

# The Role of the City in Environmental Management

1994 Edition

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**The Role of the City  
in Environmental Management  
1994 Edition**

**Prepared for**

**U.S. Agency for International Development  
Bureau for Global Programs, Field Support, and Research  
Office of Environment and Urban Programs**

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**The views expressed in this paper are those of the author and do not necessarily reflect those of the Office of Environment and Urban Programs or the U.S. Agency for International Development.**

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## Acronyms and Abbreviations

BMR	Bangkok Metropolitan Region
BOD	Biochemical Oxygen Demand
BTU	British Thermal Unit
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
GDP	Gross Domestic Product
GNP	Gross National Product
GRP	Gross Regional Product
HC	Hydrocarbons
IFC	International Finance Corporation
NENA	Near East and North Africa
NFEP&WM	National Fund for Environmental Protection and Water Management
NGO	Non-governmental Organization
NIMBY	"Not in My Back Yard"
NO <sub>x</sub>	Oxides of nitrogen
OECD	Organisation for Economic Cooperation and Development
Pb	Lead
RHUDO	Regional Housing and Urban Development Office
SO <sub>2</sub>	sulfur dioxide
SODECI	Société de distribution d'eau de la Côte d'Ivoire (Côte d'Ivoire Water Supply Company)
SOTEMA	Togolese Refuse Collection Company
TSP	Total Suspended Particulates (common dust)
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

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# Executive Summary

This paper rejects the common theme that urbanization and economic development are antithetical to environmental quality and argues the necessity of strengthening the role of cities in waste management and protection of the environment. Cities have become dynamic centers of economic growth and development: they provide jobs, education, and markets and often produce more than twice their proportional share of GNP. Cities also play a vital role in environmental management. While cities do face serious environmental issues, well managed urban centers can also make important contributions to the health and welfare of their citizens. The question is often one of management and political will in addressing environmental concerns. If current economic development growth rates can be maintained and if cities can learn to manage the wastes and pollution that threaten to engulf them, then those same cities can provide one of the most important contributions to a sustainable world environment.

Environmental quality in rapidly growing areas is really a matter of choice. Management, not chance, is the determining factor in deciding whether urban growth will help or harm the environment. Cities can capitalize on the same trends and resources which lead to economic growth and use them to invest in environmental infrastructure which will make that growth sustainable. To manage the life of a city is ultimately to choose a future: management involves identification of priority objectives and the risks that threaten them, and then effective mobilization of resources with which to meet those threats.

Developing countries have made remarkable progress in establishing ministries of environment and adopting environmental policies, but the crucial work of enforcement and implementation lies ahead. Celso Roque, writing for the Asian Development Bank, observed: "The most critical component of the policy cycle is the implementation system. This is where policies become action. It is at this stage, where resources are mobilized...". Failure to achieve implementation erodes the credibility not only of the policies but of their advocates as well.

This paper recognizes the important policy role already played by national agencies and lays out a strategic framework for improving implementation by strengthening the role of the city in environmental management. The major elements include:

- ◆ Establishing urban environmental priorities,
- ◆ Increasing public awareness and participation,
- ◆ Improving enforcement and cost recovery, and
- ◆ Increasing the role of the private sector and NGOs in the provision of environmental services.

Built on a foundation of sound environmental programs and policies, environmental protection is an investment in urban infrastructure. Environmental protection is not a luxury good, nor a subject limited to rural natural resource ecosystems, nor a

specialty requiring totally new skills and new methodologies. Most of the technical skills required are those already employed in other infrastructure investment areas: land use planning, project management, cost recovery, and enforcement of the rules of the game. More specifically, environmental protection is an investment in the economic carrying capacity of urban areas. It increases not only the number of economic activities but also the standard of living an urban region can support and is therefore a critical investment in the future.

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# The Role of the City in Environmental Management

## Introduction

The environmental movement has become a crazy quilt of often competing factions. The "Greens," concerned with forests and natural resources, and the "Blues," concerned with rivers, oceans, and coastal areas, sometimes have difficulty finding common ground with the "Browns," concerned with managing the urban and industrial environment.

This artificial distinction among environmental factions has obscured one of the most important lessons about the environment. Even the United Nations Conference on Environment and Development (UNCED) spent comparatively little time on the role of the city. Left unsaid at UNCED was the fact that the development of sustainable cities can be one of the most important factors in creating workable solutions to world environmental problems.

Cities have consistently proven themselves to be one of mankind's most efficient institutions for mobilizing resources to make the required investments for environmental protection. In direct contrast to their poor reputation among many environmentalists, well managed cities are potentially the most environmentally desirable form of human settlement. While urban areas are increasingly recognized as major engines of economic growth, often providing more than 60 percent of GDP, it is less widely recognized that urban development also plays a major role in protecting the environment that reaches far beyond the city's boundaries.

Accordingly, this paper explores the city's role in the environment and has two basic purposes:

1. To review basic myths and misunderstandings and show why we should be cautiously optimistic about the potential role of the city in sustainable environmental management, and
2. To present a strategy for improving the environment through increasing the role of the city in environmental management.

The popular assumption that rural economies generate far less environmental damage than their urban counterparts has helped drive international development assistance for decades. Accordingly, the argument holds that foreign assistance should be targeted at rural areas to prevent more people from moving to the cities. Two cases, however, can be made against this approach.

The first is that no reasonable amount of foreign aid will prevent people in developing countries from moving to the cities. This does not mean that the case for rural assistance does not have merit in its own right. However, the societal and economic pressures that have led to a wave of urban migration are simply too powerful, and foreign assistance ultimately too limited, to stem the tide.

Secondly, and more directly linked to the points made in this paper, the presumed link between urbanization and general degradation is itself subject to question. Urban areas, relying on urban infrastructure and easy access to markets, can create off farm employment more efficiently than their rural counterparts. While cities are magnets of migration, birth rates are lower in urban areas. Also, the economies of scale and infrastructure efficiencies available in urban areas mean that cities consume energy more efficiently. The following charts and graphs demonstrate.

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

# **The Relationship Between Urban Development and the Environment**

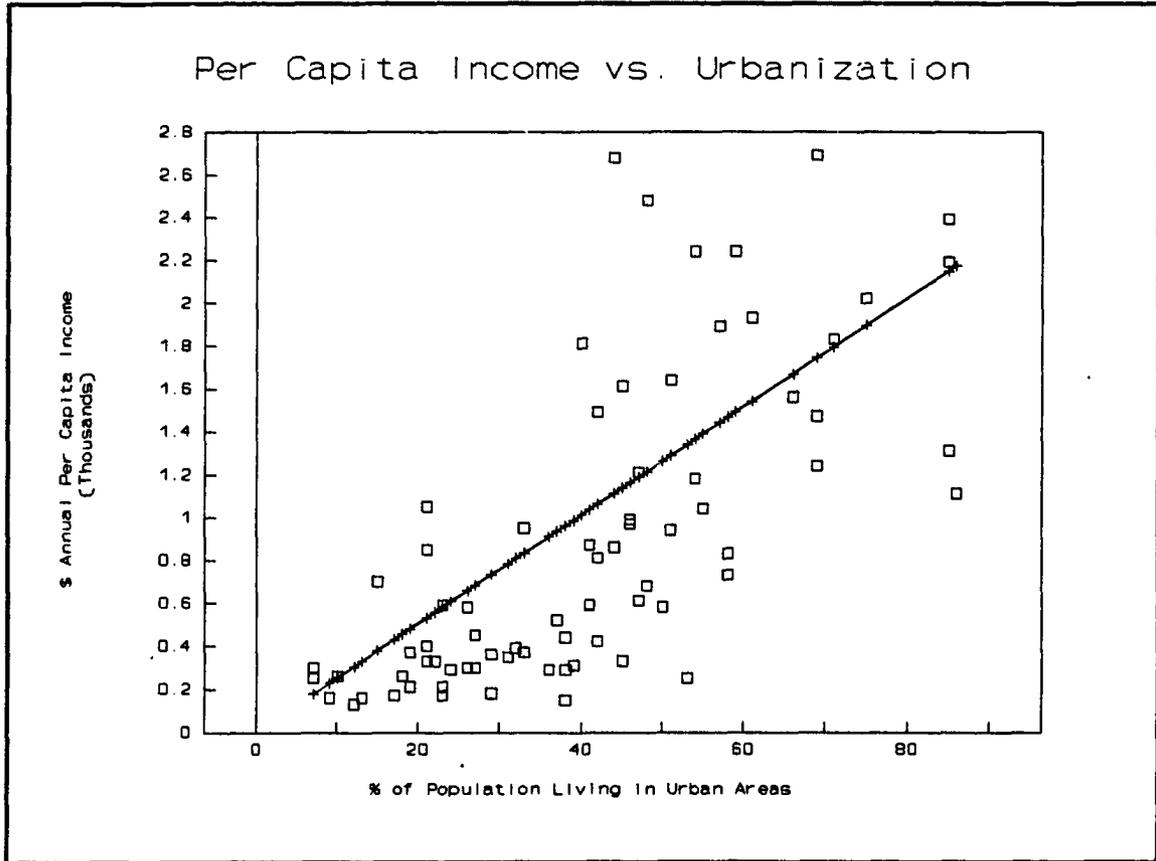
## **Impact of Economic Growth on Cities**

As Exhibit 1 implies, countries with large urban populations tend to be more efficient generators of wealth. This is partly due to the fact that cities are by far the largest and most efficient generators of new jobs. This in turn provides off farm employment that decreases the pressure to cultivate marginal, easily erodible lands. In addition, off farm employment provides new opportunities for surplus farmers while allowing those who remain on the land the opportunity to consolidate the most suitable land parcels for more sustainable and efficient farming. Meanwhile, urban areas, relying on urban infrastructure and easy access to markets and supplies, can create service and manufacturing jobs at far less cost than their rural counterparts. All of this contributes to higher per capita income in cities. In other words, while urbanization does create environmental challenges in cities, it can actually have a positive environmental impact on the countryside.

Per capita expenditures on environmental protection are also consistently higher in urban areas than in rural ones—both in absolute terms and as a percentage of GNP. Thus while urban people do generate more waste, they also have greater capacity to pay for effective collection, treatment, and disposal.

Most cities continue to have major environmental problems—and poorly managed urbanization often exacerbates them—but the fact remains that environmental quality can also improve simultaneously with economic growth and urbanization. It is a matter of choice rather than chance. The difference between exacerbation and improvement often lies in the effectiveness of environmental management and the role played by the city in that task. Helping cities to manage waste and achieve sustainable development may be the most effective way to improve the world environment.

Exhibit 1<sup>1</sup>

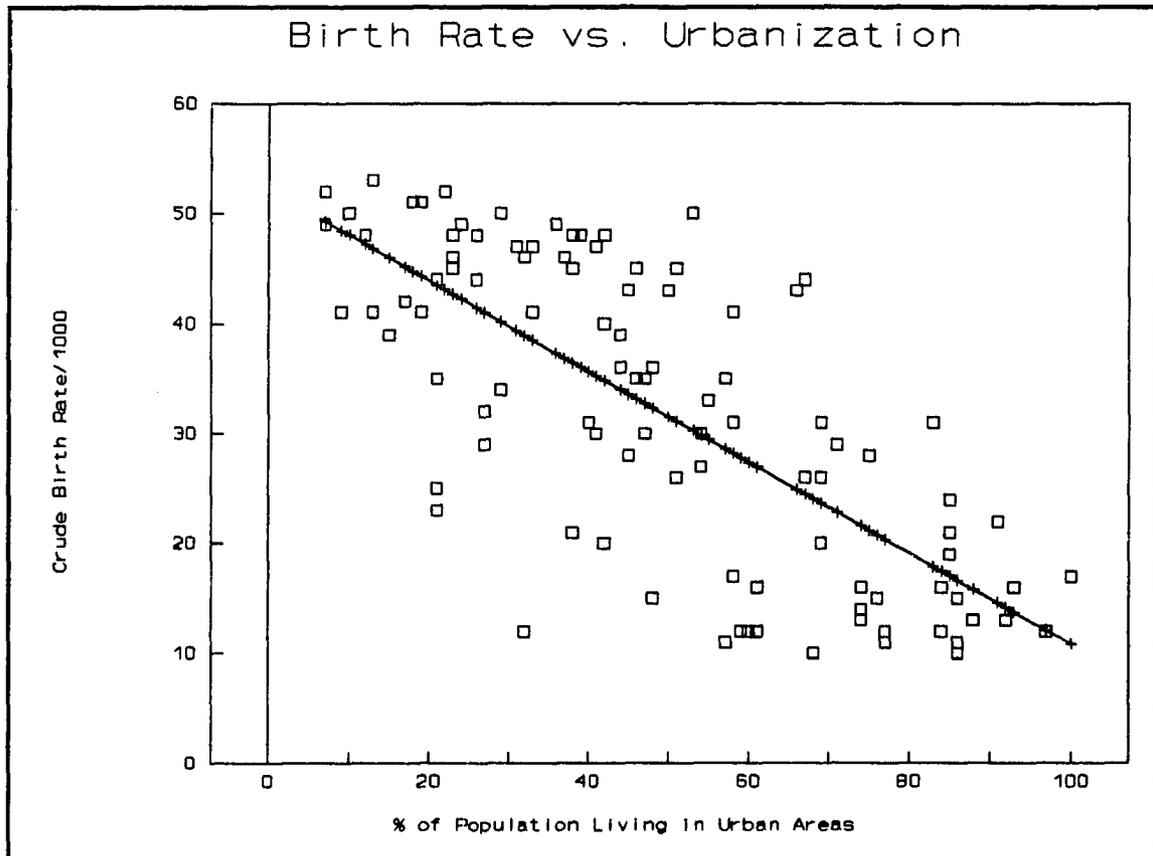


<sup>1</sup>Each block represents one country plotted by per capita income and percent urban. Source of data: *World Development Report 1991: The Challenge of Development*, Washington, D.C.: World Bank, 1991.

## Relationship of Urbanization to Birth Rates

Another factor that contributes to the strain of already limited resources is rising population, one of the most serious threats to the environment. As shown in Exhibit 2, the decline in birth rates correlates very closely with urbanization. While many factors are obviously associated with population growth, most of these factors (including education, income, and health care) are also closely associated with urbanization. As a consequence, the average birth rate in rural areas is three or four times the birth rate in urban areas. Although cultural attitudes are obviously an important factor, when race and religion are held constant, urban areas still consistently have far lower birth rates than in rural areas, even within the same country. Here again, urbanization can have a positive impact on an important factor frequently contributing to environmental degradation.

Exhibit 2<sup>2</sup>

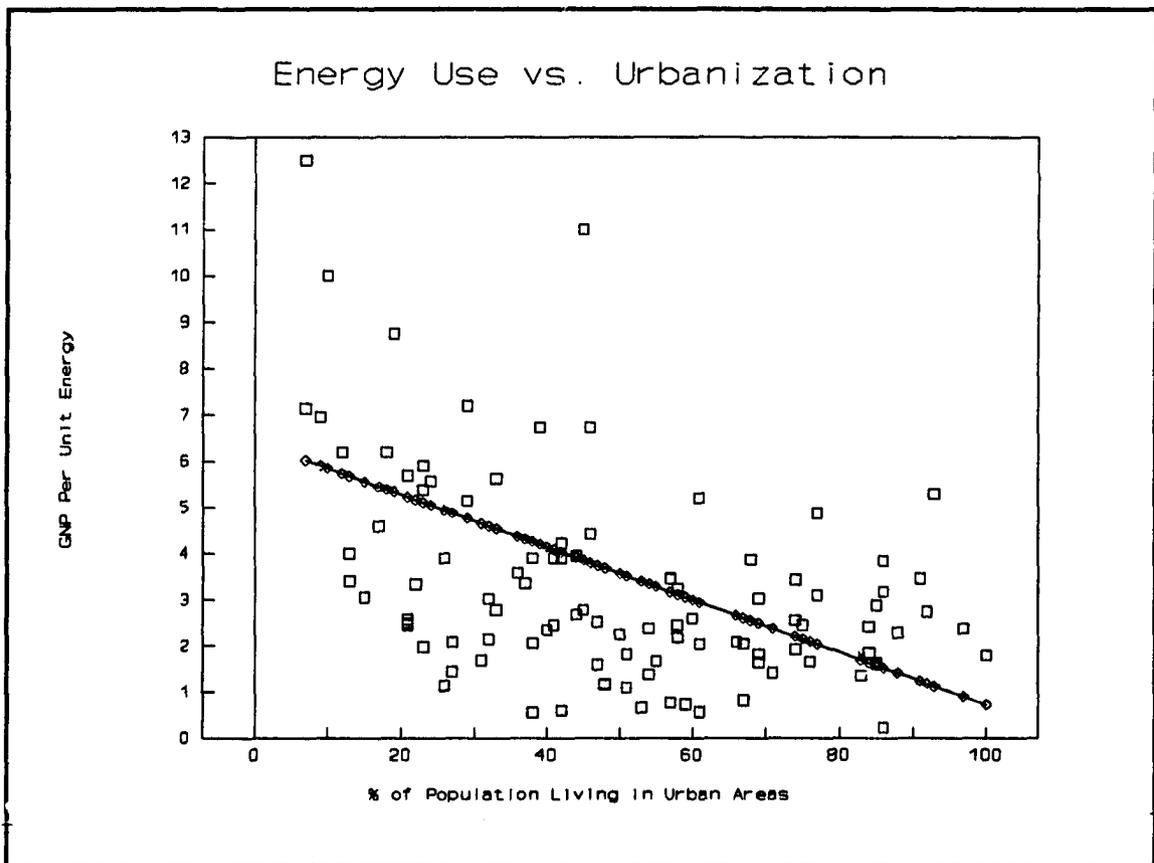


<sup>2</sup>Graph created from data provided by: *World Development Report 1991*.

## Relationship of Urbanization to Pollution Control and Energy Efficiency

Exhibit 3 illustrates the correlation between the degree of urbanization and energy efficiency. Similar relationships also exist between urbanization and increased control of sulfur dioxide emissions. The evidence shows that the economies of scale and infrastructure efficiencies available in large urban areas can be effective in reducing harm to the environment. At current levels of energy efficiency, rural China would have to burn eleven times as many BTUs of fuel as urban Japan to produce the same equivalent value of goods and services. This is by no means intended as a justification for the pollution and waste often generated by wealthy countries. If our intent is to raise incomes while minimizing the adverse impacts to the environment, however, we must recognize that we can achieve this goal more effectively in urban areas.

Exhibit 3<sup>3</sup>



<sup>3</sup>Graph created from data provided by: *World Development Report 1991*.

## **Complementary Roles of Public and Private Investment**

Popular wisdom so strongly regards urban growth as the cause of environmental problems that few bother to look for the real cause. The review of recent development history in one high growth city, Bangkok, is illustrative.

- ◆ High density development without adequate provision of mass transit and road networks has led to traffic congestion.
- ◆ High water demand without adequate investment in municipal water supply has led to excessive groundwater pumping and consequent land subsidence.
- ◆ High density development without public awareness of the need for drainage and sewerage has led to inevitable flooding and water pollution.
- ◆ Industrial development without adequate pollution control, investment, and enforcement has led to increased air, water, and solid waste pollution.

These problems were not the inevitable consequences of urban growth, but the result of failure to develop adequate institutional mechanisms to ensure that those who benefit from new development also pay for the necessary infrastructure and pollution controls needed to protect the environment.

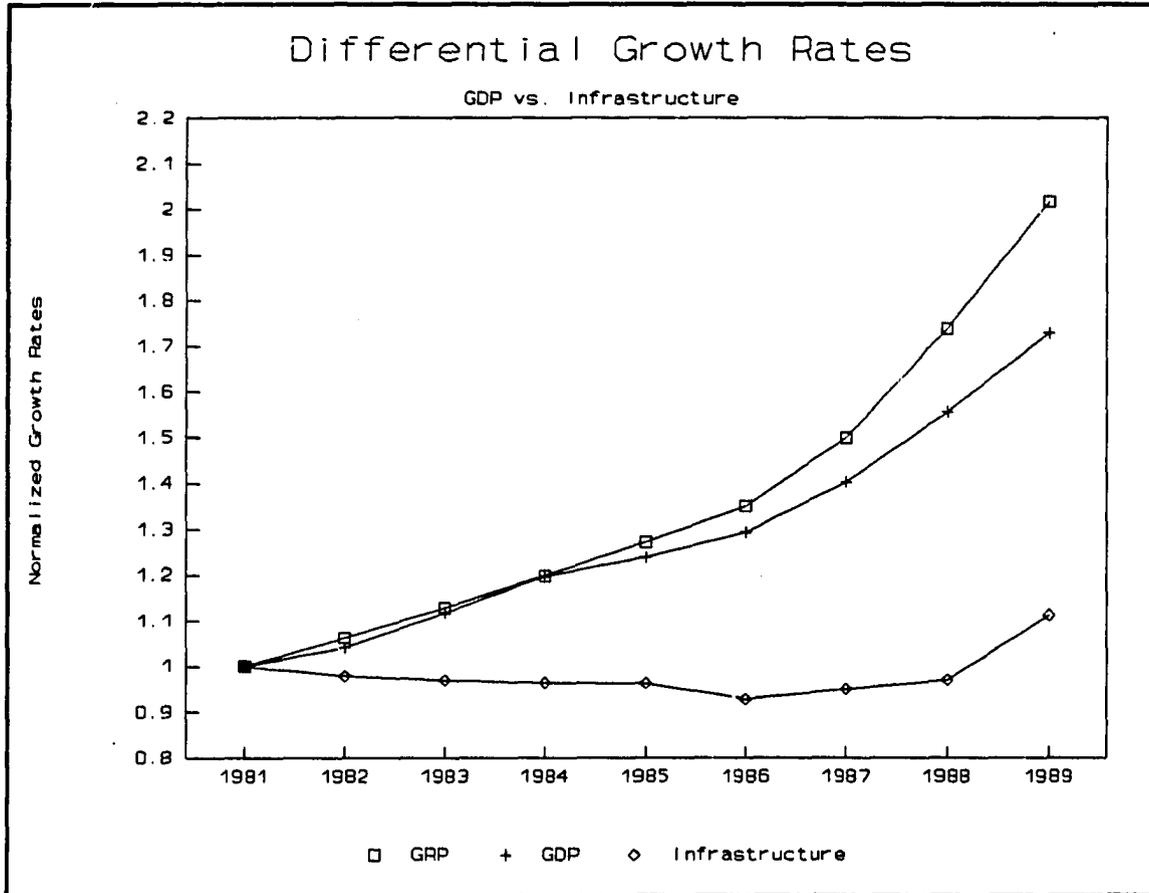
Exhibit 4 shows comparative growth rates in the Bangkok Metropolitan Region (BMR) during recent years. It suggests that environmental degradation may not be so much the consequence of urban and industrial growth as it is the result of failure to supply urban and environmental infrastructure consistent with the demands of economic growth. Growth places environmental pressures on a city, but these can be mitigated by effective infrastructure planning and investment. During these years the Gross Regional Product (GRP) of Bangkok more than doubled while the annual investments in infrastructure barely kept pace with inflation. Private car ownership quadrupled while the number of buses available for service actually declined.

In most rapidly growing cities, private investors (developers, manufacturers, and landowners) reap major benefits, not only from their own investments but from the public infrastructure which made it possible. Furthermore, they do so without shouldering the full cost that their development imposes on the community environment. Failure to require developers and consumers to pay their full costs ultimately becomes a subsidy to destructive development.

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**Failure to require developers and consumers to pay the full costs of public infrastructure ultimately becomes a subsidy to destructive development.**

Exhibit 4<sup>4</sup>



<sup>4</sup>Banasopit Mekvichai, David Foster, et al.: *Urbanization and Environment: Managing the Conflict*, Thai Development Research Institute, 1990.

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## Impact of Residential vs. Industrial Wastes

While industrial pollution consistently gets the lion's share of attention, in many cities the vast majority of pollution comes from non-industrial sources. The largest waste generators are individual citizens, households, and automobiles. Households are by far the largest generators of solid waste. Furthermore, over 70 percent of the waste discharged into the Chao Prya River of Bangkok, the Cilliwong River in Jakarta, and the Pasig River in Manila is the result of improperly treated human and household waste.<sup>5</sup> This same pattern is repeated again in almost every developing country in Asia.<sup>6</sup> Levels of fecal coliform bacteria exceed health standards in streams and canals in every major city of every developing country in Asia.

Similarly, as shown in Exhibit 5, domestic (non-industrial) urban sources are major contributors to all six of the criteria air pollutants and represent over half of four of them.

Exhibit 5 Non-Industrial Sources of Air Pollution in Bangkok by Percent <sup>7</sup>						
	TSP <sup>8</sup>	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO	Pb
Transportation	3	15	23	46	60	45
Households	28	9	20	13	1	25
Services	9	13	10	13	0	0

In Turkey, the most severe environmental impacts of urbanization are manifested in pollution from domestic effluents, domestic waste, and air pollution from household heating.<sup>9</sup> Of 2,034 municipalities, only 84 have implemented sewage systems, and by 1984, only 56 percent of urban dwellings had been linked to sewage systems.<sup>10</sup> High density development of unplanned settlements surrounding urban areas and summer resort housing lacking adequate

<sup>5</sup>*Domestic Wastewater and Water Pollution Problems in Bangkok and its Vicinity*, Office of the National Environmental Board, Thailand, 1987.

<sup>6</sup>*Sustainable Urban and Industrial Environmental Management Review Annex*, Tropical Research & Development Inc., 1991.

<sup>7</sup>Dhira Phantumvanit: *Thailand, Natural Resources Profile*, Thai Development Research Institute, 1987.

<sup>8</sup>These six air pollutants are the most common in urban areas. TSP refers to common dust or total suspended particulates. SO<sub>2</sub> is sulfur dioxide. NO<sub>x</sub> refers to oxides of nitrogen. HC refers to hydrocarbons (a precursor of ozone). CO is the symbol for carbon monoxide, and Pb is the symbol for lead.

<sup>9</sup>*Environmental Policies in Turkey*, Paris: OECD, 1992.

<sup>10</sup>IFC (International Finance Corporation): *Investing in the Environment: Business Opportunities in Developing Countries*, Washington, D.C.: World Bank, 1992.

wastewater and solid waste treatment infrastructure have exacerbated the problem, resulting in high levels of fecal coliform bacteria in aquifers in Izmir, Istanbul, and other areas. Winter accumulations of sulfur dioxide from home heating are almost double the legal levels in the city of Izmir.<sup>11</sup>

An estimated 22,100 cubic meters of raw wastewater from domestic sources are discharged into the Martil River each day by the city of Tétouan, Morocco. As demonstrated by Exhibit 6, urban domestic wastewater represents 87 percent of total volume and is expected to increase to 91 percent by the year 2011. Industrial share of organic pollution in the Martil is currently estimated at 17 percent of the total organic load and will decrease to 15 percent in the next two decades if domestic effluents more than double as predicted.<sup>12</sup>

<b>Exhibit 6<sup>13</sup></b>			
<b>Current and Projected Inputs of Domestic and Industrial Wastewater in the Martil River</b>			
Parameters	1991	2001	2011
Population	268,000	369,310	488,638
Per capita water consumption (l/day)	121	133	147
Wastewater discharged per capita (l/day)	97	106	117
Total volume domestic wastewater (m <sup>3</sup> /day)	22,100	37,190	57,170
Total volume industrial wastewater (m <sup>3</sup> /day)	3,240	4,374	5,904
Total domestic & industrial (m <sup>3</sup> /day)	25,340	41,564	63,074
Domestic BOD <sub>5</sub> load (kg/day)	12,300	18,945	26,386
Industrial BOD <sub>5</sub> load (kg/day)	2,575	3,476	4,692
Total BOD <sub>5</sub> load (kg/day)	14,875	22,421	31,078

While most of us are far more comfortable placing the blame on industrial “point sources,” we as individual citizens are often the most serious threat to the environment. This is true not only as individuals are generators of waste but often as a result of our improper land use, excessive pumping of groundwater, poor drainage, and poor cultivation practices. If cities are to achieve real environmental improvements, then urban managers must develop effective means to control residential as well as industrial pollution.

<sup>11</sup>World Bank, 1990.

<sup>12</sup>Office of Housing and Urban Programs, USAID: *The Impact of Urbanization on Natural Resources in Tétouan, Morocco*, Washington, D.C.: USAID, 1992.

<sup>13</sup>*The Impact of Urbanization on Natural Resources in Tétouan, Morocco*, USAID, 1992, p. 5-7.

## **Summing Up: The Role of Environmental Protection as an Investment in Urban Infrastructure**

Built on a foundation of sound environmental programs and policies, urban infrastructure is an investment in environmental protection. Environmental protection is not a luxury good, nor a subject limited to rural natural resource ecosystems, nor 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: land use planning, project management, cost recovery, and enforcement of the rules of the game. More specifically, environmental protection 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 an urban region can support.

The following discussion introduces strategies for urban environmental management that can make environmental protection an attainable goal for cities.

## **Strategies for Urban Environmental Management**

Management is ultimately the careful identification of priorities and the efficient marshalling of resources with which to meet them. Managing the environment requires concerted action at many levels. Programs to protect the stratospheric ozone layer require international action. Furthermore, because pollution doesn't stop at state boundaries and because industries can sometimes play off one jurisdiction against another, national standards and policies may be required even for more localized pollutants. When it comes to implementation, however, there appears to be no substitute for local involvement.

As observed in the U.S., Germany, and Japan, national organizations are great for establishing environmental standards and policies. Most successful implementation and enforcement programs, however, require strong involvement on the part of local leadership to complement the work of national actors. Standards are meaningless without compliance—and compliance cannot be achieved without incentives, monitoring, inspection, and enforcement.

At one time environmental advocates felt the solution to these problems lay solely with the creation of independent environmental agencies. According to that philosophy, such agencies should be detached, objective reviewers freed from other political or financial concerns. Increasingly it is now recognized, however, that although such organizations may have an important role, they are not able to do the job alone.

To be effective, environmental concerns must be factored in at the planning and design stage of projects, not just in a final environmental impact statement (EIS).<sup>14</sup> Environmental programs can ultimately be no stronger than the public that supports them, and enlisting that support requires involvement by the leaders of the people most directly impacted. The leaders, in turn, must work to involve the people most directly affected: the business community, the residents, workers, and particularly the parents of children at risk.

Enforcement is difficult at best, but to do it long distance is like having a doctor trying to diagnose his patients over the telephone. Haphazard enforcement simply subsidizes the polluter at the expense of the law abiding and environmentally concerned. It is only when local citizens and their leaders become involved that real enforcement of environmental policies and achievement of environmental goals become possible.

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**Haphazard enforcement simply subsidizes the polluter at the expense of the law abiding and environmentally concerned.**

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<sup>14</sup>G. Thomas Kingsley and Bruce Ferguson: *Urban Environmental Quality Management in Asia*, Washington, D.C.: Urban Institute, June 1992.

Accordingly, the involvement of local leadership is a key component of all four strategies discussed in this paper for managing the urban environment. The strategies are as follows:

- ◆ Establishing urban environmental priorities,
- ◆ Increasing public awareness and participation,
- ◆ Improving enforcement and cost recovery, and
- ◆ Increasing the role of the private sector and NGOs in the provision of environmental services.

## **1. Establishing Urban Environmental Priorities**

At the core of effective management lies the identification of primary objectives. Environmental resources are far too limited and environmental issues far too serious to fail to examine environmental priorities carefully. Experience has shown that these priorities can vary significantly from one country to another and even from one community to another. Those who seek to establish priorities simply by copying their agendas from other countries or by following blindly after fashionable issues can quickly wind up squandering large amounts of precious resources while achieving very little in real environmental improvement.

Urban environmental damages fall into three major categories of impact:

- ◆ human health
- ◆ property and productive capacity
- ◆ aesthetic and amenity values

The true costs of any impact are, therefore, the sum of the impacts in all three categories. As for the first two categories, Exhibit 7 provides a summary of principal health and productivity consequences of environmental mis-management. And while the third category, amenity values, is usually the most difficult to measure, it is often most readily visible in polluted and congested cities. The World Bank points out that this difficulty in measurement makes public involvement in setting priorities all the more important.<sup>15</sup>

Environmental priority setting is actually composed of two important parts: (1) assessing relative risks among foreseeable environmental threats to the community, and (2) determining the relative cost and effectiveness of reducing those risks. Ultimately the objective becomes one of identifying those potential activities which will achieve the greatest environmental risk reduction for the least possible cost. Studies by the U.S. Environmental Protection Agency (USEPA) have identified numerous situations where the cost per unit risk reduced for one program is more than ten times greater than for another. Put another way, the same dollar spent on a cost effective high priority task may achieve ten times as much benefit.

### **Need for Risk Assessment**

USAID and USEPA have identified "focussing on the right problem" as a critical environmental issue. Recognizing that not every problem can be a priority for every country, the World Bank also takes the view that "the highest environmental priorities are those that directly affect the welfare of large numbers of people." The Bank then concludes that inadequate attention is often paid to key basic local issues of water supply and sanitation, urban air pollution, indoor air pollution, and severe land degradation.

The number of people impacted, severity of impact, and reversibility of impact are all critical factors in identifying priority problems; the results are often counter-intuitive. The most

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<sup>15</sup>*World Development Report 1992*, Washington, D.C.: World Bank, February 1992.

serious pollutant may not be the one which receives the most publicity and may not even be the one with the most violations of the legal standard.

- ◆ Studies of the Bangkok Metropolitan Region revealed that notwithstanding concern over hazardous waste and the ubiquitous water pollution problems, air pollution (primarily air borne lead) was the most serious health threat. Because of the adverse impacts and large number of people exposed, the analysts calculated that air borne lead was potentially 100 times more serious than water or hazardous waste pollution.
- ◆ Similar studies in several Pennsylvania cities (in the U.S.) found that although ground level ozone was the most common violator, fine particulates (soot from power plants) posed the most serious health threat.
- ◆ Because of the high economic and environmental risks to coastal wildlife, marine ecosystems, fisheries, and tourism, prevention of oil pollution is a major concern for Mediterranean countries. However, there is evidence to indicate that accidental or illicit disposal of sludge from treatment plants, industrial residues, and toxic chemicals represents a greater potential risk to human health and natural ecosystems, particularly in light of recent growth in regional trade and lack of proper control mechanisms.
- ◆ Preliminary indications in India and Korea are now that one of the most serious environmental health threats may well be that posed by indoor air pollution caused by poorly ventilated cooking and heating fires.

The relative priority of urban environmental problems is also heavily dependent on the availability of alternative resources.

- ◆ Water pollution is serious under almost any circumstance, but it is most serious when there are no sources of unpolluted potable water available. Thus, water pollution might be a first priority problem if it contaminated the primary aquifer or if there was no reliable supply of municipal water, but a somewhat lower priority if most homes had ready access to safe water.
- ◆ Similarly, hazardous waste which threatened to impact the food, air, or water of large numbers of people would be far more serious than if those same people had feasible options which allowed them to reduce that risk of contamination.
- ◆ Because citizens can often find alternative sources of food or water but few can avoid breathing polluted air, air pollution is increasingly being seen as a high priority problem, particularly in New Delhi, Bombay, Bangkok, Manila, and Jakarta.

**Exhibit 7<sup>16</sup>**

<b>Principal Health and Productivity Consequences of Environmental Mis-management</b>		
	<b>HEALTH</b>	<b>PRODUCTIVITY</b>
Water pollution and scarcity	Pollution contributes to over 3 million deaths and billions of illnesses annually; scarcity results in poor household hygiene and added health risks.	Declining fisheries; increased household time and municipal costs to provide safe water; aquifer depletion resulting in irreversible compaction; economic activity constrained by water shortages.
Air pollution	Many acute and chronic health impacts: excessive urban particulate matter levels are responsible for 300,000–700,000 premature deaths annually, and half of childhood chronic coughing; millions of women and children in poor rural areas are affected by smoky indoor air.	Vehicle and industrial activity prohibitions during critical episodes; acid rain impact on forests and water bodies.
Solid and hazardous wastes	Rotting garbage spreads diseases and blocks drains. Hazardous waste risks are typically local but often acute.	Pollution of groundwater resources.
Soil degradation	Reduced nutrition for poor farmers on depleted soils. Greater susceptibility to drought.	Field productivity losses in range of 0.5–1.5 percent of GNP common on tropical soils; off-site siltation of reservoirs and canals.
Deforestation	Localized flooding leading to death and disease.	Loss of sustainable logging potential, erosion prevention, watershed stability, and carbon sequestration.
Loss of biodiversity	Potential loss of new drugs.	Reduction of ecosystem adaptability and loss of genetic resources.
Atmospheric changes	Possible shifts in vector-borne diseases; risks from climatic natural disasters; ozone depletion may account annually for 300,000 extra cases of skin cancer worldwide, resulting in 3,000–15,000 premature deaths; and 1.7 million cases of eye damage.	Sea-rise damage to coastal investments; regional changes in agricultural productivity; disruption of marine food chain.

<sup>16</sup>World Development Report 1992.

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## Impacts on the Poor

Relative priorities also depend heavily on the nature of the population most severely impacted. Unfortunately, in most cases pollution tends to impact most heavily on those least able to avoid it. Euisoon Shin (Yonsei University, Seoul, Korea) points out that:

Poorer households' unstable and inadequate incomes underlie their inability to move away from dangerous and polluted residential areas. Inadequate diets exacerbate the environmental health risks by lowering resistance to many diseases. Thus, while a lack of piped water, drains, and garbage removal service may be the main cause of deteriorating environmental conditions and of the high incidence of diseases, inadequate incomes and poor quality diets increase the related health threats.<sup>17</sup>

Water and solid waste pollution are typically most severe in the poorest communities, and those most severely affected are the young, the old, and the infirm. If, as Magsaysay has said: "Those who have less in life should have more in law," then we have a special obligation to provide for their environmental safety.

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Poorer households' unstable and inadequate incomes underlie their inability to move away from dangerous and polluted residential areas.

## Efficiency

The efficiency of pollution control programs depends both on the total cost of environmental damage and the relative ease with which the threat can be reduced. Both these factors vary widely.

- ◆ Lead pollution in urban areas, for example, typically comes from two main sources: (1) lead compounds used in house paints and utensils and (2) lead in gasoline. Lead based paints are now being phased out in most countries, but in many old houses the danger remains. While the relative threat from both of these sources is roughly the same, studies by USEPA suggest that it would cost more than 10 times as much to achieve equivalent risk reduction through scraping old paint as through reducing the lead content of gasoline.<sup>18</sup>
- ◆ Reducing the risk of bacterial contamination from polluted water can be achieved both by providing a reliable source of clean water and by treating wastewater from homes before it enters public drains and rivers. Although some risk will obviously continue as long as the public waterways are polluted, supply of clean water remains the first priority and most cost effective means to reduce exposure to disease.<sup>19</sup>

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<sup>17</sup>Euisoon Shin et al.: *Economic Valuation of Urban Environmental Problems*. Washington, D.C.: World Bank, January 1992.

<sup>18</sup>*Comparative Cost Analysis of Lead Reduction Alternatives*, USEPA, 1975.

<sup>19</sup>Sermpol Ratasuk, Senior Project Engineer, Asian Development Bank.

- ◆ Regional agreements to assess the extent of pollution and to share resources for planning, implementing, and monitoring pollution control measures represent a cost effective method for countries to begin addressing common environmental problems. The Mediterranean Action Plan, a program developed by UNEP and approved in 1975 by 16 Mediterranean governments, was designed to facilitate the implementation of regional treaties, coordinated research and monitoring, integrated planning, and administrative and budgetary support. Although political considerations and institutional differences have occasionally prevailed over efforts to control pollution, regional scientists estimate that the Mediterranean is less polluted than it would have been without these measures.<sup>20</sup>

## **Economic Impacts**

While attention is most commonly drawn to the health and aesthetic impacts of urban environmental degradation, the sheer economic costs can also be severe. These include flooding, traffic congestion, crop and aquaculture losses, lost worker productivity, and higher medical expenses. The reported value of these losses varies widely depending on the assumptions involved, but even the most conservative estimates are still substantial. The cost of traffic congestion in Bangkok, for example, varies from 272 million dollars to over one billion dollars per year, depending on the value imputed to the time spent in traffic. Conservative estimates for congestion losses in a number of Asian cities are shown in Exhibit 8. In addition to these costs, other severe financial losses have been shown in a wide variety of urban studies, including:

- ◆ Dust levels from cement manufacturing in Izmir have been recorded at 50 micrograms per cubic meter above the legal limit. Evidence shows that, as a result, yields from local olive groves have been reduced by about half.<sup>21</sup>
- ◆ Studies at the East-West Center in Hawaii estimated fishery loss from polluted water in urban rivers and bays easily exceed \$100 million.
- ◆ Tourism, consistently one of the largest earners of foreign exchange, is increasingly threatened by reports of trash, untreated sewage, and threat of epidemic disease.
- ◆ Studies by USEPA and USAID estimate the annual cost of the health impact of air borne lead pollution in Bangkok (including increased illness, lost productivity, death, and lost intelligence in children) at \$40 to \$100 million.<sup>22</sup> Euisoon Shin extrapolated from these

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<sup>20</sup>Peter M. Haas: *Saving the Mediterranean: The Politics of International Environmental Cooperation*, New York: Columbia University Press, 1990.

<sup>21</sup>*The Environmental Program for the Mediterranean: Preserving a Shared Heritage and Managing a Common Resource*, Washington, D.C.: World Bank, 1990.

<sup>22</sup>Office of Housing and Urban Programs, USAID: *Ranking Environmental Health Risks in Bangkok, Thailand*, Washington D.C.: USAID, 1990.

studies to estimate that the cost of all air pollutants in Bangkok is as high as \$400 million per year.<sup>23</sup>

- ◆ In the last decade, four oil spills of more than 10,000 tons each have occurred in the Mediterranean Sea. It is estimated that the economic costs of the largest of these spills—the release of 40,000 tons into Pilos Bay, Greece, in 1980—will exceed one billion dollars, which is comparable to cleanup costs for a major offshore spill.<sup>24</sup>

<b>Exhibit 8</b>		
<b>Estimated Losses Due to Traffic Jams<sup>25</sup></b>		
<b>City</b>	<b>Annual Cost of Time Delay (US\$)</b>	<b>Percent of Regional GNP</b>
Bangkok	272 million	2.1
Hong Kong	293 million	.6
Jakarta	68 million	.9
Kuala Lumpur	68 million	1.8
Manila	51 million	.7
Seoul	154 million	.4
Singapore	305 million	1.6

Special consideration is also due to pollutants which impose high costs by severely restricting the range of options available for mitigation:

- ◆ Hazardous wastes (including heavy metals) constitute only a tiny proportion of the total waste stream in Mexico City, but failure to control those wastes now threatens to preclude the otherwise profitable recycling of city waste for fertilizer.
- ◆ The booming computer, jewelry, and electroplating industries in Thailand, Indonesia, and the Philippines often discharge waste solvents and heavy metals directly into urban drains, not only contaminating the rivers but also precluding cost effective recycling as a viable option for the municipality.

<sup>23</sup>Euisoon Shin et al., January 1992.

<sup>24</sup>*The Environmental Program for the Mediterranean: Preserving a Shared Heritage and Managing a Common Resource*, Washington, D.C.: World Bank, 1990.

<sup>25</sup>Euisoon Shin et al., January 1992.

Environmental protection is an investment. Properly managed, it pays dividends. Poorly managed, it creates losses. Although environmental protection may be something of a new found interest for urban managers, it is far more like than unlike the other activities in which they routinely participate. Like any other infrastructure investment, it requires planning, financial analysis, appropriate technology, training, and a sound program for cost recovery and enforcement.

Properly implemented, protection of water quality is a cost effective investment in the fishing industry, the tourist industry, the water supply, and human health. Protection of air quality pays similar dividends in human health, crop production, and durability of materials. Furthermore, many of the ingredients being thrown away as pollutants are in fact valuable products themselves. Properly treated sludge from waste treatment plants is increasingly recycled as valuable fertilizer. Many private industries have also learned that pollution prevention pays. For example, cement dust blown away is an air pollutant. Cement dust recaptured and processed, however, can often generate revenue far greater than the cost of the pollution control equipment. Refinery operators tell similar stories about their valuable "waste streams" of chemical byproducts.

Both development and environmental experts often regard environmental protection and economic development as polar opposites. Conventional wisdom also holds that we cannot accomplish one goal without sacrificing the other. Although sometimes true in the short run, when urban leaders recognize the importance of clean air, water, and other natural resources as vital inputs in sustainable development, in the long run it can be readily seen that economic development requires an investment in the environment as well. Ironically, many of the Eastern European countries that sought to sacrifice environmental quality for the sake of economic development actually wound up failing miserably at both.

## **Summing Up**

The examples above emphasize the importance of counting the costs of all environmental impacts. In some cities the cost of air pollution from traffic alone might not appear to warrant a major program, but the cost of air pollution, plus lost time in traffic, plus reduced crop yields in surrounding fields, plus decreased attractiveness to tourists all adds up to a very persuasive argument for improved traffic management. In direct contrast to the often repeated claim that "cities cannot afford to protect their environment," the informed observer may conclude that the city can no longer "afford" to ignore the environment.

The setting of environmental priorities proceeds by adding up the costs of all observable impacts and comparing those with the estimated costs of control. While some environmental analysts will object on the grounds that the costs of control are usually easier to measure than the costs of the impacts, in most cases even this admittedly biased accounting will lead to substantially more support for environmental management.

The question "Who sets the priorities?" becomes critical. This paper strongly supports local government as the best judge and enforcer of environmental priorities. Although regional and national governments have an important role to play as facilitators, advocates, and leaders of environmental management, they are not as qualified to prescribe optimal approaches within a local context. The participation of local governments in the planning and financing of projects and in leading public opinion can improve the chances that central policy will be converted into successful environmental initiatives.<sup>26</sup>

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**Local governments are the best judges and enforcers of environmental priorities.**

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<sup>26</sup>*Environmental Policies for Cities in the 1990s*, Paris: OECD (Organisation for Economic Co-operation and Development), 1990.

## **CASE STUDY: Establishing Urban Environmental Priorities**

### **Thailand**

When urban environmental decay reaches serious levels, as in the case of Bangkok, government priorities can be lost in a maze of competing problems. With only 2 percent of the city's population served by sewage treatment facilities, with only 20 percent of the city's solid waste ever collected and much of that left in open dumps, and with air quality ranking among the poorest in the world, local leaders and citizens alike simply do not know where to begin. Recently, USAID and the U.S. Environmental Protection Agency (USEPA) teamed together to finance a comparative environmental risk study for Bangkok that may also have implications for other large cities in the developing world.

The study adapted a successful USEPA system of analysis, previously used only in the United States, to rank specific environmental hazards according to the immediacy and severity of the health risks they posed. The resulting report does not imply that certain environmental problems in Bangkok are less important than others. Rather, the study is an attempt to highlight those problems that have a definite and measurable health impact in order to help cities prioritize their programs.

Highest on the list, according to the report, were lead, particulate matter in the air, and microbiological diseases. A brief look at the facts confirms the seriousness of these problems. Excessive levels of lead found in air, drinking water, and food have resulted in up to 400 deaths per year, several hundred thousand cases of hypertension, and a loss of three to five IQ points for the average child per year through age seven. The study also attributed up to 1,400 deaths per year to particulate concentrations in the air. Finally, the report estimates that inadequate water supply and poor sanitation led to between 850,000 and 1.7 million microbiological disease related illnesses each year in the city.

The study team then made brief recommendations for managing these and other environmental health risks. With respect to particulate matter, for example, the report suggested a thorough emissions inventory, the desulfurization of fuels, and the installation of particulate traps on diesel vehicles.

The results of the study are currently being used by the Thailand Development Research Institute to design recommendations for the Thai government's environmental, health, and transportation programs. With limited budgets frequently determining the scope and success of urban environmental management, setting priorities can be a valuable tool for effectively addressing these issues.

## **2. Increasing Public Awareness and Participation**

Increased public awareness and participation become an important tool to involve local government and define its role. Ultimately, effective environmental protection is a question of public access. People can only maintain access to a clean, healthy, and sustainable environment if they also have access to the information, policies, and regulations intended to protect the environment.

There are undoubtedly some fields such as heart surgery or the piloting of an airplane where the requisite expertise rests in the expert hands of a few, and the rest of us are literally along for the ride. This is not, however, the case with the environment. Protection of the urban environment requires public participation. This participation requires that the public be fully aware of the causes and consequences of environmental neglect and potential opportunities for improvement. Real environmental protection requires not just the highly skilled "surgeon" or "pilot," but parents, students, and community leaders who know the value of the environment and can impart this knowledge to those around them.

Most environmental programs are only as strong as the environmentally informed public which supports them. In practically every country with a strong environmental program one can also point to an equally strong public and NGO movement behind it. Conversely, where public awareness and support are lacking, there are almost no genuinely effective environmental programs regardless of their environmental policies or pollution standards. The development of strong environmental agencies and enforcement programs in Japan, Western Europe, and the U.S. has been directly correlated with the growth of "Green" parties and successful NGO lobbies. In these countries, the NGOs monitor progress, research environmental issues, recommend solutions, and inform the public.

This finding on the importance of local participation in environmental programs is fully consistent with the findings of USAID and UNDP in a variety of related areas:

- ◆ Public awareness campaigns in Surabaya, Indonesia and Phuket, Thailand were major factors in persuading citizens and officials to make the changes needed to implement waste management programs.
- ◆ Forestry programs in Nepal were consistent failures until program designers developed means to involve local communities and give them a meaningful stake in the survival of the nearby forests.

Some developing countries have recently achieved major success in developing Ministries of Environment and environmental policies, but these cannot be maintained in a vacuum. The lack of effective enforcement in most developing countries is often referred to by local citizens and expatriate consultants alike as a "lack of political

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**This lack of "political will" can most often be traced to a lack of public awareness and community involvement.**

will." This explanation has become almost too convenient and provides no hint of a solution. In fact, this lack of "political will" can most often be traced to a lack of public awareness and community involvement.

The recognized strength of the U.S. Environmental Protection Agency (USEPA) may be illustrative. Despite USEPA's large budget, highly trained staff, and broad legal authority, its real "political will" most often comes from the public awareness and NGO strength which support it. For example, when USEPA proposes new regulations for pollution control it is almost invariably attacked by the owners and managers of the pollution sources for being "too stringent, too expensive, and too burdensome." This opposition is so strong that it would threaten to force USEPA to back down, were it not for the fact that NGOs in support of stronger controls often criticize the same proposal for being "too lenient." Through this competitive process the public has access to the full debate and can join in support of the regulations that are most appropriate.

In spite of the importance of increasing awareness and involving the public to garner public support, most environmental ministries still isolate themselves and their decision making processes. One significant example of such a process is the EIA (Environmental Impact Assessment). The EIA process has proven to be an effective tool for key decision makers to collect and weigh information about the likely environmental consequences of investment decisions before those decisions become final. Even more importantly, where it has been used most effectively, it has provided an opportunity for the public to consider the environmental impacts and bring information of its own to the table for consideration. Unfortunately, many countries see this EIA process as a forum only for the elite and highly specialized. Not only is the public denied access, but the environmental decision makers are denied the potentially powerful political support that could come from an enlightened public. Important exceptions to this trend, however, are increasingly becoming evident:

- ◆ Most countries are beginning to expand both the amount of information available and the number of people allowed access.
- ◆ Under the EIA system now employed in Malaysia, draft copies of the environmental impact statements are made available in public libraries, and interested parties are invited to make comments.<sup>27</sup>
- ◆ The Philippines is also considering holding public hearings on important EIAs.

Other countries in the region have also adopted a variety of creative means to increase public awareness:

- ◆ Thailand developed an environmental education program for its schools and started a popular television series dedicated to the environment.
- ◆ The National Water Supply and Drainage Board in Sri Lanka recruited and trained volunteers to teach water sanitation to local citizens.

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<sup>27</sup>Goh Kiam Seng, Regional Director for Asia and Pacific, UNEP.

- ◆ Magic Eyes, an urban environmental NGO in Thailand, has initiated a very successful campaign to encourage people to pick up litter with the slogan: "Magic Eyes are watching you."
- ◆ A river clean up campaign in the Philippines helped increase awareness of environmental problems by organizing boat trips focussing on both polluted and clean areas.

## **Role of Local Governments**

Increasing mechanisms for educating and involving the public can also lead to increased participation of local governments in environmental management. Rising incomes often prompt informed citizens to demand higher standards of services and environmental protection from municipal agencies and officials. Local governments can capitalize on the resulting political mandate and new sources of cost recovery to create environmental policies and programs that are comprehensive and well-integrated with other capital investments. Conversely, a higher level of participation of local governments in the design and implementation of environmental initiatives can result in increased responsiveness from concerned constituents.

The city of Angers in France has been successful in creating a "consciousness of the environment" among elected and municipal officials as well as the general public. In order to stimulate involvement by residents, several education and public participation campaigns were conducted in collaboration with environmental and district associations. The municipal health office was converted into a full environment/health department in 1983 and charged with providing logistical and technical support in implementing Angers's environmental policy. In addition, municipal officials and staff of the city's department of the interior initiated a joint effort with city planning staff to evaluate environmental impacts of proposed major capital projects.

In addition, clarifying the role of local government with respect to central governments and regional authorities in such areas as the setting and enforcement of standards can lead to more efficient and effective environmental management. In Greece, the creation of regional environmental authorities, the consolidation of local authorities, and the creation of linkages among all levels of government has led to a more active role for local authorities in decision making and better implementation of national policy at the local level.<sup>28</sup>

## **Need for Improved Environmental Data and Information**

Despite progress, problems remain with the general level of information about the environment, and many environmental NGOs do not fully trust the information that is available. Monitoring stations are limited, and the laboratories which report their findings often fail to satisfy an increasingly suspicious public. One respected NGO recently suggested, for example,

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<sup>28</sup>OECD, 1990.

that the single greatest need was for an independent laboratory which could periodically check the findings provided by government laboratories.

Environmental monitoring is simply the measuring and tracking of adverse impacts on the environment. Monitoring equipment is currently very limited and the access to data often restricted. Where this information is closeted (among a few elite decision makers), it is of little value. Experience from Indonesia has shown that monitoring information can be of most value when it is also made available to the media and the NGO community by actively working to increase public awareness of environmental management. Then those institutions can monitor both the environmental quality and the effectiveness of the organizations charged with protecting the environment.

MED POL, a cooperative regional program for pollution monitoring in the Mediterranean, has brought together 200 scientific groups from 53 institutions and 16 countries to conduct research projects and exchange information.<sup>29</sup> Participating laboratories monitor water quality, sediments, and marine organisms. One of the first projects conducted by MED POL was a study on coastal water quality which helped set emission standards for shellfish and bathing waters.

While some highly sophisticated monitoring equipment is both necessary and expensive, this equipment can often be supplemented with less expensive techniques for preliminary investigations:

- ◆ Many states in the U.S. still employ "smoke readers," individuals trained to visually measure the opacity of smoke at a distance. These individuals are qualified to testify at a hearing and their information can be used as evidence of air pollution violations.
- ◆ Students with minimal equipment can take photographs and samples of solid waste and wastewater.
- ◆ Many water quality tests which previously could be performed only in the laboratory can now be accomplished with comparatively inexpensive portable kits.

Although long term experience clearly indicates that public awareness and public involvement are critical to environmental success, the World Bank points out that this involvement can also be a time consuming and troublesome process.<sup>30</sup> Local participation can also reinforce local power structures and lead to local vetoes over otherwise highly desirable regional projects.

While this problem can be serious, NGO experience in the U.S. suggests at least one way to counter this problem. Electric utilities faced with a never ending NIMBY ("not in my back yard") syndrome over the locating of new production facilities began involving regional and national environmental groups in their decision making process early on and found the net

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<sup>29</sup>Peter M. Haas, 1990.

<sup>30</sup>World Development Report 1992.

effect very helpful.<sup>31</sup> These larger environmental groups were not so easily controlled by parochial interests as their purely local cousins, yet their participation added important insights and environmental credibility to the overall process.

The experience of a wide range of organizations confirms that attempts to add a veneer of public participation after all relevant decisions have been made is a recipe for trouble. If, however, decision makers are prepared to inform and seek participation as the process evolves and carefully select NGOs on the basis of their knowledge and representativeness, then the process can greatly enhance the support and success of environmental programs. As will be seen in the following section, this public support and participation is particularly critical for enforcement and cost recovery.

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<sup>31</sup>"Participation of Environmental Citizens Groups in the Decision Making Process," Florida Power and Light, 1975.

## **CASE STUDY: Increasing Public Awareness and Participation**

### **Brazil**

The city of Curitiba has taken important steps forward in promoting public awareness and participation, and in the process has successfully defied the common assumption that protection of the environment and job creation, particularly for the poor, are incompatible. Under the direction of Mayor Jaime Lerner, the city has established a number of innovative programs that will provide both direct benefits to low income families and significant improvements to the local environment.

One program, "Don't Throw Away Your Garbage—We Buy It" works with local residents and community groups to improve solid waste collection. The essence of the program is to compensate poor communities that bring their garbage directly to a city-administered collection site. The city offers mass transit tickets for each bag of collected garbage as well as a per bag contribution to a local community center. The program is also cost effective: the city funds this compensation from the amount it saves by not paying private haulers for garbage collection in these areas. In the first year of the program, 36 communities totaling approximately 17,000 families participated by collecting more than 1.8 million kilograms of trash. Furthermore, disease rates in areas formerly drowning in trash have already begun to decline. And, with technical and financial support from the Curitiba Environmental Department, local residents are transforming these formerly polluted areas for urban agricultural and forest use.

A second program is "The Garbage Which Is Not Garbage." This program focuses on public school education and a massive media campaign to encourage people to separate paper, cans, plastics, and other items from their trash for recycling. A fleet of 20 "green trucks" leads the curbside collection campaign, and additional drop-off sites are conveniently located at public offices and supermarkets. In the first six months of the program, an estimated 30,000 trees will be spared through the collection of 1.3 million kilograms of paper. The city is also attempting to compost grass, leaves, trees, and other yard waste (which constitute 12 percent of the waste stream) with treated sewage for eventual use in municipal parks. Here again, the program is geared toward the urban poor. The recycling project has created jobs for low income residents through the informal collection of recyclables as well as through new jobs at the local recycling plant.

### **3. Improving Enforcement and Cost Recovery**

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, enforceable regulations regarding pollution control and natural resource management.

Environmental enforcement and cost recovery are simultaneously often the most important ingredients in environmental management and the most often neglected. Carl Bartone describes enforcement as the "weakest link in the environmental management chain."<sup>32</sup> Effective enforcement is essentially a society's dedication to follow through on the commitments it has made. Similarly, effective mechanisms to recover costs for environmental services represent the only means to provide and maintain those services.

Attractive as it may sound, "it's not easy being green." There are many cost effective opportunities for pollution prevention. In the absence of effective public pressure, financial charges, taxes, or criminal sanctions, however, even the most cost effective pollution control technology will often be ignored. Those few who voluntarily comply still must compete with those who don't, and ultimately, in the absence of sound enforcement, the "good guys" subsidize the polluters.

One of the most common pitfalls of environmental programs has been the failure to establish appropriate fees, fines, and enforcement mechanisms, and the lack of "political will" to impose them. Ironically, despite growing recognition that poor enforcement is a common cause of failure, it is still one of the least studied environmental activities and often the least supported by donor agencies.

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**Ironically, despite growing recognition that poor enforcement is a common cause of failure, it is still one of the least studied environmental activities.**

Although environmental analysts think costs of control are easier to measure than impact costs, extensive arguments continue about the true costs of pollution control. As often happens, many of these arguments are extreme and counter productive. Many industrial representatives will argue that pollution control costs are so high and unreasonable that enforcement of these standards will deter new industrial investment and cause existing industries to relocate elsewhere.

But in fact, pollution control costs are typically below two percent of total manufacturing costs and far less than the cost of labor, materials, equipment, and other costs of production.

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<sup>32</sup>Carl Bartone, American Planning Association, Autumn 1991.

As a consequence, extensive studies have shown that industries rarely choose their investment sites on the basis of environmental standards and enforcement.<sup>33</sup>

At the other extreme, some would argue that pollution control costs are so small that no impact analysis is needed and that industries should voluntarily control their pollution. This argument neglects the fact that even one percent of total manufacturing costs can represent a major share of total profits and that this can provide a major incentive for many pollution sources to ignore the environmental requirements, particularly if their competitors are also ignoring them.

Exhibit 9 provides a sample of pollution control costs in the U.S. as a share of total costs and in comparison to average profits.<sup>34</sup>

<b>Exhibit 9 Pollution Control Costs</b>		
<b>Industry</b>	<b>Average Profits</b>	<b>Average Environmental Costs</b>
Automotive Industry	3.1%	2.0%
Chemicals	7.4%	2.8%
Consumer Goods	5.0%	1.9%
Electronics	5.6%	1.4%

Suffice it to say that pollution control costs are high enough to persuade many companies to try to avoid them. This is particularly true if companies have never understood the reasons for the control requirements. In fact, because most problems are the consequence of large numbers of pollution generators discharging wastes into a limited resource, the success or failure in controlling just one generator of pollution may really not make a detectable difference. Unfortunately, when several pollution generators draw this conclusion at the same time, their cumulative failures will have disastrous effects.

The goal of environmental programs is to cause the users of environmental resources—private households, automobile owners, government officials, and managers/owners of private manufacturing facilities—to reflect the true value of environmental resources in their everyday decision making. The objective of enforcement is not to close firms or even punish polluters but rather to ensure compliance with environmental standards. Rules and regulations can be

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<sup>33</sup>Christopher Duerkin, Conservation Foundation.

<sup>34</sup>"Achieving Economic Benefits Through Effective Environmental Management: Examples from the United States," paper presented at the Conference of Federation of Indian Chambers of Commerce and Industry, New Delhi, January 1992.

adopted and control equipment can be purchased, but if the rules are not followed or the equipment not properly operated and maintained, then little or no improvement is achieved.

Both Jakarta and Bangkok, for example, have regulations imposing fees on the pumping of groundwater, but the fees are rarely collected and major environmental problems (ground subsidence, salt water intrusion, etc.) are directly linked to excessive use of groundwater. India imposed strict regulations on factories discharging waste into the Ganges, but when the allowed time for compliance had passed with little action toward meeting the standards, the factories were simply given "no cost" extensions to become compliant. Hotels throughout the region are required to treat their wastewater before discharging it into the drains and rivers, yet even where the equipment has been installed, it is routinely found to be malfunctioning. Every country in the region has laws prohibiting uncontrolled waste dumping and discharge, yet most countries are still experiencing increases in pollution levels.

In 1988, the city of Athens introduced a five-year program to control increasing levels of air pollution from traffic. Designed to integrate solutions to the various causes of traffic pollution, the comprehensive plan includes the use of ring roads at various distances around the center of the city, improvement of fuels and technologies for all urban vehicles, and expansion of public transportation with parking garages and mass transit stations along inner and outer rings. Unfortunately, implementation of the plan has been retarded by the setting of unrealistically high performance standards as well as a lack of political continuity and of incentives among executive agencies and municipal officials responsible for implementing the plan.<sup>35</sup>

The purpose of enforcement is to ensure compliance with appropriate standards and regulations. Failure to require such compliance is ultimately a subsidy to the polluter and a penalty on those who voluntarily comply. Not only does the law abiding firm take on additional costs and responsibilities not shared by his competitor, but his own efforts are denigrated by the seeming lack of concern. Furthermore, as the public often has little knowledge as to which industries are complying and which are in violation, their wrath is often turned equally on both.

Despite these problems, there are increasing signs of active, creative programs for improving enforcement. Most of the successful ones involve some form of public participation.

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<sup>35</sup>OECD, 1990.

## **Examples of Successful Enforcement Activities**

- ◆ The Philippines has begun a unique multi-sector enforcement team which includes community leaders on inspection visits to local industries. These leaders including teachers, businessmen, priests, and NGO representatives are trained and deputized by environmental inspectors and then accompany them on site visits. After the inspections, the government inspectors may return to their offices, but the volunteer leaders remain in the community to monitor progress.
- ◆ The Water and Sewerage Authority of Izmir monitors effluents from about 450 industries based on regulatory standards. The municipality can take legal action to fine or close down plants whose effluents exceed the standards. Several companies have been assessed large fines, and a number of tanneries have been closed down for six months—although the threat of closure alone has been sufficient in some cases to reduce pollution levels.<sup>36</sup>
- ◆ In Indonesia the Ministry of Environment has begun listing names of the most serious offenders of water pollution laws and publishing them in the newspapers where they may be held up to public scrutiny.
- ◆ Several communities in the Philippines identified weaknesses in their local solid waste ordinances that made prosecution almost impossible. They then revised the law to make residents and businesses presumptively liable for any trash found on their property.
- ◆ The Center for Environmental Planning and Technology in India is examining the feasibility of establishing an independent team of certified environmental auditors, modeled after certified public accountants. These professionals would provide regular independent inspections and reports to certify the degree of compliance with relevant environmental standards.
- ◆ NGOs in Thailand have begun identifying riverside restaurants willing to make special efforts to ensure that wastes from the restaurant do not pollute the river. These restaurants are then endorsed by the NGOs and may be given a special emblem certifying their compliance.

## **The Use of Pricing Policies to Enforce Rules and Recover Costs**

The concept of "Polluter Pays" has been widely trumpeted as a policy for environmental management, but few municipalities have actually fulfilled it. Where the concept has been carefully implemented, it has been remarkably successful. A wealth of opportunities remain to employ this strategy. Many environmentalists and resource economists believe that one of the most effective things

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Many environmentalists and resource economists believe that one of the most effective things we can do for the environment is simply to "get the prices right."

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<sup>36</sup>World Bank, 1990.

we can do for the environment is simply to "get the prices right." Some examples of enforcement through pricing policies:

- ◆ In an effort to address the equity issues involved in cost recovery, Tunisia has implemented a system of progressive rates for water consumption under the assumption that higher income residents will consume greater amounts of water.
- ◆ In Thailand many hotels along the Eastern Seaboard, long notorious for poor waste treatment, are now efficiently treating and recycling their water for irrigation. They make this effort not because of a stepped up government inspection program but because the cost of buying fresh water now exceeds the cost of waste treatment.
- ◆ In Izmir, economic incentives are used to encourage reduction of pollutants from industry. Companies are billed for water discharged and are subject to tariff charges for sewer use based on levels of chemical oxygen demand (COD) and suspended solids in the effluent. The municipality offers deferment of penalties for industries that are willing to relocate within a two year period to an industrial park. Parks are located away from the city center and contain better facilities and lower cost pre-treatment plants.<sup>37</sup>
- ◆ The Natural Resources Defense Council, a U.S. based NGO, has consistently found that the most cost effective source of new energy is usually energy conservation. Programs which ensure that energy is priced at or above the cost of production, together with effective information and financing programs, can generally result in more kilowatt hours of electricity saved per dollar expenditure than even the most efficient source of power generation. Conversely, programs which subsidize electric power, no matter how well intended, invariably lead to less efficient use, increased demand, and increased production costs.
- ◆ Singapore has applied this same basic concept to traffic control in its once heavily congested central business district in the form of "road pricing." Recognizing that demand for road space by owners of private cars far exceeds the available supply, Singapore has established higher prices for downtown road use during rush hour. Not only does this system relieve congestion but it provides additional revenue to help pay for mass transit.
- ◆ The seventh plan recently adopted by the National Economic and Social Development Board for Thailand applies this same concept to land use. Property developers who insist on competing for scarce environmental resources to develop land may soon be required to pay an environmental impact fee. This fee will not only direct investment toward more desirable locations, but (where the financial advantages of a particular location still exceed the added cost) will make additional revenues automatically available to provide some of the necessary infrastructure.
- ◆ The rapidly growing city of Orlando, Florida (in the U.S.) developed a system of impact fees which are paid by property developers. These fees are then used to pay for the expansion of the municipal wastewater treatment system. The more rapidly the city grows, the more money comes in for waste treatment.

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<sup>37</sup>World Bank, 1990.

- ◆ Property taxes themselves are a form of pricing policy. Where they are sufficient to encourage wise land use and provide revenue to support necessary infrastructure, they can have major environmental benefits. They can encourage efficient land use, discourage speculation, and ensure adequate revenues to support required infrastructure.
- ◆ Market driven land costs, where barriers to development have been minimized, can often be far more effective than any regulation in promoting the supply and development of serviced land.

Pricing policies can also be effective in solid waste programs. The trick is to establish a price for the waste material sufficient to encourage recovery. Scavengers already recover bottles, cans, and many other recyclable materials but often fail to recover toxic materials and other major sources of air and water pollution. To achieve this end additional incentives may be required.

- ◆ Many European countries have been successful in recovering used batteries by imposing a deposit on them similar to that often required for bottles.
- ◆ Waste oil is frequently thrown away by the roadside and becomes a water pollutant. Guam has established a market for used oil, thus providing the incentive for recovery.
- ◆ Freon (a chlorofluorocarbon) regularly leaks from used air conditioners, but there is little incentive for mechanics to retrieve the substance because of its relatively cheap price. A refundable deposit on freon when sold would provide the necessary motivation.

No environmental policy or regulation can be effective without strong enforcement. Unfortunately, without public access and support, enforcement is often little more than an after-thought. Enforcement agencies are often understaffed, underpaid, and overwhelmed with the task of enforcing strong regulations with weak authority and limited public support.

## **CASE STUDIES: Improving Enforcement and Cost Recovery**

### **Poland**

Recovering the cost of environmental services is just as important as recovering the hidden costs of pollution. In the spring of 1989, as part of broad national legislation on the environment, the government of Poland created the National Fund for Environmental Protection and Water Management (NFEP&WM). Established as an independent financial institution, the Fund is authorized to issue fees and penalties for environmental pollution by Polish industries as well as to provide preferential grants and loans to foster environmentally beneficial projects. The fees (1) help pay for the cost of environmental cleanup and (2) encourage polluters to decrease their pollution. The Fund therefore serves to administer both environmental "sticks" and "carrots" and plays an increasingly important role in guiding sustainable development in Poland.

NFEP&WM receives most of its income from ecological fees and penalties which are collected by the Environment Protection Departments of the voivodship (province) offices throughout Poland. The offices determine maximum pollution levels for air and water pollutants and then issue penalties for exceeding these levels. Penalties are assigned and collected at the voivodship level from local industries and other polluters. License fees are also charged for use of natural resources, such as soil, and mineral extraction. Finally, the Fund derives some revenue from the interest charged on specific environmentally based loans, which are discussed in more detail below. The income from these penalties, fees, and interest charges is divided separately in each voivodship. Roughly 35 percent of these revenues are sent to the NFEP&WM; 55 percent remain for use by voivodship environmental protection and water management funds; and 10 percent is allocated to local ecological funds.

One such penalty is the fee assigned to private firms for sulfur dioxide (SO<sub>2</sub>) emissions. The average fee runs to approximately \$80 per ton of SO<sub>2</sub> emissions, which compares to U.S. SO<sub>2</sub> credits which currently trade at an average approximation of \$160 per ton. While some economists have complained that the penalties in Poland are priced too low to curtail SO<sub>2</sub> production, it is significant that such fees are assigned at all and, more importantly, are being collected. The Fund's collection rate runs between 60 and 80 percent, which is quite high relative to comparable countries. These collections also amount to approximately ¼ percent of Poland's GNP, and distributions by the Fund equate to about 30 percent of all money going to environmental protection in Poland.

Furthermore, by law a portion of the fees collected by the voivodship must be directed to separate sub-accounts for purposes related to the problem for which they were collected. For example, SO<sub>2</sub> fees are used to reduce SO<sub>2</sub> emissions and to develop desulfurization devices. Mineral extraction fees must support geological and mining work.

Some of the more unique functions of the Fund are its loan and investment activities. The Fund provides loans at preferential rates for environmentally based projects. Interest rates are targeted within 0.2 to 0.8 points of the National Bank of Poland's credit refinancing rates, which have ranged from 7 to 35 percent, as opposed to the commercial lending rates, which average around 50 percent. In addition, investors who meet certain requirements, such as timely achievement of project objectives or the reduction of pollution levels, may apply for individually negotiated grace periods, extended maturities, or even partial repayment of the loan. Fund managers effectively use these incentives to environmentally discipline investors and to provide significant incentives for meeting their program goals.

From time to time, the Fund also issues subsidies for certain enterprises engaged in nature protection, environmental education, and monitoring. In 1992, the Fund authorized approximately \$200 million in loans and subsidies (subsidies amounted to about 35 percent of the total). In 1993, this figure grew to more than \$300 million.

In addition, NFEP&WM may buy shares in companies whose activities support environmental protection, such as: manufacturing instruments used for environmental protection, producing coagulants used in water and sewage purification, and planning and consulting services. The Fund also works closely with Poland's Environmental Protection Bank, of which it is a co-founder. The Fund owns 44 percent of the bank's shares.

The Fund thus acts as both a catalyst for sustainable economic development and a regulator of acceptable levels of pollution. In the future, NFEP&WM plans to expand its activities to the solid waste management field and to diversify its revenue stream by increasing its share in selected private enterprises in order to open foreign credit lines to clients and to facilitate bids for foreign assistance for environmentally based activities.

## **Thailand**

A test case in Thailand has helped prove the theory that people, even among the poor, are willing to pay for good service. In an initial round of USAID funded projects in Northeast Thailand, a series of simple handpumps were installed to provide the community with drinking water. After several years it was discovered that more than half the pumps were not working, in part because the population was not willing to pay for the costs of operation and maintenance. Furthermore, many families were not using the pumps at all even though they were free. A second project delivered water through public standposts. Again the population would not pay for maintenance, and again the project fell into disrepair.

Finally, in a third project, USAID and the Thai government departed from previous assumptions that willingness to pay for a service is dependent only on the income of recipient families. In a test case, USAID provided an easily accessible supply of clean water by directly connecting a limited number of houses to water lines. The connected houses were required to pay the full costs of operation and maintenance for the system. The results were very different. Although payments were substantially higher than in Bangkok, families were willing and able to make necessary regular payments provided the water was clean and readily available. Institutions were also developed to run the system, which received a steady income from the service payments. According to the USAID Water and Sanitation for Health (WASH) program, the key message of the project is that willingness to pay is based not simply on income levels, but also on the quality and convenience of the service.

## 4. Increasing Public/Private Cooperation

Local governments are often severely limited in their ability to raise capital for new urban infrastructure. Competing demands from such diverse fields as education, health care, and police protection make it difficult to secure funding for necessary expansion in water supply, wastewater, and solid waste collection and disposal. Furthermore, most local governments have only limited experience in the "business" of efficiently managing and collecting for these services.

At the same time, however, private enterprises have some real advantages over government agencies in infrastructure provision. These can include lower production costs, more efficiency in service delivery, enhanced capacity to maintain capital equipment, and often easier access to foreign capital and expertise.<sup>38</sup> Private organizations, with fewer bureaucratic restraints, can also make decisions faster and be more responsive to consumer choices. Contracting out the construction, operation, and maintenance of environmental infrastructure also allows governments access to specialized skills and allows incremental adjustments as requirements change. Even where private sector provision of public services fails to be more efficient, it still offers at least one major advantage: it usually is far easier to close down a failed private sector operation than a public sector one.

Private sector participation does not mean the end of public sector involvement in these activities. In fact, it can allow public agencies to expand their impact significantly by freeing up limited resources to concentrate on those activities which they can do best. Private operation of waste collection and treatment, for example, allows public agency personnel to concentrate on monitoring, inspection, and enforcement. Public agencies can also focus on research into

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innovative approaches while contracting out the more traditional ones. Similarly, many agencies have effectively divided existing services: contracting out power generation, for example, while retaining responsibility for distribution. The responses are as varied as the creative organizations which generated them:

- ◆ Near Kanchanaburi, Thailand, citizens in several communities complained about the pollution of their water supplies by nearby sugar mills. In response to community concerns, the Ministry of Industry, in conjunction with the Office of the National Environmental Board, built wastewater treatment facilities which evolved into a unique public-private partnership. The facilities were initially designed and financed by government agencies but then purchased and operated by the sugar mill association itself. The govern-

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<sup>38</sup>Dennis Rondinelli: "Decentralizing Urban Development Programs: A Framework for Analysis," Washington, D.C.: USAID, 1990.

ment continues its role in monitoring and enforcement, but all decisions on cost sharing, fees, operation, and maintenance are made by the private association. All wastes now discharged into public waterways are in full compliance, and the government has recovered all its expenditures.

- ◆ In Karachi and Calcutta, per passenger costs of bus services run by private companies are less than 40 percent of those of public systems and in Jakarta and Ankara, costs are about half of those of public systems.<sup>39</sup>
- ◆ Many components of the water services in Santiago, Chile are contracted out to private companies, giving the city the highest productivity in water supply of any city in Latin America.
- ◆ USEPA has completed a study of over twenty successful public-private partnerships involving environmental services in U.S. cities. These services include wastewater, water supply, and solid waste and involve a wide variety of partnership contracts—each tailored to the needs of the particular city. Some partnerships provide complete private finance, design, construction, operation, and maintenance; while others share operation with a public agency. In almost every case there were significant savings in time and money.
- ◆ Because the value of solid waste and leisure time tends to increase with the income level of the population, people with higher incomes require more compensation to recycle, and their solid waste is more valuable. In Cairo, organized Zabbaleen communities have been given sole rights by the city to contract for collection of refuse wastes from high and middle income establishments. Using carts, Zabbaleen residents bring recyclable material home for sorting. Edible wastes are used as food for family livestock, and the rest is sold to dealers. This arrangement provides incentives both for recycling by higher income residents and private sector participation in solid waste management.<sup>40</sup>
- ◆ As part of a pilot program to test the advantages of private solid waste collection, the city of Sfax, Tunisia invited contractors to prepare bids for collection services in the district of Cité El Habib. Because of central government procurement regulations, the municipality was initially able to consider bids for contracts of only one year. Unable to recover their start-up expenses in so short a time, interested contractors withdrew their bids. The city successfully appealed the regulations and issued new bids.<sup>41</sup>
- ◆ Indonesia and the Philippines are investigating the possibility of allowing the “co-generation” of electric power. This will allow factories and solid waste incinerators to convert excess steam to electricity and then sell that electricity back to the Electrical Generating

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<sup>39</sup>“Developing the Private Sector: A Challenge for the World Bank Group,” Washington, D.C.: World Bank, 1989.

<sup>40</sup>Sandra Johnson Cointreau, Charles Gunnerson, et al.: *Recycling from Municipal Refuse: A State-of-the-Art Review and Annotated Bibliography*, Washington, D.C.: World Bank, 1984.

<sup>41</sup>Office of Housing and Urban Programs, USAID: *PPSS Project Evaluation Report: Sfax and La Marsa, Tunisia*, Washington, D.C.: USAID, July 1992.

Authority of Thailand. This will not only increase the electricity available but provide environmental benefits as well.

- ◆ Thailand already has several small hazardous waste treatment facilities built and operated by the private sector and is soliciting bids on larger facilities. Thailand is exploring further options to expand private sector cooperation in this area: one promising proposal is to impose a charge on the generation of hazardous wastes but then refund part of that charge when the waste is satisfactorily delivered to a certified private waste disposal facility. In this instance the government would inspect both the waste generator and the disposal facility, but the transport and treatment of wastes would be left in private sector hands.

While many urban infrastructure agencies are already very impressive, the opportunities for further efficiency improvements in environmental services are enormous. The World Bank, after reviewing forty years of experience, identifies institutional failure as the most common cause of inefficient performance. For example, the number of employees per 1,000 water connections in Western Europe is two to three, while the number in Latin America is ten to twenty. Even so, in cities like Caracas and Mexico City at least 30 percent of the connections are not registered. Similarly, in Bangkok and Jakarta almost half of the water supply is unaccounted for, either through leaks, improper connections, or failure to collect bills. Furthermore, in many Asian cities, the poorest 30 percent of the population has no access to municipal water, despite often massive subsidies.

Recent experience in Africa and Latin America shows that major improvements in collection rates can be achieved through privatization. In Guinea, for example, collection rates after privatization rose from 15 percent to 70 percent after only eighteen months.

When the private sector is employed in conjunction with careful analysis of local environmental priorities, a sound public awareness program, and good enforcement and cost recovery, the provision of environmental infrastructure can definitely improve. While privatization is obviously not a panacea, experience throughout the world has shown it to be an effective tool for helping cities to mobilize resources and provide badly needed services to their citizens.

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## **CASE STUDIES: Increasing Public/Private Cooperation**

### **Togo**

A private company in Togo, West Africa has established a solid record for waste collection in the capital city of Lomé. Created as a private corporation with French technical participation and financial support, the Togolese Refuse Collection Company (SOTEMA) has been in operation for more than 15 years and is now ready to expand locally and abroad. SOTEMA began in 1974 with a one year renewable contract with the government to collect, transport and dispose of the full range of waste materials. Now it collects an average of 284,000 tons every year.

One reason for the success of the operation rests with the city's excellent performance in revenue collection. An annual tax has been designated for waste collection and is applied to those households and properties which receive the service. In turn, this tax has become the principal source of government revenue for the company. A second reason has simply been good service. SOTEMA has developed a reputation for responsible disposal standards and has even established a good record of environmental improvement. By all accounts, the company has operated under strong management, resulting in steady profits. Substantial savings were also achieved when the company began manufacturing its own collection equipment under license.

## **Côte d'Ivoire**

Successful private provision of infrastructure is demonstrated in Côte d'Ivoire, where drinking water is supplied by the Société de distribution d'eau de la Côte d'Ivoire (SODECI). The company has proven to be a surprising success in a number of ways. First, in a utility industry that is frequently beset by cost overruns and poor maintenance in the developing world, SODECI is efficiently supplying water to 130 cities and towns throughout the country. Second, by supplying water at standards that are among the highest in West Africa, SODECI has maintained strong demand for its services and consistently shown a profit. The result is that the company is expanding rapidly and assuming more responsibilities in water delivery and investment. Finally, in a utility industry dominated by the public sector, SODECI is a public-private partnership.

The company operates under the French model of *affermage* in which a public authority normally controls construction of the system but contracts out its operations, maintenance, and billing to a private operator. In this case, SODECI is jointly owned by private Ivoirian interests, the government, and a French firm. Recently, the arrangement was extended to a concession contract that gives SODECI responsibility for investment in expanding the water system, though plans for investment must still be approved by the government.

Water payments are made through a graduated tariff structure in which smaller consumers pay a lower tariff rate. This not only encourages water conservation, but helps poor families afford the service. The tariff charged to other consumers is set to reflect total costs, debt service financing, and cash generation for future investments. The fee is also tied to the volume of water sold so that consumers, not taxpayers, pay for the service received. In addition, consumption is carefully metered, which helps to keep water losses low.

## **Conclusion**

The city has a major role in environmental management. The city is not the villain as it has so often been portrayed, and it need not be the victim. Sustainable cities and the economic development which they support can contribute not only to the welfare of their own citizens but to the global environment as well. City leaders—from the government, private sector, and NGOs—can contribute in ways not possible for national organizations alone. And city leaders' active participation is needed in the selection of environmental priorities and in the mobilizing of resources to invest in a sustainable environment.

Environmental protection is ultimately an investment. Properly managed, it pays dividends. Poorly managed, it creates losses. It is not a luxury good, nor a subject limited to rural natural resource ecosystems, nor an arcane specialty requiring totally new skills and new methodologies. 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 an urban region can support.

Implementation of environmental goals requires carefully determined local priorities as well as public awareness, local support for enforcement and cost recovery, and an active partnership with the private sector and NGO community. The critical task ahead is to identify and share the skills, techniques, and resources which can make this implementation possible.

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