four-fifths of the projects did not meet their targets for number of clients served or amount of water sold, causing financial problems for water authorities. The same study urged greater attention to the water and sanitation needs of small and medium-sized cities since most attention has been devoted to large urban centers.

In project design, it is recommended that users have a greater role in deciding on the type of improvements needed, bearing most of the costs, and taking responsibility for maintenance. The government and donor role would be to establish an environment conducive to community construction and management of improved facilities. The World Bank's Water and Sanitation Division also recommends increased collaboration with nongovernmental organizations, especially those with strong grassroots connections to women.

## **Municipal Solid Waste Management**

Large cities in developing countries often spend as much as 30 to 50 percent of their operating budgets on solid waste management, yet, in most cases, municipal solid waste collection services are available to less than half of the population in those cities. Generally, the poor are excluded, especially those living in squatter settlements. In addition, the portion of solid waste collected is not always handled properly due to institutional difficulties.

There are few economies of scale in residential solid waste collection for districts serving populations of more than 50,000 people. When the hauling distance from collection to the point of final disposal exceeds 15 to 20 kilometers, intermediate transfer sites are sometimes used. Trash collection services could be handled by the private sector. In addition, there is much potential for resource recovery and re-use in developing countries. In some countries, trash scavengers are well organized.

The quantity and composition of municipal solid waste varies in countries with different income levels. Municipal waste generated per capita per day averages 0.4 to 0.6 kilograms (kg) in low-income

developing countries, 0.5 to 0.9 kg in middle-income developing countries, and 0.7 to 1.8 kg in industrialized countries. The density of the waste is usually two to three times higher in low-income developing countries than in industrialized countries, and the moisture content is usually three times higher. Other common characteristics of municipal solid waste in developing countries is a high composition of organic matter and a smaller particle size.

These differences in waste characteristics have implications for technology choice. Compaction trucks and landfill compactors cannot achieve as high a compaction ratio in developing countries. Incineration usually requires supplemental energy in developing countries due to the higher moisture content and lower proportion of high heat-value combustibles. Mechanical sorting of glass, metal, and plastics is not generally encouraged, since less of this waste is present and much of it has already been scavenged.

Waste storage and disposal can be a large problem in developing countries because households have less living and yard space, access areas between shanty dwellings are small, the climate is warm, and seasonal rainfall may be high. Thus, refuse managers may need to consider a higher collection frequency for municipal wastes, manual or animal-powered pushcarts for access in shanty areas, tractor or animal-powered transport vehicles, and intermediate sites for transferring wastes to large vehicles for final shipment.

The World Bank has only been involved in a small number of municipal solid waste management projects. An example of one such loan is a pilot project in Monterrey, Mexico, which provided 43 percent of the investment capital needed to set up a decentralized, state-level company covering eight municipalities. The rest of the capital cost was borne by the central government and the state and municipal governments. The operating costs are to be covered by tipping fees and property taxes.

Solid waste projects are categorized under the World Bank's tabulations for water and sanitation. Between FY83 and FY89, only \$106 million was loaned under this classification. However, some projects in other categories have had solid waste components.

A World Bank review of 71 of its projects with solid waste components showed that the impacts were limited. Most of the support was for vehicle procurement, and this was not combined with adequate

planning, management, or operating performance. Typically, one-third to one-half of the collection fleet is out of service at any one time, and the collected wastes are not disposed of properly.

The bank acknowledges that it needs to prepare more comprehensive projects in this area, including more technical assistance and training; strategic planning; investment in primary collection and secondary collection, transfer stations, and ultimate disposal; greater private sector participation; and improved financial management and cost recovery.

In July 1988, the president of the World Bank issued a policy statement on toxic and hazardous wastes. The new policy completely prohibits support for ocean dumping of toxic or hazardous waste and inter-country shipment or disposal of these wastes. He also stated that support would be provided for country efforts to improve domestic facilities for waste management through resource recovery, reprocessing, and safe disposal.

The World Bank has prepared a number of technical reports on waste management, including a three-volume manual on safe disposal of hazardous wastes, guidelines for planning and implementation of municipal solid waste management, a review of techniques for the recycling of municipal waste in developing countries, and methods for composting human waste with domestic organic solid waste.

The joint UNDP/World Bank program in water and sanitation has conducted state-of-the-art reviews of waste management technologies, case studies, and evaluations of solid waste management activities in major cities of 18 developing countries; studied health and environmental issues; and carried out small demonstration projects for new approaches. Nevertheless, it acknowledges that more attention should be focused on solid waste management and resource recovery for urban areas.

## Industrial Pollution Control

Although industrial pollution control is not strictly an urban issue, most of the large-scale industrial firms that use technologies that generate residuals are located in urban areas. The World Bank has funded very few projects that are specifically identified as industrial pollution control. From FY83 to FY89, a scant \$30 million was loaned under the pollution control subcategory of water supply and sanitation projects. However, this does not include

pollution abatement components of industrial development programs.

In 1985, the Office of Environmental and Scientific Affairs issued environment, health, and safety guidelines for hazardous materials use in industry. These guidelines address environmental considerations, work planning, transportation, emergencies, first aid, training, safety, and worker morale.

The World Bank has prepared a series of technical reports and guidelines on environmental impacts of industrial projects. The guidelines cover 55 industrial categories ranging from aluminum production to wool scouring. The guidelines describe the process, address downstream standards and controls, and list permissible pollution levels based on reasonable costs of existing treatment and control technologies. Where these levels cannot be achieved, project appraisal and supervisory missions must document this and explain why.

The World Bank funded a manual for use in planning projects in the chemicals and energy industries. It contains guidelines on identifying, analyzing, and controlling major hazards, including assessment procedures, emergency plans, and development restrictions around the site. It also provides a simplified approach to planning projects.

The bank has also issued various reports on technical and managerial aspects of pollution control. One report provides guidelines for project planning and financing of water pollution control. It reviews sources and effects of major pollutants; water quality standards; control measures for residuals from domestic, industrial, and nonpoint sources; water re-use; operation and maintenance of treatment works; legal issues and institutional arrangements; estimation of economic and financial benefits and costs; the use of direct regulation versus economic incentives; privatization; and pricing of services.

The World Bank has also issued guidelines for occupational health and safety for 48 industrial categories ranging from the aluminum industry to textiles. The guidelines list equipment and procedures to be used and threshold limit values for exposure to hazards. The discussion covers air contaminants, burns, heat stress, noise, sanitation, medical examinations, training and education requirements, and record keeping.

# ■ Urban Environmental Management in Developing Countries

■ by

Royce LaNier, Stephen Reeve, and April Young

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## ■ Introduction

Environmental protection and economic development have often been considered mutually exclusive. As a result, public policy makers deeply concerned for the economic well being of their cities have not valued the protection of the air, water, and land resources. In so doing, many of the economic conditions they sought to alleviate have not improved, and the environmental resources which sustain economic development have been placed in jeopardy.

Just as protection of the natural resources that support urban growth is critical to sustaining that growth, investment in environmentally sensitive urban management must be made at the earliest possible stages of urban development. Because cities are the physical setting for the largest proportion of a nation's capital investment, they must be shaped and developed to maximum advantage from the outset. Failure to do so results in serious environmental damage, which in turn requires even greater investment to repair. Poor countries, in particular, cannot afford the massive expenditures required for remedial actions such as urban renewal and clean-up of toxic wastes or air and water pollution. Recognition of the interrelationship between economic growth and environmental protection, as well as recognition of the enormous cost of repairing environmental damage once inflicted, suggests a reappraisal of traditional thinking. This analysis offers the opportunity to consider how the twin goals of environmental protection and economic development can be mutually supported.

This paper assumes a working knowledge of the specific parameters of environmental damage being experienced as a byproduct of rapid urbanization and related industrial development in many developing countries. The discussion focuses on managing the urban environment and, especially, on addressing the problems (and opportunities) of rapid

urban growth. It does not address all environmental dilemmas; it leaves important issues such as depletion of natural resources, air and water pollution, and waste recycling to more detailed treatments elsewhere. The challenge here is to examine some possible responses to urban environmental problems, with particular emphasis on enhancing economic growth; strengthening local governments and urban institutions; creating better systems for guiding urban growth; improving the delivery and management of urban land, infrastructure and services; and encouraging private initiative.

Several concepts underpin the paper:

- Urbanization in developing countries is a necessary component of sustainable economic development.
- The failure to manage environmental problems created by urbanization imposes enormous costs on current and future citizens. While the shortage of resources needed to deal comprehensively with the wide range of problems is obvious, continued environmental degradation dooms the cities—and the countries in which they are located—to decades of human misery.
- Adequate management of urban environments is one of the basic elements of most reasonable, sustainable, economic development strategies. The absence of such management reduces the long-term availability of natural resources, creates a wide variety of health problems, and negates many otherwise positive investment strategies.
- Environmental protection must be viewed as an economic development tool, not as a luxury. Investment in infrastructure, services, and environmental quality creates permanent employment and also provides a setting in which private investment is both possible and desirable.

- Appropriate management strategies for developing countries are those which are explicitly sustainable, reflecting a realistic assessment of resources—both human and material—available in the country and including provision for cost recovery sufficient to allow continued investment in new facilities as well as adequate operation and maintenance.

A discussion of urban environmental management must be placed in the context of a system in which the sum is in fact greater than the individual parts. To that end, this paper suggests a conceptual framework for understanding the components of the urban environment and the interplay among them. Based on this framework, the tools, methods, and processes of urban environmental protection and management are discussed. A possible program and policy agenda is then proposed.

# ■ A Conceptual Framework

## The City as an Economic Engine

The rapid growth of cities in most developing countries is creating great challenges for governments and international assistance agencies. As the underlying economies of these countries shift from rural, agricultural subsistence to more modern industrial growth, movement from hinterland to urban areas is inevitable and necessary. Population centers create both economies of scale and the development of markets for goods and services that in turn provide the foundation for more specialized industrial and service activities. Cities stimulate and support economic output, investment, and income.

The progression from an agricultural subsistence economy to a more modern industrial society is in part a result of improved productivity in rural areas, which reduces the absolute number of people required to work the available arable land. This, combined with high birth rates and declining infant mortality, has created a labor force which can only be adequately used in more highly industrialized economies.

With few exceptions, industrialization is an urban phenomenon, bringing together investment capital, technology, and workers in order to produce goods, which are in turn sold primarily in cities. While some products certainly find buyers in more rural areas, the city creates its own market for goods and services. Some are for its population's direct use, while others are raw materials used in the production of industrial goods, secondary goods, and luxury or export products. The production and sale of such goods creates the income which is at the root of sustainable economic growth, in part through additional investment capital and in part through discretionary income, which can be used for improving education, medical care, shelter, and other important components of life.

The unhappy byproduct of these otherwise desirable outcomes of rapid urbanization is the degradation of environmental systems and natural resources, both in urban centers and their hinterlands. This destruction has reached such massive proportions that it threatens to undermine many of the productive functions of the cities and thereby significantly reduce levels of sustainable development. In China's most populous region, heavy metals pollution in the food chain has forced plant closings; in Burundi, especially those areas near population centers, fuel wood demand has stripped the country of its forest resources, causing extensive erosion and loss of agricultural soils; and in some of Kenya's secondary towns, inappropriate land use and development patterns have driven the cost of extending infrastructure to industrial and commercial development so high that economic expansion has been severely curtailed. Water pollution, erosion, depletion of resources, inefficient land use, and many other environmental problems all restrict economic growth. Still, the issue is not how to stop urbanization; rather, it is how to protect the resources which support growth at a sustainable level.

## The City as an Environmental System

An improved understanding is needed of the management of the natural resource base and the environment that supports urban economies if a government pursues a sustainable development program. Achievement of this is only likely if the city and its environs are treated as a system. While doing so may not be an answer to all urban problems, its logic reveals the actual complexity of cities and makes clear the urgent need to link economic development policy, natural resources management, and urban investment decisions.

The primary components of the urban system are its population, defined in terms of its size, density, growth rate, and relative heterogeneity; its natural environment or ecosystem; its built environment, particularly its infrastructure and overall land use pattern; its economy, most notably its underlying economic activity and the resource flows which support it; and its institutions, including governmental structure and policy making processes. It is the understanding and management of the interaction of these components that offers the most promise for the ability to minimize environmental damage. For example, when demand for land for housing exceeds supply and when institutions are unable to control or direct urban land use, the result is often unplanned settlement of environmentally sensitive areas, such as occurred in the steep hillsides of La Paz, the marsh areas of Mexico City, and estuaries of Dacca. On hillsides, vegetation is eliminated and erosion takes place; on flood plains, flood water absorption capacity is reduced and flooding increases. A strategy that leads to delivery of an adequate supply of appropriately located building sites with minimal but crucial infrastructure would reduce unplanned settlements, environmental damage, and long-term development costs.

It is important to recognize that virtually all human activities affect the community's underlying environmental system. Many, even most, effects can be mitigated or managed so that little or no permanent damage is done. But planning and management are critical, for without them, the natural environment is often overwhelmed by the effects of escalating demand and competing human needs.

There are limits to the current understanding of the components of the urban environment and especially of the complexity of their interaction. There is, however, sufficient theoretical and factual information and professional expertise available to begin much more effective management of urban environments. Common sense judgments must be relied on even though those judgments may be based on deficient data. Such management can start now and, if approached with respect for the systemic nature of interventions, much more will be learned, and urban environmental management capacity will grow.

## ■ Tools, Methods, and Approaches

Within a conceptual framework that views the city as an engine of economic growth and as an interdependent environmental system, urban management is clearly the key to environmental protection. Anticipation and mitigation of urban environmental problems through improved management, however, pose significant challenges to traditional ways of managing the urban system. The size of the problem has eclipsed the capacity of most existing tools, and the complexity of competing demands requires policy makers to re-examine conventional wisdom, rethink traditional relationships, and formulate new approaches. This analysis of the tools, methods, and approaches available to support urban environmental management objectives incorporates five guiding principles.

- *Enhance urban economic growth.* Urban growth, environmental protection, and sustainable economic development are inextricably linked. Urban growth is both a function of and a prerequisite for economic development. For that development to be sustainable, the natural resource base must be protected.
- *Develop strong institutions.* Strong local governments and related urban institutions must exist whose boundaries and jurisdictions correspond to the management tasks before them. The entities must understand their respective roles in the urban system and have the resources as well as the authority to play their part.
- *Create better guidance systems for decision making.* Governments need a systematic means of guiding urban investments to assure that scarce resources are used to their maximum benefit in a way that protects the environment and encourages economic growth.
- *Direct urban growth with land delivery and infrastructure investment.* Market-driven, environ-

mentally sound land delivery and well-conceived capital investments in infrastructure provide important opportunities for minimizing pollution, reducing long-term development costs, and shaping the urban environment.

- *Encourage private initiative.* The private sector has a significant role to play in environmental protection, in its direct response to environmental concerns and as a provider of urban infrastructure, services, and employment and investment related to pollution control.

The following sections discuss these principles and suggest tools, methods, and processes available to accomplish urban management objectives.

### Enhance Urban Economic Growth

Urban growth has been a necessary prerequisite for the development of industry and services in developing countries. The employment opportunities, markets, technological improvements, capital, and enterprises of a healthy city promote the development of its region's resources and that development, in turn, can reinforce the development of the city. Unfortunately, policy makers all too often fail to understand that growth must not be at the expense of the region's natural resources, particularly air, water, and land. In fact, adequate protection and management of those resources is crucial to continued economic health. An excellent if tragic example is provided along the Adriatic coast of Italy, where the precipitous drop in tourism is forcing the government to look closely at ways of controlling industrial pollution.

Urban environmental management strategies are needed to enhance continued economic development while, at the same time, protecting the natural resources on which urban economies depend in

ways that ensure the resources' continued availability. Although the growth strategies now employed vary between market economies and centrally-planned ones, economic planning and policy-setting processes are used by all governments to allocate resources, generate revenues, and influence investment decisions. Government interventions that grow from these processes often take the form of regional development priorities, intergovernmental grants to cities, pricing policies, wage policies, land taxes, and currency exchange rates or other monetary controls. These interventions and the incentives they embody often significantly affect investment decisions in particular regions, industries, crops, or types of facilities. The policies may alternatively lead to growth of one area at the expense of others, to increased exploitation of an undeveloped resource, to competition for scarce commodities, to the creation of new jobs, or to indiscriminate disposal of hazardous wastes.

Decisions regarding the treatment of environmental effects of a specific industry pose a particularly difficult challenge. Policies that internalize the costs of waste disposal or air pollution may adversely affect the competitive position of an industry, while policies that do not internalize these costs force the larger community to absorb the consequences in the form of deteriorating environmental quality, rising public health costs, reduced labor productivity, or eventual costs of relocation and cleanup. Perhaps the most dramatic example to date is the \$5 billion spent by the U.S. Environmental Protection Agency since 1981 to remove toxic wastes in the United States. In this instance, the failure to internalize the costs of disposing properly of industrial waste has required, and will continue to require, an enormous investment of public funds for physical cleanup. In retrospect, instead of creating an incentive for proper disposal at the time the waste was created, the marketplace was permitted to serve as a significant disincentive for appropriate environmental management, with disastrous long-term impact.

No single approach is correct or always applicable. A balance must be struck between immediate needs for price competitiveness and long-term environmental protection. The challenge is to identify the politically acceptable set of policies that best serves the economic, social, and environmental circumstances of the country and its individual cities.

Economic planning and policy making in developing countries can be enhanced through a range of

#### BEACH POLLUTION IN THE SEYCHELLES

Over the past decade, the Seychelles has pursued a strategy of economic development based to a large extent on the continued growth of tourism. The type of tourism promoted by the government relied on package tour operators selling low-cost sun-and-sand vacations to ever-increasing numbers of travelers. As the strategy began to succeed, more and more large hotels were built along the beautiful beaches, until the raw sewage being pumped into the ocean began to undermine the coastal ecosystem, which had produced the abundant marine life, clear waters, and spectacular beaches. As algae clouded the water and dead fish washed ashore along with raw sewage, tourism plummeted, employment dropped, and the economy suffered a severe shock.

general measures. Especially important is the encouragement of urban policies and strategies based on understanding the links between urban investment and agricultural productivity, between patterns of urban settlement and overall productivity, and between urban use of natural resources and the carrying capacity of the regional ecosystem. Some approaches most likely to have a positive impact are

- encouraging settlement policies that are framed to serve explicit economic goals and are meshed with each urban center's national context and natural resource base;
- encouraging development priorities to stimulate agricultural productivity as well as to strengthen the economies of cities and towns which serve as markets for agricultural outputs and sources of agricultural supplies;
- establishing resource development and pricing policies that encourage rational use of land, water, energy, and renewable resources and remove unwanted biases in economic plans and subsidy, tax, and pricing policies; and
- basing public investment in infrastructure and facilities on each urban center's potential as identified by its natural resources, positive economic and environmental advantages, and urban management skills.

#### Develop Strong Institutions

The task of managing the urban region, including the intricacies of the day-to-day operation of cities in

developing countries, is sufficiently complex that it taxes the most sophisticated system. Population growth, poverty, unemployment, and resource depletion have all weakened the effectiveness of processes and institutions designed to plan, maintain, and improve cities. In most developing countries, urban management and environmental policy setting and decision making are carried out either entirely by central governments or by a blend of central, regional, and local institutions. They are but a few of the many tasks facing overextended central governments, while local governments usually lack the funds, expertise, management capacity, and commitment from central governments to function effectively.

### Clarify Jurisdiction and Purpose

Jurisdictions of all types are often mismatched to the reasonable boundaries of the environmental problems and/or management tasks facing them; their geographic reach as well as their authority and resources may be inadequate, inappropriate, or inefficient. Yet each level of government and each jurisdiction plays an important role. Central governments and, to a certain extent, large regional governments, need to establish clear policy guidelines for environmental protection and create appropriate institutions and tools to implement those policies.

Local governments could play a more substantial role if their actions and responsibilities were part of a planning and investment decision-making process that integrated national, regional, and local responsibilities based on clearly defined principles. For an integrated process to work, all parties must have clarity of purpose as well as strong financial and management capacity. A significant obstacle may be the political will of national governments to share power with local governments, yet this is essential if responsible urban management is to be achieved.

Institutions at all levels of government traditionally consider only those functions with which they are specifically charged. The goals of each institution are few and narrow in definition; thus institutions often work at cross purposes or awkwardly with others in the exercise of urban management tasks. Individual institutions are, as a result, rarely responsive to the multidimensional requirements of the urban environment and are even more rarely in a position to manage the interactions of the components of the urban system. Interactive management techniques, ad hoc committees, or special purpose institutions

#### LOCAL GOVERNMENT CAPACITY IN KENYA

Many developing country governments have struggled to cope with dramatically growing cities in the absence of effective local government agencies. In 1981, the government of Kenya, with assistance from USAID, initiated a program aimed specifically at improving local government capacity to plan and deliver facilities, housing, and urban services and to implement central government development policies and programs throughout the country. A key element of the program was the training of local officials in a variety of areas, including the evaluation of projects, project planning, budgeting, financial management, and cost recovery techniques. The program was organized to support the focus on district efforts of the central government.

A local development planning process and reporting system known as the Local Authority Development Programme (LADP) was established as a first step. The Ministry of Local Government prepared and distributed to all local authorities a simple reporting form and a set of guidelines for completing the form, along with an indication that the LADP was essential to preparation of Kenya's national development plan and that the process would be used to identify and evaluate local projects to be financed by the central government. The result was impressive evidence that, given a clear set of guidelines, even the least sophisticated local authority can prepare a reasonable development program.

charged with cutting across agency mandates, regional boundaries, and government jurisdictions have not been emphasized in developing countries to the extent that they have in more developed countries. Governments need to adjust the charters of urban development and environmental protection institutions to better fit the tasks at hand and to find effective ways of coordinating their individual efforts.

Even with appropriate charters and greater cooperation, institutions must be strengthened. For urban environmental management programs to be implemented and sustained, capable institutions must exist, particularly at the local and regional level. Skills training and improved administrative practices aimed at comprehensive environmental resource management stand out as priority needs. Central governments should be encouraged to cede significant portions of the authority necessary to better manage environmental issues to local govern-

ments and their regional associations and to empower that authority by providing support for institution and capacity building.

### **Decentralize Authority and Improve Fiscal Management**

The institutional targets for strengthening management capacity must be both local governments and those institutions (often parastatal enterprises) that manage such urban infrastructure as electricity, water, and transportation. The sometimes lax attitude toward fiscal control and management of both of these types of institutions results in part from the expectation that the central government will bail them out. Actually, the trend has been toward increasing local responsibility for delivery of urban services while simultaneously reducing the level of central government financial support, with the result that real expenditures per capita have generally declined. In addition, internal cash reserves have often been depleted as these institutions have attempted to meet their responsibilities without expected contributions. As a result, the financial condition of most have deteriorated severely. In Nairobi, for example, the once strong, self-sustaining water development fund has substantially eroded as a result of municipal allocation of the fund's resources to meet other pressing requirements, a situation caused in large part by the central government's failure to keep current with its own obligations to the city. In the face of institutional insolvency, severe strains on most central governments' budgets, and limited international assistance, resources for new capital projects to accommodate infrastructure and urban services expansion are elusive.

The answer to the dilemma does not lie in more funding from the central government nor can loans from international sources be seen as more than an interim measure. There appears to be no alternative to locally-generated financial resources over the long run. Most cities and parastatals can dramatically improve the collection of taxes and user fees, particularly property taxes and public utility tariffs. Attempts to increase revenues must be closely coordinated with parallel programs to improve urban services. Achieving higher levels of service will, in turn, require improving management efficiency and instituting cost reduction measures.

A sound investment planning process is basic to all these measures. The choice of investment projects must meet community needs, reflect environmental

quality goals, and demonstrate high rates of return. Realistic standards need to be adopted to keep costs to a minimum. Capital investments should be designed in response to the willingness of the users to pay, however slowly, for the construction, operation, maintenance, and replacement of the facility.

In addition, virtually every form and level of government has within its scope the power to create significant incentives and disincentives for particular economic choices and investment strategies. Adequate urban management can be significantly enhanced by a reasonable evaluation of these powers and the selection of alternative courses of action or exercise of regulatory powers that the goal of environmentally sound economic growth. An excellent example of this use of power is in the imposition of recycling requirements. While some communities have attempted to enforce mandatory recycling through legislation alone, others have adopted a more incentive-driven approach. Specifically, separated trash is collected by private recyclers at no cost to the municipality or the residents. Unseparated trash or material unsuitable for recycling is collected by the municipality, but only if it is placed in trash bags sold by the local government and priced to reflect the incremental cost of collection and disposal. The result of the system has been a significant reduction in overall cost to individuals and the local government of trash removal, a substantial increase in compliance with recycling regulations, and the creation of several new recycling businesses.

In order to be effective, approaches to institutional development must be tailored to the needs of the specific country or city. Scarce resources must be concentrated on institutions that are critical to the country's development and to addressing the most significant environmental issues. Some approaches that might be considered include the following:

- encouraging decentralization strategies to place as much fiscal responsibility and management authority as possible at lower levels of government. Decentralization allows local leaders and managers to locate services and infrastructure more efficiently, to implement development projects more effectively, and to have ownership of the success of development activities. By relieving the burden from the central government, its much-needed role in coordinating and monitoring can be strengthened.
- strengthening central government agencies who coordinate local finance. In most developing

countries, public finance is highly centralized and it is essential to begin reform through the central ministries (usually finance, local government, and/or economic planning).

- strengthening the authority of local governments to raise adequate revenue to meet service demands. This includes expanding taxing and revenue raising authority; improving sources of local revenue, such as the property tax; creating special loan funds for urban development; and improving intergovernmental grant programs. Local governments must be encouraged to expand their fiscal base through collection of user charges for publicly provided services.
- inducing local government management reforms using the incentive of capital financing. International agencies and central governments should make it clear that improvement of urban environmental management is a prerequisite for future loan and grant programs.
- encouraging experimentation with new institutional means of facilitating communication. One method is the selective reassignment of officials across sectors and up and down the levels of urban institutions to increase sensitivity and knowledge of the multidimensional nature of urban environmental management.
- rewarding innovation and success through the expansion of training and job promotion opportunities for managers in agencies carrying out urban environmental management responsibilities. Capacity building needs are most acute in the medium-sized and smaller cities; however, the staffs of large cities, parastatals, and central and regional agencies should also be included in such incentive programs, as their role as facilitators may be equally critical.
- involving local government staff and elected officials in the development of improved systems and procedures. This will increase the likelihood that more lasting change will occur, although the task of achieving meaningful institutional change is arduous.

## Create Better Guidance Systems for Decision Making

Cities are the physical setting for the largest proportion of a nation's capital investment. A development

strategy must therefore carefully place investments for best advantage. In order to assure that these investments do produce maximum benefit in a such a way that environmental protection and sustainable economic growth are assured, governments need a systematic means of guiding investment decision making. The elements of this guidance system are environmental planning, information, and monitoring; public involvement and support; and development controls.

### Strengthen Environmental Planning

If the urban environment is to be managed effectively, environmental planning is a key tool. (Environmental planning is here meant to encompass traditional land use planning and other physical development planning—including transportation, open space, natural resources, public utilities and facilities—within the context and with an understanding of natural environmental processes.) The impact of decisions about the direction and nature of the tremendous urban spatial growth being experienced in cities of developing countries is very far-reaching; decisions made today create the physical setting for economic and social system activities for the life of the city and its region. Unless massive urban and regional renewal is to occur every few years, decisions about the urban environment must be made with an eye to placing the most important development objectives within a systematic framework.

As a basis for these decisions, planning is vital, but there must be a redefined and reorganized approach to planning. Planning throughout the developing countries—as well as the developed countries—has been often and justifiably maligned in the past couple of decades. While commitments to planning have been and are being made by developing countries, planning has, almost universally, not done the job.

Most often, planning in developing countries is undertaken by a central government planning ministry with little involvement by the affected local governments and their citizens. These centrally prepared plans for urban areas rarely incorporate the information, programs, and project plans of other agencies and thus only deal with a few components of the urban system and with incomplete understanding of the effects of the interventions intended in the plans. The plans are often static in nature: they establish land use directives that are fixed in time and require affected local governments' implemen-

### **ENVIRONMENTAL MANAGEMENT IN THE PHILIPPINES**

In recognition that new approaches are needed to understand urban environmental systems and better direct urban growth, USAID, in the early 1980s, initiated the Managing Energy and Resource Efficient Cities (MEREC) Project. Its key purposes were to assist selected demonstration cities in the establishment of energy/resource efficiency strategies and coordinated sectoral action plans to implement the strategies. The project was designed to provide reusable information and replicable procedures to enable application of its principles in other cities throughout the developing world.

In the Philippines, the MEREC Project worked with elected and appointed leaders and key urban-related agencies in the development of action plans covering both private and public sector activities, including land use, solid waste management, transportation, water supply, sewage disposal, and electric power supply. Particular emphasis was given to energy and resource conservation measures.

The project succeeded in its application and demonstrated that innovative urban environmental management approaches are needed to enhance appreciation of the interactions between the natural environment and cities as well as provide operational guidance to decision makers with regard to the scope of environmental considerations in urban development.

tation for five or ten years or until the central planning ministry delivers a new plan. In the meantime, unanticipated development and other events occur that render the plans obsolete.

An alternative planning approach would place the relevant sectoral interests (regional economic planning, natural resource management, transportation, infrastructure, land use, public health) and local governments in a partnership with the mandate to create a dynamic planning process. Critical to the process is a shared responsibility for setting priorities, programming capital improvements, and responding to unanticipated or emergency conditions. Environmental planning thus becomes not just the work of planners; it also requires the coordinated efforts of a range of specialists, including economists, natural resource experts, engineers, local government administrators, and others. Planning agencies must be seen less as institutions charged with making grand plans than as facilitators who

examine the relationships, both supportive and conflicting, among the many urban sectors and achieve resolution among them in order to produce more coordinated decisions.

### **Improve the Information Base for Decision Making**

If the cities of developing countries are ultimately to be shaped in a way that promotes a productive balance between urban development and the natural environment, it will be necessary for relevant institutions to be able to intervene wisely and effectively in both the natural and built environment. Wise and effective intervention requires that these institutions understand the urban system, have access to sufficient information about the urban environment, and be able to measure and monitor urban system performance.

This does not mean that a vast array of data, maps, resource values, and/or pollution indices need be collected about every city. Information systems should be established that are carefully structured to incorporate readily available data in a manner that is appropriate to the types of urban decisions that are needed. As more is learned about a particular urban system, the information base can be updated, expanded, and adapted to meet changing decision needs.

Monitoring of changes taking place in the urban environment can provide information to guide and control future development. Economic, social, and environmental indicators can be designed to measure system performance and provide a basis for evaluating progress toward selected goals. For purposes of urban environmental management, the key economic indicators may be new job creation, housing starts, and the unemployment rate. The key social indicators might be literacy rates, a measure of average household size, and infant mortality rates, while the key indicators of environmental conditions may be the percentage of households served by sanitary sewers, the number of private automobiles per thousand population, and the rate of farmland or rainforest conversion.

### **Solicit Public Involvement and Support**

Information about the urban environment has an important value beyond that of improving development and planning decisions. Information (and education) is the entree for the involvement of citi-

zens in public policy decisions, especially those who are expected to be willing to pay for interventions to improve the urban environment. Without public acceptance of the need for specific investments, rejection of well-conceived public projects may result or, at the very least, the ability to recover costs will be reduced. The history books of project implementation in developing countries are replete with examples of the dangers faced in instituting change without adequate support from the affected community; the goal sought may be undesirable, the change may produce unwanted responses, and the project may not have sufficient force to carry it to fruition.

Environmental problems, at least those that are not obviously life threatening, are not perceived similarly by the poor as by those whose basic wants are satisfied. It follows that desire for or interest in information about these problems may not be perceived as important. Needed are creative approaches to disseminate information, such as the comic book designed by Botswana's Self-Help Housing Agency to explain the country's low-income housing program or the handbook designed by Kenya's Ministry of Local Government to help citizens and councillors identify community development projects. Such efforts help to secure participation of citizens, groups, and communities in decision making. If those affected can have a voice, more acceptable and successful public investments will result.

### Create Flexible and Appropriate Development Controls

The regulation of development activities is a necessary tool by which governments can intervene and manage the urban environment. Regulatory controls and incentives can take the form of land use controls, tax incentives, planning standards, effluent permits, pollution fees, building regulations, air and water quality standards, and waste recycling incentives.

Regulations that guide development are often instituted on an ad hoc basis, without full appreciation of complex relationships between environmental protection, poverty alleviation, economic growth, and private sector encouragement. For example, unrealistically high land development or subdivision standards can raise the cost of shelter, infrastructure, and essential urban services above the level of affordability of the urban poor; reduce the ability of the formal and informal private sector to contribute to infra-

structure and services; and result in illegal squatter settlements being developed on environmentally sensitive land. By the same token, without land development controls, haphazard development patterns are more likely to result. This greatly increases the cost of providing essential services.

Development controls can become an effective force in managing the urban environment as they become more tailored to the regional and local characteristics of the specific development setting. Each city and its region has its own particular set of opportunities and constraints for development. The ability of the urban environment to support a given set of economic activities, resource consumption rates, population densities, and waste discharge levels varies considerably across urban settings. The set of opportunities and constraints can be modified. Investments in sewage treatment infrastructure, for example, can significantly expand the capacity of an urban setting to support development.

The inherent characteristics of a city and its region, as well as its ability to modify its carrying capacity,

#### CODES AND STANDARDS IN ECUADOR

Ecuador's two largest urban areas—Quito and Guayaquil—have experienced rapid growth in recent years. Most of the growth has been as a result of rural to urban migration by poor families. The settlement patterns in these cities are different, but the consequences for the local and national governments are similar: large areas of spontaneously developed low-income neighborhoods with inadequate or no essential services. The cost to provide potable water, sewerage, and basic access roadways to an existing settlement is estimated to be three times the cost to provide the same services to a vacant but designated expansion area, due primarily to the needed relocation of units in unplanned settlements.

Two local governments, in collaboration with the national housing institute (Junta Nacional de la Vivienda), are responding to the problems by establishing appropriate land use and building standards. The standards are intended to plan the prudent use of land and the building of safe and sanitary housing units as well as ensure that the developer (private promoter or public agency) plans and actually provides the essential services. The standards have also been developed to reflect the reality of incremental construction: services and housing units must meet basic standards initially and higher standards at a later date.

should be considered in the development controls designed to manage its environment. For those controls that guide land use, building density, infrastructure, and resource use, countrywide approaches should gradually be replaced with flexible controls that allow incremental changes over time to accommodate changing situations. Flexible criteria should be designed in close coordination with a very simple environmental information base and monitoring process. This allows socioeconomic variables and changing environmental realities to be recognized and reflected in the development control measures.

For those measures needed to abate industrial and other large pollution sources, there are a variety of controls and incentives. Regulatory programs include government provision of control services, regulated control levels, and economic incentives such as setting pollution fees high enough to induce polluters to install control measures on their own. As with controls guiding urban development, the best set of development controls for point-source polluters must respond to the realities of the situation, including the initiative of the private sector in policing its own actions, the extent of public technical personnel to administer the controls, the likelihood of political interference in carrying out the control programs, and the ability of the government to afford public pollution control services programs.

The elements of a guidance system—planning, information, public involvement, and development controls—are in place in most developing countries. Needed are redefinition of and refinements to the system to assure that scarce resources are used to their maximum benefit and that cities and regions are shaped to adequately protect the environment and sustain economic growth. Some of the approaches most likely to achieve this are

- encouraging redefined planning programs in developing countries that incorporate a focus on environmental systems in a manner parallel to that of other sector planning, including economic development, transportation, land use, and so on;
- facilitating the decentralization of planning from central ministries to the lowest levels of government affecting urban environmental management;
- emphasizing the short-term priorities for planning as those providing the greatest environmental/economic/social payoff, which in most

#### **INCREMENTAL DEVELOPMENT STANDARDS IN MALAWI**

In Malawi, various grades of residential areas are designated, with each having different development standards. Low-income areas are planned on the basis of standards that can be progressively upgraded. In these areas, house plots are marked only with corner stakes and road rights-of-way are graded. After this is completed, house plots are sold. While the purchaser of such a plot gets little more than what is available in rural areas, the framework for future urbanization has been established.

countries translates as guiding the spatial location, timing, and sequencing of development;

- providing access for planning managers and staff to training and education opportunities that emphasize the needed innovations in planning approaches;
- encouraging coordination of research, data gathering and monitoring approaches so that significant generic information can be obtained that may aid urban environmental management;
- improving the data base of environmental characteristics—such as groundwater resources, grazing suitabilities, and soil absorption capabilities—needed by government agencies for more region- and locality-specific development planning;
- interpreting environmental data in simple language in order to promote interest among the local population in their own resources, problems, and potential and thus enable them to have a stronger voice in shaping and implementing development plans;
- encouraging the formulation of flexible development controls for cities that reflect their ecological sensitivities, technical capacities, economic conditions, and specific urban/regional characteristics;
- encouraging the development of innovative and appropriate development controls in the areas of zoning, taxation policies, and standards;
- assisting development of effective incentives to induce the private sector to control its pollution;
- investigating the degree to which unwanted biases exist in regulatory mechanisms;

- developing training programs for public sector engineers and technicians to meet the technical capacity requirements of various pollution control programs; and
- initiating modest environmental reviews of proposed urban development activities that can be extended over time or modified according to need and available data.

## Direct Urban Growth with Land Delivery and Infrastructure Investment

A major challenge in the face of the unprecedented growth of cities in developing countries is the delivery of well-placed, ecologically suitable land for urban development and the affordable expansion of water systems, liquid and solid waste collection services, and other priority urban services. Key to the success of the fiscal capacity to do so is a sound capital investment planning process and the recovery of more of the costs of providing these essential services through targeted user charges or taxes.

### Facilitate Orderly Land Development

The assembling, planning, servicing, and distributing of land for urban development is a key environmental management tool. There is no more basic requirement for orderly urban development than access to land.

Which lands are developed and how they are used has a great bearing on whether a city can have sustainable economic development, meet the basic needs of its citizens, and develop harmoniously with its natural environment.

An inability to anticipate and control residential and other land use development has contributed to the proliferation of squatter settlements; the use of environmentally fragile lands; the consumption of valuable agriculture, forestry, and grazing lands for urban uses; the shortage of water; the inadequacy of sanitation and drainage systems; and the unnecessarily high costs of a range of other urban public services. Governments therefore have an important stake in assuring an adequate supply of well-located building sites by facilitating the preparation and servicing of land for private use.

Significant quantities of new urban land will be required to meet dramatically expanding needs for

### LAND DISTRIBUTION IN SOMALIA

In response to a tremendous influx of refugees and migrants, the city of Mogadishu initiated a remarkably effective land distribution program. Instead of the extensive squatter settlements one might expect from such in-migration, this aggressive program has met basic needs as well as the demand for commercial, industrial, and public use lands. Subdivision platting has been carried out for the majority of the city in a system of neighborhood modules that also provide for public open space, public facilities, and commercial uses. No infrastructure is provided; however, this is being added incrementally. There are many examples of private initiative in providing housing and water delivery. This program has enabled the city to develop in a manner that has considerable social benefits, is environmentally sound, and allows for cost effective additions of water, sewer, electricity, street lighting, and other urban services as they can be afforded.

housing, schools, roads, industry, and other uses. Some of the land need may be met through increasing the density of existing urban land, but the vast majority will need to come from conversion of undeveloped land. Especially in the rapidly growing cities of developing countries, it is crucial for the conversion of nonurban land to urban uses to be handled efficiently, for it is at that point that the characteristics of the new urban pattern are set. The public role is twofold: first, determining the availability of environmentally appropriate land and second, extending public infrastructure to previously unserved land. Both actions will lead to environmentally sound land use and economic development opportunities.

Unfortunately, many developing countries are virtually without plans, policies, institutions, personnel, and financing to carry out the task of meeting the land needs of their expanding urban populations. Where plans and policies are in place, the necessary authorities and controls to implement them often are not. Any program of public acquisition or distribution of urban lands requires good urban development plans, institutional and technical capacity to manage the program, functioning land development controls, and the necessary capital to finance the program.

There have been some excellent efforts on the part of governments to address land needs. One especially promising form of public intervention used by the Korean Land Development Agency and others is

land adjustment, where a public entity assembles appropriate land for urban use, installs the necessary infrastructure, and finances all costs through the resultant increased land value. Typically, the agency can sell enough of the serviced land to pay for its costs and the balance of land and/or sales revenue can be returned to the original private owner. The advantages of such an approach are that it requires minimal capital expenditure for land and does not involve the government in long-term ownership of land, instead returning it to the tax rolls.

While it is clear that some form of public intervention in the land market is necessary, it is also apparent that many governments have a very limited capacity for intervention. As a result, some forms of public intervention have done more harm than good. For example, the experience with government distribution of land in many countries has been an undermining of the private sector land market and thus a curtailing of private investment in land delivery.

### Stimulate Provision of Infrastructure and Urban Services

The provision of infrastructure and urban services has become a crucial element of the management of the urban environment, both because it contributes to the social welfare and survival of urban populations and because it is vital to the economic growth of cities. Adequate water supply, sanitation, solid waste treatment and disposal, and drainage are essential to decent shelter and public health standards. They directly advance the productivity of

labor and the capacity of urban markets to work effectively. The location of infrastructure and urban services investments has great bearing on the pattern and efficiency of urban growth, on the siting of employment centers, and on the ability of the natural environs to support development.

The costs of infrastructure and services are dependent on the standard and level of service. In most market economies, costs are largely covered by property taxes with the remainder provided by user fees and allocations from general tax revenues. Where land ownership remains with the government, land rent fees for infrastructure and services usually replace the property tax as a source of revenue. In either case, key to the success of the fiscal capacity to finance both infrastructure and services is the recovery of more of the costs of service provision through targeted user charges and taxes.

A capital improvements program for infrastructure and urban services is a vital management tool. Projects must be carefully identified that will meet urban development locational objectives, demonstrate maximum rates of return, and be designed to affordable standards. Cost recovery strategies to meet both capital and recurrent costs must be implemented to enable new investments in other projects.

The provision of urban services, whether by public or private entities, offers significant opportunities for permanent, skilled employment. While reasonable pricing policies must be established to assure the economic viability of the service, the provision of the service has benefits in terms of wages paid and creation of investment opportunities which transcend its direct cost. These benefits support opportunities for continued economic growth in urban areas and represent the beginnings of a service industry sector that is critical to an integrated urban economy.

A range of approaches exist for improving the delivery of land, infrastructure, and urban services, including the following:

- providing seed money for self-sustaining property acquisition programs that, with appropriate distribution to the private sector, will enable governments to direct and control the density of development and to guide it away from ecologically vulnerable areas;
- improving the management of public lands by property inventory, improved land information systems, and other measures;

#### LAND ADJUSTMENT IN KOREA

Land pooling or land adjustment is a concept that involves government acquisition, servicing, and resale of land, usually land held by a number of private owners. The Korean Land Development Agency has used this approach quite successfully. A development plan is prepared creating three categories of land within the project area: public land for roads, schools, and other public facilities that will remain under public ownership, usually 15 to 25 percent of the total area; private land that will be sold by the government at a public sale to recoup its out-of-pocket costs for servicing the entire area, usually 15 to 25 percent of the total area; and private land that will be returned to the original owners in proportion to their original ownership shares, usually 50 to 70 percent of the total area.

#### PROCEDURAL REFORMS IN TUNISIA

Recognition of a growing deficit in the supply of land for low-income housing and the resultant mushrooming of squatter settlements prompted a review of constraints facing private land developers in Tunisia. It was determined that delays brought about by cumbersome administrative procedures more than doubled the land development time frame. A project has been designed to assist Tunisian municipalities and other land development public agencies to improve the administrative environment in order to encourage participation of the private sector in land development.

- improving land development controls (such as tax incentives, zoning regulations, subdivision standards, and building codes) and enforcement in order to channel private land development in desired directions and areas; protect high-value forest, agriculture, grazing, and ecologically-vulnerable lands; and encourage efficient and cost effective land development by the private sector;
- channeling extensions of infrastructure and roads as well as locations of public facilities in such a way as to encourage or discourage private economic development activities dependent on them so that efficient physical development of the city takes place;
- providing incentives for increased density and/or infill development of appropriate existing urbanized lands;
- encouraging public-private partnerships in land development that bring the strengths of both sectors to bear on the delivery of adequate and appropriate lands for urban development;
- encouraging the provision of minimal infrastructure and urban services to allow self-help housing programs to operate effectively;
- encouraging community/neighborhood action efforts as part of capital assistance projects in the belief that the people most affected are the ones likely to invest in the improvement effort;
- choosing infrastructure and urban services investments that have strong impacts on economic growth and revenue generation so local governments can cope with environmental costs;
- providing local and central governments with information about the range of tested technolo-

gies and organizational systems which can reduce capital costs and facilitate cost recovery in water supply; solid waste treatment, recycling, and disposal; public transport; and other urban services;

- providing infrastructure before development occurs, where possible, thereby preempting costly retrofitting; and
- encouraging private sector provision of appropriate urban services, including solid waste collection and disposal, roadway and drainage maintenance, water distribution and sewage collection system installation, and so on.

### Encourage Private Initiative

In their efforts to provide urban services with very limited funds, some governments are finding that certain services need not be delivered by governments nor be paid for through taxes. Many development activities and urban services—including land delivery, on-site infrastructure, some transportation facilities, and garbage collection—have specific identifiable beneficiaries and lend themselves to full or partial private development or management. Many of these activities and services can be provided more effectively and at less cost by private companies than by governments and can be paid for by those who benefit directly.

Privatization can relieve financial and administrative burdens on government institutions and decrease the amount that they must borrow in order to extend services and infrastructure. It can also accelerate economic growth by expanding the ability of private enterprises to earn profits for investment.

A variety of local factors will determine whether particular urban services can be provided by the private sector and how privatization can best be accomplished. These factors include the political and economic environment of the country; the specific benefits which will accrue to the public and those which will accrue to the private operator; the availability of capable private sector managers; and the extent to which private ownership or management will displace public service jobs.

Several conditions must be met if private service provision is to be encouraged. Perhaps most important, there should be general agreement that providing the service or infrastructure improvement is

appropriate for profit making. For example, emergency medical services paid for directly by the user are probably not generally accepted as a legitimate profit-making opportunity. On the other hand, collection of certain kinds of refuse by private entrepreneurs might be greeted enthusiastically by policy makers and users alike.

A policy environment must also exist which is supportive of private enterprise. Central to this is the avoidance of unfair competition by governmental or otherwise subsidized organizations. The private investor must be given a reasonable chance to be successful.

Similarly, it is important that potential customers not be reserved for more favorable treatment. For example, if certain large companies are exempted from recycling requirements, the economic feasibility of a private recycling effort will be significantly reduced.

Approaches to creating and encouraging private sector initiatives include

- identifying specific service provision opportunities, and soliciting private sector entrepreneurs to provide those services;
- setting aside certain services or opportunities for small businesses, and extending specific credits or financing assistance to get them started;
- strategically withdrawing from certain services or service areas, based largely on the feasibility of user charges or other direct payment strategies designed to create opportunities for private providers;
- releasing publicly held lands for private development in exchange for investment in infrastructure to serve areas beyond that being developed;
- using public regulatory powers to create opportunities for private service provision; and
- planning and programming capital improvements to stimulate private investment.

## ■ Strategies and Options

The preceding sections of this paper have emphasized that sustainable economic growth depends on healthy, growing cities which, in turn, are dependent on well-managed environmental resources. Cities will continue to be the setting for the majority of developing nations' capital investment. It is essential that they be shaped and developed to the maximum economic, environmental, and social advantage.

Toward that objective, five guiding principals have been recommended and a number of tools, methods, and approaches have been suggested to improve urban environmental management. These approaches, while intended to assist developing country officials in formulating their policy and program agenda, should also guide the U.S. Agency for International Development's (USAID) Office of Housing and Urban Programs (HUP) in setting its agenda in urban environmental management. In addition, HUP should consider

- the nature and extent of HUP's and other USAID offices' experience and the present capacity to launch new activities related to the various interventions outlined;
- the priority assigned to this activity by USAID;
- the extent of new funds that can be mobilized by USAID to assist developing countries in urban environmental management; and
- the possible areas of cooperation with other bilateral donors and multilateral development banks.

It should be emphasized that there exists an important opportunity to marry the wealth of knowledge gained by HUP and that of other USAID offices from their respective prior development activities. Just as a strong city depends on well-managed development of its region's resources, so should the link be

forged between HUP and other USAID offices. HUP has extensive experience in providing infrastructure, housing, planning, and management assistance for cities; other USAID offices have extensive experience in the management of forestry, water, and agricultural resources on a regional scale. Both areas of expertise are vital to developing a successful urban environmental management program.

### Previous Experience

HUP has substantial experience in project design and implementation as well as in providing technical assistance and training to developing country institutions engaged in infrastructure and services delivery to low-income urban dwellers. This has been accomplished by developing sites-and-services projects to stem the growth of unplanned squatter settlements and urban upgrading projects to improve environmental conditions affecting health and the quality of life in poor neighborhoods. In the course of designing and implementing projects in more than fifty countries in Asia, the Near East, Africa, the Caribbean, and Latin America, HUP has developed experience in dealing with a number of critical urban environmental concerns. For example, one project brought infrastructure, particularly sewers, into small towns throughout Tunisia to improve environmental conditions in low-income neighborhoods. A subsequent project in Tunisia facilitated private sector delivery of land for low-income housing and included a study of alternative technologies for areas not suitable for service by waterborne sewage.

HUP has extensive experience in upgrading neighborhoods with extreme environmental problems. The San Miguelito upgrading project in Panama helped solve a critical environmental situation where storm water runoff and inappropriate on-site do-

mestic sewage systems were causing significant contamination of the bay, thereby endangering the shrimp industry. In the Tetuán project in Morocco, the difficulty was to deliver infrastructure to a neighborhood built on a steep slope. In the Melassine project in Tunisia, the critical problem was to control flooding and introduce infrastructure into an area where the water table was only a few inches below the ground surface.

HUP's project-specific experience has led to an understanding of the need for environmentally sound site selection criteria. In some cases, this learning came from adverse experience. In the 1960s, a project in Dakar was built in an area of unstable sand, and many of the houses were severely damaged when the sand shifted from beneath the foundations. While the Umoja project in Kenya did not suffer similar consequences, the unstable soils on which the project was sited led to higher costs than were anticipated, one of the root causes of the affordability problems that plagued the project.

HUP's project experience was valuable in defining principles such as the need for cost recovery and for maximizing the use of local resources as key elements of a sustainable urban development program. It was also valuable in clarifying what is becoming increasingly obvious: governments do not have the financial or human resources to produce housing and deliver urban services at the scale required, nor are they necessarily efficient at doing so, and government efforts should focus on creating a policy environment that encourages private initiative so that limited public resources can be concentrated on those essential elements which the private sector is unwilling or unable to deliver. These conclusions have led HUP as well as many other offices of USAID to determine that the resources that foreign assistance agencies can mobilize should be directed toward achieving policy objectives and institutionalizing program directions that affect the way projects are designed and implemented, rather than toward direct project assistance. The challenge to HUP and to USAID as a whole will be to bring the lessons learned from extensive project experience into the assistance provided at the policy development and program management level. HUP's experience to date suggests that this challenge is being met.

As early as 1980, HUP initiated the small towns project in Kenya, which was a significant departure from previous projects and a precursor of the pro-

grammatic approach in that it focused on providing technical assistance aimed at strengthening local government's ability to plan and deliver urban infrastructure and services, rather than on site-specific projects. By the mid-1980s, HUP recognized the need for tools to assist its regional housing and urban development offices (RHUOs) and USAID missions in their efforts to evaluate urban conditions and formulate appropriate strategies for providing assistance. Just as shelter sector assessments, initial environmental evaluations, site selection criteria, land development and subdivision standards, and environmental checklists had been useful tools in project design and implementation, a new set of tools was needed to assist with program design and policy implementation. Over the past few years, HUP has commissioned a number of studies intended to assist urban development policy formulation. Among these studies are several which can be considered important tools in promoting urban policy dialogue: housing need assessments, urban development assessments, municipal management audits, and private sector capacity studies.

There is also evidence to suggest that the tools prepared by HUP are being used to formulate development strategies that are environmentally sensitive. In Jordan, a USAID grant provided assistance to the urban development policy formulation process, which led to program assistance aimed at encouraging urban infill construction and increased densities in order to make better use of existing infrastructure as an alternative to further expansion of the urban area. In Nepal, an urban development assessment helped identify the key role of settlements in the development process, and subsequent technical assistance has been directed toward strengthening the government's ability to cope with the serious and growing urban environmental and developmental issues that exist.

## **A Draft Action Plan**

Urban management is without doubt an essential tool for environmental protection. It is not the only approach, but it is perhaps the one best suited to the expertise and resources that HUP has to offer to developing countries. In formulating a policy and program agenda to address the objective of improving urban environmental management in developing countries, HUP might consider the following strategies and options:

- *Strengthen and expand areas of expertise.* HUP should look to its extensive experience in secondary city development, municipal finance, infrastructure and urban services, urban upgrading, and private sector encouragement to identify its particular strengths in the management of urban environments. By comparing HUP's strengths to those of other USAID offices and international assistance organizations, HUP's niche in urban environmental management can be better defined, areas of complementary action with other USAID offices can be forged, and synergy with other international organizations can be formed.
  - Develop assistance programs with other USAID offices that link urban economic growth policies and investments with rural productivity and regional management of natural resources.
  - Establish a land development expertise to complement HUP's knowledge in infrastructure delivery and sites-and-services programs in order to position the office in a lead role in this key area of urban environmental management.
  - Expand HUP's role in urban fiscal management and strengthening urban institutions (especially local governments) in the areas of capital improvements programming, financial management, and cost recovery.
- *Assist governments to design policies and programs.* Urban policies and programs must be designed to stay ahead of the pace of urban growth in individual countries if they are to protect natural resources and guide urban development, rather than react to an established environmental problem.
  - Encourage settlement policies that are framed to serve explicit national economic goals and recognize each urban center's potential to accommodate growth as identified by its natural resources and economic and environmental advantages.
  - Stimulate innovative approaches to improving access to land to meet the needs of rapid urban population growth.
  - Improve the guidance systems—planning, monitoring, community participation, and the range of development controls—to provide a framework for orderly and environmentally sound development and allow for incremental improvements as economic conditions permit.
- *Develop and refine tools for use in policy formulation.* It is clear that some of the studies HUP has commissioned have proven to be useful tools in formulating urban development policies. Specific tools might be developed to assist policy makers in evaluating the environmental issues which may be critical to sustainable economic development.
  - Develop quick, economical, and useful assessments of urban development needs to assist missions and host country governments to define urban projects and programs as they relate to environmental issues.
  - Prepare guidelines for assessing urban environmental issues and studies that might be conducted to identify key environmental concerns for incorporation into urban development policy.
  - Establish a checklist of critical environmental indicators suitable for use by urban managers in monitoring environmental quality.
- *Disseminate new knowledge to assist decision makers.* Through international coordination of research, data gathering, and monitoring approaches, significant generic information can be obtained that may aid urban environmental management. Cities could benefit from information gained in studies of other cities around the world. The creation of information systems or the collection of data should facilitate use of information that is readily available.
  - Assess the existing natural resource base in selected urban areas using new technologies in order to define limiting factors, carrying capacities, and future growth prospects.
  - Identify biases and disincentives to achieving improved urban environmental management inherent in taxation, subsidy, and pricing policies; land development standards; and other regulatory mechanisms.

- Analyze and document the experience and lessons of decentralization efforts in various cities and countries and of innovative ways local governments have planned, implemented, and recovered costs of infrastructure and urban services projects, especially those that offer potential for replication in other situations.
- Develop cost effective incentives to induce industrial and other point-source polluters to control their own pollution.
- Improve practices for managing solid waste generation, collection, recycling, treatment, and disposal.
- *Coordinate with USAID missions and bureaus.* There are a number of cases where HUP's use of an existing loan authority and the grant resources available through the regional bureaus have been effectively combined to achieve results that otherwise would not have been feasible. The small towns project in Kenya is one of the earliest examples, and the current Municipal Finance Program in Indonesia is the most recent.
  - Provide direct, grant-funded support for urban policy formulation.
  - Provide grant-funded technical assistance in support of program implementation.
  - Initiate innovative new projects in the areas where HUP has limited experience, such as rapid provision of urban land and private sector delivery of urban services, as a means of gaining experience and developing effective approaches.
- *Seek new sources of funds.* The Housing Guaranty Program loan authority is the principal resource available to HUP at present. This source of funds has been used effectively to deliver infrastructure and services to low-income neighborhoods, but its utility in the context of addressing larger urban issues is limited. Increasingly, housing guaranty loans are applicable only in the more economically advanced developing countries, yet policy reform and changes in program direction are equally needed in countries that are not eligible for market-rate loans.
  - Seek congressional approval for the proposed Urban Development Guaranty Program loan authority to assist implementation of an environmental policy agenda.
- Seek direct budgetary allocations for urban development assistance within USAID's budget. This might take the form of an allocation for direct grant assistance or a program where grant monies are used to leverage private loan funds, thus lowering the overall cost of borrowing to a level affordable by less developed countries.
- *Provide training and technical assistance.* HUP currently supports participation in a number of U.S.-based training courses and has provided assistance to regional training centers and special workshops and seminars. This can be an effective strategy for initiating policy dialogue and for improving the capacity of institutions to manage the urban environment.
  - Improve the quality of literature and training materials available on a variety of subjects pertinent to urban environmental management.
  - Support the development of a series of urban environmental management training courses designed to meet the needs of urban-related institutions.
  - Develop a U.S.-based urban management internship training program as an alternative to traditional university training.
  - Develop institutional training and technical assistance needs assessments.

# ■ Viewing Environmental Protection as Investment in Urban Infrastructure

■ by  
David Foster

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## ■ Introduction

One of the most important challenges facing international assistance agencies during the coming decade will be to reconcile the apparent conflict between newly industrializing economies and sustainable environment. Nowhere is this conflict more visible than in the burgeoning urban population centers, which have become dynamic centers for manufacture and commerce, far outpacing the hinterlands in terms of education, productivity, and income per capita. At the same time, however, sustainable development is increasingly threatened by failure to protect the resource base that gave birth to the centers' economic enterprise.

Previously attractive resort areas with priceless natural resource endowments and substantial capital investments are increasingly threatened by failure to control the waste generated by tourist industries themselves, much less that of surrounding manufacturing facilities. Uncontrolled effluent from ship building facilities and cannery waste threaten the fishing industry that provides markets and raw materials. Affluence-induced automobile traffic and air pollution increasingly jeopardize the health and quality of life just recently acquired through rising incomes. Habits appropriate to rural lifestyles come crashing up against high density urban living patterns, and the physical and institutional infrastructure are not equipped to handle them.

The urban revolution now occurring in developing countries is well documented and probably irreversible. Population trends have been evident for at least the past 25 years, and government programs designed to reverse these patterns have generally been shown to be ineffective and unwise. The question is no longer whether urbanization is to occur but how it can best proceed so as to enhance the economy and preserve the environment.

This paper briefly reviews the environmental implications of the urban revolution, addresses the im-

portance of urban assistance efforts in developing a sound environmental strategy, and explores conceptual frameworks for implementing such a strategy through programs of the U.S. Agency for International Development's (USAID) Office of Housing and Urban Programs (HUP). It is suggested that the most appropriate framework for viewing environmental protection may be as an investment in urban infrastructure, an investment that increases the economic carrying capacity of a developing region.

## ■ Dynamics of the Urban Revolution

Urbanization is not simply the aggregation of growing populations in a limited area. It is an integral part of the development process, with major economic, demographic, cultural, and environmental dimensions.

- Urban areas have historically provided the essential preconditions for development beyond subsistence agriculture.
- Urban areas provide the external economies of scale necessary for the success of small enterprises.
- A disproportionately large and growing percentage of the gross national product of developing countries is now produced in urban areas. Bangkok, with only 10 percent of the population, produces 74 percent of the manufacturing. Lagos, with 5 percent of the population, produces 57 percent of value added through manufacturing. Abidjan produces more than 70 percent of commercial transactions with 15 percent of the population. São Paulo produces 40 percent of manufacturing with about 10 percent of the population.

Drawn by the differential in economic opportunity, the urban population in the developing world is growing nearly twice as fast as the total population.

- A majority of the population in less developed countries will be living in urban areas by the end of the century.
- Efforts to limit urban growth or even to disperse it have been largely unsuccessful.
- By the year 2000, 20 of the 30 largest cities in the world will be in developing countries.
- The total population living in urban areas of developing countries is expected to grow from 275 million in 1950 to 1.9 billion by the year 2000.

# ■ Environmental Impacts of Urbanization

Environmental challenges associated with urban development will be formidable. They are the natural consequences of physical and institutional systems that continue to operate and will produce serious environmental and economic consequences unless the necessary investments are made to keep them in equilibrium.

- Urban areas, by their nature, are net importers of pollution: they import raw materials, export finished products, and retain waste and pollution as a net residual of the production process.
- Domestic household waste is also highest in urban areas due to the combination of high density and relatively high income. Even in rapidly developing areas like Bangkok, household waste still constitutes 80 percent of the pollutant load.
- Urbanization involves greater concentration of pollutants as well as the increasing substitution of nonbiodegradable metals and plastics for biodegradable materials. The durability of these materials, which makes them attractive in an urban society, means that if they are improperly disposed of, their effects will be long lasting and cumulative.
- Urban landforms are often fragile and poorly suited to accommodate environmental stresses. Many of the characteristics that made early urban sites attractive as agriculture processing, trade, and transportation centers have later become major sources of environmental problems. Most major urban areas in developing countries trace their origins back to early settlements that were built along river basins and coastal plains for ease of access for trade; built on fertile delta soils that were unstable for construction and were eventually precluded from agricultural use because of urban growth; and built in bowl-

shaped valleys as a focal point for river navigation that later became a trap for air pollutants and a sink for water pollution and solid waste.

Many of the most serious environmental problems in developing countries are the result of natural conditions and the pressures of rapid growth as well as the result of poorly conceived or poorly implemented urban policies.

- When urbanization problems were first identified, early policies relied on ineffective growth limitation schemes.
- Other policies neglected the dynamics and speed of urban growth and relied on idealized land use plans with little thought to implementation.
- In generally weak administrative environments, policies tended toward excessive reliance on regulatory control while lacking the basic rudiments of an enforcement program.
- Weak property tax programs provided inadequate revenue to finance needed infrastructure and subsidized urban sprawl, which further increased the cost of urban services.
- Ineffective land tenure procedures took away incentives for conservation.
- Environmental protection procedures were adopted from more developed countries without fully appreciating the impact of underlying cultural and institutional differences.

Rapid urbanization can lead to a city exceeding its own resource base capacity and to the imposition of major environmental burdens on the surrounding area as well.

- High water demand (when not met through municipal surface water) leads to excessive groundwater pumping, which leads, in turn, to salt water intrusion.

- Demand for fuel leads to excessive cutting of surrounding forests for charcoal, which leads to increased flooding in rural and urban areas.
- Uncontrolled automobile and factory exhausts lead to decreased crop yields on surrounding farms.
- Water pollution leads to decreased waterborne oxygen and increased heavy metal contamination, both leading to decreased fish harvests.
- Destruction of the regional resource base ultimately leads to the detriment of the urban area as well.
- By providing alternative (and usually more remunerative) employment, urban areas can reduce the pressure for unsound use of marginal farm lands.
- Urbanization has almost universally been associated with declining birth rates, thus further reducing the rate of increase of national population pressures.
- Higher densities actually decrease the per-capita cost and energy intensity of transportation, water, sanitation and other public services.
- By raising incomes and decreasing the per-unit cost of waste treatment, higher levels of waste treatment become more affordable.
- Increased incomes also decrease the demand for charcoal and fuel wood, thus decreasing the pressures for deforestation.

Environmental impacts of urbanization can extend well beyond the region or even the continent in which they are generated.

- Industrial competition between nations with differing standards of environmental protection can lead to pressures for relaxing the more stringent standards in the name of fair competition and thus lead to a gradual weakening of worldwide pollution control efforts.
- Production and release of chlorofluorocarbons for manufacture and air conditioning is believed to lead to destruction of the stratospheric ozone layer, with a consequent increase in ultraviolet radiation. Increased ultraviolet radiation, in turn, leads to a global increase in skin cancer, cataracts, and immune deficiency.
- Increased combustion of coal, oil, and wood, combined with the decrease in forests, leads to a significant global increase in carbon dioxide. This carbon dioxide buildup is creating a "greenhouse effect," which is expected to lead to unavoidable global temperature increases of three to five degrees Fahrenheit by the year 2050. Such a rapid temperature change can lead to critical increases in sea level in areas like Bangkok and Dacca as well as to major disruptions to global weather patterns.

While urbanization, particularly rapid urbanization, carries the potential for serious environmental impacts, most of those impacts can be mitigated and many can be avoided altogether. Often neglected in environmental discussions is the fact that urbanization, particularly when accompanied by economic growth, can also have significant positive environmental impacts as long as appropriate infrastructure investments are made.

Urban areas are also normally the first to feel the impact of environmental overload and can potentially be the first motivated to take corrective action. They generally have the best education, transportation, and communication systems and, because they are more accustomed to accomplishing things through group activity, they have a head start in taking corrective action for environmental protection.

There is nothing in economic development or urbanization that is inherently anti-environment. Furthermore, reducing the rate of urban development does not necessarily improve the environment. Properly implemented, urbanization can provide for the investment opportunities that make both the economy and the environment more sustainable.

# ■ Building a Conceptual Framework

Despite the growing (albeit belated) recognition of the importance of environmental issues, they threaten to become nothing more than a series of issues unless they are effectively integrated into a valid conceptual framework. In order for environmental protection to become truly effective, it will first have to achieve a secure place in one or more of the systematic, self-sustaining programs. A first step in this direction is to weigh alternative conceptual frameworks for environmental protection and identify those that offer the greatest opportunities for effective implementation.

## Alternative Concepts

The concept of environmental protection has been misunderstood in ways that limit its usefulness and distract attention from the needs of developing countries. The misconceptions include perceiving environmental protection as a luxury, or something of legitimate concern only to developed countries and those enjoying a high standard of living; as a rural resource, or an area of legitimate concern only for parks, farms, and natural ecosystems; and as an area of expertise requiring new and different skills and methodologies from those required for other international development assistance activities.

Environmental quality has long been regarded in developing countries as a luxury good. The prospect of diverting scarce resources to preserve such luxuries has seemed, at best, to lead to inefficient development and has been regarded by some as a plot by industrialized countries to continue the dependent status of the developing world.

Unfortunately, neither environmentalists nor economic development specialists have done much to change this thinking. Well-meaning environmentalists have often focused on parks and wildlife preser-

vation with little effort toward recognizing the economic needs of people living in or near the endangered habitats. Similarly, development specialists have generally regarded environmental impact assessment requirements as one more useless paperwork burden that constrains development.

To overcome this misunderstanding, individuals concerned with the environment must emphasize those aspects of environmental quality most closely linked to sustainable economic development. Similarly, those concerned with development must be prepared to recognize environmental systems as vital ingredients in sustainable urban development. While aesthetic ideals, harmony with nature, and preservation of a nation's natural resource inheritance are undoubtedly important concepts, the most important linkage at this time is to stress the concept of environmental protection as an investment in the urban infrastructure of a given region.

## Environmental Protection as an Investment

Environmental protection is an investment. Properly managed, it pays dividends. Poorly managed, it creates losses. Like any other infrastructure investment, it requires training, planning, financial analysis, appropriate technology, and a sound program for cost recovery and sustainable development. Also like any other infrastructure investment, environmental investment must be subjected to rigorous project appraisal in order to determine if the real economic rate of return is competitive with that of alternative projects. What disguises the environment from other potential infrastructure investments is simply that it has always been there and has mistakenly been viewed as an amenity rather than an investment.

Environmental protection and economic development are often regarded as polar opposites; conventional wisdom holds that one cannot be accomplished without sacrificing the other. Although sometimes true in the short run, when natural resources are recognized as vital inputs in sustainable development, it can be readily seen that economic development also requires an investment in the environment. In order for the environment to get the kind of attention needed, the arguments must be more effectively presented in economic terms. Preservation of natural systems must be recognized as the foundation of a sustainable economy.

Properly implemented, protection of water quality is a cost effective investment in the fishing industry, tourist industry, water supply, and health of citizens. Protection of the air quality pays similar dividends in terms of crop production, durability of materials, and human health. Furthermore, many of the ingredients being thrown away as pollutants are in fact valuable products themselves. Many private industries have already learned that pollution prevention pays. Cement dust blown away, for example, is an air pollutant. Cement dust recaptured and processed can generate revenue far greater than the cost of the pollution control equipment. Similar stories are told by refinery operators about the value of their chemical byproducts.

## **Environmental Protection as an Urban Issue**

While it is certainly true that environmental problems affect whole regions and ultimately must be addressed as regional (if not global) issues, it is usually the urban areas that must first confront the harsh realities of environmental degradation. The relatively limited population and slow growth of rural areas often disguises the true scarcity of natural resources. For these reasons, in Germany, Japan, the United Kingdom, and the United States, it has traditionally been the urban areas that have taken the lead in creating environmental problems as well as in responding to them. It is not by accident that California, one of the most rapidly urbanizing states, has also taken the lead in environmental control. With such rapid urban growth now projected for many developing countries, pollution problems that the United States and Europe have been gradually confronting over the last 40 years must be addressed in developing countries in less than half that time.

## **Environmental Protection as Infrastructure**

Just as urban developers recognized the need for physical infrastructure (e.g., roads, water, power supply) in order to attract private investment and then saw the need for institutional infrastructure (e.g., finance, education, health care), there is now a need to recognize the importance of a third order of infrastructure to assure that the development achieved is sustainable. Sustainable economic development, if it is to avoid premature exhaustion of financial resources, requires a clear mechanism for cost recovery and clear delineation of responsibilities for capital resource management. Similarly, if development is to be environmentally sustainable, there must be clear regulations regarding waste recovery and natural resource management. In the absence of clearly established enforceable recovery mechanisms, both financial and natural resources will be quickly exhausted, and future development will be severely jeopardized.

Environmental protection is an investment in urban infrastructure. It is not a luxury, not a subject limited to rural natural resource ecosystems, and not an arcane specialty requiring totally new skills and new methodologies. Most of the technical skills required are those already employed in other infrastructure investment areas: finance, cost recovery, land use planning, and project management. More specifically, it is an investment in the economic carrying capacity of urban areas. It increases the number of people, number of economic activities, and the standard of living that a region can support.

# ■ Basic Environmental Concepts

## Carrying Capacity

Urban areas are the major contributors to and the major recipients of environmental problems. With the right policies, however, they can contribute to the solutions as well. The issue is not whether the city is too large or urban growth is too rapid, but whether the rate of population and economic growth exceeds the carrying capacity of the area.

Simply stated, each landform has a certain natural capacity to support some limited set of activities. While the natural carrying capacity has certain limits, the ultimate capacity to support a given population or economic activity can vary widely depending on the measures employed. Just as technology has enhanced the capacity and productivity of rural land to produce more food and thus support more people, investments in urban infrastructure ultimately increase the capacity to support more economic enterprises. Seen in this fashion, environmental protection is no more nor less than an investment in the carrying capacity of the land.

In this regard, urban environmental infrastructure is no different from any other infrastructure. Investments in sewage treatment and pollution control increase the number of residents and economic activities that a given area can support, just as do investments in housing, roads, or electricity.

## Buffering Capacity

Buffering capacity refers to the ability of natural or man-made systems to absorb or mitigate external shocks. One of the most serious consequences of urbanization is the inexorable tendency toward loss of buffering capacity. Urban systems become more constrained and more homogeneous than their natural predecessors as flood plains are filled in and forests are cut back. Viewed in this light, infrastructure becomes an investment in restoring the buffer-

ing capacity of urban systems. Such an investment may include

- monitoring systems to forecast future limits to capacity,
- cost recovery mechanisms to pay for the cost of building and maintaining existing infrastructure as well as for badly needed expansion,
- development of multiple independent service providers so that failure of one does not endanger the whole system, and
- land use plans that retain flood plains and tidal basins to absorb the impact of floods.

## Feedback Loops

Feedback is an essential ingredient of a system in equilibrium. The classic example is that of a thermostat. If a furnace puts out too much heat, temperature-responsive gauges provide feedback to the system, and the heat is then reduced. If a furnace is putting out too little heat, then feedback tells it to increase.

If sustainable development is to be achieved and the carrying capacity of urban areas is to be enhanced, then environmental feedback must be available to provide information and incentives to urban areas regarding the consequences of their actions.

## Environmental Economics

### Externalities

The need for environmental policy in a free economy grows out of the economic concept of externalities. An externality is a product or process outside of (or external to) the normal benefit/cost calculations of the decision maker and, therefore, external to normal market forces. Externalities can be either positive or negative, but in the case of environmental

protection, we are normally concerned with negative externalities.

An example of a positive externality is the benefit received by property owners when an adjacent property is improved. The investor who upgrades his own property does not normally take into account the benefit he renders his neighbors, nor does he have much hope of recovering to himself any portion of that benefit. Conversely, the pollution discharged by a factory (or a household) into a public waterway constitutes a negative externality imposed on other users of the water. In the absence of environmental requirements or other incentives, the source of the pollution incurs no additional cost as a consequence of discharging pollution and has no incentive to reduce that discharge for the sake of his neighbors. Ultimately, valuable common resources will be destroyed, even by rational decision makers, wherever the internal benefits of environmental investment do not exceed the internal costs.

The concept of an environmental control program is geared to bringing sufficient information and incentives to bear on the polluter so as to cause him or her to take the necessary action needed to restrict or eliminate the pollutants creating the negative externality. As this process normally involves bringing recognition of these external problems inside to the decision maker, it is often referred to in economic literature as internalizing the externality.

### Variable Cost Effectiveness

There is an extremely wide variation in the potential cost effectiveness (cost per unit of goal achievement) of implementing pollution control on individual sources. Variations arise out of the age, size, location, and process employed by the given industry, as well as the nature of the pollutant being discharged. Variations also exist with regard to the perceived ability of different sources of pollution to pay for the cost of control. When faced with these variations, environmental policy experts are normally confronted with a dilemma: either they can impose uniform control requirements and let the costs vary widely or they can impose uniform costs (in the form of fees) and let the control levels vary from one source to another. Either way, they generate claims of unfairness and major controversies among the public and particularly the regulated community.

Environmental control programs in most industrialized countries have responded to these controver-

sies and the ensuing political pressure by intensively studying each category of pollution sources and attempting to write pollution control regulations geared specifically to problems associated with that industry. However, this procedure has been extremely labor intensive (primarily involving government engineers and scientists), and much of the underlying cost variability and potential for political pressure remains. Costs encountered in controlling hydrocarbon emissions in the United States, for example, reportedly vary from \$10 per ton to several thousand dollars per ton. While data are not yet available to estimate the variations in cost effectiveness among sources in newly industrialized countries, there seems little reason to anticipate less variability than in the traditionally industrialized ones.

### Marginal Cost

Marginal cost in environmental protection normally refers to the cost of removing the last and most expensive unit of pollution subject to a control program. However, there is variation in control cost as one moves from one source of pollution to another, and there are major variations within the same source as well. Generally, control costs are fairly low for the first few percentages of pollution controlled, but they increase rapidly as one moves toward 80 to 90 percent control. In most waste treatment facilities, for example, it is not uncommon to find that it costs as much to move from 90 percent control to 95 percent as it did to move from no control to 90 percent. This means that for a source emitting 100 tons of a pollutant, control of each ton from the 90th to the 95th costs roughly 18 times what it costs to control each of the first 90 tons. The variations are, of course, even greater as one compares the first ton removed to the 99th.

As society normally receives no more benefit from removing pollution at \$1,000 per ton than from removing it at \$10 per ton, it therefore achieves far more gain for its environmental investment dollar through programs that control as many of the low-cost tons as possible and treat those with high marginal costs only as a last resort. Economists have repeatedly shown that the goal of maximum achievement for a given investment is assured whenever the marginal cost of control is approximately equal among all sources. Until the point of equal marginal cost is reached, society can benefit by control strategies that achieve more emission reductions from low-cost sources in exchange for fewer reductions

from higher cost sources. Experience in the United States and western Europe clearly demonstrates that control programs that allow maximum flexibility in the choice of individual control levels and technology most closely approximate the ideal of equal marginal cost. Theoretically, programs of this type could achieve savings of 80 percent or higher, but administrative difficulties probably reduce the practicable savings to 20 to 50 percent.

# ■ Alternative Environmental Control Programs

While no one approach to pollution control will be best for all areas, it is clear that the free market requires some additional set of rules, codes, or incentives in order to bring the consequences of external action home to the economic decision maker. Only when this is done can an appropriate level of investment be brought forward to protect the common environmental resources necessary for sustainable development.

Most control programs combine various forms of voluntary action, incentives, and regulation with government provision of certain pollution control services. There is probably no single combination of approaches that is best for all countries. Even within industrialized countries, there is a growing controversy over whether the traditional regulatory approaches are the most efficient. Many of their staunchest advocates admit that we should examine the alternatives if we have the opportunity to start over.

## Voluntary Efforts to Control Pollution

Voluntary programs are usually not recognized for the real contribution that they make toward pollution control. Even in the United States, far more waste has been controlled through voluntary efforts than has ever been controlled through mandatory programs. While some voluntary effort is undoubtedly motivated by the desire to achieve good public relations and minimize lawsuits, the overall benefit should not be overlooked. Voluntary efforts can also be substantially enhanced through the provision of education and technical assistance provided by government institutions and effective nongovernmental organizations. One primary concern in the development of alternative control programs should be a careful assessment of any potential negative impact on voluntary efforts.

The advantages of voluntary efforts to control pollution are that it is low cost and provides a good foundation of popular support for other pollution control activities. The disadvantage is that it is limited in overall effectiveness.

## Government Provision of Pollution Control Services and Subsidies

The principal advantage to having the government provide for pollution control is that it can reduce the delays normally encountered while private sector organizations seek to avoid paying their true cost of control. It has also been argued that since the public ultimately pays for the cost of control through taxes or the cost of consumer goods, it does not matter who makes the initial payment. However, this argument is particularly ineffective with regard to export industries and denies all pollution sources important feedback that could serve as an incentive for more efficient environmental investment.

Other advantages are that it is an effective means of providing demonstration programs, technical assistance, and training; may reduce delay in control implementation if adequate funding is available; and may be the only means of providing certain services where the private sector lacks necessary skills and resources.

The disadvantages are that the capital costs usually exceed the ability of most governments to pay, thus leading to either greater delay or greater international debt; pollution sources lose the incentive to search for least-cost solutions; and that government provision can lead to the creation of large and inefficient government enterprises.

## Regulatory Standards

Programs of regulatory standards are the ones most commonly thought of in North America, western Europe, and Japan. They involve the use of mandatory control levels and are often associated with a specified control technology. Sources of pollution failing to comply with mandatory standards must either obtain an exemption or be shut down. These programs have generally been effective when accompanied by strong technical enforcement programs, but the average cost of achieving a given level of environmental quality is generally estimated to be 20 to 50 percent higher than that which might be achieved through a more flexible incentive program. Programs of this type will likely play a significant role in any industrialized nations' pollution control efforts. However, it is important to recognize that it is not the only effective control procedure, nor is it necessarily the best for developing countries.

The advantages of regulatory standards are that this approach has a strong track record in most industrialized countries; it is less expensive than control by government agencies; and it is more effective than reliance on voluntary efforts alone.

The disadvantages are that the track record is based on use in countries with an abundance of engineers and lawyers and on legal systems able to handle complex technical decisions in a reasonably objective manner; it is more expensive, at least in many instances, than an incentive-based system; the track record is based on systems where government inspectors generally know as much or more about pollution control and industrial practice as the private industries they inspect; it is subject to bribery and political interference because of the large number of bureaucratic decisions involved; and it requires a very large investment in enforcement programs but creates no revenue to fund those programs.

## Economic Incentives for Pollution Control

Incentive programs, like the programs of regulatory standards described above, ultimately rely on the strength of the law for enforcement. However, these programs rely on financial inducements rather than government proscriptions. Technically, incentives could involve either fees or subsidies, but the use of

fees as a source of revenue together with public aversion to subsidizing (or rewarding) polluters tends to make fees a more desirable course.

The objective is to establish a fee high enough to motivate polluters to achieve the aggregate level of control desired. Those individuals or companies whose control costs are less than the fee will obviously prefer to control their pollution (or pay someone else to control their pollution) rather than pay the fee. Those whose control costs are unusually high (perhaps because of plant age, location, or peculiar technology) might prefer to pay the fee, but they will still have an ongoing incentive to control as much as they can and to search for alternative control techniques. Fee collection could be by means of well-supervised meter readers or objective, indirect measurement techniques. In order to be effective, such a program will have to

- establish a fee greater than the expected marginal cost of control for the average source of pollution,
- be limited to those categories of pollution sources for which the quantity of pollution discharged can be objectively measured,
- establish a reliable monitoring program to set acceptable estimates of pollution discharged, and
- establish an accurate accounting system to assure that fees imposed are collected and delivered to the appropriate authority.

The advantages of economic incentives are that they provide a source of revenue to fund enforcement, research, and other pollution control efforts; provide a continual incentive to the pollution source to identify the least-cost means of controlling pollution; require fewer field engineers and scientists to administer; and can be phased in gradually in response to changing conditions.

The disadvantages are that the approach has limited experience in either developed or undeveloped countries; is subject to suspicion among some environmentalists, who have labeled this concept the pay-to-pollute approach; and involves fees, which are associated in many countries with the opportunity for theft and bribery.

Even with these potential disadvantages, the concept of economic incentives is well worth considering. Major environmental organizations have recog-

nized the utility of economic incentives in appropriate circumstances. Furthermore, the opportunity for graft and corruption associated with a well-audited fee program involving public records of emission levels and fees collected may well be substantially less than that associated with under-the-table payments made in exchange for favorable rulings on required standards and observed compliance.

## ■ The Policy Context

The general tenor of policy development in many rapidly urbanizing countries has been one of overlapping authority, weak implementation, and crisis management. Urban environmental policy is perhaps the prime example. In fact, because the nature of environmental pollution involves multiple sources and incremental growth of diverse impacts, it is extremely difficult to mobilize an effective response because the crisis is rarely seen. The *laissez faire* approach that has worked well for business seems to lead to environmental disaster. At the same time, Western and Japanese models with rigid laws and confrontational enforcement often seem out of place.

Despite rapid growth in the urban population and the urban economy, there has been almost no investment in urban environmental protection. Government agencies lack the resources to provide vital environmental services, and the private sector lacks the incentive. As reflected in foreign investment decisions of the past 10 years, metropolitan regions generally represent the greatest economic asset, yet little is done to preserve their resources. The overwhelming percentage of new manufacturing investment is built on a tiny fraction of land area, yet in most cases no comprehensive plan has been prepared to anticipate the environmental impact.

While large-scale industrial activities tend to generate most of the attention, the problems caused by the increase in untreated waste from homes, automobiles, and small businesses abounding in urban areas are equally serious. Urban waterways are frequently reaching septic conditions because of household, hotel, and restaurant waste, not because of industry. Similarly, the major source of lead, carbon monoxide, and ground-level ozone in nearly every urban area is the private automobile.

The general public has been relatively uninvolved in environmental issues, not because people do not care but because they are usually unaware of the

potential impacts involved or the alternatives available. Where this information has been provided and the public has perceived the threat of a direct impact, as in Thailand, citizens have mobilized to take action. Dams, factories, highways, and logging have been halted on occasion in response to public protest, but no sustained program has been developed to help the public anticipate long-term environmental consequences or provide meaningful input into environmental debates.

A number of issues will pose major obstacles to the development of effective environmental control programs in developing countries. While it is commonly said that there is simply a lack of will to address urban environmental problems, this issue can be more accurately identified by the following elements:

- *Lack of information.* There is a shortage of information regarding sources, quantities, concentrations, and impacts of most pollutants. While there appear to be some efforts underway to begin building emission inventories, there usually is no comprehensive program to update this information and interpret it.
- *Lack of public support.* While there is some public concern about flooding and deforestation, interest has generally been limited and short lived. Nongovernmental organizations lack the resources, information, and training to build and sustain public support for stronger pollution control.
- *Lack of clear responsibilities and guidance.* Existing legislation is rather comprehensive, but responsibilities are divided among a wide variety of institutions and there appears to be no common plan for implementation.
- *Lack of financial resources.* Environmental protection, even where performed efficiently, is still an

expensive undertaking. Given the nature and history of the income and property tax systems in most developing countries, there is unlikely ever to be sufficient funds in general revenue to cover the costs.

- *Lack of technical expertise.* There is already a serious shortage of engineers and technicians in most areas, and those few who are trained are quickly hired by the private sector.

# ■ An Environmental Policy Agenda

The major shortfall in urban environmental policy in most developing countries is not the lack of laws, goals, or five-year plans, but the lack of sustainable implementation and enforcement. An environmental program capable of dealing with pollution problems requires the development of improved control policies and institutions capable of mobilizing adequate public support to sustain them.

There are at least nine major policy issues to be dealt with in initiating effective urban environmental programs in rapidly urbanizing areas of developing countries. These issues are chosen based on observed needs as well as the opportunities they offer to address major environmental problems while strengthening technical, public, and financial support for environmental control. The major challenge is to build programs that provide and implement preventive care on a sustainable basis.

- *Improving public understanding and support.* Environmental programs, because they ultimately draw their support from the general public, rarely can grow much stronger or move much faster than the public awareness upon which they are based. Improving public awareness and support should be a major priority. Paternalistic attitudes tend to hamper public involvement and thereby limit the support environmental agencies might otherwise have in dealing with potential adversaries in industry or commerce.
- *Improving environmental data bases.* Efforts should be expanded to assure that adequate information is provided to environmental agencies and the public regarding pollutants discharged to the air, water, and land, particularly near major urban centers and critical resource areas. The pollution inventory should be updated regularly and should include the sources of individual pollutants, the quantity and concentration discharged on an hourly and annual basis, and the risk and impacts associated with the pollutants. In order to assure that there are sufficient financial resources to maintain the inventory, the major portion of the costs could be borne by a fee paid by the polluting sources themselves. Such a fee should be roughly proportional to the quantity and risk of the pollutant discharged.
- *Involving nongovernmental organizations.* Environmental agencies should be encouraged to share with nongovernmental organizations and the public the information gained from pollution inventories and environmental impact studies and to involve them more effectively in discussions of environmental issues. Furthermore, they should support the efforts of environmental groups to educate the public regarding the causes and impacts of both domestic and industrial pollution and the alternatives available for control. These efforts can be assisted through the dissemination of information, the scheduling of policy conferences, and the use of realistic models to forecast and anticipate the impacts of uncontrolled pollution. The goal is to build an environmental constituency that can provide constructive criticism and public support for preventive action and difficult environmental decisions.
- *Involving the private sector.* National policy makers should be encouraged to work with organizations of local industries and other business groups to help them recognize that pollution control is integral to development and involve them in the search for cost effective solutions to urban environmental problems. Particularly in most developing countries, where technical training (especially in government agencies) is in short supply, the solution to pollution must draw primarily on private expertise. Industry must be made aware of the economic conse-

quences of pollution and of the opportunities for cost savings through resource conservation, recycling, and pollution control at the point of origin. Industry in most developing countries must be recognized as a source of pollution as well as a critical technical resource which, when given appropriate incentives and flexibility, can provide the necessary solutions.

- *Placing the burden of pollution on the polluter.* The polluter should bear the primary cost of pollution control. This reduces the drain on government resources and is generally far more efficient because it provides a continual incentive for pollution sources (both industry and the public) to incorporate recycling and other relatively low-cost procedures into the design phase.
- *Removing disincentives for environmental investment.* At least as important as the installation of new incentives is the removal of unintended disincentives for environmental investment. Building codes, property taxes, and land tenure laws frequently discourage precisely the kind of actions that could increase the carrying capacity of a region. Examples include the following:
  - Building sites prepared with water, sewer, and drainage infrastructure installed are subject to higher taxes than land developed without these services.
  - Undeveloped land, which blocks orderly urban development, is subject to lower rates than developed land providing vital community services.
  - Questionable land tenure discourages investment in adequate water and sewer facilities.
  - Inadequate provision of proper housing sites encourages squatter housing on flood plains.
- *Improving incentives for environmental investment.* Environmental ministries and other agencies concerned with the development and implementation of environmental policy should focus their primary efforts on the development and implementation of effective incentives and enforcement regulations and should avoid becoming involved in prescriptive technical solutions. Wherever possible, the choice and implementation of pollution control techniques should be left to the private sector. An incentive-based enforcement program would be based on objec-

tive measurements of the quantity and concentration of the pollutant discharged, impose a nondiscretionary fee or other incentive on the pollution source to take necessary corrective action, establish a fee slightly higher than the expected cost of control, impose minimal interference in the operation of the source, and require minimal technical and judicial involvement.

- *Privatizing pollution control.* Once effective incentives are established, it becomes feasible to involve the private sector in cleaning up its own pollution and in controlling the pollution of other sources on a contract basis. Wherever fees are established so that they exceed the cost of control, they provide an attractive business opportunity for private companies to control pollution in exchange for reducing fees. Such private sector companies could become involved in everything from trash collection and disposal to domestic waste water treatment to highly specialized design and operation of toxic treatment facilities. This approach is not intended to give private industry free rein and full responsibility for the control of pollution. Rather, it is intended to focus government action on policy development and enforcement while providing incentives to the private sector to invest in the necessary control equipment and expertise.
- *Clarifying responsibility for environmental protection.* Because the environment ultimately touches every ministry and every sector of the economy, the lines of responsibility are unusually vague and overlapping. Government institutions must be strengthened in the development and implementation of environmental policy. In some few countries this may take the form of creating an organization similar to the U.S. Environmental Protection Agency. In other countries, it may be far more realistic to expect that some segment of the ministries of health, interior, or industry will be given responsibility. At this stage, it is probably more important simply to ensure that someone is publicly responsible for environmental protection and has the necessary resources and authority to carry out that responsibility without undue interference from other institutions.

# ■ Program Options

There are two main categories of program clients for USAID in the area of urban environmental protection: those interested in policy dialogue and those interested in institutional development.

Those interested in policy dialogue include government decision makers who deal with environmental policy (including ministries of industry, environment, public works, and transportation) and the allocation of revenue raising authority as well as representatives of major municipalities. In addition, organizations of local industries and representatives of environmental nongovernmental organizations are potential clients for policy dialogue regarding mechanisms for improving public support and private sector performance while minimizing adverse impacts on economic development. Policy dialogue with these organizations should focus on improving debate and enhancing understanding of the impact of pollution on the physical and economic health of the nation, the alternatives available, and the institutional improvements necessary to implement the alternatives.

Those interested in institutional development would be interested in the creation of systems and networks to sustain and implement the decisions reached in the policy dialogue. Potential clients are those involved with implementing pollution control programs, training environmental professionals, and recovering costs for environmental services. There is also a need to strengthen the institutions concerned with collecting and interpreting environmental data, disseminating information, and enhancing public awareness. USAID's primary focus should be on the development of institutional mechanisms that can be self-sustaining and can rely predominantly on available resources.

To engage these client audiences, program activities should be considered in at least the following four areas:

- policy analysis support for strategy and program design
- training and technical assistance for regulatory development, enforcement, and service delivery
- capital finance
- pilot programs and demonstrations

## Policy Analysis Support

A number of critical policy decisions remain in most developing countries with regard to urban environmental protection. Whether the focus is industry, automobiles, or domestic sewage, the major shortfall in urban environmental policy is generally not the lack of environmental laws or goals but the lack of sustainable implementation and enforcement. Sustainability for urban environmental programs in most developing countries will require major improvements in land use policy, public awareness, and technical and financial support. The major issues that need to be studied and discussed with policy makers include

- improving land use policies (e.g., the environmental consequences of land tenure laws as currently implemented; the impact of property tax systems; the impact of zoning administration and code enforcement);
- improving public awareness and support (e.g., strategies for improving public awareness and support for environmental protection; the appropriate role of nongovernmental organizations in providing advice and disseminating environmental information);
- improving technical support and service delivery (e.g., the potential role of the private sector in providing sewage treatment, water supply,



automotive, and industrial control expertise; the feasibility of incentive systems to encourage private industry to use its own expertise to reduce pollution at its source; strategies for enforcing pollution control requirements that can be implemented with a minimum of technically trained personnel; the feasibility of adopting common emission standards with other countries in the same region for control of selected industries); and

- improving financing for pollution control (e.g., the role of environmental regulations in assuring adequate cost recovery to attract private investment for sewage treatment and pollution control; the potential use of housing guaranty and other loan funds to finance sewerage systems once cost recovery enforcement programs are in place; the potential use of ground water pumping fees to finance municipal water expansion and flood protection; the potential role of pollution fees and cost recovery to pay for pollution control services).

Analytic work recommended here provides an opportunity for an important extension of privatization efforts. Private sector resources and expertise would play an important role in addressing major environmental problems. Also, since there is no entrenched bureaucracy to overcome, privatization efforts should move relatively quickly and thereby provide an important model for other applications.

Privatization of environmental services would offer the traditional advantages of efficiency and alternative sources of financing and would offer a source of technical expertise not otherwise available. Furthermore, designing enforcement systems that rely on gradually increasing pollution fees would reduce the number of technical judgments needed and allow enforcement agencies to rely more on meter readers and less on highly trained engineers and lawyers.

In order to improve the opportunity for effective policy dialogue deriving from the analytic studies proposed, the studies should be linked with training seminars and policy conferences to broaden their impact. Ideally, seminars, training, and research on the relationship between urbanization and environmental degradation could be institutionalized as part of an ongoing program in an organization devoted to research and dissemination of information related to urban issues.

## **Training and Technical Assistance**

Most developing countries have a critical shortage of technically trained personnel, and many of the best are hired by the rapidly expanding private sector. Rather than relying on an army of technically trained government field inspectors, as is often done in more developed countries, consideration should be given to a program of training and technical assistance designed to accomplish the following objectives:

- Make better use of the limited number of technical experts currently available to government by providing assistance in selecting and operating emission monitoring equipment; using microcomputers in the development and maintenance of pollution inventories; and developing regulations, particularly with regard to use of economic incentives and private sector pollution control to leverage private expertise.
- Rely more heavily on inspectors with limited training by providing training for instructors in vocational schools.
- Draw heavily on expertise already available in the private sector by working through organizations of private industries to provide raining seminars for managers of manufacturing facilities on cost savings through pollution control and training seminars for private entrepreneurs and pollution control vendors on pollution control requirements and opportunities for privatization. Such seminars can be most effective when they involve industry representatives speaking from their own experience in recycling and minimizing waste.
- Work with environmental groups to develop training seminars for teachers, educational administrators, nongovernmental organization staff, community workers, and news media to assist them to develop curricula for their own clients to raise their awareness of environmental issues and public responsibilities.
- Provide assistance to faculty to develop and expand programs at universities oriented toward control of urban environmental pollution.

## **Capital Finance**

The potential use of USAID's Housing Guaranty Program (HG) as a source of financing for water and

sewerage is a major asset for promoting environmental investment in urban areas. Water supply, drainage and flood control, and waste collection and treatment can become attractive investments in urban infrastructure, particularly when technical assistance is provided to assure effective cost recovery.

In many situations, one can make a convincing argument that the poor will be primary beneficiaries of most environmental investments, particularly those likely to be financed with HG loans. Slum areas are invariably the most flood prone and the most likely to be contaminated by untreated sewage. Low-income housing is also the least likely to be provided with adequate water supply.

The use of HG loans will also be particularly valuable in establishing and operating pilot demonstration programs. In establishing these programs, it will be important not to place too large a share of the environmental burden on the housing program itself for fear that this will simply price HG loans out of the reach of its intended audience. Such a requirement would fail to achieve any environmental benefit and would also be disruptive to an important assistance effort. This concern notwithstanding, minimum standards can still be established, particularly with regard to

- land use planning, such as avoiding construction in an obvious flood plain, for example;
- compliance with all applicable environmental regulations normally enforced on the target income group;
- adequate provision for solid waste disposal;
- provision for sewage lines to be properly connected to existing lines, where they are available;
- provision of low-cost, appropriate treatment of waste water subject to a cost limitation of 3 to 5 percent of total housing costs; and
- performance of a modified environmental impact assessment designed to be appropriate to the scale of the project and local environmental priorities.

## **Pilot Programs**

Three main types of demonstration programs seem to offer the greatest opportunity for long-term impact. In each case, these efforts can seek to initiate

sustainable action by addressing key weaknesses in existing institutions.

- Involving the private sector in the provision of sewerage and sewage treatment is one approach. USAID's involvement could include feasibility studies of potential private sector participation, technical assistance in the design and enforcement of regulatory requirements, and capital financing through HG loans.
- Collaborating with other countries in the same region in the development of common environmental standards for selected industrial processes is a second approach. Such an arrangement would make it easier to enforce responsible standards while decreasing the fear that desired investment would be attracted to pollution havens. USAID's involvement could include feasibility studies of potential impacts and responses by other nations and technical assistance in the development of common standards and monitoring techniques.
- Involving nongovernmental organizations in the development and distribution of environmental education materials designed to raise public awareness and enlarge the constituency for improved environmental control is a third approach. USAID's role could include training and technical assistance on the development of environmental forecasting models and educational video tapes and grant funds for the development of environmental newsletters and local training programs.

# ■ Appendix A: Agenda

## Agenda

Roundtable Conference on Urbanization and the Environment in Developing Countries

Washington, D.C.

Tuesday, November 21, 1989

- 9:30 Introduction  
Peter Kimm, USAID
- 9:45 Paper presentations  
Moderator: Walter Arensberg, World Resources Institute  
"Urbanization and Environmental Quality," presented by Blair Bower, Conservation Foundation  
"Urban Environmental Management in Developing Countries," presented by Stephen Reeve, Technical Support Services  
"Viewing Environmental Protection as Investment in Urban Infrastructure," presented by Brian Morton, Research Triangle Institute
- 10:30 Coffee break
- 10:45 Discussion of paper presentations  
Respondents: Richard Stren, University of Toronto; Jerome Milliman, University of Florida
- 11:45 Open discussion
- 12:30 Lunch
- 1:30 Outline of action plan  
Royce LaNier, Technical Support Services
- Possible strategies  
Moderator: Laurence Hausman, USAID  
Panelists: Stephen Lintner, World Bank; Jim Hester, USAID; Mary Lou Higgins, USAID
- 2:30 Open discussion
- 3:30 Coffee break
- 3:45 Synthesis and summary  
Walter Arensberg, World Resources Institute
- 4:15 Closing remarks  
Sonia Hammam, USAID

## ■ Appendix B: Participants

Herbert Adelman  
Consultant  
Washington, D.C.

Walter Arensberg  
World Resources Institute  
Washington, D.C.

Gwen Ball  
USAID/PRE/H  
Washington, D.C.

Carl Bartone  
World Bank  
Washington, D.C.

Aaron Benjamin  
USAID/PRE/H  
Washington, D.C.

Larry Birch  
USAID/PRE/H  
Washington, D.C.

Blair Bower  
Conservation Foundation  
Washington, D.C.

Bessie Boyd  
USAID/AFR/TR/ANE/NR  
Washington, D.C.

Jeff Boyer  
USAID/PRE/H  
Washington, D.C.

Bruce Burwell  
U.S. Peace Corps  
Washington, D.C.

E. R. Chiavaroli  
USAID/S&T  
Washington, D.C.

Monique Cohen  
USAID/PRE/H  
Washington, D.C.

Richard Cobb  
USAID/AFR/TR  
Washington, D.C.

Scott Dobberstein  
USAID/PRE/H  
Washington, D.C.

Jerry Erbach  
PADCO  
Washington, D.C.

Caryl Ersenkai  
USAID/PRE/H  
Washington, D.C.

Ted Field  
USAID/PVC  
Washington, D.C.

Paul Gabele  
Cooperative Housing  
Foundation  
Washington, D.C.

Bill Gelman  
USAID/PRE/H  
Washington, D.C.

Ron Greenberg  
USAID/ANE/PD  
Washington, D.C.

David Grossman  
USAID/PRE/H  
Washington, D.C.

Thurman Grove  
USAID/S&T/FA/AGR  
Washington, D.C.

Jeremy Hagger  
USAID/PRE/H  
Washington, D.C.

Sonia Hammam  
USAID/PRE/H  
Washington, D.C.

Fred Hansen  
USAID/PRE/H  
Washington, D.C.

Laurence Hausman  
USAID/A/AID  
Washington, D.C.

Judith Hermanson  
Cooperative Housing  
Foundation  
Washington, D.C.

Jim Hester  
USAID/LAC/DR/E  
Washington, D.C.

Mary Lou Higgins  
USAID/S&T/EN/FNR  
Washington, D.C.

Bob Ichord  
USAID/ANE/TR/ENR  
Washington, D.C.

Larry Jepson  
USAID/AFR/TR  
Washington, D.C.

Peter Kimm  
USAID/PRE/H  
Washington, D.C.

G. T. Kingsley  
Urban Institute  
Washington, D.C.

Michael Kitay  
USAID/GC/PRE  
Washington, D.C.

Jeanine Kleimo  
USAID/PRE/H  
Washington, D.C.

Pat Koshel  
U.S. Environmental  
Protection Agency  
Washington, D.C.

Royce LaNier  
Technical Support Services  
Washington, D.C.

H. Jeffrey Leonard  
Conservation Foundation  
Washington, D.C.

Stephen Lintner  
World Bank  
Washington, D.C.

Dennis Long  
USAID/S&T/H  
Washington, D.C.

Cheryl Mandich  
USAID/ANE  
Washington, D.C.

Edvaard Markeset  
USAID/LAC/DR  
Washington, D.C.

Rich Mattson  
WASH  
Arlington, VA

Albert McGartland  
Abt Associates  
Bethesda, MD

John Miller  
Abt Associates  
Bethesda, MD

Jerome Milliman  
University of Florida  
Gainesville, FL

Hal Minis  
Research Triangle Institute  
Research Triangle Park, NC

Brian Morton  
Research Triangle Institute  
Research Triangle Park, NC

Mike Murphy  
International City  
Management Association  
Washington, D.C.

Tamar Osterman  
USAID/PRE/H  
Washington, D.C.

Alexi Panehal  
USAID/PRE/H  
Washington, D.C.

Stephen Reeve  
Technical Support Services  
Washington, D.C.

Ben Stoner  
USAID/AFR/TR/ANR/NR  
Washington, D.C.

Richard Stren  
University of Toronto  
Toronto, Canada

Ellis Turner  
WASH  
Arlington, VA

Paul Vitale  
U.S. Peace Corps  
Washington, D.C.

Sean Walsh  
USAID/PRE/H  
Washington, D.C.

John Wilson  
USAID/LAC/DR  
Washington, D.C.

April Young  
Technical Support Services  
Washington, D.C.

Dorothy Young  
USAID/PFM/PM  
Washington, D.C.

# Appendix C: Reporting Cable

PAGE 01 OF 02 STATE 000780 1572 079432 AID9294  
ORIGIN AID-00

ORIGIN OFFICE HO-07

INFO AFEA-03 AFCW-03 AFPD-04 AFTER-05 ANEA-02 ANSA-03 AAAF-03  
AFPE-07 LADR-03 LACE-01 LASA-02 LACA-03 SAST-01 PPCE-01  
PDPB-01 PPPB-02 GC-01 GCAF-02 PPEA-01 GCAN-02 GCLA-01  
FVA-01 ANME-03 ANPD-05 ANEG-02 ANTR-06 ES-01 OFDA-02  
AAID-01 STHE-03 POP-04 STRD-01 STFN-02 FMAD-02 HHS-09  
RELO-01 AMAD-01 HUD-02 LAPS-02 FMAO-01 /107 A0

INFO LOG-00 EUR-00 AF-00 NEA-00 ARA-00 EAP-00 /004 R

DRAFTED BY: AID/PRE/H: APANEHAL: GEB: 0483D  
APPROVED BY: AID/PRE/H: SHAMMAM  
AID/AFR/TR/ANR: LJEPSON (DRAFT) AID/ANE/TR/ENR: RICHORD (DRAFT)  
AID/LAC/DR: JHESTER (DRAFT) ST/FERN: MLHIGGINS (DRAFT)  
A/AID: LHAUSMAN (DRAFT)

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AMEMBASSY NAIROBI  
AMEMBASSY QUITO  
AMEMBASSY TEGUCIGALPA  
AMEMBASSY TUNIS  
AMEMBASSY BANGKOK  
AMEMBASSY KINGSTON  
AMEMBASSY CAIRO  
AMEMBASSY COLOMBO  
AMEMBASSY LISBON  
AMEMBASSY RABAT  
AMEMBASSY SAN JOSE  
AMEMBASSY SAN SALVADOR

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AIDAC FOR RHUODS AND USAID MISSIONS

E.O. 12356: N/A  
SUBJECT: ROUNDTABLE DISCUSSION ON URBAN ENVIRONMENTAL STRATEGY

1. A ROUNDTABLE CONFERENCE ON URBANIZATION AND THE ENVIRONMENT IN DEVELOPING COUNTRIES WAS HELD ON NOVEMBER 21, 1989. THE ROUNDTABLE WAS ORGANIZED BY PRE/H IN COLLABORATION WITH S&T/FENR'S ENVIRONMENTAL PLANNING AND MANAGEMENT PROJECT (EPM) AND THE WORLD RESOURCES INSTITUTE (WRI) AND WAS ATTENDED BY MORE THAN FIFTY PEOPLE, INCLUDING A.I.D. REGIONAL AND CENTRAL BUREAU ENVIRONMENTAL OFFICERS, PRIVATE CONSULTANTS, AND WORLD BANK AND PRE/H STAFF.

2. THE OBJECTIVE OF THE ROUNDTABLE WAS TO PRESENT BACKGROUND PAPERS ON URBAN ENVIRONMENTAL ISSUES AND REVIEW STRATEGIES

AND OPTIONS FOR INCORPORATING URRAN ENVIRONMENTAL ISSUES IN A.I.D.'S URBAN AND ENVIRONMENTAL PROGRAMMING AND, MORE SPECIFICALLY, IN PRE/H'S URBAN PROGRAMS. THE CONFERENCE WAS DESIGNED TO EXAMINE THE CRITICAL LINKAGES BETWEEN URBANIZATION AND ENVIRONMENTAL DEGRADATION AND THE CENTRAL ISSUES INVOLVED IN ACHIEVING MORE EFFECTIVE URBAN ENVIRONMENTAL MANAGEMENT. THE ROUNDTABLE CONSISTED OF ESSENTIALLY TWO PARTS:  
(1) PRESENTATION AND DISCUSSION OF THREE BACKGROUND PAPERS AND (2) DISCUSSION OF SUGGESTED PRE/H STRATEGIES AND OPTIONS.

3. PAPER PRESENTATIONS: THE PRESENTATION AND DISCUSSION OF PAPERS WAS MODERATED BY WALTER ARENSBERG OF WRI. THE FIRST PAPER, URBANIZATION AND ENVIRONMENTAL QUALITY, PRESENTED BY BLAIR BOWER OF THE CONSERVATION FOUNDATION, STRESSED THAT THE TREND OF URBANIZATION IS IRREVERSIBLE. URBAN AREAS, AS CENTERS OF GOODS PROCESSING AND CONCENTRATED HUMAN SETTLEMENTS, COLLECT AND PROCESS RAW MATERIALS AND ARE THEN FACED WITH PROBLEMS OF RESIDUAL DISPOSAL. TO ASSESS WHETHER OR NOT ENVIRONMENTAL COSTS ARE HINDERING ECONOMIC DEVELOPMENT, BOWER SUGGESTED THAT THE COSTS CAUSED BY ENVIRONMENTAL DAMAGE SHOULD BE DEDUCTED FROM CALCULATIONS OF GNP. THE PAPER ALSO DISPELLED THE MYTH THAT IMPROVING THE ENVIRONMENT IS EXPENSIVE AND OFFERED EXAMPLES OF HOW DEVELOPING COUNTRIES COULD ADOPT ENVIRONMENTALLY SOUND PRACTICES AT LOW COST.

4. URBAN ENVIRONMENTAL MANAGEMENT IN DEVELOPING COUNTRIES, PRESENTED BY STEPHEN REEVE OF TECHNICAL SUPPORT SERVICES (TSS), PROPOSED USING THE TOOLS AND METHODS OF URBAN MANAGEMENT TO ADDRESS URBAN ENVIRONMENTAL PROBLEMS. EFFECTIVE MANAGEMENT OF URBAN AREAS REQUIRES VIEWING THE CITY IN TWO WAYS: (1) AS AN ENGINE OF GROWTH AND (2) AS AN ENVIRONMENTAL SYSTEM. FIVE BASIC PRINCIPLES SHOULD GUIDE URBAN ENVIRONMENTAL MANAGEMENT: (1) ENHANCING URBAN ECONOMIC GROWTH, (2) DEVELOPING STRONG INSTITUTIONS, (3) CREATING BETTER GUIDANCE SYSTEMS FOR DECISION MAKING, (4) DIRECTING URBAN GROWTH THROUGH LAND DELIVERY AND INFRASTRUCTURE INVESTMENT, AND (5) ENCOURAGING THE PRIVATE SECTOR.

5. VIEWING ENVIRONMENTAL PROTECTION AS INVESTMENT IN URBAN INFRASTRUCTURE, BY DAVID FOSTER OF RESEARCH TRIANGLE INSTITUTE (RTI), STRESSED THAT INVESTMENT IN ENVIRONMENTAL PROTECTION IS AN INVESTMENT IN URBAN INFRASTRUCTURE. WITHOUT SUCH INVESTMENT, SUSTAINABLE ECONOMIC DEVELOPMENT WILL BE IMPAIRED. THE PAPER ALSO SUGGESTED THAT FOUR TYPES OF POLLUTION CONTROL PROGRAMS BE EVALUATED IN LIGHT OF DEVELOPING COUNTRY EXPERIENCE: (1) GOVERNMENT PROVISION OF POLLUTION CONTROL, (2) REGULATORY STANDARDS (COMMAND AND CONTROL), (3) VOLUNTARY EFFORTS, AND (4) ECONOMIC INCENTIVES TO POLLUTERS.

6. RICHARD STREN OF THE UNIVERSITY OF TORONTO AND JEROME MILLIMAN OF THE UNIVERSITY OF FLORIDA FORMALLY RESPONDED TO THE PAPER PRESENTATIONS. IN HIS REMARKS, STREN MADE THREE BASIC POINTS. ALTHOUGH INVESTMENT IN URBAN AREAS HAS BEEN CONSIDERABLE, IT HAS NOT BENEFITED THE URBAN POOR AS MUCH AS

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OTHER GROUPS. STREN ARGUED THAT IF URBAN INVESTMENT IS PROPERLY DIRECTED, IT CAN BENEFIT BOTH THE URBAN POOR AND RURAL AREAS. SECOND, STREN STRESSED THAT OVER TIME THERE HAS BEEN A REAL DECREASE IN THE AMOUNT OF INVESTMENT IN URBAN INFRASTRUCTURE. THIS DECLINE HAS HURT THE POOR THE MOST, DUE TO THE UNEVEN ECONOMIC EFFECTS CAUSED BY THE FAILURE TO MAINTAIN INFRASTRUCTURE—E.G., WHEN INDUSTRIES SHUT DOWN BECAUSE OF INFRASTRUCTURE FAILURES, THEY USUALLY SEND THEIR POOR WORKERS HOME WITHOUT PAY. THIRD, STREN HIGHLIGHTED THE NEED TO DEVELOP A POLITICAL COMMITMENT TO ENVIRONMENTAL PROGRAMS OVER THE LONG TERM SINCE THE NATURE OF ENVIRONMENTAL PROBLEMS REQUIRES THAT THEY BE ADDRESSED WITH A LONG-TERM APPROACH. DEVELOPING SUCH AN APPROACH IS DIFFICULT IN DEVELOPING COUNTRIES WHERE ECONOMIC CONDITIONS ARE OFTEN UNSTABLE AND POLITICAL OUTLOOKS SHORT TERM. NONETHELESS, DONOR INSTITUTIONS MUST HELP DEVELOPING COUNTRIES BUILD INSTITUTIONS TO DEAL WITH URBAN ENVIRONMENTAL ISSUES OVER THE LONG TERM.

7. PROFESSOR MILLIMAN SHARED STREN'S CONCERN FOR DEALING WITH PROBLEMS OVER THE LONG TERM AND ALSO STRESSED THE URGENCY OF DEALING WITH URBAN ENVIRONMENTAL PROBLEMS IN DEVELOPING COUNTRIES IN THE SHORT TERM. IN MANY COUNTRIES, THE GROWTH OF NATIONAL INCOME ALREADY LAGS BEHIND GROWTH IN POPULATION. THIS MEANS THERE ARE FEWER AND FEWER RESOURCES TO DEAL WITH MORE PEOPLE AND LARGER URBAN AREAS. IN SUCH A SITUATION, IT IS DIFFICULT FOR PEOPLE AND INSTITUTIONS IN DEVELOPING COUNTRIES TO BE CONVINCED THAT INVESTMENT IN ENVIRONMENTAL PROTECTION IS WORTHWHILE. TO GAIN SUPPORT FOR ENVIRONMENTAL PROGRAMS, COUNTRIES MUST ATTEMPT TO IMPLEMENT SOME LOW-COST, LOW-TECH PROGRAMS THAT WILL HAVE IMMEDIATE AND VISIBLE RESULTS ON ENVIRONMENTAL QUALITY—E.G., A SOLID WASTE DISPOSAL PROGRAM AIMED AT CLEANING UP A NEIGHBORHOOD. WITH SUCH A PROGRAM, LOCAL GOVERNMENTS WOULD DEMONSTRATE THEIR CONCERN FOR THE ENVIRONMENT AND, MORE IMPORTANT, THEY WOULD DEMONSTRATE THAT ENVIRONMENTAL CLEANUP IMPROVES THE QUALITY OF LIFE AND IS THEREFORE WORTH PAYING FOR.

MILLIMAN ALSO AGREED WITH THE ENVIRONMENTAL PROTECTION AS INVESTMENT PAPER, WHICH SUGGESTED THAT INVESTMENTS IN ENVIRONMENTAL QUALITY ARE SOUND ECONOMIC INVESTMENTS IN INFRASTRUCTURE.

8. IN A DISCUSSION OF THE PAPERS AND RESPONSES, A NUMBER OF DISCUSSANTS COMMENTED ON THE MOST SERIOUS ENVIRONMENTAL PROBLEMS FACING URBAN AREAS IN THE DEVELOPING WORLD. THEY ARGUED THAT THE MAJOR ENVIRONMENTAL PROBLEMS FACING THESE URBAN AREAS ARE THE TRADITIONAL PROBLEMS THAT THESE AREAS HAVE ALWAYS FACED—THE NEED FOR CLEAN WATER, WASTE WATER AND SEWER DISPOSAL, AND SOLID WASTE DISPOSAL. AIR POLLUTION, GLOBAL WARMING, AND OTHER GLOBAL POLLUTION PROBLEMS ARE ALSO ENVIRONMENTAL CONCERNS; THEY SIMPLY DO NOT HAVE THE MOST IMMEDIATE EFFECTS ON HUMAN LIFE IN CITIES OF THE DEVELOPING WORLD. THE NEED TO DEVELOP A SIMPLE AND QUICK ECONOMIC ANALYSIS TO DEMONSTRATE THE LINK BETWEEN A CLEANER ENVIRONMENT AND A MORE ROBUST AND SUSTAINABLE ECONOMY WAS ALSO DISCUSSED.

9. STRATEGIES AND OPTIONS: LARRY HAUSMAN, THE AGENCY'S ENVIRONMENTAL COORDINATOR, MODERATED A DISCUSSION AMONG A.I.D. ENVIRONMENTAL OFFICERS ON THE MOST LIKELY ENVIRONMENTAL STRATEGIES AND OPTIONS FOR PRE/H AND A.I.D. ROYCE LANIER OF TSS PRESENTED SOME TENTATIVE OPTIONS AND STRATEGIES. JIM HESTER, LAC/DR; MARY LOU HIGGINS, S&T/FENR; AND STEPHEN LINTNER, THE WORLD BANK (FORMERLY ANE) DISCUSSED VARIOUS STRATEGIES AND OPTIONS IN LIGHT OF THEIR WORK IN THE BUREAUS. THESE PRESENTATIONS WERE FOLLOWED BY AN OPEN DISCUSSION AMONG THOSE PRESENT.

10. A NUMBER OF STRATEGIES AND OPTIONS WERE DISCUSSED. ONE PROPOSAL WAS TO ATTEMPT TO OVERCOME THE COMPARTMENTALIZATION WITHIN A.I.D. IN THE PAST, DUE TO DIFFERENT PERSPECTIVES ON WHAT STIMULATED ECONOMIC GROWTH, THE BUREAUS FOCUSED ON RURAL ENVIRONMENTAL ISSUES AND PRE/H ON URBAN ENVIRONMENTAL ISSUES. NOW, WITH THE RECOGNITION OF URBANIZATION AS AN IRREVERSIBLE TREND IN THE DEVELOPING WORLD, THE PERSPECTIVE ON HOW TO PROMOTE ECONOMIC GROWTH IS CHANGING. IN THE FUTURE, ALL BUREAUS MUST WORK TOGETHER SO THAT THE FULL RANGE OF RURAL AND URBAN ISSUES ARE CONSIDERED IN RELATION TO ENVIRONMENTAL AND DEVELOPMENT STRATEGIES. IMMEDIATE ACTION TO NARROW THIS GAP MAY BE TO DEVELOP A FRAMEWORK FOR ADDRESSING URBAN ENVIRONMENTAL ISSUES WITHIN THE AGENCY'S EXISTING PROGRAMS, ASSIGNING APPROPRIATE RESPONSIBILITIES TO ADDRESS THESE ENVIRONMENTAL ISSUES TO THE BUREAUS, MISSIONS, RHUDOS, AND PRE/H. STAFF RESOURCES IN URBAN ENVIRONMENTAL MANAGEMENT ALSO NEED TO BE FORTIFIED THROUGHOUT THE AGENCY.

11. THE NEED TO ADDRESS URBAN ENVIRONMENTAL ISSUES OVER THE LONG TERM WAS ALSO DISCUSSED. PRE/H, WITH THE INSTRUMENT OF THE HG, WAS VIEWED TO BE IN A GOOD POSITION TO DO THIS. UNLIKE GRANTS, HGS CAN PROVIDE MULTI-YEAR FUNDING CONSISTENT WITH A LONG-TERM APPROACH. PRE/H MUST ALSO TAKE STOCK OF ITS CONSIDERABLE EXPERIENCE IN ADDRESSING URBAN ENVIRONMENTAL ISSUES. HISTORICALLY, PRE/H HAS HAD SUCCESSFUL PROGRAMS DIRECTING SITES-AND-SERVICES, UPGRADING, INTERVENING IN INFRASTRUCTURE FINANCING, LAND USE PLANNING, HELPING DEVELOP STRATEGIES FOR THE DEVELOPMENT OF SECONDARY AND TERTIARY CITIES, AND DEALING WITH SOLID WASTE MANAGEMENT.

12. WHERE DO WE GO FROM HERE? GIVEN THE IRREVERSIBILITY OF RAPID URBAN GROWTH IN THE FORESEEABLE FUTURE AND THE ATTENDANT SEVERITY OF URBAN ENVIRONMENTAL PROBLEMS, THREE IMPORTANT POINTS WERE UNDERSCORED. FIRST, WITH THEIR LIMITED RESOURCES, A.I.D. AND OTHER DONOR AGENCIES MUST WORK WITH BOTH THE PRIVATE AND PUBLIC SECTORS OF DEVELOPING COUNTRIES TO STRENGTHEN RESPONSES TO THESE PROBLEMS. THIS MUST INCLUDE ACTIVELY SEEKING OPPORTUNITIES TO WORK WITH THE INFORMAL SECTOR AND NGOS.

13. SECOND, THE IMPACT OF URBAN ENVIRONMENTAL DEGRADATION ON ECONOMIC GROWTH MUST BE MADE MORE CLEAR. USING ECONOMIC ANALYTIC TOOLS TO DEMONSTRATE THIS LINKAGE IS CRITICAL WHEN ARGUING FOR SUSTAINABLE GROWTH. THIRD, A.I.D. MUST BUILD A CONSTITUENCY WITH ENVIRONMENTAL GROUPS TO HELP PUT URBAN ENVIRONMENTAL PROBLEMS IN DEVELOPING COUNTRIES HIGHER ON THE AGENDA.

14. THE PUP DIVISION OF PRE/H IS CURRENTLY IN THE PROCESS OF DEVELOPING A DRAFT STRATEGY AND ACTION PLAN FOR ADDRESSING URBAN ENVIRONMENTAL ISSUES IN SHELTER AND URBAN DEVELOPMENT PROGRAMS. THE STRATEGY AND ACTION PLAN FOR PRE/H WILL BE DEVELOPED BY EARLY 1990 AND WILL BE FORWARDED TO THE RHUDOS FOR COMMENT AND REVIEW. COPIES OF THE ROUNDTABLE PAPERS HAVE BEEN POUCHED TO THE RHUDOS AND MHAS. YOUR REMARKS ON THE PAPERS AND STRATEGY AND ACTION PLAN WHEN YOU RECEIVE THEM WOULD BE APPRECIATED. TO RECEIVE ADDITIONAL COPIES OF THE PAPERS CONTACT ALEXI PANEHAL AT PRE/H. BAKER

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