

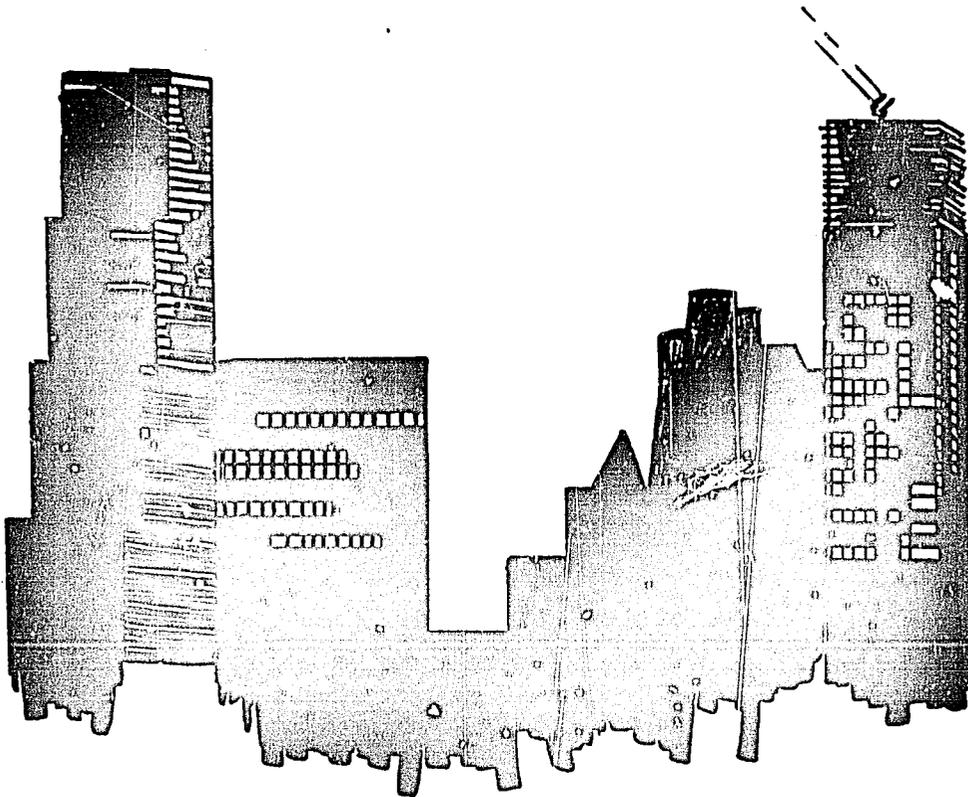
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The United States Agency for
International Development
Mission to the Republic of The Philippines

SUSTAINABLE URBAN AND INDUSTRIAL ENVIRONMENTAL MANAGEMENT REVIEW

Final Report
May 21, 1991

*A Review of the Present Status with
Recommendations for Future Directions*



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ABBREVIATIONS

ADB	Asian Development Bank
AID	US Agency for International Development, Washington
AIDAB	Australian International Development Assistance Bureau
BOD	Biochemical Oxygen Demand
BOI	Board of Investment, Government of the Philippines
CA	Commonwealth Act
CAMP	Coastal Area Management Plan
CCPAP	Coordinating Council for the Philippine Assistant Plan
CIDA	Canadian International Development Agency
CZM	Coastal Zone Management
CENRO	Community Environment and Natural Resources Office(r)
CDSS	Country Development Strategy Statement (USAID)
DA	Department of Agriculture, Government of the Philippines
DANIDA	Danish International Development Administration
DBM	Department of Budget and Management, Government of the Philippines
DBP	Development Bank of the Philippines
DECS	Department of Education, Culture and Sports, Government of the Philippines
DENR	Department of Environment and Natural Resources, Government of the Philippines
DOTC	Department of Transportation and Communications, Government of the Philippines
DPWH	Department of Public Works and Highways, Government of the Philippines
DOST	Department of Science and Technology, Government of the Philippines
DILG	Department of the Interior and Local Government, Government of the Philippines
DTI	Department of Trade and Industry, Government of the Philippines
EC	Environment Canada
ECC	Environmental Compliance Certificate
EEC	European Economic Community
EIA/SS	Environmental Impact Assessment/Statement System
EMB	Environmental Management Bureau, DENR
EPA	U.S. Environmental Protection Agency
ESF	Economic Support Fund (USAID)
ERDB	Ecosystems Research and Development Bureau, DENR
EO	Executive Order
FASPO	Foreign Assisted and Special Projects Office, DENR
GDP	Gross Domestic Product
GEMS	Global Environmental Monitoring System
GNP	Gross National Product
GVA	Gross Value Added
GOP	Government of the Republic of the Philippines
GFI	Government Financial Institution
HLURB	Housing and Land Use Regulatory Board

ICLARM	International Center for Living Aquatic Resources Management
IMF	International Monetary Fund
IRDC	International Research and Development Center
IRR	Internal Rate of Return
ITDI	Industry and Technology Development Institute (DOST)
JICA	Japan International Cooperation Agency
LIDE	Leyte Industrial Development Estates
LGU	Local Government Unit
LLDA	Laguna Lake Development Authority
LOI	Letter of Instruction
LWUA	Local Water Utilities Administration
MAI	Multilateral Assistance Initiative
MMC	Metropolitan Manila Commission
MMA	Metropolitan Manila Authority
MSI	Marine Science Institute
MTPDP	Medium-Term Philippine Development Plan
MWSS	Metropolitan Waterworks and Sewerage System
NAWASA	National Water and Sewerage Administration
NCSSO	National Census Statistical Office, Government of the Philippines
NEPC	National Environmental Protection Council
NPCC	National Pollution Control Commission
NAMRIA	National Mapping and Resources Information Authority
NDC	National Development Corporation
NIA	National Irrigation Administration
NGO	Non-Governmental Organization
NEDA	National Economic and Development Authority
NRDC	Natural Resources Development Corporation
OECD	Organization for Economic Cooperation and Development
OECS	Overseas Economic Cooperation Fund
ODA	Overseas Development Agency, U.K.
PCAPI	Pollution Control Association of the Philippines
PCARRD	Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (DOST)
PCB	Polychlorinated Biphenyls
PD	Presidential Decree
PENRO	Provincial Environment and Natural Resources Office(r)
PICOP	Paper Industry Corporation of the Philippines
PNOC	Philippine National Oil Corporation
PNPA	Philippine National Power Authority
PVO	Private Voluntary Organization
PIDS	Philippine Institute for Development Studies
PAP	Philippine Aid Plan
PSSD	Philippine Strategy for Sustainable Development

PTA	Philippine Tourism Authority
RA	Republic Act
RED	Regional Executive Director, DENR
RWDC	Rural Water Development Council
SAR	Structure-Activity Relationship
SAL	Structural Adjustment Loan
SECAL	Sectoral Adjustment Loan, World Bank
TSDF	Transfer, Storage and Disposal Facility
TSCA	Toxic Substance Control Act (U.S)
UPLB	University of the Philippines at Los Banos
UPD	University of the Philippines at Diliman
UPM	University of the Philippines at Manila
USAID	United States Agency for International Development/Phillipines
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
USEC	Undersecretary
WHO	World Health Organization
WHPZ	WellHead Protection Zone
WSA	Water and Sanitation Administration, Government of the Philippines
WORLD BANK	International Bank for Reconstruction and Development

EXECUTIVE SUMMARY

The field of environmental management is one to which many economically developing countries, as well as bilateral and multilateral donor agencies, are giving increasing attention. The reason for the attention is simple: economic growth cannot be sustained if the water, land, and air become conduits for disease; if traditional resources, such as coastal fisheries, become fouled; and industries and businesses are caught up in meshes of conflicting, frequently shifting standards and regulations.

Responsible industry, the kind that has learned the worth of being a good neighbor and has the capital resources to make long-term investments, increasingly seeks locations that are able to offer stability and an urban/industrial climate, including environmental services that function.

This exploratory examination was conducted in response to a request by the U.S. Agency for International Development Mission to the Philippines for an Urban and Industrial Environmental Management Profile. The resulting product was to present a "Tour of the Horizon."

This study recognizes five sets of inter-relationships in what is called urban and industrial environmental management:

- o **The relationship between the aquatic, terrestrial, and gaseous media** - Streams of by-products and residues can pass interchangeably among aquatic, terrestrial, and gaseous media approaches to pollution reduction must be comprehensive to avoid pollution reductions in one medium resulting in a simple shift to another medium.
- o **The relationships among national and local levels of government** - National policies and actions affect the abilities of the local elected officials to collect and use taxes and regulate the use of land and water resources.
- o **The relationship between distribution and characteristics of resource use** - Differences in the distribution and characteristics of resource use caused by differences in the size, profitability, location, resource inputs, and processes employed by various sectors of industry and commerce.
- o **The relationship between industrial cost and benefits** - Trade-offs between the financial costs and benefits of firms that arrange their processing of resources in ways that minimize external discharge of by-products and residues and maximize the social costs and benefits received by citizens at large.
- o **The relationship between industrialization and urbanization** - As industrialization occurs, urbanization follows closely behind; the processes are inextricably linked.

Urban and Industrial Environmental Management Review

Recognition of the five sets of inter-relationships resulted in the use of a multi-media approach to the characterization of the current situation, a recognition of the problems and opportunities that seemed most critical to address, and recommendations as to what the U.S. Agency for International Development (USAID) should actively support. The multi-media approach, is useful for more than recognition of such facts that solid waste dumped along a water body soon changes from a terrestrial pollutant to an aquatic pollutant. The intergovernmental relationships also vary by medium. For example, there is a different relationship between the national government in matters associated with water supply than prevails in matters associated with solid waste management. Similarly, manufacturing and other business concerns differ somewhat as to the nature of their influence.

The study was carried out by a team of nine professionals: two environmental engineers, a natural resource economist, an attorney, a specialist in environmental regulatory practices, a coastal zone environmental specialist, an environmental geographer, a private and public sector organization specialist, and a natural resource planner.

The team visited environmental management facilities in and around Metropolitan Manila, explored an extensive body of literature – including some 14 studies of solid waste management in Metropolitan Manila, and made field visits to government installations, industry and commercial activities in Cebu City, Ormoc, Cagayan de Oro, Davao, and General Santos City. The latter four sites were chosen as representative examples of the range of urban and industrial situations found outside Metropolitan Manila.

Current Situation

Population

The official population estimate for the Philippines is 60,684,887. The rate of natural growth is about 3.2 percent per annum. The cities are growing at about 3.88 percent per year – far higher than the expected natural increase. This demonstrates an acceleration of rural to city migration.

A major share of Philippine urbanization is accounted for by Metropolitan Manila. The region has an estimated day time population of more than 10 million and a resident population of more than 8 million, or about 13.3 percent of the total national population. The growth is accounted for partially by the information and opportunity rich environment, but mostly from the natural advantages of an international class seaport and absorption of nearly the entire national investment in urban infrastructure. It is (for example) one of the few places in the country that the telephones work.

In recent years the Government of the Philippines (GOP) has made a determined effort to slow the rate of growth in Metropolitan Manila. Since the early 1970's, development schemes, such as industrial estates and export processing zones, sought to disperse industry to remote parts of the country. The major, stand-alone industries in Ormoc and Iligan are part of the strategy as

are the industrial estates in Iloilo City and Bacolod City and the newly emerging agro-business centered development in General Santos City. As a result, each of the major regional centers is demonstrating increasing rates of growth. As they do, so does the demand for safe drinking water, sanitary handling of household waste, and protection from hazardous and toxic materials. Unfortunately, a standard concomitant of new urban growth is that a major portion of the population is made up of very poor rural people. In some of the representative cities visited, 69.4 percent of the total population is below the national poverty level.

These are people in most dire need of having their government offer them environmental protection.

Water, Land, Air

The current situation in the Philippines is not good.

Monitoring

Twenty years ago the country embarked on a fairly ambitious water quality monitoring system. Today, only the historic records of the sampling remain. Some random sampling is now done by the Department of Environment and Natural Resources Region XIII (National Capital Region) Office and by the Laguna Lake Development Authority. Monitoring equipment, laboratories, and trained personnel are all lacking.

Water Supply

Water supplies are adequate in quantity because, with the exception of Metropolitan Manila, the overwhelming majority of domestic water supply is obtained from ground water. Only two other cities have major reservoirs and water treatment plants. On the down side, however, is the nearly unfettered tapping and extraction of water from the nation's aquifers. There are well documented instances of salt water intrusions into the aquifers which will become more serious as the pumping continues. The fact is, no one is certain what is the safe yield for ground water in the various urban areas.

The situation is further clouded by the use of ground water for agricultural irrigation and for industry. There seem to be no published, enforced protection measures for well heads or well fields and no measures in place to prevent the contamination of the aquifers at the points of recharge.

Waste Water

The stock of public collectors, gravity mains, and facilities for the treatment of domestic and industrial liquid by-products and residues is up to ninety years old. Most of it does not function. There has been donor assisted construction of portions of systems, but none have been put into service. The major portion of the Metropolitan Manila population disposes of its sanitary waste

through individual septic tanks. Due to soil conditions, the drain fields do not operate well, and most home owners do not bother with annual cleaning of the tanks. This results in untreated household sanitary waste passing through the soil and drainage structures into the waterways of the metropolis and, ultimately, Manila Bay, and possibly spreading across the city by the regularly occurring floods. This is representative of the national condition.

Recent studies have shown that in the Pasig River, which courses through the heart of Metropolitan Manila, some 70 percent of the biochemical oxygen demand originates with domestic waste; the remaining 30 percent comes from industries located along the river. However, the industrial waste stream may contain heavy metals and other hazardous or toxic materials. Industry has indicated a willingness to comply with effluent standards and the Department of Environment and Natural Resources enforcement actions have intensified in the metropolitan area.

Coastal Zone

The movement of by-products and residues down the waterways of Metropolitan Manila is indicative of conditions elsewhere in the country. As a result, the traditional fish protein diet of Filipinos is in jeopardy. The coastal zone is fragile under most conditions, but especially so in the Philippines. This is because of the narrow continental shelf and the lack of any deep ocean water upwellings that bring nutrients into the coastal water. Philippine coastal waters depend entirely upon the streams, coral reefs, and mangrove swamps to support their food chain. Since the majority of urban and industrial growth in the Philippines occurs along the coast, the outwash from the cities and several industrial and service sectors contribute to a variety of pathogens and toxic materials that are taken up by the fin and shell fish which are caught and consumed by humans.

Terrestrial

Solid Waste

There are currently no facilities that can be classed as sanitary landfills. Some 60 percent of the solid by-product and residue stream in Metropolitan Manila. After the recyclable and reusable materials have been removed by household and neighborhood scavengers, is actually transported to open dumps; the remaining 40 percent remains uncollected. The uncollected fraction remains along streets and alleys, but mostly in the esteros and canals that cut through the city. With the onset of the rainy season, these materials, along with the septic tank leachate are washed out to Manila Bay or dumped into Laguna del Bay. Even after the material reaches an open dump, material sloughs into the water or contributes to air pollution as a result of smoldering fires in the dumps.

The scavenging system is remarkably well organized. any usable materials which reach the dump, household and neighborhood are scavenged and sorted by glass, plastic, metal, nylon

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cordage, and so on. These materials are sold to middle men who in turn sell them to recyclers and reusers. Scavengers make their livelihood from this occupation.

Industrial solid by-products and residues are carted from the factory sites by solid waste contractors. The contractor, in fact, buy the material from the manufacturing company for a price based on the contractor's estimate of the value of the reusable material he/she will be able to recover. That part of the stream that he/she finds technologically or economically unusable are taken to a dump. Since hazardous and toxic materials, such as PCB's and asbestos, often have little or no market resale value, they most often end up in the dump where they threaten the scavengers and entering water bodies as leachate.

Hazardous and Toxic Waste

The Congress last year enacted RA 6969 designed to regulate hazardous and toxic chemicals and other materials, including radioactive wastes and medical wastes. Regulations implementing the statute are in the process of being drafted.

Land Use Planning and Control

Planning and controlling the use of land and other resources is, at best, rudimentary. At one time, all municipalities were required to produce municipal development plans. The plans designated agricultural, residential, and industrial zones. However, the zones can be conveniently by-passed by municipal government. More important, there are no guidelines for environmental planning at any level of government. Hence, investment decisions are made with relatively cursory examination under the Environmental Impact Statement System which provides for the application for an Environmental Clearance Certificate and Operating Certificate. This is true at all levels and equally effects the investment decisions of Regional Development Councils and the Board of Investment at the national level.

Air Quality

Major stationary sources of by-products and residues discharged into the ambient air include power plants, cement, and fertilizer manufacturing facilities, among others. Small businesses may, on a cumulative basis, also create significant quantities of air pollutants. The major cause of air quality degradation is the private and commercial vehicles powered by internal combustion engines lumped under the classification of mobile sources.

Major Problems and Opportunities

An examination of the current situation shows that health and welfare of Filipinos is at risk with little cohesive government structure capable of attacking the back log of problems or of preventing new development from adding to problems.

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The public sector is bogged down by the maze of agencies, statutes, and layers of government, while it has been easy to point to industry as the cause of the major urban and industrial problems, in fact, domestic sources contribute the majority of by-products and residuals to the water, air, and ground.

Among the problems are the lack of vertical and horizontal coordination among the agencies charged with the management of the urban and industrial environment, the critically low manpower and equipment resources that the Environmental Management Bureau can muster, and the replication of this lack administrative coordination at each level of government.

The bright spot in the facade of the urban/industrial picture is industry itself and the enterprising spirit of Filipino entrepreneurs. Harnessing the innovation and energy of these two forces may make it possible to begin improving the quality of the water, air and land.

Recommendations

In light of the nature of the problems and opportunities, several criteria were selected to evaluate those components of a project appropriate for USAID. A number of recommendations follow.

It is concluded that Metropolitan Manila has drawn the lion's share of interest from both the GOP and from donor agencies; very little has or is being done in the rest of the country. On this ground alone, recommend that the design of a USAID project exclude Metropolitan Manila, except as solutions found during the course of any project will contribute to solutions in the region.

Capitalizing of Industry

It is recommended that the central engine to drive the project be industry, including manufacturing, commercial establishments, and service concerns.

Using the good offices of Philippine trade and industry organizations, a risk assessment of industrial sectors will be conducted. The objective of the assessment is to prioritize industrial sectors and geographic locations for attention.

Within the priority industrial sectors, we recommend offering hands-on training in the methods and financial results of industrial auditing. The objective will be to produce tangible results to raise awareness among local industry officials about the benefits that can accrue from a regular process of industrial audits.

The audits will yield some substantive information about the volume and nature of the waste stream, including those that are hazardous and toxic. This information along with the risk assessment would be used for selecting several sites for the design and construction of an integrated waste management system.

Continue Focus in Demonstration Projects

The volume and characteristics of the industrial waste load would be further defined through demonstration projects. The coverage of the industries would be expanded in the demonstration area to include the medium- and small-sized establishments. Through participatory action, citizen organizations in demonstration neighborhoods could begin a local government comprehensive planning process.

Analysis of the industrial data will be extended to include the domestic stream. The analysis will lead to a technical requirements statement for the material that must be treated. Innovative explorations would be made for the most cost effective ways to meet the technical requirements. Solutions may include formalizing the scavenging and recycling operations, joint financing arrangements with industry for building waste water treatment facilities, and private operations of a hazardous and toxic materials treatment facility.

Solutions chosen will be incorporated into the land use component of the comprehensive plan and form the basis for a capital improvement budget financed with public money. This plan will be presented for consideration by NEDA and the Board of Investments. Subsequent approval by the Regional Development Council would trigger the release of money to design and construct public components.

National Interests Respond To Industry-Urban Needs

It is expected that the recommendations made as a result of the industrial audits and the of demonstration projects will raise a number of issues that must be resolved at the national level, and initiate a national dialog on needs to be fixed in order for industry-government partnerships to work. If the scarcity of capital inhibits industry investment in environmentally better processes, then the incentives abandoned in 1984 may be re-instituted; if tariff barriers inhibit adoption of internal efficiencies that result, in failure to meet discharge standards, then the move toward a more open market structure may be accelerated.

While it is not possible to predict all of the national concerns that will emerge from the work in the factories and in the local government units, there is likely to be additional concern about inventorying, storing, transporting and treating hazardous and toxic materials; the operation of the permit and clearance procedures now in place; and the steps needed to further protect the nation's coastal zone and groundwater supplies.

All of the recommended actions are within the original project concept and are targeted for improving the environment for economic growth in the Philippines.

1.0 THE CURRENT SITUATION

1.1 Demographic Context

1.1.1 **Population**

The official May 1, 1990 population estimate for the Philippines is 60,684,887. An overall density of 193 persons per square kilometer is more than double that of either Malaysia or Indonesia. Population growth rates are slowing, but at a pace too slow for economic growth to support. The rate of growth is in excess of 2.3 percent per year.(4)

Rapid urbanization is a fact in the Philippines. The population growth rate of cities is about 3.88 percent per year – far higher than the expected natural increase. A rural-to-urban population shift is expected to continue even at the lowest projected rate of natural increase. Only a small percentage of the expected increase in population over the next 20 years is expected to occur in rural areas.(5)

1.1.2 **Urbanization**

In contrast to rural areas, the cities constitute an information and opportunity rich environment with complex interpersonal and economic networks.

A major share of past urbanization in the Philippines has occurred in the Metropolitan Manila region (defined in Executive Order (EO) No. 392, as the cities of Manila, Quezon, Caloocan and Pasay, and 13 adjacent municipalities in Rizal and Bulacan Provinces). Taken as a single metropolis, the area has a day time population of over 10 million and a resident population of more than 8 million; or about 13.3 percent of the total national population.

The urban and industrial numbers from within the formal boundaries of Metropolitan Manila don't tell the entire story. Classic urban fringe conditions prevail in the provinces both north and south of the formal boundaries. New housing and industrial estates are being built on relatively better agricultural land. The new industrial plants offer jobs and, attract residents to the vicinity. In addition, housing in parts of Cavite and Laguna Provinces, for example, are for residents who will commute to jobs within Metropolitan Manila. A standard metropolitan statistical reporting system would accord an even greater percentage of total population to this extended urban region.

There has been a determined effort on the part of the Government of the Republic of the Philippines (GOP) to slow both the absolute and relative rates of growth in Metropolitan Manila. First, industries were banned from making new starts within 50 miles of the regional boundaries. This was followed by a program of government sponsored industrial estates and export processing zones established in Visayas and Mindanao. However, the attraction of Manila was - and remains – so strong that, with few exceptions, new industrial facilities locate as close as

possible to the edge of the banned area. Such location decisions are being influenced by some bi-lateral donor assistance programs. For example, several donor agencies are assisting in the development of industrial estates in Cavite and Laguna Provinces. (6)

There is no way to underestimate the attraction of the international class port and its extensive import and export handling facilities. Another attraction of Manila, both for people and industry, is that most of the urban infrastructure works better than in other areas of the country.

A 1988 evaluation of the industrial estates and export processing zones observed that, "A combination of measures, and not just the creation of new industrial estates and export processing zones, is required to increase the level of industrial dispersal. Fiscal measures, gradual improvements in basic infrastructure, and short-term programs aimed at releasing specific constraints should also be part of the package(7.). This is particularly important now that many of the urban advantages of Manila are beginning to crumble and choices must be made about the location of infrastructure investments.

1.1.3 Primary Secondary Cities

Led by agribusiness and a number of primary industries that have located outside of Manila, the GOP industrial dispersal policies are beginning to take hold. As a result, the principal secondary cities are demonstrating increasing rates of urban growth.

Metropolitan Cebu has the second largest concentration of population. Metropolitan Cebu is composed of the cities of Cebu, Mandaue and Lapu-Lapu and the municipalities of Talisay and Consolacion. The population of the metropolitan region is estimated to be 1.2 million people.

Davao City is the third largest urban center in the country, with an estimated population above 800,000. Davao City is the largest in terms of land area.

1.1.4 Poverty and Environmental Effects

Concentration of population, commerce, and industry in cities inevitably leads to competition for space which drives up land costs which, in turn drives up the cost of housing. Open land spaces are occupied informally by those workers who cannot afford to buy.

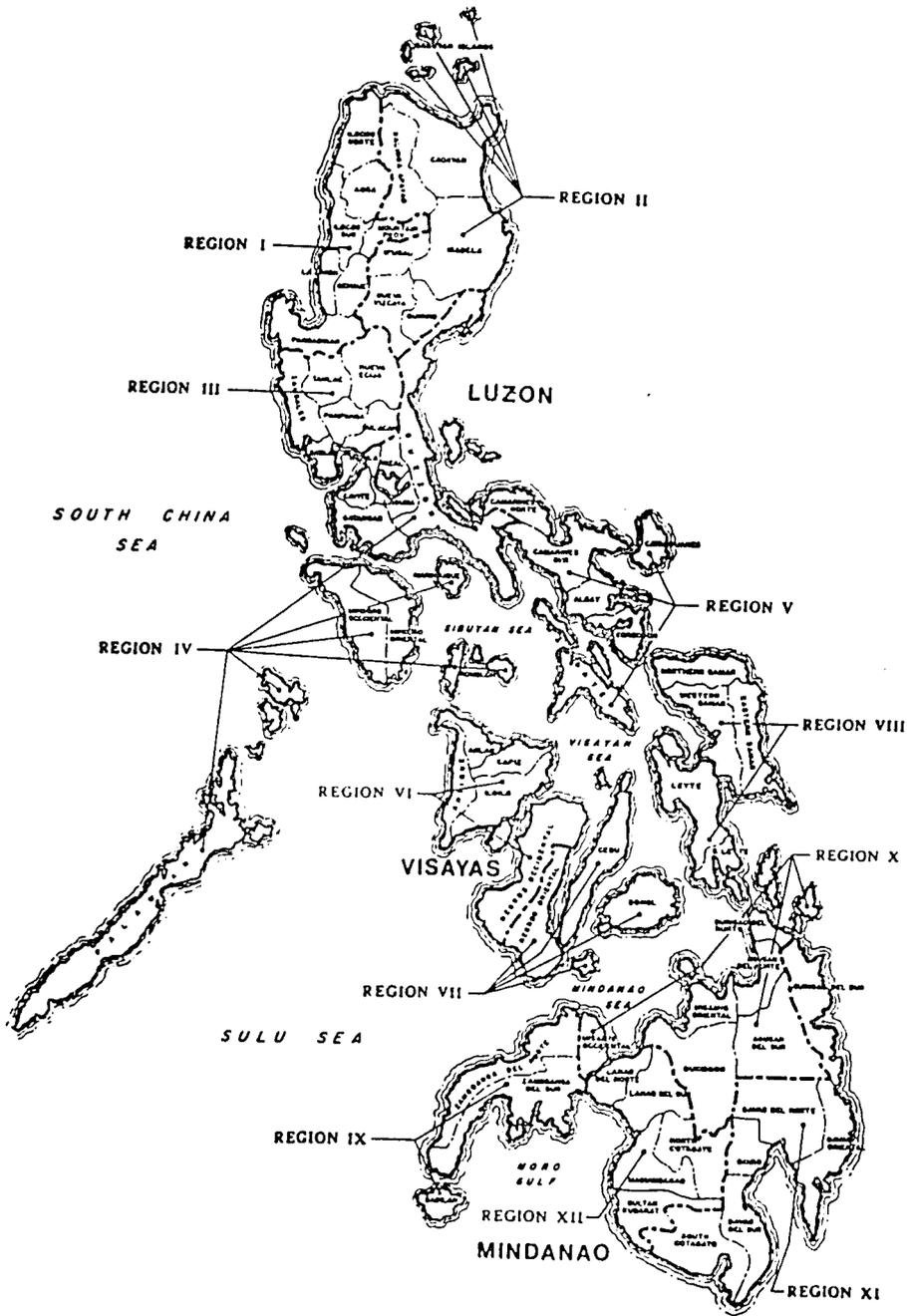
Less recognized is the migration of rural people toward the promise of employment in urban centers. These people have few of the skills needed to gain entry to better paying industrial jobs. This migration is more noticeable in the rapidly growing regional cities. Supporting this conclusion is the fact that of the urban and urbanizing cities and municipalities, Metropolitan Manila has the lowest percentage of poor, 43.9 percent, while other urban areas are relatively worse off. Figures for the representative urban and industrial areas visited during this study show a percentage of poor that range to as high as 69.4 percent from a low of 54.9 percent. The comparative situation is shown in Table 1.

Table 1. Urban poverty levels, selected cities

Region	Urban Areas	Urban Poor (%)
Region VII	(Including Metropolitan Cebu)	60.7
Region VIII	(Including Ormoc)	69.4
Region X	(Including Cagayan de Oro)	54.9
Region XI	(Including Davao and General Santos)	60.3
Region XII	(Including Iligan)	66.5

Source: NSCB. 1990. 1990 Philippines Statistical Yearbook.

Table 2: Base Map of the Philippines



Source: Sustainable Natural Resources Assessment-
Philippines, USAID

1.2 Aquatic Environment

1.2.1 Surface

1.2.1.1 Monitoring

The National Pollution Control Commission (NPCC) established a monitoring program for many rivers and lakes during the period 1972 to 1982. The design called for annual and biannual samplings of major rivers throughout the country and monthly sampling for rivers in and around Metropolitan Manila. Increasingly constricted budgets since then have restricted sampling to infrequent intervals on only rivers in and adjacent to Metropolitan Manila.

The Laguna Lake Development Authority (LLDA) carries out a regular monitoring program in Laguna de Bay and its watershed.

There is no consistent water quality monitoring program in the Philippines. Available equipment is limited in amount and location. Most of the donated equipment had no provision for sustaining its operation and maintenance.

1.2.1.2 Studies

Samples of Manila Bay were taken by the NPCC under contract to the Metropolitan Waterworks and Sewerage System (MWSS). The study established dispersion, mixing patterns, dissolved oxygen level (DO), and various physical and chemical parameters, such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), coliform bacteria, mercury and toxic heavy metals. The results for total coliform bacteria and for fecal coliform bacteria, shown in Table 2, clearly indicate dangerously polluted conditions. No trends can be determined without systematic monitoring.

The World Health Organization (WHO), MWSS, and the Laguna Lake Development Authority conducted an initial water quality study of the Laguna de Bay. The study originally concentrated on the nutrient balance in the lake, and was later expanded to cover other physical and chemical parameters. The results are included in a 12 volume report.(8) Again, without reliable monitoring data, trends cannot be stated.

Limited water quality sampling was done between 1970 and 1972 in Mactan Channel and major rivers in Cebu Province as part of the sewerage program for the Central Visayas Urban Project.

There is currently a study of the Pasig River being conducted by the Environmental Management Bureau (EMB) with financial support from the Danish International Development Agency (DANIDA).

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Table 3. 1985 Geometric Mean of Total Coliform and Fecal Coliform from selected stations in Manila Bay

STATION	NO. OF SAMPLES		GEOMETRIC MEAN TC OR FC % 1,000/100 ml			% OF SAMPLES EXCEEDING 1,000 TC OR FC/100 ml	QUALITY SATISFACTORY FOR SB ^c WATERS
	TC ^a	FC ^b	TC ^a	FC ^b	TC ^a		
Navotas	13	13	512.120	130.578	100	92	No
North Harbor	24	24	79.339	18.383	100	87	No
Luneta	24	24	297.640	91.435	100	100	No
CCP	24	24	17.361	6.502	100	87	No
DCP	24	24	22.504	6.679	92	87	No
Bacoor	24	24	62.254	17.086	100	100	No
El Nido	24	24	3.431	1.044	75	46	No
Villamar	24	24	4.128	1.355	75	100	No
Viva Mabuhay	24	24	4.369	1.375	84	46	No
San Isidro	23	23	12.955	4.536	79	79	No
San Agustin	24	24	10.679	3.045	87	80	No
Starfish	14	14	19.982	5.591	100	86	No
Villa Susana	24	24	12.960	4.520	96	84	No
Garden Coast	24	24	3.408	0.915	67	54	No
Rikkitoy	23	23	3.522	0.846	67	46	No
Punta Grande	24	24	3.332	0.976	63	50	No

^a - Total Coliform

^b - Fecal Coliform

^c - Marine and estuarine waters whose best usage is for primary contact recreation

Source: Manila Bay Monitoring Program (Final Report), 1986.

1.2.2 Domestic Water Supply and Sewerage

Prior to 1968, technical, financial, and supervisory support for water supply and sewage collection and treatment nationwide were the province of the National Water and Sewerage Administration (NAWASA). Since 1968, the technical, financial and operating responsibility for water supply and sewage collection and treatment in Metropolitan Manila, and some contiguous areas, has been assumed by the Metropolitan Waterworks and Sewerage System (MWSS). The mantle of the old NAWASA for the rest of the country now rests with the Local Water Utilities Administration (LWUA).

The majority of water supply for Metropolitan Manila and the cities of San Jose, Zamboanga and Olongapo come from surface water impoundments and treatment. The balance, or overwhelming majority, of all urban and industrial water is drawn from groundwater.

With their limited budgets, MWSS and LWUA have concentrated, on the development of water supply systems rather than on complementary waste water systems even though the MWSS charter directs it to plan, build, and operate both water and sewerage systems and the LWUA is authorized to encourage autonomous local water districts to do the same.

Septic tanks and pit privies are the most common methods of disposing of sanitary waste. Due to soil conditions in most cities and high housing densities restricting the size of leaching fields, septic tanks do not operate very efficiently and are seldom emptied. Given the physical constraints, and the fact that very few tanks are cleaned annually, houses and other facilities that are served by septic tanks virtually discharge untreated sewage into storm drains, gutters, or streams. The situation is exacerbated in the rainy season.

The majority of the existing inventory of waste water collection and treatment systems was designed and constructed during the early 1900's. Notable exceptions are those collection systems and treatment plants built and amortized by developers, such as the Ayala Corporation, as part of the build out of residential and commercial properties.

1.2.2.1 New Residential Development

Part of the difficulty in dealing with new sources of domestic and commercial sewage is the sometimes conflicting interests and goals of the government agencies involved. The authority to license residential subdivisions rests with the Housing and Land Use Regulatory Board (HLURB). These regulatory powers stem from the National Housing Authority (NHA) legislation. Because the NHA's main mandate is for low cost housing and affordability, HLURB policies tend to follow the same pattern. HLURB does not require developers to construct and maintain sewers and sewerage treatment plants. In 1980, the NPCC issued rules and regulations controlling domestic waste water discharges which were in conflict with HLURB rules and regulations. The NPCC regulations have been inherited by the Environmental Management Bureau. Neither set of regulations has been amended or repealed.

1.2.2.2 Ambient Water Standards

In 1972, the NPCC promulgated surface water standards. The standards adopted were similar to those then in force in the U.S. State of California. Stream standards of such specificity require extensive monitoring to be effective. Lacking such a system, the standards were actually enforced as effluent standards by defining the quality of the water to be discharged. Industries complained, understandably, and caused promulgation of the revised effluent standards adopted in 1978. Both effluent and stream standards were revised again in 1990.

The revised Water Usage and Classification Standards establish numerical water quality criteria for water bodies based on their designated uses. Effluent regulations apply to all industrial and municipal waste water sources, with different standards for new and existing sources. In the next few years, all existing point sources are to come into compliance with the new point source standards.

1.2.2.3 Non-Point Sources

There are two main sources of non-point discharges into ambient water bodies. The first is "urban wash" which is simply the collective term for all the material that runs off from impervious urban surfaces such as roofs and pavements. This is of concern in urban environmental management especially when the storm drains discharge directly into bay systems that support highly productive fisheries.

The second source is run-off from agricultural fields. This subject is beyond the scope of a profile of urban and industrial environmental management. However, there are many interactions. For example, the utility of Laguna de Bay for fish production may be more influenced by fertilizer, pesticide, and herbicide residues carried in run-off from agricultural fields than from industrial effluents.

1.2.3 Sub-Surface

1.2.3.1 Supply

The use of groundwater for domestic and industrial supplies is given priority over surface water due to the low cost of extraction and treatment. At times, a deep well and pumping equipment is needed, but in some cases, such as in Davao City, only a pump is needed since the water is flowing from artesian pressure. The most common treatment required is chlorination for disinfection. In a few cases, treatment for high levels of iron and manganese is required, and some industrial users soften and demineralize groundwater before using it for process water.

Supplies from deep wells that tap aquifers should not be confused with shallow, surficial wells. An unknown number of rural dwellers depend upon such wells for their water supply. The wells

are fed by direct percolation of rainwater from the surface. The wells are easily contaminated and are often the source of cholera and typhoid outbreaks.

Although deep groundwater is utilized by a large segment of the population, by industry, and by agriculture, there has been no demonstrated movement to protect this resource from contamination. Land controls are badly needed in the recharge areas as well as near the well-head to protect this valuable resource.

The 1978 version of the Water Usage and Classification Standards extended classification and regulation to ground water. Unfortunately, the coverage of ground water resources was dropped in the 1990 revisions. Currently, there are no regulatory standards for ground water.

1.2.3.2 Salt Water Intrusion

Due to small recharge basins and proximity to the sea, most groundwater resources in the Philippines are susceptible to salt water intrusion. Urban centers, such as Manila, Cebu, Bacolod, Davao, and Cagayan de Oro have experienced salt water intrusions as have many areas in Panay.

The National Environmental Protection Council in 1984 commissioned a study to assess the extent and gravity of saltwater intrusion in several areas throughout the country. Metropolitan Manila, Metropolitan Cebu, Bulacan, Pampanga, Capiz, and Sorsogon were examined. The data established that Metropolitan Manila and Metropolitan Cebu were experiencing progressive salt water intrusion due to over-pumping of ground water. The characteristics of salt water intrusion are shown in Figure 3.

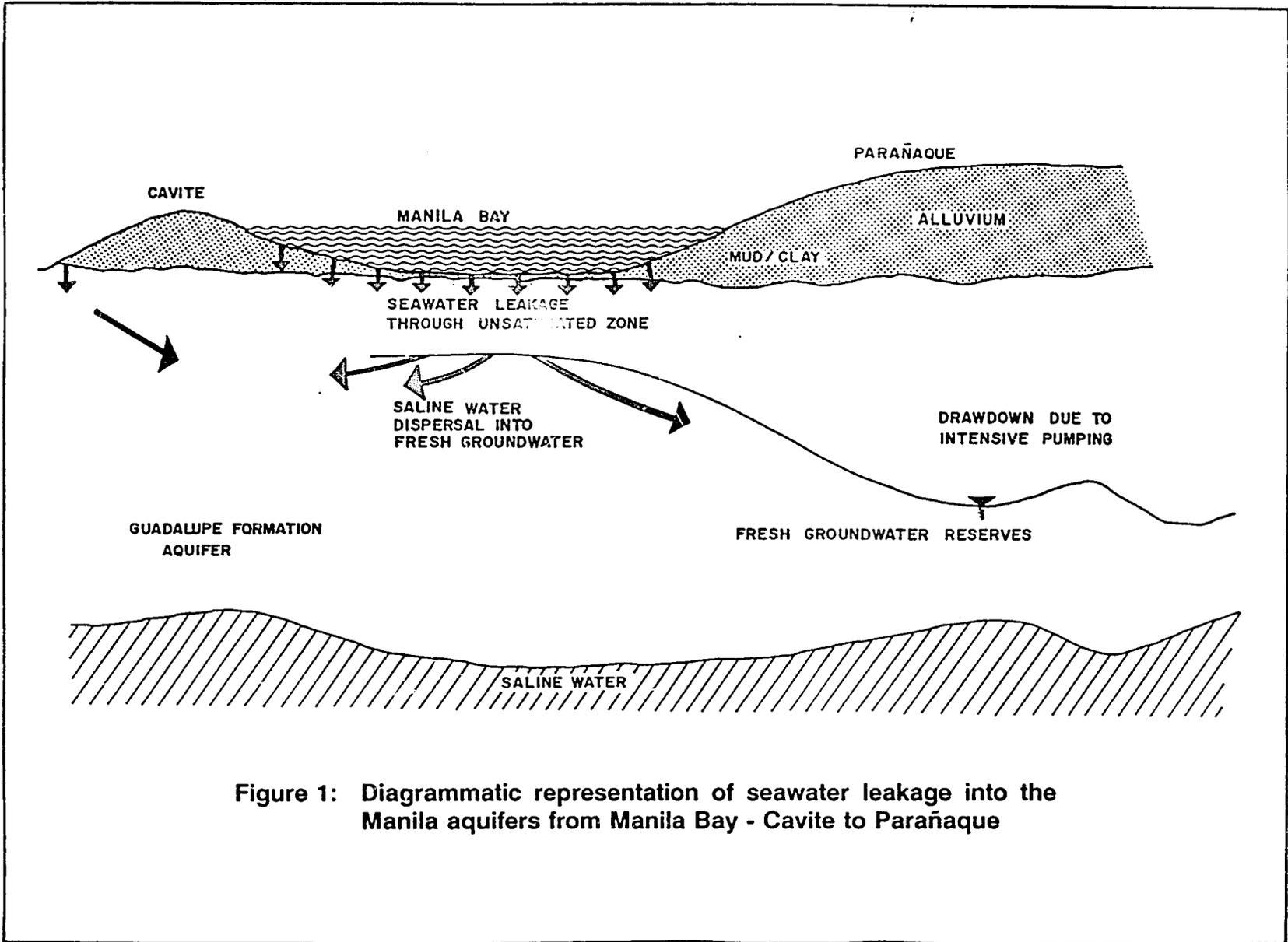


Figure 1: Diagrammatic representation of seawater leakage into the Manila aquifers from Manila Bay - Cavite to Parañaque

Coastal areas of Bulacan and Pampanga have been subject to long standing naturally occurring ground water salinity in 1984. Roxas City in the Province of Capiz was experiencing tidal salinity in its water supply intake. In all likelihood, the situation in each of these locations has become worse in the intervening seven years.

The National Water Resources Board (NWRB) has the authority to license and control the drilling of wells and extracting the water. Even though regulations and a licensing procedure exist, no evidence was found to indicate that the NWRB used well drilling as a means of research or monitoring, nor is there evidence that well head and/or aquifer recharge protection zones are considered in managing the sub-surface water supply.

1.2.4 The Coastal Zone

The statement that everything that happens in the Philippines affects the coastal zone is true. This is so because the inter-tidal waters of the country act as a receptacle for all materials, point and non-point in origin, that are carried downstream by the rivers.

Most urban and industrial developments in the Philippines occur on the coastline. Therefore, the vast majority of urban and industrial pollution show up as problems in the coastal zone.

There is clear evidence that pollution in the sea causes public health problems, especially in the case of viruses and pathogens in recreational areas, and mercury and PCB's in seafood. Pollution also is known to reduce fish production.

The Philippines has only a very narrow continental shelf and no areas of upwelling where nutrient-rich deep ocean water comes to the surface. Upwellings also tend to dilute pollutants entering from on-shore. Therefore, Philippine fish production is dependent on the nutrients entering the system from coral reef and mangrove habitats and on non-polluted coastal waters.

Unfortunately, very little data on marine pollution exist in this country apart from studies of Manila Bay referred to above. Reviews of data from other urban and industrialized coastlines are the only available method of identifying industries, pollutants, and geographic areas of potential concern.

1.3 **Terrestrial**

1.3.1 **Solid Waste**

1.3.1.1 **Domestic**

1.3.1.1.1 **Local Government**

Collecting and handling of solid waste is largely the responsibility of local units of government (LGU). There is statutory precedent for the Department of Public Works and Highways (DPWH) to construct sanitary landfills, and authority for the Department of Health (DOH) to provide guidelines and technical assistance in all phases of waste management.

1.3.1.1.2 **Waste Characteristics**

The per capita per day solid waste generation rate in urban centers (where measurements have been taken) is approximately 0.5 kilograms (kg) with an average density of 250 kg/liter (l). The average volume at curb is two liters/capita/day. This solid waste has an average heating value from 1,100 to 1,300 British Thermal Units (Btu) per pound. The low heating value is due to high moisture content, ranging from 70 percent in the rainy season to 40 percent during the dry season.

At present, it costs approximately ₱4 to ₱5 per cubic meter (m^3) to dispose of solid waste in open dumps; the estimated cost of developing and operating a sanitary landfill may reach ₱40 to ₱60/ m^3 with the variation a function of the availability of suitable cover material. For this reason, all the solid waste in the country that is collected is disposed of in open dumps. There is no evidence that there is anything that can technically qualify as a sanitary landfill operating in the country.

Despite the low open dump costs and the low percentage of total volume that is actually collected, solid waste management is one of the larger line items in all municipal budgets.

1.3.1.1.3 **Inter-Media Effect**

Most of the uncollected solid wastes are dumped in the backyard, streams and canals. The solid waste in backyards and in street heaps are frequently washed into the water bodies. Some open dumps are adjacent to water bodies and the waste material sloughs into the water on a regular basis. It is conceivable that up to the equivalent of 140 grams (g) per capita per day of BOD is contributed to water bodies by uncollected solid wastes. This is a far higher value than leachate from the dumps themselves.

1.3.1.1.4 Studies

The solid waste situation in Metropolitan Manila has been extensively studied since 1972. There are to date 14 reports and feasibility studies that have been completed under the aegis of various international and bilateral donor agencies.

The Economic Support Fund (ESF) Secretariat of the GOP has funds coursed through USAID, to assist those communities impacted by the existence of U.S. Military installations and for other purposes. The Secretariat has conducted solid waste studies and paid for development activities in two cities in La Union Province, one city in Pampanga Province and three cities in Zambales Province. Without exception all desperately need urban environmental management infrastructure, but investments are made according to local government priorities. The Olongapo administration chose to use ESF money to support a resource recovery center in Pagasa. It failed partially due to lack of municipal commitment. The current mayor made a commitment. Using ESF money, Olongapo has an operative solid waste management system, including the nearest thing to a sanitary landfill in the country. Except for Olongapo in Zambales Province and San Fernando in La Union Province, the other municipalities have chosen to invest in other infrastructure, such as school buildings and roads. What has been learned from the Olongapo experience is that municipal commitment coupled with an available funding source can break the inertia that handicaps the solving urban solid waste problems.

In 1982 the NEPC gave ₱50,000 grants to each of the provincial capitals to carry out solid waste management studies. Due to the inadequacy of the funding provided, very few of the cities and municipalities accepted the grants or did any work. In 1981, the International Bank for Reconstruction and Development (World Bank) funded solid waste management studies for Iloilo, Tacloban, Bacolod, Cagayan de Oro, and Davao City. One of the studies is included in the 14 conducted for Metropolitan Manila. System designs were completed in 1983 but nothing has yet been built.

1.3.1.1.5 Recycling

The present household scavenger system in most urban areas is remarkably efficient. Separation begins in the household and continues through a series of scavengers who operate in the neighborhood heaps and in the dump sites themselves. Glass, metal of all kinds, rubber, hemp, nylon cordage, and a considerable amount of the paper, cardboard and polyethylene plastic is removed and carried to middle men who move it to enterprises that specialize in recycling a reusing one kind of material. It is not completely clear how the social organization functions – assigning territories or materials, for example – but the appearance is that the operations are quite rigidly controlled and regulated. Neither is it clear how the recycling functions.

There are no estimates of the total number of individuals or families that make all or a major part of their livelihood from this scavaging-reusing system.

1.3.1.1.6 Toxic and Hazardous Materials

While each household may discard only very small amounts of hazardous materials, in total the amount discarded in domestic waste is very large. Included in this stream, 30 percent of which may never be collected, are materials such as flashlight batteries, paints, medicines, solvents, and beauty aids. Even household smoke alarms contain Americium, a radioactive substance. Asbestos may be found in old roofing and in air conditioning unit insulators.

1.3.1.2 Industrial

1.3.1.2.1 Standard Loads

A number of private waste management contractors serve the industrial sector. The current practice is for a selected contractor to pay an industrial firm for all the total amount of by-products and residues produced. The contractor periodically hauls away the gross amount. He removes and sells those items for which there is a market thereafter depositing the "unusable" material at a dump site. The amount paid by the contractor depends upon his estimate of the value of the recoverable and useable material to be picked up. Companies with very low quantities of recyclable materials pay contractors to haul their wastes to dump sites.

Since the system only sorts out those materials that are reusable with existing technology and/or price structure, toxic and hazardous materials are seldom removed before being dumped. Once in the dump, toxic and hazardous material become a hazard to those who scavenge on the dump and make the dump contents unsuitable for composting or other uses.

1.3.1.2.2 Toxic and Hazardous Loads

The Toxic Substance and Hazardous and Nuclear Wastes Control Act of 1990 (RA 6969) grants extremely broad regulatory powers to DENR. Unlike many other environmental statutes, which focus primarily on wastes and discharges ("end of pipe" controls), RA 6969 grants DENR broad authority to regulate the entire life cycle of a chemical or chemical mixture from its point of manufacture to ultimate disposal. An interagency task force, chaired by EMB is presently drafting regulations as required by the statute. The regulations will give substance to the statutory requirements for maintaining an inventory of chemicals manufactured or used in the Philippines and to test new chemicals and chemical mixtures prior to use in the country.

Very little information was found regarding the volume, character, or location of toxic and hazardous materials in the Philippines.

1.3.1.2.3 Medical Waste

Disposal of waste generated by hospitals and other health care facilities has gained new importance with the threat of Acquired Immune Deficiency Syndrome (AIDS), but they have

always posed health problems in that much tissue and disposable implements carry pathogens that can infect those who subsequently handle them. Since hospitals use high quality polyethylene bags to contain their waste, and the bags are attractive by dump scavengers, those who are part of the materials recycling system are at high risk of contracting diseases of one kind or another.

Another complexity facing regulators is the statutory requirement for hospitals to build, operate, and maintain incinerators. Major public institutions could meet the requirement. But many small clinics and private facilities, originally built in pursuit of GOP policy to make medical care more easily accessible, are now in serious financial condition. They claim to be unable to afford such facilities. Rigid regulatory action obviously serves one public purpose, but if pursued, defeats another public purpose.

1.3.2 Land Use Controls

The study of industrial dispersal referred to above (7), makes a considerable point of what the authors call "The Spatial Orientation of Dispersal". They contend that: "Zoning regulations should be adopted that apply strict environmental regulations and raise permit costs for industrial location in Manila well above those in the regions."

Between 1976 and 1978, the then Human Settlements Commission directed each municipality and city to prepare a master plan for development. Three classes of land use were recognized: agriculture, residential, and industrial. All cities and municipalities have such plans.

Under the "Local Autonomy Act," municipal and city governments are empowered to enact zoning regulations to attain desirable patterns of land use. Interestingly, however, the national government also exercises general powers in providing for zoning measures, such as that through the National Building Code (PD No. 1096) and the uniform application of measures prescribed by the Housing and Land Use Regulatory Board (HLURB).

In theory, the HLURB bases its approval of developments upon existing municipal plans. However, HLURB may issue a waiver of the master plan if a resolution requesting a change is adopted by the Municipal Council and approved by the Mayor. But HLURB has no fixed guidelines and standards for the separation of various land uses. Nor does it seem that any other agency has such guidelines (including EMB in judging EIA/EIS).

Evidence is not yet clear whether sufficient buffers are being built into the land use controls for new industrial estates or whether the size and treatment of the buffers is suited to the type of manufacturing activity within the estate.

1.4 The Gaseous Medium

The statutory authority for controlling air quality is RA No. 3931, under which a National Water and Air Pollution Control Commission was formed. Under this authority, the National Ambient Air Quality Standards were issued in 1978. They set standards for particulates, sulfur dioxide (SO₂), photochemical oxidants, nitrogen dioxide (NO₂), and carbon monoxide (CO). These standards specify maximum permissible emission rates for specific pollutants from stationary sources and designate maximum permissible ambient concentrations for certain metals and other pollutants.

1.4.1 Fixed Sources

The main source of industrial air pollution is from energy generating facilities. Other sources are cement factories, fertilizer factories, steel mills, copper smelters, and chemical factories. As was noted earlier, without a system of continuous monitoring, it is not possible to comment on the status of air quality in the Philippines. Field observations, however, support the contention that there are serious localized conditions. One example is the coating of fine dust deposited in the vicinity of the Iligan Cement factory.

Emissions from thermal energy generating facilities are related to urban and industrial environmental management in the Philippines. There are old generating facilities in the midst of urban centers, such as the old Rockwell plant in Metropolitan Manila. There is increasing use of extremely low quality local coal. Even in combination with high grade imported coal, use of the local fuel will require highly efficient scrubber systems. Finally, many generating plants that are located long distance from the urban centers they serve. Examples are the Batangas and Bicol facilities that feed the Luzon grid.

1.4.2 Mobile Sources

Motor vehicles are the major source of air pollutants. High emission rates from motor vehicles are due to the high cost of maintenance and acquisition of new rolling stock. With regards to public transport vehicles, a re-examination of the present boundary system would assist in improving maintenance of rolling stock and reducing air pollution.

The levels of pollutants in the air caused by mobile sources is indicated by the black smoke-belching vehicles and the presence of smog in most urban areas, particularly Metropolitan Manila. Allowable concentrations of Total Suspended Particulates (TSP), for example, is 180 micrograms per m³ for 24 hours or 250 micrograms/m³ for a one hour exposure. Readings in Metropolitan Manila have registered as high as 340 micrograms/m³ with many other readings approaching 250 micrograms/m³.(9)

1.5 Status of Major Present and Probable Projects

Interest in the urban and industrial environmental management sector has grown spectacularly in the past two years. Both donors and economically developing countries are realizing that sustainable development depends on a healthy environment. They are startled by news of the high costs of rapid, uncontrolled development in places, such as Formosa and Taiwan.

The Philippines is no exception. Development agencies have been long working on planning for the growth of this sector. For example, an examination of USAID-supported projects reveals substantial support for urban housing projects and for encouraging industrial development. Similarly, the World Bank has consistently offered to support what are called "urban development" projects. However, other than financing studies, the pace of which has been accelerating recently, there have been very few actual projects—mostly urban sewer systems specifically designed to deal with the complex issues posed by urban and industrial environmental management.

Included in the study category were two U.S. Trade and Development Program assisted feasibility studies. One was of industrial waste management in the Laguna de Bay region and the other was one of the 14 solid waste management studies in Metropolitan Manila. The implementing government agencies were the (LLDA) and the DPWH.

As in other aspects of this description of the current situation, it is well to divide discussion between Metropolitan Manila and the rest of the country.

1.5.1 Projects for Metropolitan Manila

As noted earlier, 14 or more studies of one phase or another of urban and industrial environmental management have been completed for Metropolitan Manila and vicinity. The most recent report released is: Manila Metropolitan Region Environmental Improvement Study. (6) The work was done for DENR, EMB by James M. Montgomery, Consulting Engineers, Inc. in association with Philnor Consultants and Planners, Inc. The bibliography lists the majority of the earlier studies and reports. In addition, the Montgomery Report, which was funded by a Technical Assistance Grant from the Asian Development Bank (ADB), recommends a series of strategies for dealing with environmental improvement. The total estimated cost for the recommended "Integrated Environmental Improvement Action Plan is US\$610 million; US\$297 million for flood control which has not been considered in the statements of current condition presented in this chapter. That still leaves US\$313 million to be found for solid waste and water quality management.

Very similar data were developed by Myra Hechanova, a consultant to the World Bank. (10)

1.5.1.1 Water and Sewer

Loans

There exists a master plan for a regional waste water interceptor system. Budgeting for its construction is segmented. The first phase of funding, dubbed Metropolitan Sewer System I (METROSS I) has been disbursed. Loan funds to pay for construction of METROSS II are being sought. These costs are included in the Montgomery estimates cited above.

The ADB Office of Environment is contemplating a \$200 million Environmental Sector Loan. While there may be disagreement within the ADB whether the focus should be upon Metropolitan Manila, limited to other areas of the country, or include both, the intent is comprehensive and will include financing for solving urban and industrial environmental problems.

The Manila South Water Distribution Project has been financed by an ADB loan.

Grants

The Pasig River Rehabilitation Project is financed by a grant from the Danish International Development Agency (DANIDA). The approach is to catalog the location and characteristics of all effluents discharged into the Pasig River and to make recommendations for restoring the life to the river.

An ADB technical assistance grant is the basis for the DENR/EMB directed work to revive the Bulacan River. Heavy PVO involvement also exists.

Additionally ADB technical assistance grant funds are being used for the design of the Montalban/San Mateo/Marikina Water Supply Project.

1.5.1.2 Industrial Environmental Management

The World Bank has made available a technical assistance grant to support a major study of Industrial Efficiency and Pollution Control in Metropolitan Manila. The project is to be jointly managed by the DENR and the Department of Trade and Industry.

The study is designed to be a precursor for an estimated US\$100 million loan program for Metropolitan Manila.

1.5.1.3 Gaseous

ADB plans a technical assistance grant for a Mobile Emission Source Study for Metropolitan Manila.

The Italian government has made a grant to support the design and implementation of Air Quality Management program in Metropolitan Manila.

1.5.1.4 Projects in Metropolitan Cebu

Water and Sewer

With a technical assistance grant through the Japan International Cooperation Agency (JICA) and loan funds from the Japan Overseas Economic Development Fund (OECD), plans for water supply and waste water collection and treatment are being made and implemented in Metropolitan Cebu.

Further development planning for Metropolitan Cebu water supply will be supported by a technical assistance grant from the ADB.

Solid Waste

Technical Assistance for solid waste management is being provided by the German Technical Assistance Agency (GTZ). It is not certain whether the planning will become operational.

1.5.1.5 Regional Projects

Luzon

The active Energy Sector Project, assisted by loan funds from the World Bank, is limited to Luzon Island. There is a significant environmental component within the project.

Western Visayas

A Development Master Plan is envisioned for the Western Visayas area under terms of a planned ADB technical assistance grant.

1.5.1.6 Unlimited

Urban Development

The ADB has had under preparation for some time an Urban Development Sector Loan. The terms of reference for the consultants engaged to design the project suggest many issues directly involved in urban and industrial environmental management will be included.

The grant component of the USAID-assisted Decentralized Shelter and Urban Development Project will chartered cities wishing to secure the housing loan guarantees in the preparation of an acceptable capital improvement budgets.

1.5.1.7 Coastal Zone

The USAID-assisted Association of Southern East Asian Nations (ASEAN) Coastal Resource Management Project is active. These are grant funds available..

In addition, the Australian International Development Assistance Bureau (AIDAB) is assisting the ASEAN-Australian Coastal Living Resources Project.

1.5.1.8 Other

Active

The World Bank is providing loan financing for an Industrial Restructuring Project.

The Canadian International Research and Development Center (IDRC) has grant funds available to support the operation of a pilot Industrial Waste Exchange System Project.

The Canadian International Development Agency (CIDA) is supporting an Environmental Management Project with grant funds.

The Australian International Development Assistance Bureau (AIDAB), provides grant support for the operation of the National Mapping and Resource Information Agency (NAMRIA), and the Land Survey and Titling Project, among others.

Planned ADB Projects include: a technical assistance grant to assist in Developing a Computer Based Information System, a technical assistance grant to assist in Developing and Environmental Education Program, and a technical assistance grant to improve and strengthen the Environmental Impact Assessment process.

1.5.2 Projects With Potential for Environmental Improvement

There are several on-going or planned donor-assisted projects that have potential to be useful for urban and industrial environmental management. The majority are designed to support GOP policies for industrial dispersion. The quotation from a report analyzing the dispersal policy's performance, cited earlier, presented clear evidence that the industrial and export zone estates did not pay careful attention to their impacts on the human environment. Programs such as the USAID-assisted Southern Mindanao Development Program, illustrate how planning for economic, social, biological, physical, and institutional concerns can be applied to making decisions in accord with the Philippine Strategy for Sustainable Development (see Chapter 2).

The record is not clear whether project thrusts, such as the CALABARZON development project, will help alleviate, or will contribute to, the urban environmental management problems in areas where new estates are being encouraged.

Similarly, the planned ADB technical assistance grant for Developing Hospital Services may or may not include an element addressing the problem of medical waste. If it deals only with expanding hospital numbers and capacity, then the contribution to the waste stream will become worse; if it deals with finding economically feasible solutions to handling medical wastes, then it may aid in alleviating the severe existing problem.

1.5.3 In Summary

In summary, there is not a great deal of donor support activity in the urban and industrial environmental management area. The major loan assisted projects are concentrated in Metropolitan Manila, but even though quite large in absolute terms, they constitute only a small portion of the estimated total costs of meeting the back-log of liquid, solid, and gaseous issues in the metropolis. Other than three projects in Metropolitan Cebu, there are no problem specific projects elsewhere in the country.

**Figure 2 Active and Planned Donor-Assisted Projects
Related to Urban and Industrial Environmental Management**

Sector	Activity	Donor	Duration	Donor Funding (\$000)
Water	Pasig River Rehabilitation	DANIDA	1990-94	1.9 M
	ASEAN Coastal Resources Management	USAID	1984-91	2.5 M
	ASEAN-Australian Coastal Living Resources Management	AIDAB	1985-94	13.6 M
	Bulacan Rivers Revival	ADB	Planned	not applicable
	Montalban/San Mateo/Marikina Water Supply	ADB	Planned	1,238.0
	Manila South Water Distribution	ADB	Planned	35.2 M
	Water/Wastewater in Cebu	JICA/OECF	Planned	
	Metro Cebu Water Supply	ADB	Planned	2.0 M
Land	Solid Waste Management in Cebu	GTZ	Planned	4.5 M
	Hospital Services Development	ADB	Planned	100.0
Air	Air Quality Management in Metro Manila	Italy	Planned	1.0 M
	Mobile Emission Source Study for Metro Manila	ADB	Planned	830.0
Other	Industrial Efficiency and Pollution Control in Metro Manila	World Bank	1991-92	750.0
	Energy Sector Loan, Environmental Component	World Bank	1991-94	200.0
	Industrial Restructuring Project	World Bank	On-going	
	Environmental Management	CIDA	Active	3,000.0
	Environment Sector Loan	ADB	Planned	300.0
	Urban Development Sector Loan	ADB	Planned	50.0 M
	Development of Computer-Based Information System	ADB	Planned	not applicable
	Environmental Education	ADB	Planned	100.0
	Western Visayas Development Master Plan	ADB	Planned	1,336.0
	Environmental Impact Assessment	ADB	Planned	500.0
	Regional Municipal Development	ADB	Planned	40.0 M

2.0 ECONOMIC AND POLICY FRAMEWORK

2.1 Economic Principles

The economics of urban and industrial environmental management reflect the complexities outlined in the introduction to this report. For one set of decision-makers, the micro-economics of the firm are dominant; for another set of decision-makers, the macro economics of sector development are most prominent; and for another set of decision-makers, the principles of welfare economics are paramount. There are at least two other dimensions of urban and industrial environmental problems that deserve economic rationales: risk sharing and investment inhibitors.

The concept of externalities provides a convenient framework for characterizing the situation. Economic theory assumes that firms maximize profits and individuals maximize utility. Only individual costs, not costs which are borne by society as a whole, are normally considered in the maximization process. The disparity between the private decision-making process and the public good is referred to as the externalities problem.

As with nearly all other aspects of urban and industrial environmental management, there are trade-offs among each of the sets.

2.1.1 Macro-Economic Dimension

Current economic policies are designed, first, to generate manufacturing employment and, second, to dispersing the new employment in some equitable fashion, throughout the country. The benefits are those traditionally associated with development: high employment rates, increased per family income, and increased public revenues to pay for expanded social services, such as education and health care.

Decision-making at the macro scale takes place at the national government and in corporate strategic planning. In general, present policies are organized to provide incentives for rapid industrial growth. There are many examples. One that is relevant is the organization of infrastructure support for industrial estates in the four-province region called CALABARZON. Other examples are the use of agro-processing enterprises to anchor dispersed industrial development in places such as General Santos City.

There is currently very little discussion in macro-economic literature on the interrelationship of industrial development with sustainable development and *vice versa*. This may be eased with the completion of the USAID-assisted component of the Natural Resources Management Program that is to develop a method of incorporating environmental and natural resource use into the system of national accounts.

There is growing evidence that location decisions made by large financially stable manufacturing firms are influenced by their perceptions of environmental conditions. The effect on macro-economics has two dimensions. The first is that the firms are eager to know whether everyone will be held to the same standards. Second, their perceptions of how well a government and its infrastructure works is shaped as much by the obvious condition of solid, of waste management systems and living conditions as by the transportation and communications infrastructure. There are no data from which to estimate the marginal loss of new plant locations because of the lack of functional urban and industrial environmental infrastructure.

2.1.2 Economics of the Firm

The driving forces for firms are the production function, which gauges the marginal efficiency of investment in production, and the cost curve where the value of inputs is compared with the value of outputs. These are the factors that most influence the profit and loss statements of firms.

The decision-makers are corporate officers --those who deal with the balance sheet--and plant managers--technical people who deal with the chemistry or mechanics of production. The decisions are internal to the firm.¹

These are the economic principles that govern the majority of the decisions about industrial environmental management. It is this milieu in which tax incentives, new technologies, and the desirability of recycling or reusing materials are considered and investment decisions made. Obviously, changes that will add to the profit of the firm are likely to be adopted quickly; changes that result in additional net costs will, on the basis of micro-economic theory, be rejected.

There is one further element in this last decision-making step: the degree to which the additional costs can be passed through to the consumer. Here, other principles derived from marketing strategy, such as consideration of market share now claimed and the impact the proposed price increase will have on that share, and hence gross income, will enter into the final decision.

Some decisions are being made, (particularly by American multi-national firms) that seek to avoid future costs arising from contingent liability for today's actions. In other words, they do not want to be accused of, or worse, sued because of pollution whether in the U.S. or abroad. This gives rise to their concern over a "level playing field" where everyone, including their competitors, are required to meet the same standards.

¹ There are exceptions. Some firms are motivated by an intense desire to appear to be acting as a "good neighbor." To further public, or consumer, impressions, they are willing to expend money to gain what may appear to be an external benefit. However, even in this case the market will register internal benefits and set prices for "good will." The point is, however, that public spirited firms do make investments that do not seem to be economically rational.

2.1.3 Welfare Economics

This is the branch of economics having to do with measuring impacts upon society. It is within the sphere of welfare economics that the majority of public decisions are made. To the degree that impacts of internal decisions made by the firm impact on part of society that does not make or influence the decision, the effects are external to the firm. It is in the realm of welfare economics that the effects of externalities are considered.

A significant portion of the impact of environmental pollution is born by individuals in the form of diminished quality of life. Although the costs of environmental pollution are not readily quantifiable, they represent significant costs in terms of their effects on human health, the natural environment, property and materials, and over-all economic activity.

However, the social responsibility of government to protect the public health and welfare of its citizens is the core of urban environmental management. Public services, such as solid, liquid, and gaseous waste collection and treatment, are thought to produce social benefits that exceed the costs. In this area, public entities should consider all contributors to the waste stream as possessing the same status whether major manufacturing plant or household, but they seldom do. The by-products and residuals are to be handled in the public interest.

Other aspects of urban environmental management, although sometimes addressed by more specialized groups, such as land economists, are subject to analysis through welfare economics. In the specific instance of maintaining open space or a naturally operative stream ecosystem, societal -- or welfare -- gains are involved.

Methods of paying for the social benefits of well operated environmental management systems are also an issue. The first method is to use general revenues to pay the costs to the governmental unit managing the waste system. The second method in general use is the service fee. That is, all those who use an environmental service, such as household waste pickup, are charged some portion of the total cost of the service. The third method in general use is a tipping fee at the disposal site. Each has its strengths and weaknesses when considered in economic terms.

2.1.4 When The Three are Combined

2.1.4.1 Equity

As in nearly all situations, there are trade-offs among the three economic modes. Some part of maximum macro-economic increments can be traded for increases in either internal or welfare margins. The more common trade-offs in urban and industrial environmental management are between internal and welfare systems. The determinant of the slope of the substitutability curve is equity. This is to say that there is usually more than one way to redress inequities. For example, if a discharge from a single manufacturing plant caused a measurable decrease in the

amount of fish caught, two means are available to redress the inequity. First, the cost of restoring the fishery could be assessed to the manufacturer.² Second, the fishermen could be compensated in cash for the fish catch foregone. (A reverse situation could also apply where a waste water outfall stimulates fish production. In that case, it would logically follow that the fishermen would pay the marginal value of the increase in catch to the manufacturer who is generating the enriched water.)

2.1.4.2 Internal Cost and External Benefits

Since the threshold for internal investments is the point of diminishing returns, it is possible to achieve some measure of pollution reduction from each firm by internal efficiencies. However, in most situations there is a point at which further reductions to meet socially determined levels are economically not feasible. At that point, the public regulatory mechanisms must enforce societal judgements of the importance of the public health and welfare. By going to the maximum extent to achieve public goals through internal profit incentives, it should be easier to use public persuasion to ensure the achievement of full compliance.

There is general agreement that the poor condition of the taxi and jeepney fleets in Metropolitan Manila is responsible for a major portion of the particulate load found in the urban atmosphere. Two obvious problems with strict enforcement of anti-smoke belching standards. The first is the cost of inspecting the vast number of vehicles involved. The second is whether the operators of these key elements in the metropolitan transport system can afford to meet the standards. Herein lies a classic public policy dilemma: Should government continue to allow the operators of these inefficient vehicles to cause elevated rates of respiratory disease, among other things, or through strict enforcement force many owners/operators out of their means of livelihood. This is a trade-off curve with unknown values on the axes and an uncertain slope.

2.1.4.3 Public Financing

Clearly, most jurisdictions use some combination of revenues to support the operation of their urban services. The most common is the use of fees and charges for some portion and the use of general revenues to make up any shortfalls.

This aspect is particularly important in the Philippines because of the relatively high percentage of residents at or below the poverty level. One study has shown that to assess the full cost of the operation of the Cebu Water Utility District to users would result in a 95 percent increase in water bills. Even though rates are very low, it was thought that an increase of such magnitude would be unacceptable. The situation becomes even more acute when financing of urban environmental management services is considered for a community such as Cagayan de Oro where people below the poverty level constitute more than 60 percent of the residents.

² This assumes that through the exercise of the police power of the state, the damaging discharges are stopped.

Using these conventional approaches recognizes one thing: willingness to pay and ability to pay are two different things. It is possible that a family living in a hovel would be willing to pay for pure drinking water and a street free of odorous litter, but the family has no discretionary income with which to pay for it. The conventional approach ignores a willingness to pay test for those who are able to pay. Again, because current rates are so low, it is possible that some would, in fact, be willing to pay substantially more in order to have access to uniformly safe drinking water, clear water flowing in esteros, and clean streets.

2.1.4.4 Risk Sharing

The recognition of the special problems posed by hazardous and toxic materials has given rise to a parallel concern – risk sharing. The simple fact is that it will be difficult to enforce the safe handling of toxic and hazardous waste materials without having well conceived and operating waste treatment and disposal systems in place. Once again, there arise questions about sustainable financing for such facilities.

Experiences in Hong Kong, Indonesia, Thailand and Malaysia offer strong indications that there must be at least partial willingness on the part of government to share in the risks involved in establishing facilities to treat and/or dispose hazardous and toxic materials. Even when the Government of Thailand invested in a treatment facility, only a limited number of private operators offered bids to operate the facility.

2.2 Economic Characteristics and Trends

2.2.1 **Economic Environment**

The quality of the environment in the country's urban and industrial sectors is closely linked to the structure and performance of the economy. The Philippine's continuing problem with foreign debt, accelerating inflation, high interest rates, and reduced over-all growth affect the capacity of both the public and private sectors to make investments in environmental management. They also seriously constrain the public sector's ability to make sustainable investments that will address pressing socio-economic and institutional issues that significantly contribute to the deterioration of environmental quality in urban areas.

Current GOP macro-economic policies are aimed at achieving the goals of poverty alleviation, productive employment generation, promotion of equity and social justice, and sustainable economic development. The primary development strategies toward the goals are employment-oriented, rural-based and able to maximize the complementarity between agriculture and industry. Providing infrastructure, enhancing the delivery of social services, and decentralizing authority and responsibility have been identified as primary pathways to rural development and equity. This is consistent with the mandate of the 1987 Constitution and with

the underlying assumption that a system that has greater local control over resources can better remedy present problems while supporting economic growth.

The private sector is expected -- and is being encouraged -- to play a primary role in revitalizing the nation's economy.

2.2.2 Major Indicators and Trends

The Philippine economy is characterized by the following major indicators and trends:

- o About 25 percent to 30 percent of export earnings go into debt service;
- o About 20 percent of the known work force is unemployed and many more are under-employed;
- o Agriculture continues to dominate the economy, but the industrial sector is growing in importance;
- o Rural incomes and opportunities for advancement lag significantly behind incomes and opportunities in urban areas;
- o The current inflation rate estimated at 18.3 percent;
- o The cost of capital -- a major factor in environmental decisions by industrial managers -- is very high, with a prime rate hovering around 20 percent, and even higher a cost for small to medium sized firms;
- o Credit availability is biased against small and medium-sized enterprises;
- o The formal industrial sector has limited labor absorption potential;
- o Thriving informal parts of formally recognized sector exists, including waste material recycling and reuse; and
- o Environmental controls are being under-utilized.

2.3 The Urban Sector

There are 73 provinces and two sub-provinces, 58 cities, and 1,562 municipalities. Cities and municipalities are classified in accordance with their income. First class cities are those with revenue more than ₱30 million. Sixth class cities enjoy revenues of less than ₱5 million. Municipalities are classed as first class if revenues exceed ₱15 million, second class municipalities are those with revenues that range between ₱10 million and ₱15 million; there are

11 of the former and only four of the later. Sixth class municipalities have revenue of less than ₱1 million.(14)

2.3.1 Environmental Problems

Rapid urbanization is exacerbating an already stressed and inadequate infrastructure and is overwhelming the capacity of local governments to overcome the shortages of basic services. Of urban households, 50 percent have no running water, and 56 percent do not have adequate sanitary facilities. The effects of the lack of basic facilities and services, along with the high incidence of urban poverty, are manifested in pollution and over-all degradation of the urban environment.

Increasing waste generation is associated with urbanization itself. As urban lifestyles are adopted, and disposable income increases, refuse increases. The increasing waste generation is made worse by the fact that local government, the units responsible for providing solid waste management services, are often not in a position to perform that task. This is caused by the restricted nature of their financial base, the absence of technical capability, and a lack of understanding that innovation, rather than mimicking is essential to finding local solutions. Reliance of the property tax base to support environmental services is a case in point: it may be that consumer taxes scaled to the severity of the packaging problems posed would be an alternative source of local revenue.

In many cities, squatter communities are found on virtually any and all unoccupied land, including swamps, river banks, railroad right-of-ways, and abandoned buildings. Within the squatter communities, however, various forms of microenterprises abound. These enterprises provide income and self-employment, commonly involving vending food, plants, and junk. Squatter communities also provide the person power for scavenging reusable and recyclable waste materials. Thus, while squatter communities may be responsible for waste generation and dumping into the urban environment, they also perform an important role in urban waste management. Collectively, they are part of the informal, unregistered economy that will be referred to below.

2.3.2 Local Government Finance

Among the problems confronting local governments in redeeming their responsibilities to their residents, the most pressing is the lack of financial resources to construct needed environmental infrastructure.

The local government unit (LGU) tax base is narrow and often tax collection efficiency is very low, in some jurisdictions, dipping as low as 60 percent. In addition, frequent amnesty programs have given incentives to taxpayers to avoid paying on time.

A more important factor contributing to LGU's financial difficulty is the current structure of revenue allocation within the government. Under the existing Manila-centered structure, local funds are channeled to the national government for eventual reallocation back to the LGU's. This system has discouraged local initiatives for revenue generation and tax collection, also stifling innovation in solving what are strictly local problems. Changes in the system have been urged (noted in chapter 3).

Financial returns on investment in environmental services tends to be low due to the unwillingness or inability of the ultimate consumers to pay for the full cost of the services. The unwillingness arises largely from perceptions that it is the government's responsibility to provide such services from available revenue. As noted at the outset, this is a fertile field for deriving combination arrangements that meet both the welfare objectives of the government/public and the profit motives of private firms.

2.4 The Industrial Sector

Beginning shortly after Independence, the GOP promoted industrialization by pursuing an import substitution strategy made operative by import controls. In the 1960's and 1970's, industrial policy shifted to the imposition of high tariffs and quantitative restrictions. This was accompanied by liberal financing, investment incentives, and overvalued exchange rates. The incentives, however, were heavily biased in favor of large, capital intensive (as opposed to labor intensive) enterprises. This has had a profound impact on the current structure of the country's industrial sector. Also in the 1970's, the GOP emphasized export-oriented enterprises. During this period, several export oriented industrial zones were established, notably in Iloilo and Cagayan de Oro.

Starting in 1981, the GOP embarked on a medium-term structural adjustment program aimed at making Philippine industry more efficient and competitive in world markets. The program consisted of tariff reform, import liberalization, realignment of indirect taxes, rationalization of industrial incentives, and sector development programs.

The focus of current industrial policy is on regional dispersal and rural-based industrialization and employment generation. Since 1986, reforms have been instituted to eliminate distortions in the incentive structure and move back to a market driven, private sector dominated economy.

The private sector encompasses, however, a wide range of activities and types of firms. There are manufacturers and other industrial activities that result in residuals that require proper management to ensure that environmental quality is maintained. The residuals include those in aqueous, gaseous, and solid forms and range from innocuous to highly toxic and hazardous; these firms range in size from very small, family enterprises to very large government corporations characterized by large-scale operations and low employment contribution. Indeed, the private sector ranges from unregistered firms to the food industry, which contributes the largest amount to manufacturing employment, to internationally known multi-national enterprises. As can be perceived, the capacity of the industrial private sector to meet the challenges posed

by management of their wastes and residuals varies widely as does their record of undertaking environmental management.

The size and character of the enterprise has a bearing on industrial environmental management. San Miguel Corporation, for example, has adopted a corporate philosophy committed to compliance with government regulations and to increased efficiency of materials recycling and reuse. Large firms, such as San Miguel, given their access to capital and technology, are in a better position than are small and middle-sized firm, to prevent and control pollution if they so decide. Some of the most modern and best operating liquid waste treatment facilities in the country are located within industrial facilities.

There is a large number of small, diverse, and unregistered establishments that make up the Philippines' informal industrial subsector. Little is known about this informal subsector except that it contributes perhaps as much as 40 percent of gross national product (GNP). Compared to small and medium-sized firms, informal entrepreneurs have even less access to credit and technology, and are little affected by changes in the tax code. These enterprises generally operate on very narrow margins of profitability and tend to be very vulnerable to price and cost change.

In 1989, industry posted the highest growth rate (6.91 percent) among the economic sectors. Estimated sectoral growth rates for 1990 show the service sector growth to be about 4 percent, industrial growth of about 2.1 percent, and agricultural growth at 0.63 percent. Projections for 1991 show slow growth in all sectors with agriculture expected to grow slightly faster than industry. In 1992, however, the industrial sector is projected to be the main growth sector.

The concentration of industry is a demographic factor that should not be overlooked: 60 percent of all industries are currently located in Metropolitan Manila.

To encourage investments in industrial estates and in other priority areas designated by the GOP, several investment incentives are offered. The incentives included: enterprise income tax exemptions, capital equipment incentives, special treatment for investments made in major facilities located in less developed areas, and access to bonded manufacturing/trading warehouse systems.

In addition, firms investing in sectors and/or areas designated in the GOP Investment Priorities Plan are exempted from all taxes, with the exception of income tax under the national Internal Revenue Code, on sliding scale for 15 years, as shown in Table 3.

Other incentives include tax exemptions on imported capital equipment, from 50 percent to 100 percent tax deduction for expansion reinvestment, and tariff protection of up to 50 percent of the dutiable value of imported items similar to those being manufactured or produced by a pioneer enterprise.

Table 4. Sliding tax exemption scale for priority investments

Years	Percent Exemption
1 to 5	100
6 to 8	75
9 to 10	50
11 to 15	20
16 and after	0

Source: Board of Investments. "Investment Priorities Plan"

2.5 Costs of Environmental Pollution

The full impact of pollution on human health cannot be ascertained without knowledge of the nature of pollutants, where they are, who is exposed to them, and what their effects are. However, a rough indicator of the health impact of pollution is the incidence of diarrheal diseases, strongly associated with unsafe drinking water. Diarrhea is ranked second among the ten leading causes of morbidity in the Philippines,. In 1986, the incidence rate of diarrhea was 990 per 100,000 population. During the period 1981 to 1985, the number of reported diarrheal cases increased by 3.2 percent.

Pollutants discharged into the natural environment also affect flora and fauna to varying degrees. These ecosystem effects, in turn, can have significant impacts on productivity and long term sustainability of economic processes depending on the affected ecosystems. For example, water pollution has significant impact on fishing productivity. A study on alternative methods of waste water disposal from the Tongonan Geothermal Power Plant in Leyte place the value of annual loss of fishery production in the Camotes Sea and Ormoc Bay to be in the order of ₱11.4 million in 1980.

Pollution also adversely affects materials and property. These effects are manifested in terms of reduced property value and increased maintenance costs of buildings and structures. The cost of pollution also includes direct damage or loss of property. In the case of pollution from mine wastes and tailings, total value of damages to crops, land, and property were estimated at almost ₱3 million in 1979 - 1980, or about ₱96 million in constant 1978 prices. The general relationships between the generation of SO₂ and damage are shown in Figures 4 and 5.

Losses in tourism earnings are another casualty of urban-industrial pollution. The sight of uncollected garbage, squatters lining the street, dirty air from vehicles and industrial emissions, and suspect water quality turn away prospective recreational visitors to the country.

The costs are particularly acute in the coastal zone. Here coastal-oriented tourism and fisheries are important to the national economy. Failure to control pollution in this critical zone will become an increasing impediment to economic growth, negatively impact people's livelihoods, and become the source of debilitating human diseases extracting high costs both in real terms and in terms of opportunities foregone.

2.6 Institutional Arrangements

2.6.1 Statutory Structure

There is, in the form of Commonwealth Acts, Republic Acts, Presidential Decrees, Executive Orders, Letters of Instruction, and Administrative Orders, coverage in Philippine law for every conceivable aspect of urban and industrial environmental management. A brief listing of the more significant statutory coverage is shown in Table 5, where the organization is by the major factors in urban and industrial environmental management: solid, liquid, gaseous, governmental authority, and financing.

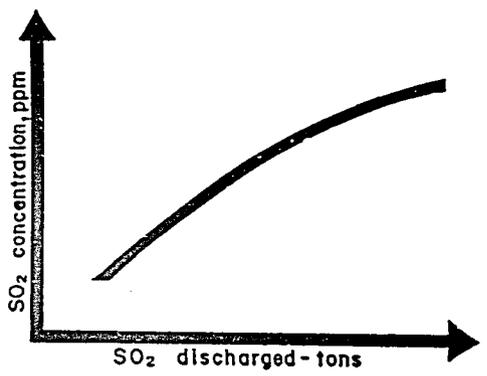


Figure 3: Relationship between SO₂ discharged and SO₂ concentration

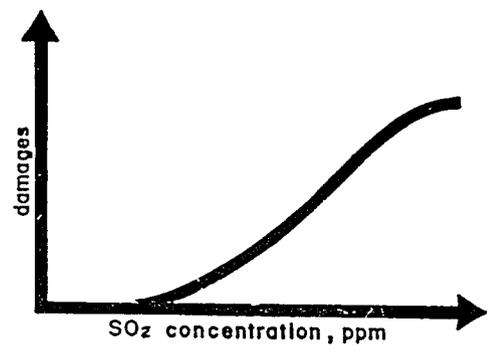


Figure 4: Relationship between SO₂ discharged and damages

Source: Bower, Blair, T. et al 1968 *Waste Management: Generation and Disposal of Solid, Liquid and Gaseous Wastes in the New York Region.*

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Table 5. Indicative List of Key Urban and Industrial Statutes

Citation	General Title/Contents
PD No. 1152	Philippine Environmental Code
PD No. 1151	National Environmental Policy
PD No. 1586	Environmental Impact Statement System
RA No. 3931	National Water and Air Pollution Control Commission - basis for: National Ambient Air Quality Standards Water Useage and Classification Standards Effluent Regulations
	Local Autonomy Act grants authority to zone
BP Blg. 337	Local Government Code
PD No. 1067	Philippines Water Code
EO No. 226	Omnibus Investments Code of 1987
PD No. 984	Philippine Pollution Control Law
Act No. 2152	Irrigation Act
CA No. 383 } LOI No. 376}	Anti-Dumping Act with authority to "recover streams"
RA No. 1378	Plumbing Law requiring sewer connections
PD No. 856	Code of Sanitation
PD No. 393	Basis for Pollution Adjudication Board
PD No. 600 PD No. 979	Marine Pollution Decrees
PD No. 125	Mine Wastes and Tailing Fund
RA No. 6969	Toxic Substances and Hazardous and Nuclear Waste Control Act

While coverage of the field is complete, it should be noted that all aspects of a single topic, such as regulation of land use, will not be found in codified form. Further, some of the enactments still on the books refer to now defunct organizations, with the functions transferred to a new entity under the terms of another statute. Environmental policy and enforcement are classic cases in point. Environmental policy and, hence, the origins of the Environmental Impact Assessment/Statement System (EIA/SS), were first defined by Presidential Decrees establishing the National Environmental Protection Council. Earlier legislative action placed authority to police compliance with discharge and ambient standards in a National Pollution Control Commission. All of the duties and powers of these now defunct organizations were, under yet another Presidential Decree, incorporated into a new entity called the Environmental Management Bureau within a reconstituted Department of Environment and Natural Resources.

The most recent, often referred to statement of GOP environmental policy is the Philippine Strategy for Sustainable Development (PSSD). The PSSD, is the master plan for the rehabilitation of the Philippine environment(11), and was the result of Cabinet level deliberations, issued in November 1989 as Cabinet Resolution No. 37. It has relevance to urban and industrial environmental management because of the emphasis placed on resource recycling and reuse, pollution control, and waste reduction through the adoption of appropriate technologies.

2.6.2 Government Structure

Government structure follows statutory structure; overlaps, contradictions, and gaps in the statutes are reflected in the administrative structure.

2.6.2.1 National Government

The unquestioned lead agency for urban and industrial environmental management is the Department of Environment and Natural Resources (DENR). Contrary to the situation in forestry and most other renewable natural resource management programs, the department and its bureaus do not have, with minor exceptions, complete responsibility, authority, or control of the activities that affect the human environment.

The EMB is the vehicle used almost exclusively by the DENR management to influence environmental policies and actions. The current major instrument chosen is the Environmental Compliance Certificate (ECC). The EMB also has at its disposal the setting of ambient water and air standards and imposing conditions on permits for air and water discharges. The EMB provides staff support for the Pollution Adjudication Board, a quasi-judicial body chaired by the Secretary of Environment and Natural Resources, empowered to issue cease and desist orders, assess fines and penalties, and consider compliance schedules.

The priorities for DENR is contained in the DENR's "Mid-Term Investment Program - 1990-1995." The investment program is cognizant of the 11 strategies of the PSSD which are, in turn, subdivided into project initiatives. Most of the initiatives are presented as statements of priority

for funding from any source. The sum of the 127 projects listed would cost almost US\$3.38 billion over the five year period of the plan. The lion's share of the proposed spending is allocated for the rehabilitation of degraded ecosystems, mostly forestry-related projects that are part of the National Reforestation Program. The relatively low priority given to urban and industrial environmental concerns is apparent in the DENR's programming of its proposed investment expenditures. Only eight of the proposed projects directly deal with industrial pollution (shown in Table 5). Most of the proposals are for studies on specific aspects of industrial pollution. The cost of these eight projects is estimated at US\$12.25 million. This is only 0.36 percent of the total proposed mid-term program.

2.6.2.2 Pollution Penalties

A point system is currently used for calculating penalties for pollution. The system is based on the four weighted factors (shown in Table 7). The Guidelines for the system are published as PAB Resolution No. 10.

Table 6. Point System for calculating penalties for pollution

Factor	Weight
Duration of the Violation	6.5
Present condition of the resource	5.5
Capacity of the source of pollution	4.5
Average deviation from effluent or emission standards	3.5

Source: PAB Resolution No. 10

Overall points are calculated by multiplying the weights assigned to the factors by the categorical points which capture gradations in each of them. The over-all weighted scores correspond to particular levels of daily fines.

While the fine increases with increasing severity of the violation, its marginal rate of increase is constant. This constant marginal increase in fines tends to be regressive in that increasingly pollutive firms pay relatively lower increments in fines. Also, the system of fines tends to ignore the differential impact of various types of pollutants.

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Table 7. DENR Programs in Support of Residuals Management in Industry

Program/Project	Indicative Cost (U.S\$ 000)	Implementation Period	Type of Assistance
Pipeline			
<hr/>			
Leachate Pollution from Dumping Sites in Manila	91	1990-1991	TA - Studies
Proposed			
<hr/>			
Toxic Chemicals and Hazardous Waste Management Program	645	1991-1995	TA - Studies
Air and Water Quality Monitoring Network	8,423	1991-1995	TA - Institu- tion building
Developing Air, Water and Soil Quality Standards	70	1990-1991	TA - Studies
Economic Incentives for Pollution Control	91	1991-1992	TA - Studies
Pollution Control Technologies and Industrial Efficiency	30	1990-1991	TA
Developing Recommendations to Reduce Pollution from Toxic Materials Used in Small-Scale Mining	300	1990-1992	TA - Studies
Environmental Impact Assessment of Major Mines in the Philippines	2,600	1990-1993	TA - Studies
TOTAL	12,250		

TA = Technical Assistance

Source: DENR. 1990. DENR Investment Program (1990-1995).

The Philippine Pollution Control Law (PD No. 984) is the basis for the existing penalty structure. The PD specifies a fine not exceeding ₱5,000 per day for failure to comply with any order, decision, rules, or regulations for pollution control or abatement. The fine is imposed for every day the violation or default continues. Failure to pay the fine can result in the closure of the operation or establishment. It should be noted that the monetary penalties in PD No. 984 have not been adjusted since 1976 in spite of the drastic loss in purchasing power of the peso.

Section 8 of PD No. 984 requires persons and establishments to secure discharge permits as required by regulations promulgated by the DENR. Operating without the requisite permits carry a penalty of up to ₱1,000 for each day the violation continues. Section 8 also provides for jail sentences of two to six years. The fine schedule is shown in Table 7.

The current structure of penalties, the ineffective policing by the DENR, and the complicated requirements for permits conspire to create an atmosphere wherein firms find it more economical to simply pay the penalties for noncompliance on the odd chance that their violations are detected. Needless to say, the current system does not lead to a realization of the "polluters pay principle."

2.6.2.3 Incentives and Disincentives

Sections of PD No. 1152 contained incentives to encourage industry to install anti-pollution devices. These incentives included an exemption of up to 50 percent of the tariff duties and compensation for importation of pollution control devices and equipment, or a tax credit equivalent to 50 percent the value of the tax and tariff duties that would have been paid if pollution control equipment had been imported. These provisions expired in 1984 and have not been reinstated.

Several laws pending in the Congress are meant to encourage pollution control-related investments through tax and credit incentives and to encourage compliance with environmental laws by increasing penalties for violations. Those of most immediate concern are shown in Table 8.

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Table 8. Schedule of pollution fines, 1988

Points	Amount of Fine (Pesos)	
	A	B
1 - 10	100	500
11 - 20	200	1000
21 - 30	300	1500
31 - 40	400	2000
41 - 50	500	2500
51 - 60	600	3000
61 - 70	700	3500
71 - 80	800	4000
81 - 90	900	4500
91 - 100	1000	5000

Legend:

A = for violations of Section 8 PD No. 984 requiring any person or establishment to secure a permit from the Commission for the following:

- (a) construction, installation, modification, or of any sewage works or any extension/addition thereto:
- (b) increase in volume or strength of any wastes in excess of the permissible discharge specified under existing permit.
- (c) construction, installation, or operation of any pollutive industrial establishment or the extension of same.

B = for all other pollution cases not covered by Section 8 or PD No. 984.

Source: PAB Resolution No. 10, Guidelines for Rating Fines.

2.6.2.4 Other Agencies

When a broad reading of PD No. 1151 and the PSSD is taken, all aspects of the human environment – social, economic, institutional, biological, and physical – are to be considered in public decision-making. Thus nearly all, agencies of government have a stake in urban and industrial environmental management.

This fact is tacitly recognized by the required establishment of environmental management units in all agencies of the national government. A moment's reflection confirms the merit of the approach; the EMB should not be the only agency of the national government that worries about environmental impacts. The National Irrigation Administration should worry about environmental issues when it plans irrigation systems; the Department of Public Works and Highways (DPWH) should worry about environmental issues when it plans road systems; as a matter of fact, most agencies worry about at least one aspect of the human environment when they plan or justify any program or project.

A common complaint about government is that one agency does not know what other agencies are doing. At this moment, there is no such coordinative planning organization at the national level. Figure 6 shows the areas of responsibility for selected national and extra-territorial agencies.

2.6.2.5 Permitting Agencies

A substantial number of permits are required in the Philippine system. In urban and industrial environmental management, permits are required for discharges, for drilling wells, for operating boilers, and for building an industrial or residential estates. Even more important, clearances for the location and construction of major projects in the private sector are required from the Board of Investment in the Department of Trade and Industry, and for major projects in the public sector from the Interagency Coordinating Committee in the National Economic and Development Authority. The leadership of the DENR has been alert to the opportunity of tying the licensing and permitting requirements to the EIA/SS. Under a memorandum of understanding between DENR and NEDA, the Interagency Coordinating Committee will not approve a project that has not qualified for an ECC.

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Table 9. Pending and Proposed Policies/Strategies in Support of Residuals Management in Industry

STRATEGY/POLICIES	STATUS REMARKS
<u>Pending</u>	
Granting of tax incentives for the operation and maintenance of pollution control facilities and devices and regulation of discharge of all industrial and other wastes and prescribing a graduated system of effluent charges.	Senate Bill No. 1259
Regulation of importation of substances (i.e., chloro-flouro carbon (CFC) continuing substances) that are known to deplete the 'ozone layer'.	Senate Bill No. 994
Prohibition on importation of hazardous waste or garbage	Senate Bill No. 364
Encouraging improved management of toxic and hazardous substance in industry by a system of penalties and subsidies	There is a draft administrative order entitled "Hazardous Waste Management Policy" being subjected to further reviews before final approval by the Secretary of DENR ^a
<u>Proposed</u>	
Investigation of alternative production methods with particular attention to highly pollutive energy conversion and a means of promoting energy conservation and an energy efficient production processes	Under PD No. 1068 (1977) provides for acceleration of research and development of industrial investigation of processes and utilization of non-conventional/new renewable sources of energy, the government shall continue to promote the adoption of non-conventional energy technologies are direct combustion systems (biomass-fired furnaces and and cookstoves), biogas systems for household and agro-industrial use solar water heater systems, and windmills for water pumping and irrigation systems.

Table 9 (continued)

Investigation of new and emerging technologies that may be applicable to pollution control in the Philippines	A technological innovation adopted in this proposed policy is the use of biogas digesters to recover methane from piggery or distillery wastes. Attention shall be given to the recycling, recovery and reuse of industrial wastes.
Research and development of pollution control methods using local materials	This shall be taken up under an environmental research project of the DENR (i.e., Indigenous Pollution Control Technologies).
Formulation and application of financial schemes to encourage industries and local government units to set-up pollution control facilities	The government is considering the financing scheme that involves tax incentives for business enterprises undertaking pollution control measures (e.g., waiver of all taxes on importation of pollution control equipment/facilities). The government may also grant tax credits for corporate research into pollution control.

* RA No. 6969, "An Act to Control Toxic Substances and Hazardous Wastes, Providing Penalties for Violation Thereof, and for Other Purposes," was passed by both the Senate and House of Representatives on September 6, 1990. Approved by President Corazon C. Aquino on October 26, 1990.

Source: DENR. 1990. DENR, Mid-Term Investment Program (1990-1995).

Figure 5: Areas of Responsibility - Selected Agencies

Organization	Air Quality	Water Quality	Waste Management	Land Use
Dept. of Environment and Natural Resources				
<ul style="list-style-type: none"> o Environmental Management Bureau o Pollution Adjudication Board (PAB) o Regional Offices 	<ul style="list-style-type: none"> o Promulgation of policies and standards o enforcement policies o ambient air quality monitoring o staff support to PAB o Enforcement decision o Schedule of fines for non-compliance o Compliance schedule o Closure notices o Monitoring o Enforcement 	<ul style="list-style-type: none"> o Promulgation of policies and standards o ambient water quality monitoring o effluent discharge monitoring o staff support to PAB o Enforcement decisions o Schedule of fines for non-compliance o Compliance schedule o Closure notices o Monitoring o Enforcement 	<ul style="list-style-type: none"> o Promulgation of toxic and hazardous waste management regulations (RA 6969) o Promulgation of solid waste management rules o Inter-agency coordination o Future enforcement actions - RA 6969 o Future monitoring and enforcement of RA 6969 	<ul style="list-style-type: none"> o Issuance of EOC as precursor to HLURB approvals o Input to EOC decision
Department of Health	<ul style="list-style-type: none"> o Protection of public health o Monitoring 	<ul style="list-style-type: none"> o Protection of Public Health o Monitoring 	<ul style="list-style-type: none"> o Management of hospital wastes 	
Department of Public Works and Highways	<ul style="list-style-type: none"> o Traffic management responsibilities for emission control 	<ul style="list-style-type: none"> o Maintenance of drainages 	<ul style="list-style-type: none"> o Maintenance of drainages o Construction of sanitary landfills (in Metro Manila) o Coordination with Presidential Task Force on Solid Waste Management 	
Metropolitan Waterworks and Sewerage System	<ul style="list-style-type: none"> o None 	<ul style="list-style-type: none"> o Construction and operation of municipal wastewater treatment systems 	<ul style="list-style-type: none"> o Disposal of sludges from wastewater treatment facilities 	<ul style="list-style-type: none"> o Land use patterns affected by availability of water supply and wastewater treatment capacity
Local Water Utilities Administration		<ul style="list-style-type: none"> o Provision of water supply 		
Department of Trade and Industry	<ul style="list-style-type: none"> o Licensing (BOI) of firms that could emit air pollution o Promotion of adoption of indigenous technologies o Promotion/development of industrial estates 	<ul style="list-style-type: none"> o Licensing of firms (BOI) that could have wastewater discharges o Promotion of adoption of indigenous technologies o Promotion/development of industrial estates 	<ul style="list-style-type: none"> o Licensing of firms (BOI) that would generate solid waste o Promotion/development/operation of industrial estates 	<ul style="list-style-type: none"> o Promotion/development of industrial growth and industrial estates o Promotion and operation of export processing zone through EPZA.

2.6.2.6 Regionalization

Each agency is directed to shift planning and management to offices that serve the 13 administrative regions of the country. Creation of the regions also means that planning for urban and industrial environmental management, inter-agency coordination, impact assessment, and regulation are to be done at the regional level. Since there is no environmental coordinative mechanism at the national level, there is nothing to replicate at the regional level.

In the case of the DENR, most of the bureaus formerly operated as quasi-independent line-and-staff organizations. For example, the then Bureau of Forest Development's line of command extended from the bureau director through regional foresters and district foresters to rangers and foresters. By having only one line of field communications that extends from the Secretary through the Undersecretary and three Assistant Secretaries for Field Operations, what was a combination command and technical line within the bureaus has been replaced by a command line. The technical line has not been effectively replaced.

As a consequence, technical staffs in the regional offices, particularly in those that do not have the personnel or resources of the forestry units, are isolated from peer and disciplinary support. Shortages of people and effective equipment exacerbate an already serious morale problem caused by a growing work load and lack of support communication.

Regional Development Councils (RDC) and Regional Development Assemblies (RDA) (EO No. 366) have been formed. The membership of the RDC consists of governors, mayors and the regional directors from the region, are staffed by NEDA personnel. It is the task of the RDC to place priorities on the types and locations of public investments that are needed within the region. These wish lists are sorted out by NEDA as part of the preparation of fiscal year budgets and in reviewing overseas development assistance proposals.

2.6.2.7 Local Governmental Units

The power of the sovereign rests in the national government. Therefore, the provinces, cities, municipalities, and all other local government bodies are able to do only what is specifically authorized by the national government. In this respect, there is no hierarchy; that is, the powers of the province are not different in nature than the powers of the cities.

Dating from early colonial time, Philippine government structure has always had a strong centrist character. Events in the 1970's tended to reinforce and increase the power in the center of the national government. The result the concentration shows up in things such as taxing power in the national government. The system expects LGU's, principally the cities and provinces, to collect property taxes, transmit them in toto to the national government, and then be allocated some portion of the total, in the discretion of the national government, to finance those services assigned by national legislation.

There has been considerable rhetoric used during the past five years about devolving authority to the LGU's commensurate with the responsibilities assigned to them. However, very little has been done by way of granting autonomy of action to the local governments. Many proposals to accomplish varying amounts of redress are being considered by the Congress. (Some of the salient proposals are shown in Table 10.)

This retention of power in the center affects urban and industrial environmental management in several ways. While the center has assigned nearly exclusive responsibility to the LGU's for the management of solid waste and land use planning, there has been no delegation of authority to raise money or to hire the expertise to do either one. The national government has specified that the LGU's employ an environmental manager, yet there is no pledged money to pay for the position or the work that is expected.

As noted above, the statutory framework for urban and industrial environmental management provides authority for local LGU's, except the provinces, to zone land use (PD No. 1152). The provision assumes incorrectly that zoning is an end in itself. Thus the capacity to finance the preparation of comprehensive sector plans for the LGU's hardly exists. Likewise, there are no grounds for the preparation of capital improvement budgets that schedule investments in the environmental infrastructure.

2.6.2.8 Extraterritorial Agencies

The unique problems facing the 17 municipalitics comprising the Manila have caused the national government to take extraordinary steps to provide some form of extra territorial, cohesive, metropolitan government. At one time, the municipalities were tied as entities to the Metropolitan Manila commission exercising a few of the powers unusually associated with regional government. The recent formation of the metropolitan Manila Authority replaced the Manila Commission, with traditional mayoral responsibilities transferred to the new authority. However, the 17 mayors still maintain the actual authority. Thus, other than solid waste management, grants of authority exercise regional administrator over function areas (water supply, sewerage systems, open space, transportation, and communications) usually assigned to metropolitan agencies are lacking. The water and sewerage functions of the region are administered by the Metropolitan Waterworks and Sewerage System, the independent body. Integrated development planning for some parts of the region are the responsibility of the Laguna Lake Development Authority, another independent body. The Metropolitan Manila Flood Control and Drainage Council is worth mentioning. due to it's overlap with the LLDA and the DPWH in the engineering aspects of flood control, and relationships to functioning stream ecosystems mentioned earlier as an important element in regional office that has the region as its sole purview.

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Table 10. List of proposed legislation affecting local governments

Bill No.	Title
Senate	
155 ^a	Providing for a revised local government code
280	Providing for the strengthening of local development by rationalizing national planning and resource utilization enabling certain political units
374	Transferring to the jurisdiction of local government the management, administration and operation of Inter-Island ports and fish ports
845	Requiring the equal sharing by the national government and the local units of all charges on foreign products collected
967	Providing local government units adequate internal revenue allotments
1148	Providing the local government units equitable share in income, estate, and donor's taxes
927	Enhancing the Financial Autonomy of Local Government Units
805	Granting to the local government their just shares from national taxes
808	Requiring all corporations and establishments to pay their taxes to the local government where they have their principal place of business; authorizing local government concerned to retain its local share of such taxes remitting only the national government share
749	Providing local government units adequate internal revenue allotments, amending for the purpose Section 4 of Presidential Decree No. 1741
756	Rationalizing the internal revenue allotment to local government units
House	
24980	Providing for a local government code
69	Granting autonomy to the local legislative and executive government
72	Constituting the local executive governments as ministerial agents of the national executive government
9654	Authorizing local executives to appoint local officials paid out of local funds
2073 ^a	Providing for a local government code
9656	Authorizing the local municipal treasurer to take custody of local funds/share due their municipalities for deposit in any duly authorized bank
14450	Creating the local government units development and management authority to formulate, coordinate and manage the plans, programs and services of the local government units

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Table 10 (continued)

15667	Providing for the increase in the share of local government units in internal revenue taxes and automatic release of their share
15668	Discontinuing the mandatory contributions from cities and municipalities for the maintenance and operation of the Integrated national police
18964	Amending BP 337 otherwise known as the local government code increasing fund allocations to barangays
19702	Granting fiscal and budgetary autonomy to local government units in the formulation and determination of monthly salary rates/scales and cost of living allowances for all elected local government officials
20039	Providing for the automatic release of the share of the local government units in the national internal revenue taxes and appropriate fifty percent of the same for developmental projects
22131	Granting tax autonomy to provinces, cities, and municipalities
23741	Granting to local government units autonomy in the management of their funds

^a = Considered key bills in a decentralization strategy

Source: Yotoko, Eduardo A. et. al. 1990. Policy Analysis of Philippine Decentralization.

3.0 MAJOR ISSUES AND CONCERNS

It seems an inescapable conclusion that people of the Philippines face some severe urban and industrial problems. In many ways, the current picture in the urban and industrial environmental management scene is the product of more than a decade of neglect.

The issues presented in the following sections are drawn from the preceding two chapters. They are organized by major issue with discussion that may include significant subordinate issues and concerns.

3.1 The Deterioration of the Urban and Industrial Environment

3.1.1 Indicators of Urban and Industrial Pollution Levels

Evidence confirming the incidence of diseases associated with liquid and gaseous pollution, such as diarrhea and upper respiratory infection is the rise in both relative and absolute terms. The lack of medical geography work done to tie the incidence of the diseases to specific sources is cause for concern.

As one of the more productive fisheries in Asia, total fecal coliform counts in Manila Bay are very high. So far there has been no definitive tracing of the outbreaks of cholera in the region to the eating of fin fish, shell fish, or bi-valves. The Pasig River is biologically dead and its visible and invisible pollutant load flows into the Manila Bay or Laguna de Bay depending on the tide. The fact that river restoration is a major activity in the Department of Environment and Natural Resources' (DENR) Mid-Term Investment Plan seems to indicate that many rivers are in bad shape. There are no consistent, comparable data series which show the relative condition of rivers and streams passing through or serving other urban and/or industrial areas.

Most disturbing is the data presented that fin fish in several parts of the country's coastal zone are displaying evidence of having ingested mercury and other heavy metals.⁽¹⁵⁾ The deleterious effects of such pollutants as they move up the food chain are well documented.

Simple observation of the condition of the streets, esteros, creeks, and canals in any urban settlement is the best indicator of the level of solid waste management that has been achieved. The levels of these systems have, and continue to, result in flooding and increased incidence of disease.

3.1.2 Monitoring

Currently no longitudinal data of any kind exists on which to make trend observations. Therefore, all of the indicators on the physical and biological sides cited above only report conditions at a specific point in time.

As will be seen below, several professional disciplines are charged with the health and safety aspects of urban and industrial environmental management. Yet operational data collection to link environment-based diseases with environmental conditions has not been started. In spite of readily available instruments and technically trained personnel, even relatively simple measurements useful in building a data base have not been taken .

3.2 Operation and Maintenance of Facilities

3.2.1 Water Supply and Issues

The record of the Philippines is very good with respect to the safety of the domestic water supply and is a major reason for concern with the rising rates of diarrheal diseases. For those few communities that rely heavily upon surface water supplies, such as Metropolitan Manila, the operation of the water treatment facilities is at a high standard with sufficient pressure in the mains to prevent infiltration of pollutants.

Part of the reason for the good record is the predominate position of ground water as a source of culinary water. Where local autonomous water utility districts treat ground water -- usually by simple chlorination -- the record of facility operation is good. The real issue for health and safety is whether the supply of uncontaminated ground water for domestic use can be maintained in the face of steep increases in the demand for, and use of, ground water for industry and agriculture. A nagging concern is that most of these facilities are relatively new and the record of long term maintenance has not been established.

As previously noted, there are two kinds of ground water: surficial and aquifer. In an urban environment, with pollutants of all sorts put on the surface of the land, surficial water sources are easily contaminated.

The rising tide of new urban dwellers, whether to Metropolitan Manila or to the fast growing regional cities, is simply overwhelming the ability of local authorities to extend water distribution lines to serve these new residents. The situation is exacerbated by a policy dilemma: should permanent services be extended into squatter neighborhoods thus giving them an aura of legitimacy and, since the majority of the settlers are below the poverty level, who will pay for the service rendered?

3.2.2 Waste Treatment

Waste Water Treatment capabilities suffer from a lack of investment and upkeep. With most treatment facilities having been built over 60 years ago, the absence of facility upgrades in terms of capacity or process has caused enormous backlogs in service from increasing demands by a growing population. Little or no provisions exist to keep new increments of demand from adding to the backlog. The GOP now faces the issue of how to pay capital costs while continuing to pay operating and maintenance costs.

The Modern Waste Water Treatment facilities in the country today are those within major industrial plants. The effectiveness of these treatment plants is a function of age, financial position of the firm, and the competence of the operators. However, the operation and maintenance practices of most industrial waste water treatment facilities could be improved substantially.

Package treatment plants, installed by developers, tend to have high quality maintenance and operation, demanded by the developer. Typically, the plants are built to serve upper scale housing subdivisions and commercial establishments.

Concern regarding the new industrial and package plants, is how well they fit into a strategy for keeping the new growth in treatment demand from adding to the existing backlog. The facilities are subject to frequent shut-downs primarily caused by the malfunction of sensitive sensor or other equipment designed to operate in temperate climates and high labor cost conditions. Additionally, while plants are down, the systems go anaerobic or the effluent is by-passed and discharged.

Finally, the operation of facilities cannot ignore septic tanks. Examinations of the septic tank method of liquid waste treatment prove that it does not work well, if at all. As the septic leach fields are inefficient at best and if the tanks are not cleaned on a yearly basis the domestic waste water is passed virtually unchanged into the waterways.

Thus, possible solutions should ideally encompass labor intensive facilities suitable to a harsher climate, capacity and process alterations for increasing demand, and the improvements or examination of the use of septic tanks.

3.2.3 Solid Waste

The concerns and issues associated with solid waste are connected to two simple facts.

- o Only 60 percent of the total solid waste stream is collected; the remainder is left in neighborhood bins, on the streets, and in streams and canals.
- o Existing facilities are open dumps with no control of leachate, sloughing into adjacent water bodies, and with no proper covering.

3.2.4 Air Quality

3.2.4.1 Fixed Source

The issues and concerns attached with water and solid waste facilities above, correlate to emissions into the ambient atmosphere. Some plants and corporations do an excellent job at controlling emission while others need substantial improvements, with some toxic and hazardous materials being emitted. As mentioned in Chapter 1, motor vehicles are the major source of air

pollutants, and the number of vehicles on the road is increasing. The ability to handle these materials is not present. Thus, deteriorating urban air quality is a major concern. Only two operating air quality monitoring stations exist for all of Metropolitan Manila.

3.2.5 Hazardous, Toxic and Nuclear Substances

No structure for dealing with hazardous, toxic and nuclear wastes is in place. The Congress has enacted a Toxic Substances and Hazardous and Nuclear Waste Control Act, but the implementing regulations are only now in the process of being finalized. In fact, none of the steps for a comprehensive toxic and hazardous waste management program have been taken. At the moment, the volumes, locations, characteristics, or proper handling methods of the chemicals and chemical compounds explicitly covered in the legislation is not known. Until even a rudimentary inventory is taken, it is not possible to indicate how these materials are affecting the health and welfare of the citizenry.

It has been reported earlier that the handling and disposal of medical wastes is a special problem due to the highly infectious nature of some materials. Reports indicate that current law requires hospitals to install, maintain, and use specialized incinerators to treat the materials. Virtually all establishments are in violation of the law.

At the moment, the Non-Governmental Organization (NGO) Desk within DENR, in cooperation with other DENR units, is drafting a plan for Awareness and Emergency Preparedness at the Local Level (AEPLL). The weight of experience in economically developed and undeveloped countries demands that provisions be made to alert citizens of imminent danger and to be able to evacuate them on short notice or render immediate aid in the event of an industrial disaster. AEPLL is designed to assist decision-makers and technical personnel in improving community awareness of hazards in plants and in preparing response plans in the event accidents or other events at these plants pose a danger to life and the environment.

Establishing priorities for large, stand alone industries with high risk of fire, explosion, or toxic leaks is straightforward. Finding those concentrations of small, and sometimes unregistered, enterprises that pose similar risks is much more difficult. In fact, the possibility is greater that these smaller enterprises will be more prone to poor material handling and storage increasing the risk of accidental emissions, fires, and explosions.

The GOP, faced with the weakness and uncoordinated status of land use controls in the country, must find a workable solution. If there is no will to use the police power of the state to prevent the encroachment of squatters into zones of high danger, it can be expected that high life and property damage will be incurred in the event of a major accidental event. The issue, obviously, is what should be done about it and by whom.

3.3 Industrial Sectors and Urban Areas Contributing To, or Affected by Environmental Degradation

Pointing fingers at a single industry or industrial sector as the reason the Philippine environment is deteriorating (or indicating which urban area in the country is experiencing the greatest degradation) evades the complexities of urban and industrial environmental management.

Some attempts have been made to indicate which groups of industries are prone to emit harmful compounds. These data are presented in Table 10. It can be seen that power generation, leather tanning, pulp and paper manufacture, textiles, cement manufacturing, mining, and food processing are among those with the highest index of potential pollution.

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Table 11. Classification of Philippine Industries

Industry	Industry
A. Highly Pollutive; Extremely Hazardous	
Basic industrial chemicals except fertilizer	3511
Chemical products nes	3529
Petroleum refineries	3530
Miscellaneous products of petroleum and coal	3540
B. Highly Pollutive; Hazardous	
Sugar milling and refining	3118
Distilling, rectifying and blending spirits	3131
Wine industries	3132
Malt liquor and malt	3133
Spinning, weaving and finishing textiles	3211
Tanneries and leather finishing	3231
Leather products except footwear	3233
Pulp, paperboard and paper	3411
Pulp, paperboard and paper, nes	3419
Soaps, cleansing prepns, toiletries	3523
Cement, lime and plaster	3692
Iron and steel	3710
Non-ferrous basic metals	3720
C. Highly Pollutive; Non-Hazardous	
Meat Slaughter, preparation	3111
Dairy products	3112
Fruit, vegetable preparation	3113
Fish, crustacean preparation	3114
Vegetable, animal oils and fats	3115
D. Pollutive; Extremely Hazardous	
Fertilizer and pesticides	3512
Synthetic resins, plastic materials	3513
Paints, varnishes & lacquers	3521
Tires and tubes	3551
Rubber products, nes	3559

Source: National Environmental Protection Council. Environmental Impact Assessment Handbook, 1983.

The true test is what a particular plant is discharging and the effect of that material on the ambient receiving body. Taking a sector approach masks the existence of the multitude of small business concerns, such as machine shops, electroplaters, car repair shops, dry cleaners, and backyard foundries, that probably contribute more in total to the pollutant load on the Philippine environment than most of the large, easily recognized industries. Very little information about small formal and informal enterprises exists.

Similarly, all urban areas are subject to the same environmental conditions, varying only by the size of the population and the relative income levels of that population. The residents of General Santos City treat their domestic wastes in the same way as the residents of Quezon City, but there are more of the latter and they have different waste characteristics resulting from a different life style.

The issue lies in finding ways to identify and classify problems on the basis of the real risk posed to people, property, and the environment.

3.4 Capacity of the Government of the Philippines

The GOP faces the question of how to focus and coordinate the full force of the government to accomplish what it sets out to do. The question is paramount in environmental affairs because, as has been pointed out repeatedly, no single discipline or jurisdiction has a monopoly on things that impinge upon the human environment. There are many concerns in the area of urban and industrial environmental management. Some of them are addressed here.

3.4.1 Legislative

An examination of the "statutory" authorities dealing with urban and industrial environmental management shown in Chapter 2 reveals that the overwhelming bulk stems from Presidential Decrees (PD) and Executive Orders (EO). Even the well regarded Philippine Strategy for Sustainable Development is the product of Cabinet deliberation. With the exception of the massive revision of the Local Government Code³ and passage of the Toxic, Hazardous and Nuclear Waste Act (RA No. 6969) the Congress has not acted in specific areas, such as solid waste management, or in codifying the environmental code. This signifies a lack of national focus.

The issue is garnering far more interest from the Congress. As the elected national legislative body, the Congress is a prime source of the social value judgements necessary for determining optimum solutions for the serious environmental problems outlined above. Some of the concerns and issues to be listed below, such as the jurisdictional overlaps, are best approached in the legislative process.

³ The legislation has worked its way through both houses and the conference committee report has been given third readings in both houses and seems assured of passage in June, 1991.

3.4.2 Policy and Program Analysis

There are a number of staffs that are highly qualified and capable of performing policy and program analysis. Among them is the staff of the Board of Investment (BOI) in the Department of Trade and Industry (DTI) and the staff serving the Interagency Coordinating Committee in the National Economic and Development Authority. Both deal largely with the economic portion of the human environment and, to a degree, the social portion.

Comparable staff expertise for physical and biological policy and program analysis is not clear. This is attributed to the way the government's primary source of biological expertise approaches policy. The policy and programming capabilities of other departments were not investigated. As an illustration, it is unknown what role in policy and program analysis is played by the sanitary engineers employed by the Department of Health. However, it is evident that the full range of talent and expertise of the government is seldom brought to bear on urban and industrial environmental management issues.

3.4.3 Department of Environment and Natural Resources

The capacity of the DENR is questioned due to problems with the formulation of environmental policy, department and agency coordination, internal bias toward forestry, and the ability of EMB to undertake assigned tasks. Meanwhile, concerns faced by DENR range from statutory ambiguity to regionalization and decentralization.

3.4.3.1 Environmental Policy

The collegial nature of decision making by the current secretariat is recognized and unabashedly applauded. Also recognized is the idea that the staff expertise of the technical bureaus is brought to the table by the officers in charge of the offices. Carried to a logical conclusion, the only place that urban and industrial environmental management issues will surface is through the Office of Environment and Research. This reflects a schism in the DENR: natural resources on one side and environment on the other. Each bureau of the department has its own technical expertise with each contributing to environmental policy making and coordination.

3.4.3.2 Coordination

The DENR secretariat has vigorously pursued a program of coordinating environmental assessments of proposed public and private investments. A substantial amount of pressure is placed on the other departments of the national government to establish and use environmental planning units. However, DENR has not led the way.

The issue is giving focus to the rudiments of a system that was put in place in response to a set of circumstances and guidelines that came from another era. Since policy analysis and planning utilize the same perspectives, it is incumbent on the DENR leadership to provide a coordinative

focus based on sound environmental planning principles encapsulated in the collective talents of the technical bureaus.

3.4.3.3 Forestry Bias

The concern for departmental balance stems from the examination of not only of the financial resources now available to the DENR, but the work program proposed for the mid-term. From all viewpoints, manpower, money and facilities, forestry is the dominant activity in the department. The bias extends to all levels manifesting itself in ways such as technical isolation and poor morale. Utilizing some of the resources to support general environmental planning for the department as a whole would increase agency effectiveness.

3.4.4 Environmental Management Bureau

Treating the Environmental Management Bureau (EMB) as a separate entity is a commentary on the bureau's status in the department, as somewhat of an entity in itself.

3.4.4.1 Personnel

Analyses indicate that removing the legal staff supporting the Pollution Adjudication Board along with all administrative staff would virtually leave no technically trained people to perform the long list of duties assigned to the Environmental Quality Division of the Bureau. The concerns are manifold. Even if large sums were available from internal or donor sources, there are not enough people to accept expanded tasks. Institutions of higher education are not turning out the numbers and varieties of professionals to match the jobs to be done, thus limiting the absorptive capacity of the EMB for new initiatives. While an inordinate amount of effort is devoted to the operation of the Environmental Impact Assessment/Statement System (EIA/SS) quick technician training will not cure EMB ills.

3.4.4.2 Organization

The concerns for organizations are the products of the evolution of the EMB. Duties assigned to two very different organizations, the policy oriented National Environmental Protection Council and the enforcement-oriented National Pollution Control Commission, were merged into a single bureau. As has been observed earlier, bureaucratic structure follows statute. In this case, the whole statutory and organizational framework are in need of an overhaul. It is no longer national policy to exempt certain major industrial location decisions from the process, but the statute allows such exemptions to be made by the President. In the interest of continuity, it seems evident that this is an area for priority Congressional attention.

3.4.4.3 Environmental Impact Statement System

The primary issue of the EIA/SS is that the system remains primarily a regulatory device buried in the third tier of the departmental bureaucracy. This is not the place where inter-governmental interactions on major development issues can or should take place. The present EIA/SS is largely mechanical, working on a case-by-case basis and cannot reflect long-term social objectives, resulting in the system being used as a permitting tool rather than a planning tool. The system is viewed by "project proponents" as another regulatory hurdle to be overcome rather than as a sound planning process benefiting them and the public.

Even more important is the need to identify a point in the administration where final value judgements are made to resolve honest conflicts among the points of view of the technical agencies.

3.4.5 **Problems in Governmental Statutes**

Anyone interested in the capacity of the GOP to come to grips with urban and industrial environmental management issues must be concerned with the serious jurisdictional over-laps existing in the present statutory fabric. For example:

The Sanitation Code (PD No. 856):

- o Requires all provinces, cities, and municipalities to have waste management programs and directs what is now the Department of Interior and Local Government to promulgate guidelines for the programs;
- o Assigns to municipalities and cities the responsibility of providing efficient disposal of solid and liquid waste and the abatement of pollution from pesticides and chemicals and directs the Department of Health to provide guidelines and assistance in meeting the objectives;
- o Requires that all garbage, filth, and waste be placed in proper receptacles and charges the Department of Public Works and Highways with the responsibility of ensuring that the waste is placed in proper receptacles;⁴ and,
- o Prohibits dumping into the sea and other navigable waters (the definition would include the Pasig), but fails to charge a specific agency with enforcement responsibility.

⁴ This statute may be the basis on which the Department of Public Works and Highways was given by the Presidential Task Force on Solid Waste the task of designing two landfills in two municipalities in Metropolitan Manila.

At the same time, the Philippine Environmental Code (PD No. 1152) charges what is now EMB to provide for a waste management program for the proper disposal of waste.

In other instances, the statute seems reasonable but is strong on form and weak in substance. For instance, the Local Autonomy Act grants to cities and municipalities the authority to undertake zoning, but without the mechanics of establishing a planning function there is no basis for any jurisdiction to classify and set conditions on the use of land.

Instead of a solution, there is an issue. Firm statutory directives are needed, with incentives that establish comprehensive local planning of which the land use sector is a part.

3.5 National and Regional Affairs

During the past five years, the national government has moved deliberately to establish an effective regional structure. Not only have the several line agencies, such as the DENR, established administrative offices in each of the 13 regions, but coordinative mechanisms are beginning to take shape in the form of Regional Development Councils. The clear intent is that decisions that take into account the positive and negative consequences of proposals are to be made to the maximum extent possible at the regional level. The policy has been vigorously pursued, however, some concerns associated with regionalism remain.

3.5.1 Regional Organization

3.5.1.1 Policy

As with the pivotal role of the DENR at the center, the Regional Executive Director (RED) is cast in the role as the lead environmental officer of the region. In the regional offices visited, there is no evidence that provisions are made for a policy and planning staff to serve the RED's as a focus for the formation of department positions on environmental matters in the region.

3.5.1.2 Horizontal Coordination

The RED's will increasingly be faced with the coordination of total government assessment of development proposals made for their regions. It seems certain that environmental management decision-making will be steadily shifted downward. Given the emerging role of the regional NEDA staffs with the Regional Development Councils (RDC), full assessment of all aspects of the development proposals may have to center at the regional level.

3.5.2 Vertical Horizontal Coordination

3.5.2.1 Relations With Local Governmental Units

It is understood that the proposed Local Government Code will either authorize or mandate the existence of an environmental officer in each local government unit (LGU). This means the coordination of environmental planning will have to extend to the LGU's in the region. Further, vertical relationships within the regions are in a pioneering stage. The concern here is that the new officers will be looked to as environmental impact technicians who follow the procedures of the EIA/SS, but do not participate in substantive decisions. Combinations of horizontal and vertical coordination will also have to be worked out until the LGU's attain sufficient capability to coordinate national agency programs operating within their jurisdictions.

3.5.2.2 Separating Levels of Interest

Presently, the distinction between the national interest and the regional interest is based upon monetary value. If a facility exceeds a certain capital investment or a public project exceeds ₱300,000, the decision is to be made in the center. This basis is not sound from an environmental point of view. A road reconstruction costing several million pesos may have no impact on resources of national importance, while a minor solvent plant located upon an aquifer recharge zone would have.

It is possible within such a planning framework to define those things that are of local, provincial, regional, and national interest. The location of the environmental decision making should follow those levels of interest when proposed resource inventories are conducted

3.5.2.3 Increasing Site Specificity

As the level of decision-making descends, the level of site specificity ascends. It is at the regional and lower levels that the details of site design can be assessed for impact upon the human environment.

It has been questioned whether or not a sufficient data base exists at the regional scale to effectively make these analyses. Another area for concern is the ability of the regional staffs to establish data development relationships with the proposers of development projects, whether public or private.

In order to develop a standard planning information base (SPIB) within each of the regions. The SPIB structure should be accessible and able to accept newly developed data.

3.5.3 Breaks in Technical Communications

There is a lack of technical communication vertically through the technical bureaus of the DENR. One would think such standardization of operations to be part of a continuing agency training program. That it is not is a cause for continuing. Agency training for the standardization of operation does not exist.

However, the evident solution is in the DENR. Communication between the technical bureaus should be encouraged and facilitated, with technical expertise in the bureaus (whether in EMB or the Forest Management Bureau is irrelevant) traveling to the regional offices to conduct in-service briefings for their technical colleagues. The centralized training staff should facilitate these communications links.

3.6 Local Government Relationships

Quite separate from the mechanics of regional vertical integration with LGU's is the matter of local autonomy. This report has been explicit in demonstrating the relationships between the ability of the LGU's to be financially independent and the solution of the solid waste treatment problems.

Yet, a more serious concern centers upon establishing comprehensive planning machinery in the LGU's. It is on the ground that resource patterns of national significance are located, that controls on the use of land and water are identified and enforced, that monitoring systems are put in place, and that people's participation is the most important.

The emerging autonomy of the LGU's will stress the Provincial and Community Environment and Natural Resource Offices (PENRO and CENRO). Planning the manner in which the DENR staff contribute to the balance of the urban environmental management systems is mandatory.

One suggested point of entry for the DENR is investigating the propensity to recycle and reuse by-products and to meet effluent discharge standards by the municipally licensed slaughterhouses.

Since presently, the national government exclusively reserves right to eminent domain, the need exists for public bodies to acquire rights in property upon which they plan to build treatment facilities.

3.7 Private Sector Roles

The Filipino people have a strong enterprenurial spirit, finding enterprising ways to take advantage of market opportunities. This is an enormously valuable trait and should be kept in mind in all phases of urban and industrial environmental management.

The judgments employed by Filipino entrepreneurs are based on the economics of the firm, by providing the acid test for profit. It has been generally thought that this talent was limited to the industrial side of the equation. However, the public/government side has been notably unsuccessful in meeting the challenges of urbanization and industrialization; perhaps increased involvement of private firms in doing public jobs will be more successful.

The issue is finding ways to harness and maximize this enormous force in the interest of the Philippine environment.

3.7.1 Adversarial Relationships

A deliberate distinction is made between the private sector and industry. In the Philippines, a substantial portion of what is referred to as industry is in fact, in public hands. However, in reality, the behavior of the public corporations is identical to that of privately owned organizations. For ease of exposition, all aspects of the manufacturing and commercial service sectors, public or private, are referred to as "industrial" as distinct from the conventional "urban" aspect which is usually thought of as a public responsibility.

The present GOP interface with the private sector on environmental matters is confrontational. This position is staked out largely by the DENR. During the research for this report, it was found that DENR positions were beginning to change from confrontation to what is called a development approach. It is not yet clear just what that means, but performance seems to indicate a reference to achieving environmental soundness reviews as part of the permitting process. The rhetoric, however, continues to portray the view that industry is a villain that must be brought to heel or closed down.

3.7.1.1 Lack of Industrial Involvement

There has been little formal attempt by the DENR to enlist the support of industry in their urban and industrial environmental management initiatives. Without the cooperation of industry, it will take massive investments in enforcement and revision of the penalty schedules to make compliance a more attractive alternative than evasion. However, resorting to such massive enforcement will hit heavily on the small and medium sized enterprises with the most narrow profit margins. The result could mean forcing many small and medium sized enterprises out of business.

In reality, the massive size of today's Philippine urban and industrial environmental management problems, with limited financial and personnel resources likely to be available, dictates a cooperative strategy as the only workable opinion.

By enlisting the good will and support of industry, reaching socially acceptable urban and industrial environmental management goals is possible.

3.7.1.2 Approaches Within Industry

It was noted earlier in this chapter that a decade of neglect had affected the condition of the public service infrastructure. What is true of the facilities described there is representative of much of the industrial stock of the country, particularly the public corporations.

Financially Viable Firms

It is with the larger and better financed firms that the economics of the firm offer the greatest opportunities seeking profitability. The concern is that continued regulatory approaches will discourage rather than encourage the evaluation by these firms of efficiencies that can be made that will add to profitability and reduce emissions.

Due to the high cost of capital, even though given process changes can be shown to improve efficiency, the cost of money to install the changes may block the improvements.

Meanwhile the opportunity is good for improving efficiency and profitability of small firms through analysis of their processes. Some changes are small and can be accomplished at minimal cost. The challenge is reaching enough of them to make a difference in the gross discharges into the environment.

3.7.2 **Present Plans and Proposals are Traditional**

The substantial number of engineering studies and plans for urban and industrial environmental management has been referred to in chapter 1. With only one or two exceptions, the institutional arrangements have assumed traditional economically advanced conditions. Under that paradigm, a municipality or other public authority obtains capital, builds a capital intensive mechanical system, and then operates it with revenue from fees and charges and/or from general revenue. Under such systems, industry is considered to be an externality. Even the most recent of the studies devotes little or no space to the internal situation in industry or the nature of the effluents that industry may put into the treatment stream. It is generally assumed that the sizing and processes used to treat waste are domestic standards. Another concern is that the capital intensive systems have substantial imported components, such as compactor trucks and electronic controls and monitoring devices.

Only one proposed approach to solid waste management attempted to use the informal recycling system now associated with open dumps.

Urban and industrial environmental management systems must recognize unique Philippine conditions and be tailored to function in the local environment. It is of further concern that conditions are not the same throughout the Philippines. Therefore, technical, economic, financial, social, and institutional solutions appropriate for Metropolitan Manila may simply not work in Cagayan de Oro or elsewhere.

3.7.3 Entering the Urban Aspect

The same entrepreneurial drive that influences actions in the industrial aspects of urban and industrial environmental management should be considered in dealing with what have been intractable urban problems. As many economically advanced countries are finding, it is feasible and desirable to have complete waste treatment systems built and operated by private firms.

Since public finances are so strapped in the Philippines that complete urban management by public entities may never catch up to the problem; and since per capita income levels are so low that completely private solutions may not be viable, the issue is devising ways to forge mutually beneficial joint financing arrangements. However, it is anticipated that there will be traditional reluctance for some phases of municipal waste treatment systems to be owned and/or operated by private firms. There should be no limits to what private firms can operate. Yet, achieving the necessary results requires unlimited access to what private firms can operate.

3.7.4 Partnerships

Each waste treatment system will have different characteristics, keeping with the idea that each system is likely to deal with different problems. There will be abundant opportunities for entrepreneurs to seek internal efficiencies best suited to local markets. This will be an important part of the necessary partnership between private organizations and public bodies.

There are a variety of ways to form partnerships with industry to provide waste water treatment.

At issue will be the treatment accorded in the new local Government code to private firms in providing municipal service. This relationship is currently controlled under the provisions of PD No. 752. What is now the DILG has ruled that LGU's cannot invest in private enterprises and that LGU's cannot grant incentives to private operators. The department held, in the later case, that authority to make such grants is vested solely in the BOI.

3.7.5 Expanding Business Opportunities

3.7.5.1 Manufacturing

If emphasis is placed upon the domestic fabrication of equipment suited to treat solid, liquid, and gaseous waste, it will be possible for Filipino entrepreneurs to enter the field. In a country with low labor costs and an excess of available labor, it makes sense to create equipment that is not only suitable for use in the Philippines, but which relies on labor intensity rather than capital intensity. Under suitable conditions, this could be a growth industry.

3.7.5.2 Consulting

There are two aspects to consulting. The first is quite obvious. If there are to be facilities designed and built, there will be a need for local firms qualified to provide the needed professional services. The larger the demand, the larger the field. Not so readily visible, however, is an approach to meeting the gross resource shortages in the public sector. The challenge is to create the statutory environment permitting and encouraging the use of certified environmental auditors by industry. The certification process would be similar to that employed for Certified Public Accountants with practitioners employed in much the same way.

3.7.6 Incentives

By re-establishing the original incentive schedule from PD No.1152, the necessary incentives will become available to overcome the exceptional cost of capital and the current lack of incentive mechanisms. Making such changes would ensure the installation of waste treatment facilities that would otherwise not be considered cost efficient.

3.7.7 Private Voluntary Organizations

A large part of the entities discussed above are non-governmental organizations (NGO's). A particular kind of NGO is the private voluntary organization (PVO). Again, there is a wide range of types and sizes of PVO's.

3.7.7.1 Trade and Commerce Associations

Organizations like the Philippine Chamber of Commerce and Industry and its related chambers, can be influential in implementing a national urban and industrial environmental management strategy. The challenge is enlisting the considerable influence of the members of the chamber to further the GOP's environmental agenda.

Another type of PVO that could contribute to the same objectives is professional associations, such as the Philippine Pollution Control Association. The members, who include members of industry, would be instrumental in promoting a system of certified environmental audits.

3.7.7.2 Citizens' Organizations

A growing number of citizens organizations, from single purpose, local clubs to national networks, are showing an interest in environmental matters. Some were created up in response to the considerable impetus given by the National Reforestation Program, while others seek to restore to life damaged stream ecosystems or prevent destructive cyanide and blast fishing. Only a few have become interested in urban and industrial affairs.

NGOs have been very active in calling attention to environmental issues, leading protests against polluting firms and proposed projects with potentially polluting effects, and monitoring the environmental impact of projects. In a 1990 consultation of provincial NGOs, demands were made for the collection of more provincial and regional data on natural resources and their exploiters. Such data would be used as a mechanism for pressuring government into adopting and enforcing ecological policies; and, for technical assistance for biochemical analyses of the ecological effects of both government and private development projects.

Partially as a response to the shortage of enforcement personnel, the DENR, and more particularly the EMB, seeks to use PVO's as an extension of itself. More important though is the role such groups play in raising public awareness and in educating the general public as to the values and dangers involved in ecosystem destruction.

DENR officials are aware that some organizations are being formed by individuals intent on promoting their own agenda and not that of the GOP.

Thus, a concern with using the PVO's as an extension of the department is that there will be times when one or several deputized citizens will act in the name of the department but contrary to department policy or intent. DENR then faces the issue of the amount of legitimacy to be granted to the organizations in terms of training and organizational skills. The standard approach is to handle the PVO's through information and education offices with the intent to extend standard educational information to any citizen with an interest in protecting and managing some part of the natural environment.

3.8 Government and Private Laboratory Capacity

3.8.1 Laboratories

An evaluation of the current capacity of government analytical laboratories performing environmental testing reveals the need for significant improvements. Observations in government laboratories visited corroborates the fact that the facilities were, generally understaffed and ill-equipped. While the major objective in the laboratories is the identification of pathogens, the laboratories were not able to perform basic tests for coliforms. The study team did not ascertain the degree to which such tests could be performed in facilities operated by the DOH.

Regulated industries also have some laboratory equipment, some of which is quite sophisticated. In one instance, officers taking samples to monitor the performance of a mining company relied on the laboratory facilities of the company being monitored. As would be the case with a Certified Environmental Audit program, professional results can be used by both the regulated and the regulator.

Thus the current debate is whether it is feasible to build a network of university, agency, and private facilities before embarking on an investment program to install a laboratory system operating exclusively within and for the EMB.

The scenario for monitoring systems and equipment is the same as that of laboratory capacity. There may be monitoring stations operated by units of the state college and university system, but this study did not discover any. Operational data indicating the degree to which industry is monitoring the discharges being made, particularly into the air, was not collected.

There is special concern, however in the monitoring conditions in the coastal zone, as the coastal waters of the country are receptacle for all manner of by-products and residuals. Because of the importance of locally caught fish to the national diet and the livelihood of many artisanal fishermen, this monitoring system ought to have substantial GOP investment in hardware and training for long-term staff.

3.9 Gaps Worthy of Concern

3.9.1 Ground Water

The Water Quality Criteria and Rules and Regulations Relating to Water Pollution Control formerly classified ground water. When the regulations were revised in 1990, the references were dropped. The concern is that groundwater resources are now completely unprotected.

The issue is the enactment of well head zone protection and for aquifer recharge area protection. Implementation of the protection should take into account the jurisdiction and permitting authority of the National Water Resources Council, the funding and supervisory authorities of the Local Water Utility Administration, the ecosystem protection mandates of the DENR, and the land use control authorities granted to the LGU's.

3.9.1.1 Coastal Water "Reclamation"

In the past several year there has been a growing awareness that coastal zone resource management is in the ational interest. Yet it seems that RA No. 1899 grants unrestricted authority to chartered cities and municipalities to dredge and fill tidal areas. Making new land is often the path of least resistance for local governments facing shortages of developable land.

The concern is obvious; the issue is finding equitable ways of recognizing the national interest in altering the character of the critical inter-tidal zone and balancing it with the interests of the LGU's to develop in what they perceive as their best interest.

4.0 RESEARCH, INFORMATION AND TECHNICAL ASSISTANCE NEEDS

A recurrent theme encountered in touring the urban and industrial environmental management horizon is the lack of data. In most instances, the lack is absolute; in other instances the data are difficult to find or, significantly, not ordered in useable or consistent form. The significance of this condition lies in the inability to construct longitudinal analyses. Research across a broad spectrum of disciplines will be required to develop the data. Much of the research needs have been identified during the inquiries leading to the annexes found in Volume II.

Urban area residents, industrial decision-makers, government officials, and private voluntary organizations (PVO) need information to assist them in judging the risks to their health and welfare and to support public action to reduce those risks. Industrial decision-makers require technical information about new processes and practices that increase efficiency, reduce emissions, and limit liability. Government officials will benefit from information from other practitioners. PVO's can learn about how similar organizations have dealt with urban and industrial environmental management problems.

Another recurrent theme throughout this report is the complexity of the technical, economic, social, and institutional problems surrounding urban and industrial environmental management. These problems, however, can be analyzed and addressed if existing technical expertise is brought to bear.

These two topics will be briefly addressed in this Chapter.

4.1 Research Needs

4.1.1 **On-Going Research**

Urban and industrial environmental research activities were found in three locations. Yet, none of the practitioners appeared to be aware of major listings of priority research topics.

4.1.2 **Department of Science and Technology**

Under the general supervision of the Department of Science and Technology (DOST), there are research agencies dealing with major sectors. One such agency is the Industry and Technology Development Institute (ITDI). Research that is supported from the Government of the Republic of the Philippines (GOP) budget or from donor sources in the area of urban and industrial management is either monitored or conducted by the staff of the Environmental Division of the Institute.

As is true of all DOST supervised operations, the Environmental Division has prepared a master plan for the conduct of priority research in the mid-term. The Division's most recent listing is for

the period 1989 to 1992. The Goals and Targets set for the Division for that period are: "1. to undertake studies on waste treatment for various industries and environment impact assessment studies and 2, to develop techniques utilizing agro-industrial wastes for the recovery of useful products." The objective is: "To evaluate the effects of industrial and agricultural activities on the environment and on public health, and to minimize adverse effects through the development of pollution control and waste utilization technologies and hence, promote enhanced environmental quality."(16)

The 33 research topics (Table 11) are organized in seven general categories. The scope of the research agenda is too broad to permit scientific judgments to be made about the quality of the research designs or of the work completed. Suffice to say that there is a substantial convergence of the research needs identified in the various aspects of this study and the topics included in the seven categories shown.

4.1.2.1 Ecosystem Research and Development Bureau

The Bureau is the major research arm of DENR. The Bureau is purported to have conducted a complete revision of its research agenda but it was not available for review.

4.1.2.2 Research and Development Division (EMB)

EMB management reported that one research topic has been funded and is on-going.(17) The research involves the use of trace isotopes to track the movement of leachate from dump sites.

Table 12. Industrial Environment Research Topics, Environment Division, Industry and Technology Development Institute, 1989 to 1992

Category/Title	Status
Effects of Industrial and Agricultural Activities on Air and Water Environment	
o Validation of Existing EIS Methodologies	Completed
o Determination and Monitoring of Concentration of Agricultural Chemicals in Run-off at UPLB Area	Suspended
o Determination and Assessment of Solid and Liquid Effluents of Citric Acid Plant	
o Monitoring of the Effects of Fertilizer and Pesticides on the Ecosystem	
o Toxicity Studies of Electroplating Wastewaters on Fish and Aquatic Life	IDRC
o Assessment of Environmental Impacts of Coal-Based Power Plants	FCIER-Ongoing
o Assessment of Air and Water Quality at a Pulp and Paper Plant	PCIER
o Determination of the Level of Toxicity of Wastewaters from the Plastics Industry to Aquatic Life	
Public and Occupational Health Effects of Industrial, Agricultural and Urban Activities	
o Hair as a means of Assessing the Presence of Environmental Pollutants in the Body	
o Monitoring of Chlorinated Organics in MWSS	
o Monitoring and Assessment of Air and Noise Pollution within a Garments Manufacturing Plant	
Adaptation and Development of Air and Water Pollution Control Technologies for Selected Industries	
o Reduction of Detergent Concentration in Textile Manufacturing Wastewaters	
o Industry Survey, Characterization and Treatment of Wastewaters in Plastics Manufacturing	
o Performance Evaluation of a Pilot-Scale UA-FR, TF, RBC	
o Particulate Pollution Control in Small and Medium Scale Foundries	
o Treatability Study and Process Design of Wastewater Treatment for Dairy Plant	
o Anaerobic Treatment of Pulp and Paper Mill Effluents	
o Pollution Control Technologies in Pesticide Plants/Factories	Completed
o Pilot Scale Treatment of Tannery Wastewaters	
o Pollution Monitoring and Control in Acid/Bases Plants	
o Pollution Control in Electroplating Industries	Ongoing
Development of New and Improved Wastewater Treatment Technologies	
o Design and Construction of Mobile Wastewater Treatment and Research Facilities	
o Pilot Fermentation Plant Wastewater Treatment by Solar Aquatic Method	
o Development of a Granular Medium Filter with Automatic Backwash by Hydrostatic	Head Pilot Scale
Construction Materials from Wastes	
o Fiberboard and Other Building Materials from Textile Wastes	Completed
o Feasibility Study on Utilization of Metallurgical Slags on Low Cost Construction Materials	
Processing of Agro-Industrial Wastes	
o Utilization of Chrome Shaving Wastes as Filler in the Rubber Industry	
o Utilization of Waste Gypsum	Completed
o Utilization of Waste from Iron Concentrate as Pigment for Industrial Purposes	
o Recovery of Silver from Photographic Wastes	Completed
o Production of Defatted Rice Bran from Prawn Feed Component	
Treatment and Disposal of Municipal Solid Waste	
o Preliminary Design of a Plant of Materials Recovery/Biogas Generation from Garbage	
o Preliminary Study on Vermicomposting of Municipal Solid Waste	

4.1.2.3 Other Research

The World Health Organization had supported studies on the impacts of air quality deterioration in Metropolitan Manila, but no active research on environmental health-related topics was in progress.

This is not to say that there is no other research work being done that is of value to urban and industrial environmental management. Faculty at Central Mindanao University may be working on mercury use in mineral processing and Cebu Central University may be doing research on urban social characteristics, as they have done for the Mangapo watershed. Similarly, there may be public administration, or regional planning research, or research in any one of the multitude of disciplines that make up the urban and industrial environmental management spectrum that are not industry or technology related taking place that are directly applicable to the issues raised in the previous chapter. The existence of these studies were not confirmed.

4.1.3 **Priority Research Topics**

Bio-Physical

- o Alternate design characteristics, costs, and environmental impacts of long marine outfalls for waste water disposal. The research would test assumptions about the characteristics of the discharges, the factors that control the length (e.g., distance to edge of continental shelf), and the effects on marine flora and fauna.
- o Design characteristics, feasibility and impacts of providing overflow capacity for storm drainage in urban waste water systems.
- o Determine the technical constraints to residuals management and establish patterns by industrial sector, process, and size of firms.
- o Develop cost effective systems for handling and treating medical wastes, including low level radioactive substances.
- o Expand research in the fields of compost and methane gas generation from domestic and agricultural by-products and residues to improve efficiency and quality of product.
- o Design wide ranging projects to develop indigenous devices and equipment for treating, handling, and transporting by-products and residuals in liquid, solid, and gaseous form. The research should not attempt to mimic existing, high tech equipment, but take fully into account the operating conditions found in the Philippines.

Socio-Economic

- o Establish the statistical relationships between environmentally related diseases and environmental cause by location and type.
- o Analysis of the internal decision-making of firms in response to fines and penalties.
- o Establish the relationships between the level of management decisions to invest in environmental improvements (equipment and techniques) and various levels and combinations of credit and financial incentives.
- o Investigate alternative structures for the imposition and administration of a system of impact fees and correlate levels and types of impact fees with likely investment and location decisions of industry and commerce.
- o Determine the effect of stringent, well administered environmental standards, backed by an operative environmental infrastructure, on the location decisions of major international corporate entities.
- o Conduct site specific investigations into the health impacts of major industrial dischargers into the ambient air and water with attendant tolerance levels by parameter and monitoring requirements to protect the public health and welfare.
- o Determine the social structure of the scavenger-based solid waste separation, recycling, and reuse systems in Metropolitan Manila, Metropolitan Cebu, and Davao. Compare similarities and differences to generalize those data that will be needed to characterize such systems that occur in other urban areas.
- o Evaluate effectiveness of various information media and the types of presentation needed to deliver information to those segments of the population that are most socially disadvantaged.

Institutional

- o Determine the effects of current technical communication systems in the DENR on morale and field efficiency with recommendations for improvement.
- o Determine the organization and structure of a Standard Planning Information Base and the operation of such a system with or without electronic support.

4.2 Information Needs

4.2.1 The Public

The type of information needed by the public is not generally disseminated. The information that could be made available will, until Philippine-specific research is completed, come from a variety of sources such as the United Nations Environment Program, (UNEP) the United Nations Education, Scientific, and Cultural Organization (UNESCO), and the World Health Organization (WHO).

Information themes needed to encourage environmental action and awareness by the general public, judging from the campaigns in other areas include appealing to employment, health, income, and convenience. In other societies, penetrating the active consciousness of people in the lower strata and motivating them to act in positive ways is very difficult. Until market-oriented research the Philippine context is completed, dissemination methods may be more diffused and experimental than directed.

4.2.2 Industry

4.2.2.1 Process Information

The International Research and Development Center (IRDC)-supported Materials Exchange Program is indicative of the kinds of information that is needed by some parts of the industry. The practice of networking information about innovative and new materials is gaining acceptance within the industrial sector.

The need for far greater exchange of information about improved processes and equipment is still needed though. Some of the information is locally generated: the experience of those firms that have made strides to improve their internal processes or installed equipment to meet the requirements of their discharge permits, for example. Other sources are international. Some of the information can be accessed through the Philippine affiliates of multi-national firms; the rest from industry associations and professional organizations, such as environmental planners, civil, chemical, mechanical and sanitary engineering societies, and American Mining Congress.

4.2.2.2 Business Information

It has been noted in several discussions, that the decisions to install new technology or to alter existing technology are made on economic and financial grounds. Therefore, there is a need for the exchange of information to serve these needs. The information could range from research bulletins to industry newsletters. The information exchange in this areas is often problematic because management is designed to reveal financial information to competitors.

4.2.3 Professional Organizations

There already appears to be a reasonable degree of professional interchange among the members of professional organizations. The impact of professional exchange is greater because a substantial number of firms do not employ the full range of professionals found in consulting practice. Increased information exchange between the Philippine professional societies and their counterparts in other countries will be beneficial.

4.2.4 Information on Local Conditions

As in other sectors, there are all large gaps in basic data about local conditions. Some of the information gaps are those associated with monitoring systems. Examples that have been emphasized are: the volume of water available in the nation's aquifers and the actual volumes now being withdrawn; the conditions of inland lakes and streams and the estuarine and coastal water bodies; the quantities and nature of the materials being discharged from fixed sources into the ambient water and air of the nation; the volume and treatment of medical wastes throughout the country; compliance and trend records for those industrial establishments with poor compliance records; and an inventory of toxic and hazardous chemicals and related materials.

4.3 Technical Assistance

More important than research will be practical demonstrations and applications of technology already known and in use elsewhere. The needs are so large and the range of skills so diverse that only a sampling of the total technical assistance can be mentioned. These specialties listed below are thought to be the ones that will yield the highest returns, but data and information are so sketchy that this is not certain. Technical assistance encourages industrial improvement and has the power to grant incentives vested in its Board of Investment and to the EMB because of the effect on discharges.

4.3.1 Industrial Audits

There are four aspects to industrial auditing should be addressed.

4.3.1.1 Direct Assistance to Industry

There are many public and private sector personnel in the United States who have extensive experience in conducting environmental audits. All of them have general approach experience; each of them has industrial process specific experience. For example, environmental managers, usually chemical engineers, in the synthetic fiber industry have conducted audits of factories of varying age. These specialists could assist counterpart Philippine engineers analyze their use of materials and energy and their practices. The amount of such assistance is limited only by the availability of the personnel and the number of industrial sectors and sub-sectors that will be covered and the intensity of coverage.

4.3.1.2 Extension Assistance

This term is used to refer to auditors possessing a firm theoretical knowledge of the process involved who would work with small and/or unregistered firms that tend to operate in specific neighborhoods. Such a person might work with EMB officers in given barangays of a chartered city, with the knowledge and cooperation of the city administration and bureaucracy. The auditors would be much like extension agents. They would gain confidence of the proprietors, conduct an audit of leading or representative operations, and demonstrate savings that might be made.

4.3.1.3 Establishing a System of Certified Environment Auditors

Technical assistance in this area will be diverse. The objective is to set standards, establish training, and create a certification mechanism for those who would enter the field as Certified Environmental Auditors. Clearly the auditors would have to be technically competent to conduct the kinds of audits mentioned above; that is, make initial examinations of factories, analyze the processes being used, and make recommendations to management for improvement. In addition, they must be able to inspect a given facility and to determine the degree to which that facility is in compliance with the terms of its operating permits.

4.3.1.4 Assistance to Financial Controllers

The assistance would consist of present or former financial officers who would counsel their counterparts in Philippine industry in the methods for evaluating the impact on profitability (short term and long term) of adopting the mechanical changes that emerge from the audits of their plants.

4.3.2 Regional Environmental Planning

The importance of this aspect of the urban and industrial environmental management scene cannot be under-estimated. A whole host of relationships are being defined which will profoundly influence the shape of the environment. The principal forces center around the Regional Development Councils (RDC), the Regional Development Assemblies, and the staff role being played by NEDA. Once again, there are a number of activities included within the rubric of regional environmental planning.

4.3.2.1 Assistance to DENR Regional Offices

A major set of concerns and issues were raised with respect to the importance of the proposed resource plans proposed for at least two of the administrative regions. There are several disciplines that have done this kind of work in the U.S., many of them are or have been

employees of the successful voluntary associations of local governments.⁵ The United States experts would work with colleagues designated by the Regional Executive Directors, and would focus on:

Definition of Resource Patterns of Significance

Distinguishing the levels of significance is the key to the levels of decision-making and the sources of funding for given activities. Applying these principles will be critical to the successful use of the plans for planning and implementation of environmentally sound approaches in the regions.

Establishing Horizontal and Vertical Coordination

As has been emphasized before, it is important in environmental planning, particularly urban and industrial environmental management, that other departments and numerous levels of government be included in the inventory and subsequent assessment process. Technical assistants experts would assist the regional staffs by regularizing their relationships with the Provincial and Community Environment and Natural Resource Offices, and the local governmental units (LGU). This will, perforce require interaction with the NEDA staff.

Establishing Environmental Impact Assessment Guidelines

This work would follow easily from the first two items of work. Once the levels for consideration -- provincial/chartered city, municipal, regional, national -- are worked out, and the links with levels of government and disciplines are settled, then the guidelines will simply formalize what is already agreed upon.

4.3.3 Regulatory and Policy Issues

Several issues were identified for attention at the national level. The issues that would be addressed by technical assistance would be:

4.3.3.1 Hazardous Waste Management and Toxic Substances Management

The EMB personnel consulted indicated that the development of regulations required by RA No. 6969 were rudimentary and that considerable assistance would be helpful. Technical expertise in this area would be helpful to not only EMB, but to the Fertilizer and Pesticides Authority and the Department of Health as well. Since encouraging private practice is also important, technical assistance may be important to the development of the legal firms specializing in environmental law.

⁵ These organization go by a variety of names, such as councils of government, regional councils, and metropolitan councils. The distinction between formal regional governments that are chartered by legislative action and those that are voluntary associations should be made. Some of the best practitioners who gained their experience in the regional agencies now occupy positions in academe.

4.3.3.2 Hazardous Waste/Toxic Materials Transportation

Very little attention is being given to the mechanics of transporting the hazardous and toxic materials once they are identified and inventoried in compliance with the law. U.S. Department of Transportation specialists could make significant contributions to the EMB and to the Office of Ground Transportation.

4.3.3.3 Ground Water Protection

Three types of technical assistance would match the concerns and needs identified.

Characterizing Aquifers

The first is from the field of subsurface hydrology, in which the principal aquifers, particularly those with identified subsidence and salt water intrusion problems, would be characterized and estimates made of the safe, sustainable yield that can be expected from them. Priority should be given to Cebu where the City Water Utility District proposes to drill nearly a dozen new wells, some of which are intended to provide irrigation water for a golf course. The methods used to characterize and inventory these aquifers would be transferable by Philippine engineers and scientists to other aquifers.

Well Head Protection Zones

Information has been presented in Chapter 1 concerning the importance of protecting the area around the location of the well and attendant equipment. The technical assistance would be directed to the National Water Resources Council and EMB for developing the standards, regulations, and guidelines.

Well Production Monitoring

As part of the permitting process, registered well drilling contractors should be required to provide data from the cores extracted and the operating entities would report regularly on the quantities of water extracted from the well and the hydrostatic level of the water table.

4.3.3.4 Pre-Treatment Program

Technical assistance in this area is conditioned on movement toward a system of co-financing industrial and domestic waste water treatment. The need for regulatory change will emerge if an agreement is reached with a group of industrial plants in geographic proximity to each other. The group would agree to contribute the cost of internal treatment of domestic level waste to a common fund, and only construct within the plant, treatment units sufficient to bring the waste stream to domestic standards. When that is done, the existing regulatory structure will have to

be adjusted. The above requirements are called for because it is presently assumed that all discharges will be made into ambient water.

In some ways, this step will require an extension of the technical expertise used in industrial audits. The audit will identify the volume and character of the residuals/waste streams that must be treated. The method of treating that stream to make it suitable for discharge into a domestic sewerage system will then have to be designed.

4.3.3.5 Design a System of Impact Fees

The need for economic policy assistance will depend upon the results of, and the reception given to, research into impact fee methods and levels. If the research shows that such an approach is not appropriate in the Philippines, or if the recommendations are rejected, then no further assistance will be necessary. If the research and the reception are favorable, then technical assistance will be needed to help draft legislation and implementing regulations.

4.3.4 **Comprehensive Local Planning**

The technical assistance skills required in this activity are complementary to those that will be employed in regional planning. The focus is different because the decision-maker will be the Mayor and legislative body of a city or municipality. The technical assistance will concentrate on three areas, but must be able to provide a comprehensive, multi-sectoral approach to planning and decision-making. The three areas are:

Land Use

Land use will take into account the actual delineation of the areas of national, regional, provincial, and local significance and their impact upon the use of land and water within the jurisdiction. The remaining land surface would be subject to standard urban land use analysis. The analysis would be the basis for a draft zoning ordinance. The zoning ordinance would be supplemented by a subdivision ordinance that will take into account the regulatory authorities of the Housing and Land Use Regulatory Board and the permit requirements for industrial estates.

Environmental Infrastructure

There are likely to be four sub-sectors: liquid waste, solid waste, open space, and air quality. The statement of concerns and issues makes clear that standard solutions will probably not work in Metro Manila let alone the other urban centers of the country. Therefore innovative solutions will be required. The actual design of facilities and systems will be developed in collaboration among various technical specialties as will be explained in the description of skills needed for one or more demonstration systems.

Capital Improvement Budget

The culmination of the assistance would be the formation of a capital improvement budget that shows the amounts and sources of funds that will be required to construct the environmental infrastructure. The budget will reflect the joint financing arrangements arrived with industry, the contract arrangements expected with private firms, and depreciation reserves for continued modernization of the plants after they are built. The object will be to demonstrate sustainability to the RDC.

4.3.5 Education and Training

The list of assistance in training equals the list of technical skills described above and then some. An exhaustive listing is not practical. Note is made of some of the more significant items.

4.3.5.1 Education

A team of environmental planning faculty members would provide technical assistance to the Department of Education, Culture and Sports on improving the system of degree education in urban and industrial environmental management. As has been described, the curricula would emphasize multi-disciplinary approaches and synthesis. The team would not become involved with undergraduate education; it would limit itself to the graduate level and to dispersion of centers where the curricula would be offered.

4.3.5.2 Training

Training could range from the operation of monitoring and laboratory equipment to training for waste water treatment plant operators.⁶

Of particular importance will be training certified environmental auditors.

4.3.5.3 Private Voluntary Organizations

Introductory training could be offered for interested citizens. The training skills would come both from technical sources and from counterpart citizens' organizations in the U.S. Care would be exercised to not treat the participants as extensions of the EMB or any other staff. Emphasis would include introductions to the character of industrial processes, the nature of the discharges and internal treatment potential, and the role of PVO's in increasing local awareness of environmental management issues.

⁶ Some concern must be expressed about the ability to retain trained waste water treatment plant operators. It is alleged that in the parts trained Filipino operators could earn superior wage scales in the countries of the Gulf Region. Thus, once trained, those graduated would leave the country.

4.3.6 Guidelines

The output from most of the technical assistance consultants outlined above would be some of technical manual for use by Philippine agencies. There are likely to be other fields where it will be desirable to develop guideline and/or manuals for training or to achieve standardization in the application of regulations. Some possible areas not mentioned so far are:

- o Ocean disposal of wastes;
- o Principles of industrial siting and buffer zones;
- o Oil spill contingency planning; and,
- o Making septic tank systems work.

4.3.7 Demonstration Systems

The objective of the demonstration systems is to develop a check list of steps that will be required for the planning of an integrated waste management system in any locality in the Philippines. Therefore, a technical assistance team will be required to work with Philippine counterparts to design the system and take it to operational stages.

The expected technical expertise would include:

- o Risk analysts;
- o Industrial auditors for select industries;
- o Environmental engineers;
- o Community motivators;
- o Ecologists;
- o Regional planners;
- o Financial analysts;
- o Resource economists (with industrial experience);
- o Monitoring specialists; and,
- o Chemists and similar specialties, as needed.

The technical personnel would realize that whatever urban-industrial site is to be planned will present unique problems and opportunities. There is not likely to be room for conventional solutions, although some conventional steps will have to be taken. Confirmation of the volume and character of the domestic waste stream will have to be determined; this is straightforward, although it will have local variations. Sorting out the informal operators of the separation and recycling businesses will be more difficult, and working them into a final urban waste management system will test the imagination of all technicians, Filipino and expatriate.

Tested methods will have a place in the design and operation of the system. The standards for a sanitary landfill are well known: only one cell, representing a small proportion of the total site, is open at any one time and is top covered quickly, for example. The imaginative work comes

in finding the operating mode that will maximize the participation of private entrepreneurs in constructing and/or operating the treatment facility.

Similarly, if an industry-government partnership for managing liquid waste streams seems technically and politically feasible, then the final shape of the institution established to accomplish the design and operation of the system, including monitoring, will require substantial innovation.

A significant benefit that accrues from nearly all demonstrations is the on-the-job training that is accomplished when professionals work together. In addition, the demonstration would be treated as a case study for training purposes in the manner of a business school case where facts are presented, but not the solution. Finally, the demonstration will be a place where officials from LGUs across the nation can visit to see how they can address some of their more pressing environmental management problems.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

5.1.1 **The State of the Urban and Industrial Environment is Poor and Adversely Affects Economic Development**

5.1.1.1 Biological and Physical Degradation

The evidence of biological and physical degradation is visible in most urban centers of the country. Solid wastes accumulate in creeks, canals, esteros, and streets during the dry season and are washed into the coastal system in the wet season. Most of the water bodies look foul and are. Industrial stacks emit particulates that coat the surrounding landscape.

The less visible evidence is equally disturbing. No new waste water treatment facilities have been put on line for more than four decades without technically adequate sanitary landfill in operation in the country. Salt water intrusions and subsidence are indicators that the mainstay of the country's water supply, groundwater, is passing the point of sustainable production.

5.1.1.2 Risks Facing the Coastal Zone

Even a cursory examination of the location of the urban centers (where most industries are located) shows they are parts of large estuarine-bay systems. Continued discharges of untreated or inadequately treated solid and liquid wastes from domestic and/or industrial sources will ultimately destroy the waters that produce a large part of Philippine dietary protein. In addition, coastal fin-fish, mollusks, and crustaceans can become vectors for life threatening diseases such as cholera and hepatitis.

Dynamite and cyanide fishing are often decried as destroyers of productive coral reefs, which is true. But some industrial discharges--not necessarily from the large, stand-alone industries--carry with them chemical agents that can be just as deadly to living coral.

As several South American countries are currently discovering, once people considering travel learn of epidemics or of despoiled beaches and reefs, they change travel plans and avoid the afflicted areas. This is a severe blow to foreign exchange earnings from tourism.

5.1.1.3 Social and Economic Costs are Great

Social costs are incurred and loss of productivity is caused by the rising rates of environmentally-related diseases, such as typhoid, diarrhea, cholera, and respiratory infections.

Old manufacturing plants are starved for capital to modernize and face increasing problems with competitiveness. Such plants are not efficient users of raw materials and have a difficult time

meeting effluent discharge requirements. Government's are faced with trade-offs between the major economic systems that are at play: the internal economics of the firm, the macro economic policies of the government, and the social welfare economics of society at large.

5.1.1.4 Weaknesses in Political and Institutional Policy Frameworks

Unlike other environmental issues facing the country, such as forestry, the political and administrative framework for dealing with urban and industrial environmental issues is very complex. It is possible that the situation in Metropolitan Manila is an extreme case, but even a simple enumeration of the agencies and entities that are involved with some aspect of the problem is bewildering. The complex web may, to a large degree, account for the lack of action on the water, air, and land use quality issues facing the region.

Similarly, most of the departments and agencies of the national government either have explicit or implicit responsibilities for one of more parts of the urban and industrial environment. The statutory authorities are dispersed, sometimes contradictory, and have, at a minimum, created administrative overlaps.

A mechanism that can give focus and, thus, coordination, to government actions in the public and private sectors is not currently in place. In addressing the more straightforward problems of forestry and reforestation, the Department of Environment and Natural Resources (DENR) has provided exemplary leadership. This has not been true for urban and industrial problems. The environmental planning unit encouraged in other agencies, in industry, and at the local government level is lacking. The Environmental Management Bureau is overloaded with responsibilities and understaffed both at the center and in the regions. There is no capacity for urban and environmental management at all at the provincial or community levels.

5.1.2 **Sound Urban Environmental Management is the key to sustainable Economic Development**

5.1.2.1 The Rate of Urbanization and Industrialization Will Accelerate

This conclusion has to be tempered by the fact that events in Metropolitan Manila tend to skew national data, but the effects of the decade-long government policies to disperse growth to other urban centers is taking hold.⁷

The employment magnets are heavy industry as illustrated by the facilities in Ormoc and the Cagayan de Oro - Iligan Corridor. More recent trends, however, emphasize development of

⁷ The reason Metropolitan Manila skews national urban data is the concentration of investment in urban infrastructure and the natural advantages of being the national capital and the major international port. Thus, when the growth rate of, say, Iloilo City is said to be below the national average, the national figure is buoyed by Metro Manila growth. In absolute terms, regional and provincial cities show substantial growth.

medium-sized agribusiness-oriented facilities for which the Philippines show a natural competitive advantage in world markets. Simply stated: there will be a larger absolute and proportional part of the total population living in urban centers and there will be more manufacturing facilities and jobs throughout the country. Both the Government of the Republic of the Philippines (GOP), and specifically the Department of Environment and Natural Resources (DENR), have explicitly chosen to emphasize development of private sector solutions to major problems. This approach plays to the strengths of the population: if there are opportunities to engage in profitable business that will reduce pollution, then it is the nature of Filipino entrepreneurs to enter the business.

5.1.2.2 The Task of Creating Environmental Management Systems is Complex

The Philippine experience parallels the experiences of the economically developed and developing countries. As manufacturing processes become more complex, the spent materials become more difficult to handle, treat and move to some end receiving medium. The longer it takes to put an environmental management structure in place, the more difficult and costly the task of establishing a workable, integrated system will be.

5.1.2.3 Industry Attitudes to Environmental Management is Favorable

There is convincing evidence that many of the major firms, both private and government controlled, are ready and willing to fully cooperate with government agencies in bringing industrial pollution under control. The evidence comes from conversations with senior management officials and with representatives of business and trade organizations.

Major manufacturing firms have international connections and realize that environmentally responsible practices can be profitable for two reasons. First, the economic benefits of having a good neighbor image can be great. Second, multi-national firms are subject to court jurisdiction in other countries. Many companies have found that careful internal auditing of resource use in their processes has not only enabled them to meet effluent standards, but increase efficiency and reduce costs as well.

Industrialists have the most modern and efficient wastewater treatment facilities in the Philippines and private consulting engineers are currently being engaged by private interests to design and build wastewater treatment plants that meet stringent discharge standards and the quality of the effluents of many manufacturing plants now surpass regulatory standards.

After a decade of neglect, much of the Philippine industrial capital stock is behind the curve of modern technology. National macro economic policies are moving the country increasingly into an open, competitive world market, and to successfully compete in the world economy, Philippine industry will have to become more efficient. One obvious way to do so is to streamline existing operating processes as engendered by introducing environmental management statutes.

5.1.2.4 A Functioning Infrastructure and Environmental Management Policy Framework is Essential

Investments in urban and industrial environmental infrastructure can have significant pay-offs in attracting high quality, sustainable new industrial capacity.

Responsible companies must be assured of a stable economic and policy environment before they will invest in a region. Corporate plans for capital improvements are long-term and require that factors such as costs, including those incurred through taxation and compliance with environmental regulations, are stable and can be factored into business projections.

While industrial location decision-makers give primary consideration to variables such as power, communications, transportation, and water supply when determining where to locate a water plant; factors such as land use controls and the presence of cooperative, development-oriented public agencies, enter into the decision-making calculus. For example, industries look for consistent, enforced land use laws which can keep plants free from creeping settlement. In addition, industries function best with an environmental policy framework that has a consistent set of standards to which they can adjust.

5.2 Tour of the Horizon

The tour of the Philippine urban and industrial environmental management horizon shows that there is an enormous range of activities that could be profitably supported by the U.S. Agency for International Development Mission to the Philippines (USAID). The following are opportunities in which USAID can assist the GOP:

- o Set consistent national policies and priorities;
- o Incorporate recognition of larger national and regional environmental values, such as ecologically sensitive and productive areas, in land use decisions that are made by local units of government;
- o Perfect a coherent system for identifying urban and industrial environmental improvement projects, include selected projects in a capital improvement program that is funded, and assure the work is completed, operated and maintained;
- o Coordinate local governments in metropolitan areas and in provinces;
- o Establish and support technical and professional training in a number of disciplines;

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- o Acquire and install hardware for analytical laboratories and monitoring systems that adequately measure ambient air and water quality, the character of point discharges, and the presence and character of toxic and hazardous materials;
- o Apply even-handed, consistent, but flexible regulation and enforcement by administrative agencies and the courts;
- o Devise tax and user fee policies to reinforce the goals of decentralization;
- o Support massive public information and education programs;
- o Mobilize citizens to act as watchdogs and to act responsibly themselves;
- o Examine the process mechanics and balance sheets of manufacturing concerns as a means of determining material reuse and internalizing treatment processes;
- o Organize flexible standards and innovative, cooperative enterprises with industrial concerns;
- o Protect the health and well-being of human beings -- including those who now make their livelihoods from collecting, separating, and recycling domestic solid wastes;
- o Improve the legal and regulatory framework by installing an integrative regulatory framework based on pollution prevention goals; and,
- o Choose a particular substantive area -- such as medical wastes or slaughterhouses -- as the subject for a comprehensive application of appropriate technology to align and construct facilities to reduce risks to human health and increase the use of by-products and residues.

This list is only indicative of the enormous array of possible activities that could be supported by any donor agency.

5.3 Choosing A Role For USAID

5.3.1 Criteria for Rejection

5.3.1.1 Sufficient Local Resources or Existing Donor Support

The U.S. Agency for International Development Mission to the Philippines (USAID) has limited grant funds from the Natural Resources Management Program. USAID should not invest in project areas that are already covered by GOP resources, nor in which one or more bilateral or

multilateral donors are already or likely to be committed. An example is the Pasig River. The problems of the Pasig have been extensively studied and a major inventory project funded by the Danish International Development Agency (DANIDA) is being implemented. Another example is the functioning of the Local Water Utility Administration (LWUA). The LWUA acts as a broker between multilateral and bilateral donors and local autonomous water districts. Thus, investment in development of new water supplies seems adequate, although efforts to protect new water supplies are inadequate and, at a minimum, should be coordinated with other agencies.

5.3.1.2 Too Capital Intensive

It is easy to identify local units of government throughout the Philippines where no agency is now active in the environmental management field. Very often the immediate need is for facilities to manage domestic effluents or solid wastes. Actual construction of environmental management facilities is very expensive. It is estimated that constructing conventional sewerage and treatment facilities in the Metropolitan Manila region will cost over US\$100 million and will take decades to complete. Therefore, any project configuration that required major capital investments in hardware was rejected.

5.3.1.3 Maximize Efforts

The Mission should avoid diffusing its efforts in a larger number of smaller projects that would, even in the aggregate, have minimal apparent impact.

5.3.2 **Criteria For Inclusion**

5.3.2.1 Breaks New Ground

Grant funds, even when relatively limited, to initiate activities not yet considered either by the GOP or other donor organizations. Innovation is a valuable contribution in a field that, in many ways, is often tied to conventional solutions. Grant support can be used to break the inertia carried with many of the traditional technical and institutional solutions to urban and industrial environmental management problems.

5.3.2.2 Offers High Utility for Others

There are many financial and donor organizations that are interested in providing large capital sums to finance infrastructure investments. Some of them are earmarked specifically for the environmental sector; others are to be available for closely related purposes, such as urban development. To the degree that the results of USAID investments produce foundations and guidelines that will encourage the flow of such funds, USAID investment will yield high returns in terms of environmental improvement. A ready example exists in the proposed Asian Development Bank (ADB) Environmental Sector Loan.

5.3.2.3 Complementarities With Existing USAID Projects

There are a substantial number of on-going USAID projects that can contribute to, or benefit from, an urban and industrial environmental management project. Some of them have been cited earlier in this report. Among them is the Private Sector Revolving Fund where there is already an established connection with the Bank of the Philippine Islands. In addition, centrally funded projects, such as the Asia Bureau's Regional Environmental Project, should be targeted for collaborative efforts.

5.3.2.4 Substantial Policy Component

Grant funds are extraordinarily useful in fostering policy dialogues. This aspect is particularly relevant in the environmental management component of natural resources management. As shown in the Introduction to this report, national policies have far-reaching effects upon the behavior of national line and staff agencies; upon local, regional, and provincial governments; upon the behavior of industrial managers (regardless of size); and upon the physical health of the citizenry.

There are already a number of policy initiatives upon which the GOP and USAID/P have agreed. Regionalization and decentralization, privatization, and equity in distributing costs and benefits which could be reenforced, and would reenforce environmental management efforts.

Whatever intervention is proposed, it should be identifiable and the results attributable.

5.3.2.5 Local Support

Clearly, local support comes from the several levels of government that were described in the Chapter 3. There should be a demonstrable willingness on the part of the GOP to engage in national policy dialogues. To a large degree, support is assumed if there is already a locally-funded activity in the DENR Mid-Term Investment Plan (12). Similarly, there should be strong local government support for demonstration interventions in the specific local, metropolitan, and provincial areas chosen. In some cases, the support may have to be manifested by the willingness of an elected public official to stake a portion of his career on taking potentially unpopular stands on environmental issues. Experience provides clear evidence that is important to have the support of Private Voluntary Organizations (PVO). On the industry side, legitimization of projects that will affect industrial interests can be accomplished through major PVO's, such as the Philippine Chamber of Commerce and Industry and its affiliated chambers, as outlined in Chapter 3. Citizen support is equally important, especially in the areas where demonstration projects are to be started. Support can be generated by the active involvement of citizen PVO's in the community.

5.3.3 Perceptions Do Not Necessarily Square With Facts

During the discussions of the current situation with respect to water, land, and air contained in Chapter 1, it was shown that domestic rather than industrial sources were the major contributors of by-products and residuals. The conventional perception is that industry is the major culprit. There is little question that the perception is often used as a decoy to divert attention from the massive public problems that exist. The rationale is that if industry is to blame, then industry can afford to clean up its act – without passing on the cost to the consumer or adding to the enforcement staff. To deal, in conventional ways, with the cost of treating the domestic waste stream is perceived as something that will raise taxes or service fees.

Another misconception that is capital-intensive high technical equipment must be installed to solve urban and environmental management problems. In some cases, such as scrubbers in generating station stacks using low quality coal, expensive advanced technology may have to be used. For the most part, however, there are probably a variety of labor intensive solutions which, if tied to private sector operation, will work under Philippine conditions.

5.3.4 Public Regulation and Enforcement Will Require a Massive Expansion of the Environmental Management Bureau

The perception that industry is the major environmental culprit has led to an adversarial relationship between the DENR, as the major environmental agency in the country, and industry. To rectify the outstanding urban and industrial environmental management problems, will require massive investments in engineering staff at both the center and the regions, in laboratory and monitoring equipment, and automated data management systems.

5.3.5 Attention Must Be Paid to Horizontal and Vertical Coordination

It has been shown that environmental management involves most of governments at all levels. To fully account for the differences in values inherent in the disciplines and jurisdictions of national government agencies and the local governmental units (LGU), mechanisms are needed to make effective exchanges of plans, information, and expertise.

A restructured Environmental Impact Assessment/Statement Systems would be well suited to perform the facilitating function. The authorization exists for such a system; it is identical to the intent of the Philippine Strategy for Sustainable Development.

5.4 Recommendations

From the standpoint of visibility, investment interest on the part of other donors, and the high capital investment requirements, it is recommended that no project be centered in Metropolitan Manila. This is not to say that the support of such activities as statutory reform, refining regulations pertaining to hazardous and toxic materials, economic research, and organizational

reform will not benefit urban and industrial environmental management in the National Capital Region; they will. But the focus should be upon the rest of the country in keeping with the industrial dispersion, regionalization, and decentralization policies of the GOP.

Using the criteria enumerated above, a conceptual approach to an urban/industrial environmental management project emerged (shown on Figure 6).

Given the major concerns, issues, and opportunities that exist in the Philippines, the project will be best designed if the perception of industry as being the central factor in urban environmental management is used as the major impetus. There are four major advantages to taking this approach. First, popular support can be mobilized for an initiative that purports to correct the perceived transgressions. Second, there are significant economies that can be achieved within nearly all of Philippine industry that will make it more efficient and, hence, more competitive in the world markets. Third, discipline can be imposed on the nearly endless list of actions that should be taken to improve the urban and industrial environmental management situation in the country. Fourth, actual conditions can be used to choose both the industrial sectors and/or geographic areas most in need of immediate attention.

The following discusses the steps involved in the conceptual approach to an urban/industrial environmental management project.

5.4.1 Stakeholder Analysis

5.4.1.1 Elliciting Organizational Support of Responsibility

While the lead agency for urban and industrial environmental management must be the DENR, the Department of Trade and Industry (DTI) must be included in the project to ensure support from the industrial sector. Industrial sector support would be enhanced by the full involvement of the Philippine Chamber of Commerce and Industry, the American Chamber of Commerce, and other similar organizations.

Meanwhile, project rationale would be explained to the citizen PVO community at the outset – almost in the manner of a "scoping session" for environmental assessments. Help could be solicited from any one of several emerging national organizations.

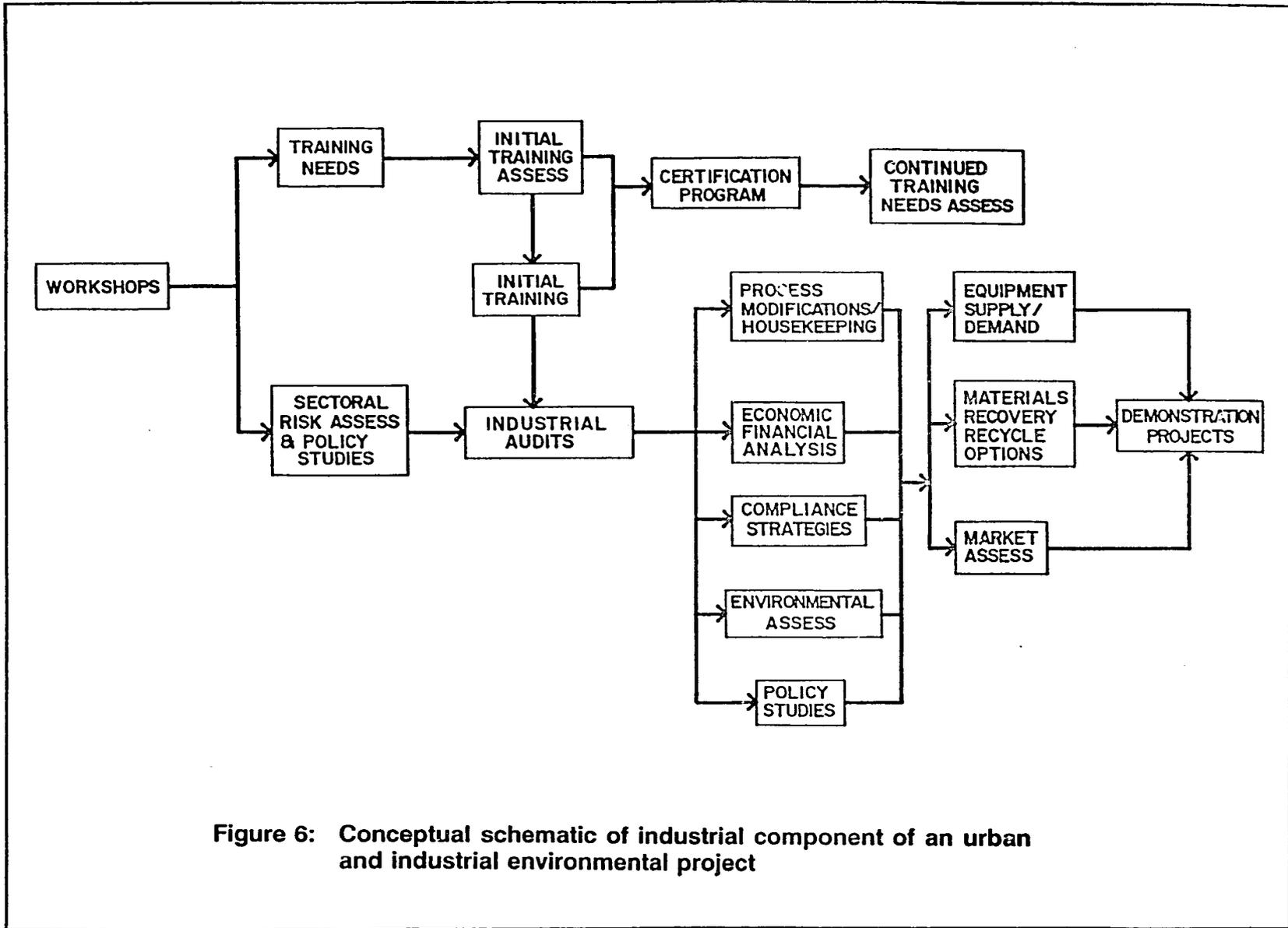


Figure 6: Conceptual schematic of industrial component of an urban and industrial environmental project

5.4.1.2 Risk Assessment

An environmental risk assessment will be employed to rate the risk to human health and welfare by the various industrial sector that operate in the Philippines (13). The assessment would determine which of the industrial groups pose the greatest risk in specific locations.

DENR and DTI personnel will be trained in Risk Assessment techniques, which they could employ when reviewing new industry proposals.

5.4.1.3 Sectoral Risk Assessment Industrial Audits

The initial focus of the industrial audits will be upon those sectors identified as posing the largest risk. Trade organizations would assemble pertinent industrial representatives in the sector in one plant, preferably within a designated high risk location. They would be joined by personnel from the regulatory agencies, such as the Environmental Management Bureau and the Department of Health. The invited representatives would include personnel from the technical and management staffs.

A skilled industrial auditor will conduct an audit of the chosen plant. Normally an audit will examine the raw materials being processed, the manner in which they are being handled, the reagents and other materials used in the manufacturing process, energy use, standard housekeeping practices, and the types of by-products and residuals that accumulate. It is natural that the methods currently being used for treating/disposing of these materials will be noted as will the levels of compliance with existing operating permits of all kinds. Special attention will be accorded to hazardous materials and toxic substances at each stage. Thereupon, recommendations are made for improvements that will result in reduced costs to the firm.

The recommendations will focus on developing technically and financially feasible changes that can be made in process and the handling of materials that will reduce waste generation at the source rather than "at the end of the pipe," and will encourage the reuse and/or recycling of what may now be waste materials.

The cornerstone for building an integrated environmental system for any jurisdiction will necessarily require baseline data on volume and nature of the materials that technically or economically cannot be further reduced. At least one industrial audit per major industrial sector will be performed to develop baseline information. Each of the audits should also be viewed as a training session for the attendees so a small cadre will emerge of persons familiar, if not skilled, in the process as it applies to their industry.

5.4.2 Siting and Selection of Demonstration Projects

As described, the risk assessment step will identify geographic areas with high risks. From that list of high priority areas, one or two would be selected for intensive, integrated attention. Up to three areas (one each in Mindanao, Visayas, and Luzon) might be considered.

The most promising coordinating body for whichever areas are selected would be the Regional Development Council for the region in which the demonstration is to be located. The reasons is evident: it is a meeting ground for local and national government officials. Further, there is a need to test and refine the planning capabilities of the RDC's.

Start with Industrial Audit Results.

The industrial audits will have established some initial parameters for the size and nature of the problems to be faced on the industrial side.

Mobilize the Community to find Middle and Small Sized Industrial Establishments.

The point has been made several times that the major industrial concerns – those most likely to have been involved in the industrial audits – do not make up the bulk of the by-product and residual stream. It will be necessary to find ways to also reach the middle- and small-sized industrial and commercial establishments, even some of the unregistered establishments. This will be possible only through the cooperation of a majority of the residents.

A participatory community planning approach will be used, which is consistent with the identified need for a comprehensive community planning process.⁶ The neighborhood scoping meetings will assist in identifying the small industrial and commercial concerns. The technical personnel will only visit such establishments on invitation and then with the objective of an audit that will contribute to better financial returns. In addition, the neighborhood scoping session will include citizen input into immediate problems, no matter what they are.

Clearly, from all that has been said on the subject before, a substantial effort would be devoted to characterizing the operation of the scavenger-operated waste separation, transport, and recycling system in use.

Technical Analysis of Industrial/Urban Waste Treatment

Working from the information gained during the audits, there would have to be a technical analysis of the volume and nature of the total waste loads that require treatment. Analysis would also specify the nature of the storage, transport, and disposal required for each class of waste

⁶ There are many models for what is needed and probably would work. The Goals For Dallas Program is one that is well suited to a neighborhood approach and could guide the approach.

identified. Emphasis would be placed on toxic and hazardous materials and upon medical wastes, including low level radioactive materials.

Prepare a Schematic Technical Solution

Given the inventory and analysis described above, technical teams would devise scheme that define the treatment needs. This should not be confused with a pre-construction feasibility plan. It is only to indicate that, based on the composition of the liquid discharges that will be made under the terms of the permits and after the internal improvements are made, a certain capacity of treatment of a certain level will be needed. The elements of such a schematic analysis are shown in Figure 7.

Incorporate Resource Inventory

The DENR Mid-Term Investment Plan proposes that regional resource inventories be conducted in two regions. As part of a regional inventory, those parts that pertain directly to the urban and industrial environment would be completed first and made available to the RDC. These data should include characterization of the aquifer from which both the local jurisdiction and industry draw their water, streams and flood plains, coastal resources, and zones prone to earth slide or flash flooding. These data would be used as the basis for guiding the development proposals made as a result of the participatory meetings in the neighborhoods.

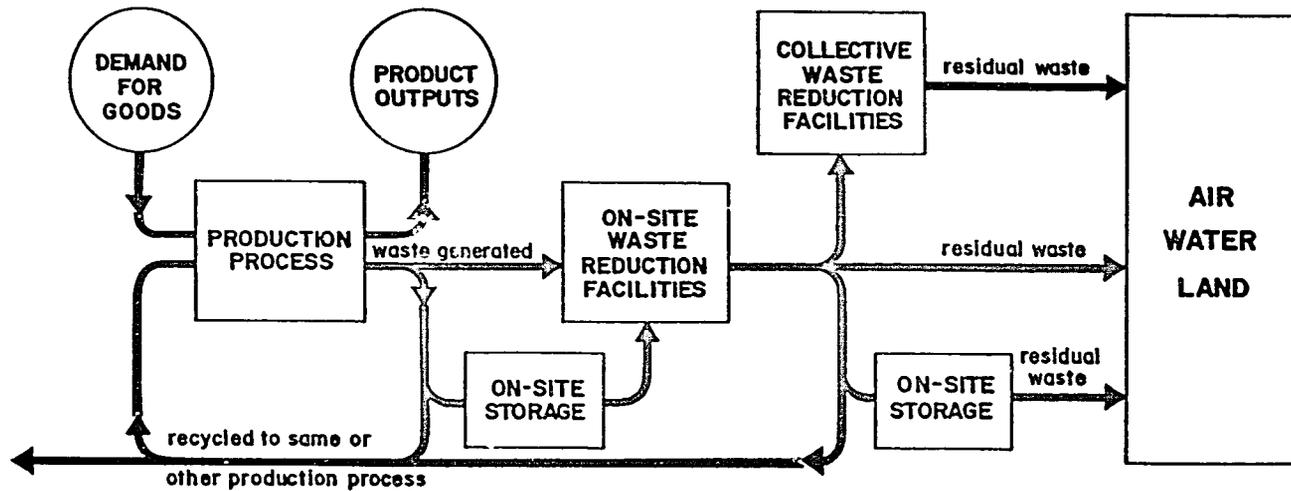


Figure 7: Waste management system

Source: Bower, Blair, T. et al 1968 *Waste Management: Generation and Disposal of Solid, Liquid and Gaseous Wastes In the New York Region.*

Build a Land Use Component

The resource pattern, the location of industries, as drawn from the audits and neighborhood meetings, and the location of public facilities will serve as the basis for distinguishing land use requirements, both by size and location. One of the concerns would be the amount and treatment of the areas that separate the major classes of land use: heavy industry from residential, for example.

Explore Alternative Methods of Handling Waste

This will be a multi-discipline endeavor. The objective will be to find (within the specific conditions and opportunities of the specific community) technically, financially, ecologically, and institutionally viable ways of building and operating waste treatment facilities that will meet the minimum criteria set in the sketch analysis and achieve a reasonable degree of equity in the way costs and benefits are distributed. A sub-objective will be to minimize the amount of public investment that will have to be made in either the construction or operation of the system. It is at this stage that such devices as jointly financed wastewater treatment, formalized materials recovery facilities, and so on will be considered.

Capital Improvement Budget

The capital requirements of the agreed upon system, the incentive schedules that will be necessary to encourage the agreed upon participation of private entities, and the levels of monitoring and enforcement will be derived from the optimum solutions agreed upon by the participants in the RDC. The budget would be acted upon formally by the governing jurisdiction and forwarded to the RDC for its consideration among the regional priorities.

Land Use Plan Component

The environmental management units decided upon will have to have geographic locations. They will be incorporated in the land use component of an emerging comprehensive plan for the jurisdiction.

5.4.2.1 Environmental Planning

Each step of the process will be an exercise in multi-agency environmental planning. It should be documented as such. Importantly, the data that are developed should be formatted with the view that they will be part of a growing and continuing regional standard planning information base.

The demonstration will provide opportunity to examine ways in which the permit systems can be integrated on the basis of the environmental planning process.

5.4.2.2 Follow Through to Construction

Following the action of the RDC on the proposed system, funding will be provided for the public portion required to implement the planned system. If the system calls for a state of the art landfill, it should be built; if assistance is required to finance a joint wastewater facility, it should be provided on the basis of the RDC recommendation.

5.4.2.3 Personnel and Training

An often-repeated complaint received from DENR field personnel is the lack of adequate laboratory and monitoring equipment. The demonstration projects would be able to evaluate such needs and would, in addition, determine if there are practical means by which industry could contribute to the provision of the needed facilities.

The demonstration projects would provide an excellent opportunity to conduct a training needs assessment for personnel in the several agencies that will be involved. This will include at least EMB, DOH, DPWH, DILG, and NEDA. Since the proposed systems will be based on high levels of compliance and enforcement, it will be possible to assess the manpower requirements of the agencies involved in planning and implementing the program.

The demonstrations will also ascertain, if not determine, the role of newly proposed environmental officers to be engaged by LGU's.

5.4.3 National Implications

In both the industrial audit phase and in the demonstration projects, the existing statutory and administrative machinery will be tested. This will be the focus for policy and related studies and/or recommendations.

Only a few of the issues that seem likely to emerge are mentioned here because there is no way to predict what will be the results of the industrial audits.

- o The degree to which the tariff structure that protects older, inefficient industrial plants inhibits the improvement of environmental quality.
- o Revamping of the Philippine Environmental Code with emphasis on making the PSSD the national environmental policy and tailoring the EIA/SS to support that policy.
- o Removing restrictions on the ability of LGU's to share costs with, or to offer incentives to, private operators of waste treatment facilities that operate in the public interest.

- o Alter the authorities of LGU's to engage in comprehensive planning as a pre-condition to enacting zoning restrictions.
- o Act immediately to inventory and protect the groundwater resources of the country.
- o Rationalizing the permit requirements for new and existing industries.
- o Making a system for the inventory, handling, and treatment of hazardous and toxic waste materials operative.

Based on the topics raised and discussed during the course of this study, it is not unreasonable to forecast that perhaps 12 or so studies and investigations will emerge from the real world testing inside industry and in support of local government autonomy.

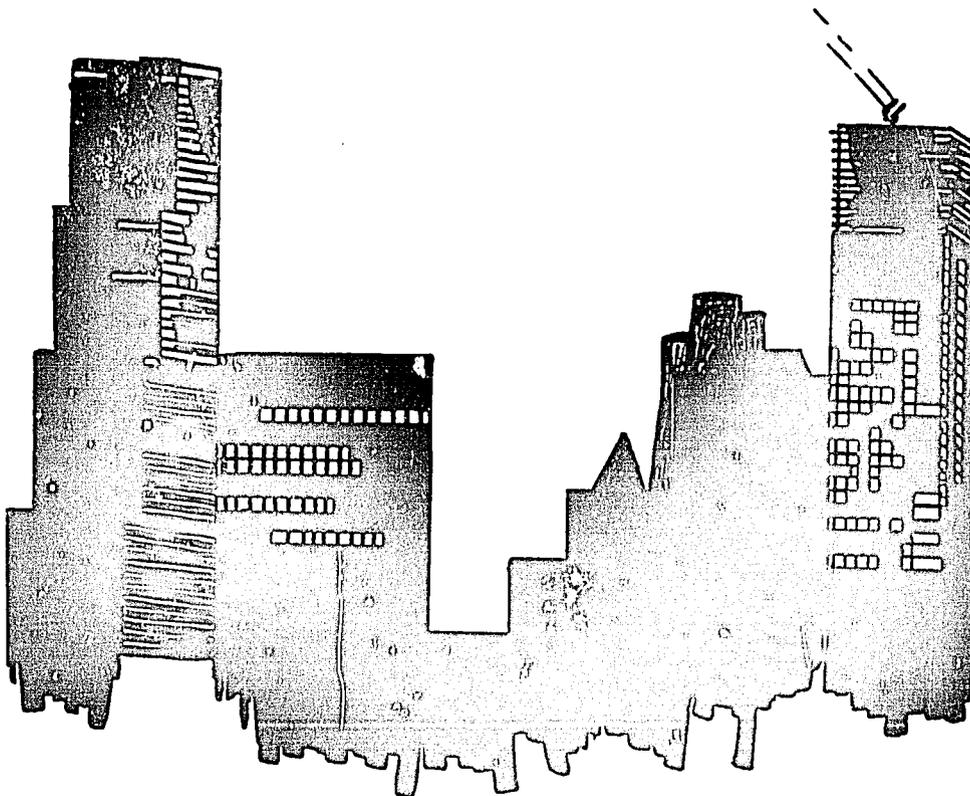
5.5 Utility For Others

Successful completion of a project modeled along these lines would be enormously useful. It will, obviously, improve the policy and investment climate for urban and industrial environmental management. It will also serve as a check list and guide to any other institution, donor or commercial lender, that wishes to invest or support investments to improve the urban and industrial environment of the Philippines.

The United States Agency for
International Development
Mission to the Republic of The Philippines

**SUSTAINABLE URBAN AND INDUSTRIAL
ENVIRONMENTAL MANAGEMENT REVIEW**

ANNEXES



Prepared by:
Tropical Research & Development, Inc.

In Association with:
Dames & Moore International

ANNEX A. TECHNICAL FRAMEWORK

Sustainable Urban and Industrial Environmental Management Review

By:

**William L. Fletcher
and
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CHAPTER A.1. AQUATIC

Overview

Water is a crucial commodity for the Philippines. It is used for human consumption, industry, agriculture, fisheries, navigation, and power. The need to conserve and protect both the quantity and quality of this very valuable resource is paramount. In this chapter water is addressed in two categories: surface water (which covers the streams, rivers, lakes and ocean) and groundwater (which covers all subsurface water).

Data are presented in Table A.1 (9) that show for the year 1988 a breakdown of water consumption from groundwater and surface water sources. The data show that of a total of 4,352,507 liters per second (LPS) was produced from legally recorded sources, and that 99 percent of legally granted water comes from surface sources.

Recommendations for ways to protect these resources have been made within this chapter and are summarized as follows:

Providing technical assistance and training to improve technical knowledge and organizational skills of government agencies, industrialists, community leaders, radio, tv, and print media personnel, and non-government organizations.

Developing guidelines to assist in planning and implementing the following environmental management activities:

- Data base development monitoring programs
- Land use planning and urban planning
- EIA review and preparation
- Land and ocean disposal of non-toxic wastes

Performing industrial audits to assist industry in complying with environmental laws, abating pollution and increasing internal efficiency. Audits of all industrial sectors -- including large, medium, and small industries -- should help them in complying with discharge standards.

Constructing wastewater collection and treatment facilities which would provide both industrial and domestic waste treatment. Such a demonstration project should take advantage of both innovative technology and innovative means of financing. The successful implementation of this project should provide a model for others to follow.

Table A.1.

Table A.1. Summary of water rights grants as of December, 1988

Source of Water Supply	Domestic		Irrigation		Power		Industrial		Livestock		Recreation		Fisheries		Total	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
Groundwater	2339	12759.301	1118	17478.82	6	1167	219	5427.98	57	121.9	18	125.85	37	555.33	3794	37636.37
Surface Water	131	94855.830	6034	1742214.06	100	2412924.3	143	62379.17	4	42.5	8	154	90	2301.1	6510	4314870.9
Total	2470	107615.13	7152	1759692.8	106	2414091.35	362	67807.15	61	164.4	26	279.85	127	2857.43	10304	4352507.3

Source: National Water Resources Board, 1988

Legend: a - number of grantees

b - volume in liters per second (LPS)

Current Situation

Monitoring

The development of an effective environmental management strategy and control of water pollution from various sources has been hampered by the lack of a consistent and concise monitoring program. Monitoring equipment employed in the past was mostly donated by various international and bilateral assistance agencies. The donations were often for the initial installation of the equipment and did not cover the replacement of critical and sensitive spare parts. Government agencies have been forced to strip some monitoring units to provide for spare parts for others. In certain cases, technical (obsolescence) and changes in the design have made the donated equipment worthless. Calibration and routine maintenance of the monitoring equipment is also a problem.

The National Pollution Control Commission (NPCC) established a monitoring program for various rivers and lakes between 1972-1982. (1) Initially, the program covered annual or biannual sampling of major rivers throughout the country, and a monthly sampling of rivers around Metropolitan Manila. The Pasig River (the major river running through Metropolitan Manila) had seven sampling stations at the height of the program. However, due to budgetary constraints the program was trimmed to cover only major rivers of Metropolitan Manila, and in recent years sampling has been conducted on an infrequent basis.

The limited monitoring data collected to date show that much of the pollution in the rivers and lakes results from domestic sewage and solid wastes disposal. The pollutants are primarily organic material undergoing anaerobic decomposition. Anaerobic decomposition results in the generation of malodorous hydrogen sulphide gases, floating scums, dissolved oxygen depletion and subsequent fish kills or other dislocation of the aquatic ecology. While the government has recognized domestic sewage and uncollected garbage as the main source of water pollutants in urban areas, national pollution control programs have been directed at industry because the control of domestic sewage and solid waste is primarily the responsibility of other governmental levels that have extremely limited discretionary financial resources.

Surface Water

Metropolitan Manila

Manila Bay was studied and monitored by NPCC under contract with Metropolitan Waterworks and Sewerage System (MWSS). The focus of the MWSS program was to construct sewage outfalls at various locations around Manila Bay. The project evaluated the dispersion, mixing patterns, dissolved oxygen level, and various physical and chemical parameters, such as BOD, COD, E. coli, mercury and toxic metals. The results of the bacterial count along the bay are shown in Table A.2. (2). The values of bacterial contamination ranged from three to over one hundred times the standards set for recreational waters. High fecal coliform counts were correlated with squatter areas and sewage outfalls. The study also included the Zapote, Pasig,

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and Tullahan Rivers as well as other rivers discharging in to Manila Bay. The results of the study are documented in the Manila Bay Monitoring Program Final Report, 1986.

Another on-going study of the Pasig River clean up and rehabilitation is being carried out by Carl Bro under a grant from the Danish International Development Agency (DANIDA).

Laguna de Bay

The other water body which has been extensively studied is Laguna de Bay. The Laguna de Bay is a freshwater lake part of which borders Metropolitan Manila to the east and extends from south to nearly the south boundary of Laguna Province. The only outlet of Laguna de Bay is the Pasig River. The surface water elevation at Laguna de Bay is only a meter or two higher than the high water level of Manila Bay during the rainy season. During the dry season the lake's surface elevation drops and sea water flows toward Laguna de Bay at high tide. The World Health Organization (WHO), MWSS and the Laguna Lake Development Authority (LLDA) foresee the potential utilization of Laguna de Bay for water supply of Metropolitan Manila.

LLDA has a wider mandate. It is charged with multiple use development, including fishing, irrigation and industrial uses. The initial water quality study concentrated on the nutrient balance in the lake, but the study was later expanded to cover other physical and chemical parameters. The results were included in a 12-volume report entitled "Comprehensive Water Quality Management Programme for Laguna de Bay." (3) LLDA still carries out a regular monitoring program although it is not as extensive as the studies carried out prior to 1978.

After reviewing the results of testing covering the years 1980 to 1988, it is noted that levels of phosphates are rising, pH is remaining relatively constant, dissolved oxygen is gradually reducing, turbidity is increasing, total dissolved solids are decreasing, coliform bacteria count is erratic, and temperature is generally holding at the same level. The rising phosphates, dropping dissolved oxygen and increasing turbidity are all indications of increasing contamination. This may be from activity in the drainage area, such as new development and agriculture. These activities were confirmed in field observations. In 1989,

TABLE A.2. 1985 Geometric mean of TC and FC

STATION	NO. OF SAMPLES		GEOMETRIC MEAN TC OR FC % 1,000/100 ml		% OF SAMPLES EXCEEDING 1,000 TC OR FC/100 ml		QUALITY SATIS- FACTORY FOR SB WATERS
	TC	FC	TC	FC	TC	FC	
Navotas	13	13	512.120	130.578	100	92	NO
North Harbor	24	24	79.339	18.383	100	87	NO
Cuneta	24	24	297.640	91.435	100	100	NO
CCP	24	24	17.361	6.502	100	87	NO
DCP	24	24	22.504	6.679	92	87	NO
Bacoor	24	24	62.254	17.086	100	100	NO
El Nido	24	24	3.431	1.044	75	46	NO
Villamar	24	24	4.128	1.355	75	100	NO
Viva Mabuhay	24	24	4.369	1.375	84	46	NO
San Isidro	23	23	12.955	4.536	79	79	NO
San Agustin	24	24	10.679	3.045	87	80	NO
Starfish	14	14	19.982	5.591	100	86	NO
Villa Susana	24	24	12.960	4.520	96	84	NO
Garden Coast	24	24	3.408	0.915	67	54	NO
Rikkitoy	23	23	3.522	0.846	67	46	NO
Punta Grande	24	24	3.332	0.976	63	50	NO

TC - Total Coliform

FC - Fecal Coliform

Source: Manila Bay Monitoring Program Final Report, 1986.

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LLDA was the recipient of a grant from the U.S. Trade and Commerce for a study on toxic and hazardous waste disposal in the Laguna Lake area. The investigation was carried out by Engineering Science Inc.

Outside Metropolitan Manila

Outside of Metropolitan Manila, the Pampanga River was studied in relation to irrigation and the Candaba River was studied for a swamp development program. These studies were carried out by the National Irrigation Authority.

Water quality sampling was performed from 1970 to 1972 in Mactan Channel and major rivers in Cebu Province as part of the sewerage program for the Central Visayas Urban Project. The results were reported in the feasibility study prepared by NORCONSULT. (4)

Only three cities are currently using surface water. Those cities are San Jose, Zamboanga and Olongapo. Most urban centers and industries are dependent on groundwater. Development of surface water source generally requires, a dam, silting basin, coagulation, flocculation, filtration and disinfection.

Groundwater

The utilization of groundwater for domestic and industrial water supply has been given priority over surface water due to the low cost of extraction and treatment. To tap the groundwater resource only a well is needed. For ground water treatment, typically chlorination is required for disinfection and in some cases iron and manganese removal is needed. For an industrial plant, ground water softening and some times demineralization is required. A 200 meter (m) deepwell will typically cost P 1.5 Million and on the average will yield 1 - 2 cubic feet per minute (m³/m).

Saltwater Intrusions

Due to small catchment areas and proximity to the sea, many groundwater resources in the Philippines are susceptible to salt water intrusion. Urban centers such as Manila, Cebu, Bacolod, Davao and Cagayan de Oro have experienced salt water intrusion. In areas with extensive limestone structures, salt water intrusion may take place rapidly.

Salt water intrusion occurs when pumping of groundwater from wells reduces the hydrostatic level of the ground water below sea level thereby causing the seawaters to flow toward the wells.

This

results in the intrusion of salt water into the aquifer. A diagram of this phenomena is shown in Figure A.1.

The Ground Water Salinity Intrusion Control Study, conducted by the National Environmental Protection Council (NEPC) in 1984, assessed the extent and severity of saltwater intrusion in

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several areas in the country, including Metropolitan Manila, Metropolitan Cebu, Bulacan, Pampanga, Capiz, and Sorsogon. The study established that Metropolitan Manila and Cebu are experiencing a progressive salt water intrusion problem due to over-pumping; the coastal areas of Bulacan and Pampanga have been subject to long-standing naturally occurring salinity.

The Government of the Republic of the Philippine (GOP) has shown concern for this loss of water resources and has commissioned a number of studies to monitor groundwater extraction and utilization. The National Water Resources Council (NWRC) is mandated to license and control the drilling of wells and extraction of groundwater resources. (14) However, the team did not find any consideration for protecting areas immediately adjacent to the wells or for aquifer recharge areas.

Waste Treatment

Population

The major population center in the Philippines is Metropolitan Manila which is a political agglomeration of the old city of Manila, three other cities (Quezon, Caloocan, Pasay) and the 13 adjacent municipalities in Rizal and Bulacan Province. Metropolitan Manila has a day-time population of over 10 million and a resident population of approximately 8 million people.

The second biggest population center in the Philippines is Metropolitan Cebu with a population of 1.2 million people. Metropolitan Cebu is composed of the cities of Cebu, Mandaue, and Lapu-Lapu and the municipalities of Talisay and Consolacion.

Davao City is the third largest population center with close to 0.8 million people.(34)

Waterworks and Sewerage Systems

Water supply and sewage collection and treatment for the whole country were formerly administered by the National Water and Sewerage Administration (NAWASA). In 1968, NAWASA was abolished and replaced by MWSS for Metropolitan Manila and by the different water districts for other municipalities and cities outside of Metropolitan Manila with populations greater than 20,000. The operation of the local autonomous water districts is subject to

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Figure 1

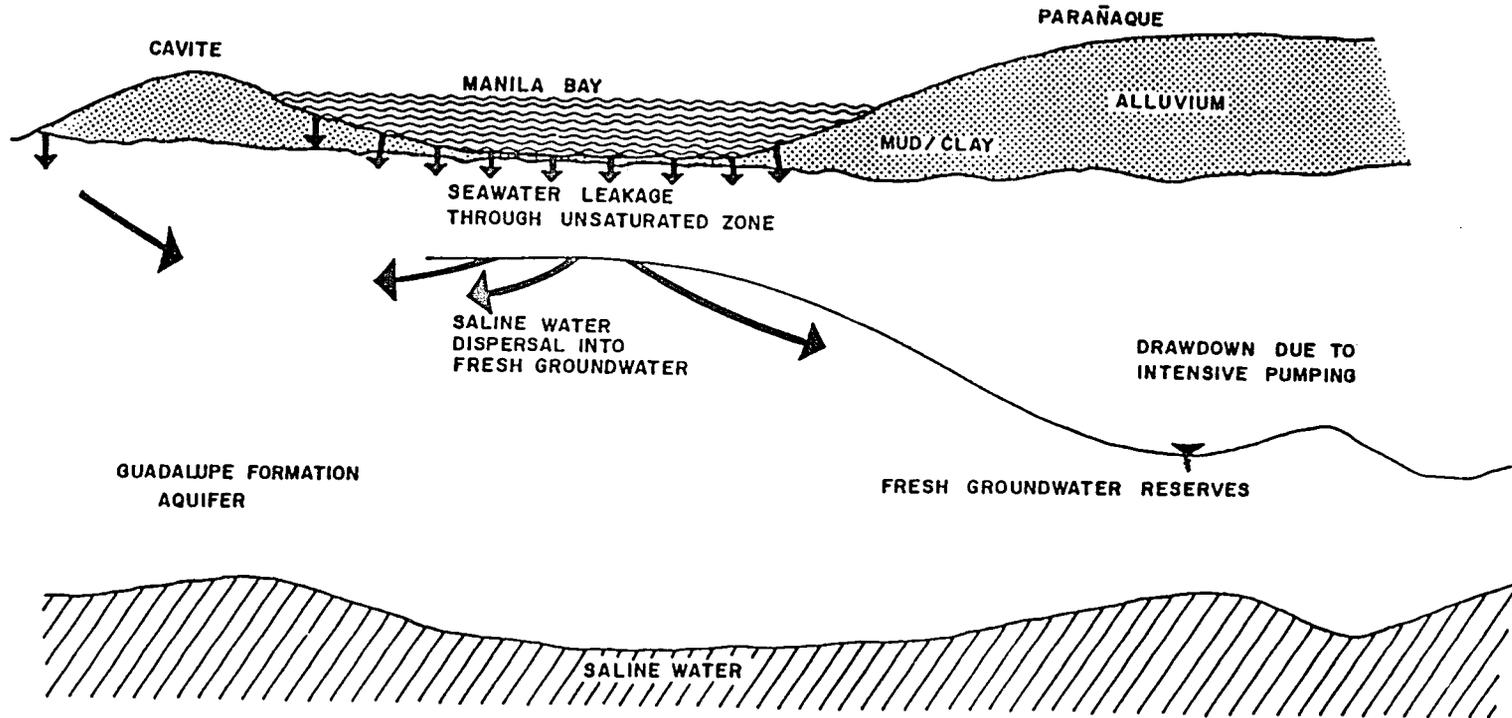


Figure A.i. Diagrammatic representation of seawater leakage into the Manila aquifers from Manila Bay - Cavite to Parañaque

rules and regulations issued by Local Water Utilities Administration (LWUA). Prior to 1987, systems in municipalities with populations lower than 20,000 were administered by the Rural Water Development Council. In 1987, RWDC was merged with LWUA so that now all municipalities with populations of less than 20,000, their water districts are subject to the controls at LWUA.

Development of municipal water and wastewater facilities have been very slow in development due to very high capital and operating costs. Therefore MWSS and LWUA have given a higher priority to providing water supply than to providing wastewater collection and treatment. Even though both agencies are directed in their charters to be responsible for both water and wastewater, water supply has invariably moved first as demonstrated in Metropolitan Manila. The allocation in our opinion of 50 percent of the water rate to be used for sewerage is not realistic as is the case with the Metropolitan Sewer System (METROSS) proposal.

For Metropolitan Manila, the organic load from domestic wastewater is estimated to be 60 percent to 79 percent of the total waste load, with the remainder being from industrial sources. The estimate has varied from time to time due to lack of an efficient monitoring program.

The construction of the existing sewerage systems in the Philippines was mostly carried out by the Americans in the early 1900's. Ermita district in Manila was sewerred in 1906 as was Baguio City. Zamboanga was sewerred in 1936. Baguio City used cast iron sewer pipes which later became decayed and unserviceable. Zamboanga City used vitrified clay pipes which are still in use.(5,6,7)

Ayala Corporation, which is the prime real estate developer in the country, has built separate sewer systems for a 600 hectare development in Makati and a 700 hectare development in Alabang Muntinlupa. Ayala Corporation has also built and currently operates a collection system and a sewage treatment plant development serving the Ayala Alabang Estates. The company plans to construct another treatment plant in Las Pinas for another 300 hectare development. The Makati sewage treatment plant in Magallanes Village is being mothballed due to unsettled claims with MWSS. As a result, the untreated waste continues to be discharged to the receiving stream.

Outside of Metropolitan Manila, Baguio City has a sewage treatment plant constructed in 1983 under a Japan International Corporation Agency (JICA) grant. The plant has never been operated because the grant was only for the sewage treatment plant and did not include the sewerlines. Baguio City was supposed to build the collector sewer system, but due to financial constraints was not able to do so. Cebu City has a 167 hectare reclamation project with a 2.5 (mgd) aerated lagoon. The development has been very slow and for the last 7 years the sewage treatment plant has been operating at less than 50 percent of the designed capacity. The spare capacity is, however, currently being used by a Pepsi-Cola plant and the Cebu City abattoir. Ayala Corporation is in the process of building a 10,000 m³/day sewage treatment plant and sewer system in Cebu City for its 54 hectare commercial center.

The Zamboanga City sewerage system, managed by the Zamboanga water district, discharges its effluent to the sea through a 500 meter long outfall. The outfall, which was damaged in 1975, was restored by the water district in 1981. Back in Metropolitan Manila MWSS has a sewage pumping station in Tondo that is part of the sewage outfall was destroyed by a typhoon in 1972 and it was rehabilitated in 1978. (5) The National Housing Authority built a separate sewer system for the Tondo foreshore area rehabilitation program from 1977 to 1984. An aerated lagoon was supposed to be built as part of the sewerage system but it has not been built to date, which means that the untreated wastes are being discharged. A southern sewer system and outfall is programmed by MWSS under its METROSS II package. This program is under review by the Asian Development Bank.(8)

Septic Tanks

Based upon the "National Profile of Sanitation Facilities 1986" it was estimated that 73 percent of the household in urban areas and 62 percent in rural areas had toilet facilities. The remaining population utilized latrines connected to private septic systems, pit privies or deposited directly into water courses. The control of environmental sanitation rests with the Health Officers of the local government. Studies made in Metropolitan Manila of septic systems pointed to their minimal effectiveness in providing treatment. To correct this deficiency a sludge pumping pilot program was implemented. The conclusion that all systems which do not receive routine maintenance are not efficient.

Industrial

The industries in the Philippines are concentrated primarily in the Metropolitan Manila area. Many of these industries were initially located on the outskirts of Manila but with the increase in population and the corresponding demand for residential and commercial areas grew, the industries were surrounded by residential areas. Due to the lack of infrastructure before and after World War II many industries were located along the Pasig River. The river and sea provide a transport corridor to Manila and the neighboring islands. Monitoring of the rivers within Metropolitan Manila area has been done and results published by NPCC. These results are tabulated in Table A.3 which follows and which shows that, at the time of the report, no dissolved oxygen

Annex A. Technical Framework

Table A.3. River monitoring results for dissolved oxygen 1982-1984

STATIONS	1982		1983		1984	
	RANGE OF DISSOLVED OXYGEN, mg/L	MEDIAN (mg/L)	RANGE OF DISSOLVED OXYGEN, mg/L	MEDIAN (mg/L)	RANGE OF DISSOLVED OXYGEN, mg/L	MEDIAN (mg/L)
North Bay Malabon/ Navotas	0-7.0	1.75	0	0	0	0
Concepcion Tinajeros	0-7.0	0	0	0	0	0
Tandang Sora	0-6.8	2.1	0	0	0	0
McArthur Highway	0-5.3	1.3	0.4-7	0	0	0
Marie Subd.	0-2.0	0	0-2.0	0	0	0
Gulod	0-7.0	6.0	0-5.2	0.3	0-4.0	1.6
	5.4-9.0	6.6	0-7.0	3.2	0-6.2	3.0
Sanchez UERMMC	0	0	0	0	0	0
E. Rodriguez Ave.	0-0.50	-	-	0	0	0
Quezon Blvd. Ext.	0-0.70	0	0	0	0	0
Roosevelt Avenue	0-2.0	0	0	0	0	0
EDSA Congressional Ave.	0-3.4	1.75	0-2.6	0	0	0
Tandang Sora	0-1.5	1.0	0-4.5	2.3	0	0
	2.9-4.3	4.0	0-9.0	0	0-1.7	0.85
	6.1-7.0	6.4	0-6.4	5.0	0-6.2	3.1
Montalban	7.5-10.0	9.6	9.4-10.9	10	5.0-7.5	5.75
Malanday	6.6-9.0	8.5	6.2-10.8	9.0	4.0-6.8	5.3
Marikina	5.0-8.4	7.1	0-6.9	4.7	1.1-6.0	4.05
Provident	1.5-8.4	4.2	0-6.3	0	2.5-4.0	3.1
Rosario	0-7.6	4.3	0-4.3	0.9	0-3.0	1.85
Vargas	0-7.5	4.6	0-6.5	0	0-8-4.0	3.1
Del Pan	0-4.9	2.2	0	0	0-2.0	0
Nagtahan	0-5.1	2.6	0	0	0-1.5	0
Lambingan	0-4.8	4.4	0-4.5	0.6	0-2.3	0
Guadalupe	0-6.1	4.5	0	0	0-1.2	0.5
Bambang	0-6.4	5.5	0-6.2	2.7	0-5.0	4.0

TR&D, Inc.

Table A.3. (Continued)

MIA	0-7.0	0	0-4.8	0	0	0
Paranaque Island	0-11.0	5.7	0-9.6	4.0	0	0
Subdivision	3.4-5.4	4.7	0-7.0	5.2	0	0
Zapote	-	-	0-8.7	4.0	-	-
Barrio Ligas	0.9.7	4.0	0-9.5	5.8	0	0
Sucac Road	0-9.0	4.7	3-10.5	4.5	0	0
Aurora	0	0	0-4.0	4.0	0	0
Las Pinas	2.8-6.2	4.3	-	-	0	0

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was present at many of the monitoring points. This was confirmed during our field trip on the Pasig where no visible fishlife was observed and bubbles from anaerobic decomposition was seen rising to the surface. Other monitoring results showed the presence of heavy metals and pesticides which are derived from industrial and agricultural operations.

Outside Manila

The industries outside of Metropolitan Manila were primarily engaged in the processing of agricultural products such as sugarcane, coconut oil, copra and hemp. The concentration of these industries to Manila was based primarily on proximity to the market. Until the late 1970's most of the Philippine population was in rural areas, however, the rural/urban ratio of the population has been continually declining since independence in 1946.

The government has adopted a strong position to stimulate regional development and decentralization. The development of regional centers was studied and implemented by the Ministry of Public Works in 1978-1983. National Economic Development Authority (NEDA) implemented the Central Visayas Urban and Rural program. United States Agency for International Development (USAID) from 1972-1978 was strongly involved in Bicol Basin River Project and through the Economic Support Fund in the Central Luzon Region.

Government Agencies

One of the main problems in the control of domestic wastewater discharges is the number of government agencies involved with conflicting interests and goals. The development of subdivisions is controlled by the Housing and Land Use Regulatory Board (HLURB) whose primary mandate is the provision of affordable housing for the public. Its regulatory functions were a spun off from the National Housing Authority's which formerly controlled and licensed residential subdivisions. Because the National Housing Authority's main mandate was for low cost housing and affordability, HLURB policies tend to follow the same pattern. HLURB does not require developers to construct and develop sewers and sewage treatment plants, even for high class developments. For this reason, even Ayala Corporation utilized septic tanks instead of sewer system in Ayala Heights, in the face of keen competition from other developers in the Quezon City area. HLURB issued the permit to develop and the license to sell the lots to real estate developers. In 1980 the now defunct National Pollution Control Commission issued and gazetted the rules and regulations on the control of domestic wastewater discharges which directly conflicted with HLURB rules and regulations for residential housing development. While the NPCC rules and regulations were not withdrawn, they were never implemented. HLURB maintains control of the housing and real estate industry standards.

Land Use

Between 1976 - 1978, the now defunct Human Settlements Commission required all municipalities and cities to prepare masterplans for land use and development. HLURB based its approval of subdivisions on those plans. HLURB issues a waiver or changes based on resolutions approved

by the municipal council and approved by the Mayor. HLURB does not have definite guidelines and standards regarding buffer zones and location of various land.

While domestic sewage accounts for the majority of the waste discharged to the rivers, lakes and other waterbodies, the Department of Environment and Natural Resources (DENR) has been concentrating its efforts in curtailing the waste discharged from industry. Under the present conditions even if all the industries discharged distilled water, the waterways such as the Pasig, Tullahan, Malabon and Zapote Rivers would to remain septic. Since, the control of domestic sewage discharge is the responsibility of other government agencies such as MWSS and LWUA, DENR is reluctant to force the issue of pollution from domestic sewage.

The ratio between domestic/industrial waste discharges is higher outside of Metropolitan Manila where the level of industrialization is lower.

Water Quality Standards

The NPCC promulgated water quality standards of 1972. The water quality standards were similar to California stream standards.(10) As water quality standards require an extensive monitoring program for proper implementation, the standards were enforced unofficially as effluent standards. Due to complaints from factories which were required to discharge effluents with BOD levels in some cases as low as 1.5 milligrams per liter (mg/l), the effluent standards of 1978 were promulgated. (11) The water quality and effluent standards were subsequently revised in 1990. (12) The revised effluent regulations (1990) apply to all industrial and municipal wastewater effluents. These regulations are more flexible than the 1978 effluent standards in that separate limits were set for different classes of fresh or marine waters.

Problems and Opportunities

While the issues and concerns are discussed in separate sections of this report, an integrated approach to solving water quality problems should be always borne in mind. A solution to one problem may aggravate problems in other sectors. As discussed in the previous section, the sources of water pollution in Metropolitan Manila and other Philippine urban centers is mainly from domestic sources rather than from industrial sources. This fact was recognized by the now defunct NPCC in its various annual reports and the LLDA study of its watershed.

Domestic Water and Wastewater

MWSS, LWUA and their predecessor, the National Water and Sewerage Administration (NAWASA), are government corporations with specific authority granted in their charter to provide water supply and sewerage. These agencies have placed a higher priority on supplying water to their customers than providing sewerage. The ability of MWSS and LWUA to provide essential water supply services is being taxed to the limit. Hence, the provision for proper sewerage and sanitation has often been neglected in favor of concentrating resources on the improvement of water supply system.

Domestic Water Supply

With the exception of Metropolitan Manila, San Jose Zamboanga, and Olongapo, all of the population obtains their potable water supplies from groundwater. This major dependence creates problems in determining the adequacy of the supply and the protection of its quality. A groundwater monitoring program is needed to collect all existing data available and new data such as:

- o Well boring logs with soils and water levels
- o Locations of all wells
- o Water Quality Analysis
- o Water Use data

Studies should be done to determine where the groundwater aquifers are being recharged and to estimate in what quantities. With this information, planning for future water uses and protection of the sources can be accomplished.

Domestic Wastewater

Pollution from domestic wastes represent a large percentage of the Biochemical Oxygen Demand (BOD) loading in streams in urban areas. It has been estimated that up to 70 percent of the pollution can be connected to domestic sources, such as septic systems, privies and other human wastes, as well as uncollected solid wastes. (Solid wastes are addressed in Chapter 2). The remaining 30 percent of the pollution load is attributed to industry. Although the larger pollution loading is from domestic sources, the most effort has been directed toward industry for abatement. Due to the magnitude and cost of the domestic problem, plus the lack of clear cut authorities to match responsibilities, responsibility resting with existing agencies and level of government have not been successful in reducing this problem. This unsolved dilemma needs to be attacked through innovative technical and financial methods.

Subsurface disposal systems (septic tanks) which constitute the major method at domestic waste disposal have been found to be ineffective due to poor soil conditions and lack of maintenance. In order to correct this problem, a maintenance program which would pump the tanks annually and a suitable disposal facility are necessary.

Pollution from septic tanks connected directly to storm drainage systems is a serious problem in many urban locations. When wastewater treatment facilities are available, these connections should be removed from the drains. Due to high costs of separation, consideration should be given for treatment of dry weather flow from the combined drainage system. Overflows for the wet weather flows, which would be diluted, could be allowed to be discharged.

Industrial Wastewater

Industries are confronted with meeting the effluent standards for discharge at their liquid wastes as required under the 1990 effluent standards. Many of the industries are not fully aware of what their responsibilities are or how to attain them. In some cases such as with older plants, the conditions under which they were permitted have changed substantially. In some industries lack of space and anticipated pollution control equipment makes upgrading difficult.

The existing industrial sector under Administrative Orders 34 and 35 effective on April of 1990 must meet less stringent interim requirements than new industries for a period not to exceed 10 years. Industries with high strength wastes, for example, must conduct studies while operating under less stringent standards

during a two year period. Industries that cannot comply must apply for temporary permits and are subject to a penalty fee.

Means of educating industry in the new law and standards are necessary as well as guidance on how to reach compliance under the law's time frame. Industry needs to have the resources of competent analytical laboratories to assess their wastes, determine that they have attained compliance, and to also continue to monitor their compliance.

Incentives

Considered by industry to be one of the more positive programs of government, the Tax Incentives Program authorized under Section 56 of the Code, granted tax exemptions, credits or deductions for the procurement, installation, utilization and manufacture of pollution control equipment, devices, spare parts and accessories. Incentives ranged from fifty percent of tariff duties and compensating tax to fifty percent of expenses actually incurred for research projects undertaken to develop technologies for manufacture of pollution control equipment. The Program was administered by the NEPC in 1980 but was terminated in 1985, when the prescription period for the incentives lapsed. Efforts were made to extend the effectivity of the incentives but the legislative branch of government has not come up with laws to this effect. Only a little more than twenty (20) industrial firms were able to avail of tax incentives under the program. Among these were the San Miguel Corporation, Kimberly Clark Philippines, La Tondena Inc., Franklin Baker Corp., etc. (9)

Serious considerations should be given to the reinstatement of this program and the encouragement for development of local manufacturing to reduce costs, make parts more readily available, and aid employment.

Research, Information and Technical Assistance

Substantial data exists from a variety of sources regarding water resources but in order to prepare an effective environmental management plan this information needs to be consolidated,

evaluated and incorporated into baseline data. These data then needs to be expanded through the development of an environmental monitoring plan to become the data base for GOP decision making. This program will require monitoring, sampling, and laboratory equipment. Hardware for laboratories and monitoring systems should be adequate for monitoring and analyzing ambient air and water quality as well as point discharges.

Technical assistance will be required to improve the organizational and technical knowledge of the public, non-governmental organizations, community leaders, industrialists and media personnel. The technical assistance could be provided through sponsorship of seminars, contests, and articles in the media. Technical assistance could also be provided for development of textbooks on environment for use in the grade school and high school curricula.

The Asian Development Bank, the Asian Institute of Technology, and USAID have been conducting continuing education program for government officials in the Asian countries. In 1987 the program was offered to Malaysian government officials, in 1988 to Indonesian officials in 1989 to officials from Thailand and in 1990 to officials from several countries including Indonesia, Singapore and Brunei. Similar courses could be offered to government officials responsible for preparing EIA's for their respective agencies, to the EIA review committee, and to the general public. One important aspect of the course is for the different sectors to meet and discuss the problems involved in the preparation and evaluation of an EIA. They should get to know the objectives and purpose of the different guidelines.

There is a need to prepare guidelines and technical manuals on a variety of topics, including:

- a. Guidelines on monitoring, development of database, and presentation of environmental quality data.
- b. Guidelines on land use planning, with specifics on siting of industrial zones and control of environmental pollution.
- c. Guidelines for EIS/EIA preparation, review, and implementation for various projects.
- d. Land disposal of agricultural, agro-industrial, sewage and other non toxic and hazardous wastes.
- e. Ocean disposal of agricultural, agro industrial, sewage and other non toxic and hazardous waste.
- f. Ecological study on the effect and utilization of marine outfalls for wastewater without toxic and hazardous wastes. As the Philippines is composed of a number of island, the sea should be a medium for disposal of wastewater which does not contain toxic waste. The procedure when properly controlled could improve the circulation of essential nutrients in the sea and its productivity.

- g. For urban problems quantification of the water resources, utilization and extraction, recharge and waste disposal is important for most cities. Salt water intrusion is a problem to many cities today.

The guidelines should be based on data and experiences which are compatible with existing local environment, institutions and culture. Without any demonstration or pilot projects the guidelines will be merely a survey of the existing conditions and literature review of experiences in other countries which will be of limited use.

Operator training for waste treatment facilities is another important aspect which is not covered by either the non-formal and formal educational system. A number of companies have offered on-the-job training together with the designer of their waste treatment facilities and suppliers. The turn over of personnel is very high. There is a great demand for water and wastewater treatment plant operators in the Middle East. At present the salary of a wastewater and water treatment plant operator in the Philippines varies from 100-150 USD/month while the offer for similar jobs in Saudi Arabia in 1989 was US\$ 900. The Saudi Arabian pay scale for waste treatment plant operators is higher than the salary scale of Filipino Engineers working in that country. For example Ayala Corporation in 1983 conducted a training program for 30 wastewater treatment plant operator with the University of the East. After 12 months only three operators were left. PCAPI has been considering operators accreditation and training but have had difficulty implementing a program due to the scarcity of trained personnel.

In the Philippines professional chairs and promotion criteria do not stress publications and research. Seniority or rank in his main job, and teaching load have higher weight than research. For this reason academic research is not very popular. Encouragement and development of university research facilities is important to complement the laboratory facilities in government. Coordination with the Department of Science and Technology (DOST) will help in supplementing the research budget and continuity of the research efforts. DOST is the government agency responsible for development of research, and distribution of the results. DOST which funds both fundamental and applied research is headed by a cabinet secretary. The Department of Education, Culture and Sports (DECS) should institute promotion criteria that encourages research and development by giving high recognition on publications and research carried out.

Significant volumes of agricultural residues are generated from rice, corn, coffee, cocoa, tomato, pineapple, banana, papaya, and sorghum plantations and processing. Large quantities are also generated from pig, chicken and duck farms. Production and utilization of methane by-products, composting residues and sludge are topics of special interest. Production of animal feeds from brewer's yeast and agricultural residues is for example being done by the San Miguel Corporation.

While most industries realize the need to maximize utilization of their waste material very few have a financial base to carry out pilot studies and the basic research necessary to develop and commercialize a product. Some have installed facilities as part of their waste water treatment requirements and later on tried to maximize utilization of the residues from the waste treatment process. This is the approach taken by Republic Flour Mills in Pasig, and Surico in Davao City.

Conclusions and Recommendations

Industrial Audits

An industrial audit program is recommended to provide assistance to industries of all sizes and types. The scope of audits should include, but not necessarily restricted to the following:

- o Making process flow diagrams with all raw materials, waste streams and products generated shown. Toxic and hazardous wastes should be identified and quantified.
- o Analyzing the energy by types and quantity with energy conservation opportunities noted.
- o Reviewing the internal process for waste reduction, such as housekeeping, water conservation, changes in chemicals, changes in the process, waste reuse, waste available for reconstitution or exchange options that may be taken.
- o Specifying options that may be taken to bring the process into compliance with environmental laws and regulations.
- o Recommending action plans with schedules and casts for compliance. The recommendations should address energy conservation, waste exchange and other industrial actions to abate pollution.

This audit program should provide industry with information which could reduce pollution, reduce costs, reduce energy use and provide guidance for both industry and government to follow. The audit should be a roadmap to environmental compliance, with possible fringe benefits of waste exchange, new technology energy conservation and communication. The audits should be accomplished with industrial representatives from the financial as well as the technical areas. The technical experts performing the audits should be teamed with counterparts from DENR for good communication and technology transfer.

Wastewater Collection and Treatment Facility

The implementation of a demonstration project to treat domestic wastes and industrial wastes is recommended. The project will need to be innovative both technically and financially. This is because such facilities cost more and require complicated phasing of construction to provide the greatest reduction in pollution for the least cost. The following suggestions should be considered:

Financing

In all cases it is expected that some form of financing can be arranged that will provide for interest rate lower than industry can obtain on their own. The proposed wastewater facilities project should consider all options of financing in order to obtain the lowest costs such as:

- o Using private companies that, in exchange for a contract and agreed fees, would construct, operate and maintain the facilities. It would be possible for industry to modifications of participation in the ownership of the system through, for example, purchase of stock.
- o Creating joint public/private entities which would be based on special agreements between the municipality and the industries.
- o Leaving construction, operation and maintenance in the public sector where the project is owned by a public body.

Joint Industrial Domestic Wastewater Treatment Facility

Industries who are discharging wastes to a stream and need to construct a wastewater treatment facility in order to meet effluent compliance should have the option of joining together and constructing a facility. This would provide economics of scale for both the construction and the operation. Industries would be required to pretreat their wastes to insure that no toxic or hazardous wastes were included in the stream reaching the joint facility and that these wastes are amenable to conventional treatment. Under these conditions, the industry should be permitted to discharge wastes until the joint facility is constructed and available. The industries financial participation should be equated to the cost of constructing their own stand alone facility. To provide for an equitable sharing of the operations and maintenance costs, they should be based upon a formula which would address waste quantities, strength and treatability. The domestic wastes from the municipality should be charged in the same manner based upon the formula. It is acknowledged that financing even the municipal portion of operating and maintenance costs will require substantial changes in municipal financial ability.

If a large industry and a small municipality were involved, a similar arrangement might be possible where the industry would construct the plant, accept the domestic wastes from the municipality, and be compensated based upon flow and strength of wastes.

Industries participation should be encouraged as a means to meet compliance, obtain lower interest rates for a joint government project, take advantage of lower capital and operations and maintenance costs due to economies of scale, and simplified permitting and compliance reporting.

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Monitoring Program

An environmental ambient water monitoring program is recommended which should begin with a compilation of all existing data for inclusion into a data base. The program would need to expand the present sampling, monitoring, and analytical base in the form of additional hardware and laboratory facilities. This program is needed by both DENR and the industries for their regulation and compliance activities. These needs, as pointed out by representatives of DENR regional offices and industry representatives, can be attained by various means. We recommend that privatization be considered, where a private company under contract could provide services to both DENR and the industries for a cost which should be less than if each geared up to their own work.

Technical Assistance Training

Training of technical and management staff is recommended to be a part of the environmental management program. As discussed with DENR Regional staff, local government and with industry, the need for training was suggested by all. This training should include but not limited to the following:

- o Regional DENR Management Staff
- o Regional DENR Laboratory Staff
- o Regional DENR Sanitarians (Technicians)
- o Municipal Engineers
- o Municipal Health Officers
- o Industrial Environmental Officers
- o Wastewater Treatment Plant Operators

Recommended subjects to be given should include environmental laws and regulations, preparation of environmental impact statements, environmental monitoring (sampling and analysis) wastewater treatment operations, and other subjects as needed.

It is recommended that training should also be made available to community leaders, NGO's, PVO's and media personnel in order to perform a better service to the public in "public awareness".

CHAPTER A.2. TERRESTRIAL

Overview

The siting of solid waste disposal facilities puts into focus the conflict between the waste generators and persons living in the vicinity of the proposed site. At present, there is no mechanism in place to resolve this issue in the Philippines. Often the National government (in some cases the office of the President) has to step in to resolve the issue such as the cases of the San Mateo and Carmona sanitary landfill sites.

One of the main problems in siting solid waste management facilities is the public's lack of information on, and understanding of, environmental pollution control, the nature of wastes and pollutants, and their reuse and/or recycling.

Possible solutions to the solid waste collection, transfer and disposal problems must take into account the prevailing social, cultural, economic and financial base. Waste collection options should include consideration of schemes which are labor intensive rather than capital intensive. Institutional development should include providing to scavengers opportunities for a better product markets, health protection, and essential social services.

A demonstration project is proposed which could result in the generation of guidelines for the siting, design, and construction of sanitary landfills, including collecting, separating, recycling, reusing, and transporting materials. In addition, the project would evaluate innovative techniques to reduce pollution, conserve natural resources, and provide employment.

Current Situation

Domestic Wastes

The per capita solid waste generation rate in Philippine urban centers is 0.5 kilograms per day (kg/day) with an average waste density of 250 milligrams per liter (mg/l). The average volume at curb is 2 liters per capita per day (L/C/D). The solid waste has heating values ranging from a low of 900 British Thermal Unit per pound (BTU/lb) for market waste to a high of 3,000 BTU/lb for waste from commercial centers. The average heating value varies from 1,100 to 1,300 BTU/lb. The low heating value is due primarily to the high moisture content, which goes up to 70 percent during the rainy season and falls to 40 percent during the dry season. In addition, collection and separation from the stream of paper, plastic materials, and textiles which have high heating values results in a low heating value for the remaining solid waste. (17)

To better demonstrate the quantity and character of solid wastes to be expected Table A.4 which follows is from UNDP Project Management Report Number 1 "Recycling from Municipal Refuse."(35)

At present, it costs ₱4 to ₱5 per m³ to dispose of solid waste in open dumps. While disposal in sanitary landfill typically provides the cheapest alternative to open dumping, it is estimated that

the disposal of solid wastes in sanitary landfill would cost from ₱40 to ₱60 per m³, depending on the availability of cover materials. For this reason, almost all the solid waste in the country is currently disposed of in open dumps.

At this time, the collection and disposal of solid waste is entirely the responsibility of local governments. Except for the efforts by the now defunct NEPC to finance solid waste management studies and the Presidential Task Force on Solid Waste Management, the involvement of the national government in solid waste management issues is very low. Unlike water supply, where (MWSS and LWUA) national agencies have been able to secure soft loans for infrastructure and promote standards for various level of services, each local government has been left to its own resources and initiatives with regards to solid waste management. Even with the currently low level of solid waste management services, solid waste management is generally one of the biggest expense items in all municipal government budgets.

Funding for proper waste management at the local level is severely constrained. The municipal and local government tax base is very small and often the tax collection efficiency is low. In many Philippine cities and municipalities, the collection efficiency for the real estate taxes is as low as 60 percent. Frequent amnesty programs have provided disincentives for taxpayers to pay on time.

Capital for solid waste management equipment is also a critical issue. Metropolitan Manila was forced to pay higher solid waste collection rates to private contractors since it had insufficient funds to purchase new collection vehicles. The same thing holds true for many other Philippine cities. The Japanese government has been supporting procurement of solid waste collection vehicles for Metropolitan Manila and other cities. In the case of Metropolitan Cebu, additional trucks were donated by Kaohsiung, Taiwan under the sister cities program. Some of the towns in Pampanga were able to obtain surplus trucks from the U.S. Naval facilities. In recent years, local investment for purchases of collection trucks has been very low or non-existent.

Annex A. Technical Framework

Table A.4. Patterns of municipal refuse quantities and characteristics for low, middle and upper income countries

	Low-Income Countries ^a	Middle-Income Countries ^b	Industrialized Countries
Waste Generation (kg/cap/day)	0.4 to 0.6	0.5 to 0.9	0.7 to 1.8
Waste Densities (wet weight basis-kg/cubic meter)	250 to 500	170 to 330	100 to 200
Moisture Content (% wet weight at point of generation)	40 to 80	40 to 60	20 to 40
Composition (% by wet weight)			
Paper	1 to 10	15 to 40	15 to 50
Glass, Ceramics	1 to 10	1 to 10	4 to 12
Metals	1 to 5	1 to 5	3 to 13
Plastics	1 to 5	2 to 6	2 to 10
Leather, Rubber	1 to 5	-	-
Wood, Bones, Straw	1 to 5	-	-
Textiles	1 to 5	2 to 10	2 to 10
Vegetables/Putrescible	40 to 85	20 to 65	20 to 50 ^c
Miscellaneous inerts	1 to 40	1 to 30	1 to 20
Particle Size, % greater than 50mm	5 to 35	-	10 to 85

Source: UNDP. 19 . "Recycling from Municipal Refuse." (Project Management Report Number I.)

a Includes countries having an annual per capita income of less than US\$360 in 1978.

b Includes countries having an annual per capita income of more than US\$360 and less than US\$3,500 in 1978.

c This may be reduced in areas with household or commercial garbage grinders which discharge to sewers.

Relation to Water Quality

While improving the management of domestic sewage is critical to protecting the health of streams and rivers, improved solid waste management may have an even greater effect. Most of the uncollected solid wastes are currently dumped in backyards, streams and canals. Solid wastes dumped in the backyards are washed during the rainy season into the water bodies. The collected solid waste are also dumped in areas close to rivers, seashores and creeks, such as in the case of the Smokey Mountain dump. During the rainy season, the uncollected solid wastes are washed into the river and the sea.

Using the estimated per capita solid waste generation rate of 0.50 kg/day and assuming a 70 percent organic content, then the per capita organic load from solid waste is .350 kg/day. If only 30 percent of this BOD quantity ends in the creeks and rivers then the organic loading from imposed solid waste disposal is 104 gm/capita/day. The ultimate BOD of the organic material varies from 1.3 to 1.6 times in weight. The equivalent BOD from the organic material in solid waste ending up in the water course would be in the vicinity of 140 gm/capita/day. This value is about 3.5 times the normal BOD load generated per capita per day from domestic sewage, which is only about 40 gm/capita/day.

While the current concern is focused on leachate from decaying solid waste, a large quantity of solid waste is deposited directly in the water bodies where it subsequently decomposes. Thus, the potential environmental damage caused by solid waste disposal in the waterbodies is much higher than from leachate alone.

Metropolitan Manila

The solid waste program of Metropolitan Manila has been extensively studied since 1972. (18-30) To date, a total of 14 reports and feasibility studies have been completed by various international and bilateral agencies. The Japanese government has donated a number of compactor trucks for solid waste collection, and the World Bank is currently funding the design of transfer stations and a second sanitary landfill site in Carmona.

Outside Metropolitan Manila

Outside of Metropolitan Manila, the U.S. Economic Support Fund (ESF) Secretariat has been funding solid waste studies and development authorities in Olongapo City, San Fernando, and La Union, Mabalacat, Pampanga, San Antonio, Zambales, Baguio City and San Marcelino, Zambales. Except for Olongapo, San Fernando, and La Union, ESF discontinued the implementation of solid waste management systems. The Metropolitan Cebu Solid Waste Management system was studied by NORCONSULT under the Central Visayas Urban Project funded by the International Bank for Reconstruction and Development (World Bank). The design of the system was completed in 1983 and is scheduled for implementation under the 16th Yen loan in 1992.

In 1982, the now defunct National Environmental Policy Council offered ₱50,000 grants to

provincial capital to carry out solid waste management studies. Lucena City was selected as the pilot area. Very few cities accepted the grants as the funding was considered inadequate.

COWICONSULT in 1981 carried out solid waste management studies for Iloilo, Tacloban, Bacolod, Cagayan de Oro and Davao City under the regional centers development program funded by the World Bank. Formal design was completed in 1983.

Field inspections of solid wastes being collected, separated, transported, and disposed of at dumps, including the activities of scavengers, was very enlightening. The source separation by the homeowner serves a very valuable function as does the purchaser of the separated wastes by the push cart entrepreneurs for resale to the recyclers. The function of the scavengers is valuable in that it reduces the volume of waste which must be disposed of, conserves natural resources, and provides employment. Other activities which were observed such as pick, transport, and disposal, offered substantial room for improvement.

Industrial Waste

A number of private waste disposal contractors serve the industrial sector. The typical practice is for a contractor to pay the industrial companies served for all their wastes. The contractor then removes the recyclable materials and dumps the "worthless" materials in the municipal dump. The amount paid for industrial waste by the contractor depends on his estimate of the recoverable and useful component of the solid wastes. Companies whose wastes contain very low quantities of recyclable materials typically have to pay the contractor for waste disposal.

While this system facilitates the recovery and reuse of products, the control of toxic and hazardous waste is inadequate. Often the toxic and hazardous waste components will have little recycle value and will end up in the municipal dump. Toxic and hazardous waste disposed of in the municipal dumps is a threat to scavengers and future utilization of the solid waste for composting or other uses.

Toxic, Hazardous and Nuclear Wastes

Prior to the enactment of the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (R.A. 6969), the management of toxic, hazardous and nuclear wastes had been addressed by guidelines developed by the NPCC staff in 1987. The guidelines specifically prohibited hazardous waste importation without prior notice, and prohibited the storage, transport, collection, processing and disposal of these wastes in a manner that would present a risk of injury to health or the environment. Just before NPCC was absorbed into DENR, the staff promulgated guidelines for the disposal, transport and storage of toxic and hazardous wastes. One of the main problems with the guidelines was the lack of appreciation for the resources required for implementation. As a result, the issue has essentially been dormant until the passage of RA 6969.

Industrial

Toxic and hazardous wastes are manufactured, utilized, transported, treated, stored and disposed of by industry. With the enactment of the new law, the national government has the authority to regulate hazardous waste management. In addition, DENR has the authority to regulate the entire life cycle of a chemical or mixture from the point of manufacture to the its ultimate disposal. The team believes that a well defined regulatory program for toxic, hazardous and nuclear materials is necessary and needs to be developed.

Very few data were found by the team regarding the volumes and types of toxic and hazardous wastes present in the Philippines except for limited studies performed by EMB and the Laguna Lake Development Authority. In this regard a complete waste inventory needs to be a part of a management plan. The plan should also include a public information and DENR should publish and disseminate widely the rules as required by the law.

Hospitals

Also of concern today are the wastes generated by hospitals, clinics, and similar health care facilities. Disposal of wastes from hospitals have caught the attention of the public with the spread of AIDS and other diseases. By law, hospitals are required to maintain an incinerator to dispose of contaminated materials and amputated human organs unless specifically saved for research or upon orders of the courts.

One of the national government's policies since independence has been the opening of small hospitals. This policy was adopted to encourage better delivery of medical services and better access to medical facilities by the public. However, a number of private hospitals are today in serious financial condition despite very high charges for medical care and use of the facilities. With their low capital bases small clinics and hospitals are not in a position to build on-site facilities for proper disposal of toxic and hazardous wastes. While concerns are currently centered on spent syringes, dressing materials and amputated organs, little attention has been given to proper disposal of expired drugs, which are often dumped into the hospital's septic system.

Other

Another concern is the toxic and hazardous wastes generated by households. While household solid waste may contain low concentrations of toxic and hazardous wastes, the effects cumulative from the sheer magnitude of the volume is enormous. This mass of toxic and hazardous waste may exceed that from industrial sources. Industrial facilities have economic incentive to handle hazardous materials efficiently. However, a great deal of the hazardous materials are used in the manufacture of household and office products, such as fluorescent lamps. After use, these products are typically dumped with other solid wastes. Flashlight batteries, electric appliances, paints, medicines and beauty aids are common waste materials from households which contain toxic and hazardous materials. Even seemingly harmless smoke alarms contain radioactive substances such as Americium. Other household products may contain high concentrations of

lead or other metals (such as Cadmium) used in the preparation of dyes and paints. Asbestos material is often found in old roofs and in heating and air conditioner insulators.

Problems and Opportunities

Currently, the population of the Philippines is estimated to be approximately 60 million people. The estimated per capita solid waste generation rate is between 0.4 to 0.6 kg/day/person. This means that approximately 30 million kg. of waste is generated and must be disposed of every day. To this must be added the industrial component, which adds significant quantities. Hardly any of this waste gets to proper disposal sites. The team has observed substantial quantities of solid wastes in the rivers, ravines, streets, and vacant lots. It is estimated that only about 60 percent of the solid waste ever stream gets to the dumps such as they are. This adds a very large pollution load to the rivers and streams particularly during the rainy season. The BOD loading from solid wastes and from domestic waste loading caused by the low efficiencies of septic tanks, results in poor stream quality in many areas. No properly designed facility for accepting and disposing of septage was identified. Attacking the problem of septic tank pollution cannot begin until such facilities are available.

One aspect of the present solid waste handling and disposal practice is very valuable and should be maintained. The scavenger system results in significant recycling and reuse of materials such as paper, plastic, glass, and metals. This scavenging system serves a valuable function by reducing the volume of wastes which must ultimately be disposed of. In addition, it conserves natural resources and provides employment.

It is felt that due to the character of the solid wastes being dumped (e.g., high in organic matter and moisture), they would be amenable to composting. The agricultural sector could utilize compost as a soil supplement, provided that the quality is controlled in other words, such things as heavy metals and toxics must not be present.

Improved solid waste management could reduce the volume of waste getting into the streams, thus improving the utility, safety, and appearance of the streams. Constructing properly sited and designed sanitary landfills, using composting as an integral component, could potentially convert the waste to a valuable material for agriculture.

Research, Information and Technical Assistance

Environmental Research

A variety of environmental research activities were undertaken during the past decade. These research activities were dispersed over a wide array of institutions and were, therefore, largely uncoordinated. Although a lot of ground has been covered, ranging from pollution to natural resources degradation control and rehabilitation, these efforts have been largely unmonitored up until 1988. At that time the Ecosystems and Research Development Bureau attempted to inventory all environmental research and development programs of the DENR. As a result, it was able to come up with the "Integrated Research and Development Plans and Programs of the

DENR, 1989-1993" which will serve as guide for future research activities of the various units under the Department. Government resources allocated in this field up to the present, have remained very minimal. (9)

Environmental Education

Environmental education efforts slowly gained ground during the past decade, with more activities undertaken in the formal education sector. In 1984, soil conservation concepts were integrated into the school curriculum at all levels, through the initiative of NEPC, Department of Education, Culture and Sports (DECS), DDA and other institutions. In 1985, instructional materials for the schools were analyzed with regard to their environmental concepts content. Some institutions, like the University of the Philippines - ISMED developed the "Philippine Environmental Science Series".

At the university level, the University of the Philippines in Los Banos (UPLB) offered courses in ecology and environmental studies. As of 1988, about 12 inter-disciplinary undergraduate degree programs related to the environment were offered by colleges and universities. These programs were, however, concentrated only in the Southern Tagalog and the National Capital Region. Universities and colleges consolidated efforts to form the Environmental Education Network of the Philippines.

To integrate and provide direction to existing environmental education efforts, the EMB in 1989 with assistance from the United Nations Development Program (UNDP), the DECS, academic institutions, and non-governmental organizations, initiated the development of the "Environmental Education Strategy". The strategy aims to develop an environmentally literate and responsible citizenry that can ensure the protection and improvement of the Philippine environment and promote sustainability, social equity, and economic efficiency in the use of the country's natural resources. Key environmental programs for the formal and non-formal sectors were drawn up under the strategy, which the EMB and other collaborating institutions and organizations have begun to implement. More resources should be placed into this effort in order to intensify and widen the scope of activities. (9)

Conclusions and Recommendations

A major improvement in the Philippine environment could be accomplished by improving solid waste and toxic and hazardous waste management systems.

It is recommended that a demonstration project which could generate guidelines for the siting, design and construction of a sanitary landfill be developed. An integral part of the demonstration project, with a goal of collecting 100 percent of the solid wastes, would also encompass development of guidelines for the following:

Waste Separation - Waste separation in the households should be continued and expanded into a more formal plan to reduce waste quantities and conserve natural resources.

Waste Collection - Waste collection should be designed, taking into account the prevailing conditions of the demonstration area. This means collection vehicles or equipment should fit the area such as push carts for the narrow streets and walks,. Local collection points serving small population areas should be fed into transfer stations where wastes could be prepared and transported to the land fill in suitable vehicles.

Scavenging - Scavenging because of its value for conserving resources and providing employment should be continued and expanded where possible. Control over scavenging should reduce their exposure to health risks and improve their efficiency, such as formalized scavenging at local pick up points, and employing scavengers as a part of the solid waste program.

Sanitary Landfill - The demonstration project should include guidelines for proper siting of the landfill. Following site selection, the design of the landfill should formulate an operating plan describing how it will be operated.

Specific waste disposal areas which should be designed within the landfill area include:

- o A secure area for toxic and hazardous wastes.
- o A secure area for medical and pathological wastes.
- o An area for recyclables and recycling.
- o An area for composting and compost storage.
- o An area for other wastes unsuitable for composting.

The design of this demonstration project should include handling of septage. Should the project be located in an area which includes piggeries or other animal wastes, some form of digestion facility should be evaluated. Animal wastes and septage wastes might be disposed of by digestion and recovery of biogas. The digestion process would render the digested waste pathogen free for use on farms and the gas could be marketed for cooking fuel. The composting area design should be evaluated also for possible methane collection.

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CHAPTER A.3. AIR

Overview

The development of power and energy resources are primarily concentrated on geothermal energy, hydroelectric power plants, and thermal power plants in areas and regions away from the users. For example, the major thermal power plants serving Manila are located in Batangas and Bataan. The geothermal fields and power plants are located in Laguna and Bicol. A similar situation exists in Mindanao. While environmental damage takes place in the vicinity of the power source, the beneficiaries are the major cities and urban centers which may be far removed from the sources.

The primary industrial source of air pollution in urban areas are from power and energy generation. Other air pollution sources include cement factories, steel mills, and chemical factories.

Motor vehicles are the major source of air pollutants in Metropolitan Manila and probably other urbanized areas. High emission rates from motor vehicles are due to the high cost of maintenance and acquisition of new rolling stock among other factors. With regards to public transport vehicles, a reexamination of the owner and driver relationship (i.e., the "boundary system") could improve maintenance of rolling stock and reduce air pollution.

It is recommended that the current Anti-Smoke Belching Program be continued and evaluated for effectiveness. Also recommended is the expansion of the program to cover other pollutants such as carbon monoxide, hydrocarbons and lead, and studies to determine the public health risk from these pollutants.

Current Situation

Monitoring

The National Pollution Control Commission (NPCC) was the recipient in 1972 of five fixed air quality monitoring stations from the Japanese government. The monitoring stations were installed in Cubao, Herran, Quiapo, Divisoria and Ermita. The monitoring stations allowed for the measurement of carbon monoxide and particulate levels. The number of monitoring stations has dropped as some stations were decommissioned in order to provide necessary spare parts for others.

The World Health Organization's Global Environmental Monitoring System (GEMS) program included Cagayan de Oro City as an air quality monitoring station. Some large industrial estates such as Leyte Industrial Development Estate (LIDE) operate a continuous monitoring station for sulfur dioxide. The National Power Corporation is monitoring the particulates and sulfur dioxide levels from large thermal power plants. Philippine Geothermal is monitoring arsenic, sulfur dioxide and hydrogen sulfide emissions from Tiwi Spring Geothermal Power Plant. However, the source monitoring results from the industries are not available to the public.

EMB has a number of portable kits for monitoring emissions from mobile sources. The testing equipment covers primarily particulates and is used for campaigns against smoke belching vehicles. The Japanese government has donated to the Land Transportation Office of the Metropolitan Manila Commission (LTO) two fixed vehicle emission measurement stations which are used primarily to certify registration of vehicles older than 5 years old.

In addition, the Japanese government has provided laboratory equipment to the Department of Labor to monitor the air pollution levels in the workplace. The University of the Philippines Institute of Public Health (UPIPH) has received a grant from the German government to study the health effects of air pollution levels in Metropolitan Manila, with specific reference to the health of the jeepney drivers. UPIPH received an additional grant to study the air pollution levels in communities around Leyte Industrial Development Estate.(31) Reports are under preparation. The Asian Development Bank is also currently funding a technical assistance program for monitoring and control of air pollution emissions from mobile sources in Metropolitan Manila.

Mobile Sources

To date, efforts to control emissions from mobile sources have focused on smoke belching vehicles (primarily diesel driven buses and jeepneys). For private vehicles the LTO has opened two vehicle testing stations. The objective is to require all private vehicles older than 5 years to pass the emission test prior to registration. While the licensing and testing programs will serve as a basis for renewal of operating permits once a year, the proper control of vehicular emissions will depend to a large extent on the proper maintenance of the vehicles. Due to the relatively high price of spare automotive parts, public transportation operators and private vehicle owners tend to replace spare parts only when it affects the engine operation. Spark plugs, contact points, and filters are cleaned and adjusted during tune ups instead of being replaced.

Government efforts to get old vehicles off the road is expected to meet strong resistance from the public. A new car at US\$ 8,000 is equivalent to 12 years work at current the Philippine per capita income of US\$ 700/year. Many cars on the road today are more than 10 years old and it is not unusual to find a 25-year old car running on its original engine. The same holds true for trucks, buses, jeepneys, and hauling vehicles. A number of vehicles are locally reconditioned. The high cost of a new vehicle should encourage owners to improve maintenance programs; however, due to expensive spare parts the owner is often forced to run his vehicle with low efficiency resulting in high air emissions.

With regard to taxi and jeepneys, the owner/driver relationship is often based on the "boundary system". The vehicle unit owner leases his unit to a driver for a particular period and price. The time period and price is known as the "boundary". The driver pays for fuel and, during this period, the driver tries to earn as much as possible. Anything he earns above the cost of the boundary lease is his take home pay. Maintenance is not encouraged in this system, as the "down time" would cut into the driver's earnings. While this practice encourages entrepreneurship on the part of the driver, it also results in to bad driving habits and low concern on the condition of the vehicle. Poor vehicle condition and bad driving habits results in higher emissions.

Industrial Sources

Stationary sources also contribute to air pollution in urban areas. Large plants such as the copper smelters and thermal power plants typically have their own equipment for monitoring sulfur dioxide. Air quality in the areas surrounding some other factories is difficult to establish due to lack of monitoring stations and data. For dispersed sources within a factory, the Pollution Adjudication Board has set a ruling accepting expert opinion in place of monitoring data to penalize a factory for air pollution. While this may add some discipline, the lack of quantitative data may open the system to abuse.

One of the mitigating conditions in the Philippines against serious air pollution episodes has been the geography and topography of the country. The country is primarily composed of small islands which are open to strong winds throughout the year. Temperature inversions take place for short periods during the early hours of the morning and evening only.

Documented complaints related to air pollution from factories have been directed mainly against thermal power plants, specifically those in Calaca, Batangas, (32) Toledo City, Cebu, the Tiwi Geothermal power plant in Albay, and cement plants throughout the country. Complaints have also been directed against steel plants, small foundries, fertilizer plants, and paper factories. In some instances the problem is related to improper land use regulations and planning. For example, Rizal cement was given a permit to operate a cement crushing and bagging plant in Pasig in the 1960's. Without consideration of the existing industrial facilities of Rizal Cement, land developers subsequently were given permits to develop nearby areas for first class subdivisions. Similarly, the Naga Thermal Power Plant in Cebu was given a classification for heavy industrial use, while the immediate area outside its fence is zoned as residential area. National Power Corporation designed their facilities to comply with the NPCC standards for industrial zone while NPCC field officers responding to complaints from residents, used the residential standards for noise and air pollution.

Problems and Opportunities

Air quality has a major impact on the quality of life. In the urban areas of the Philippines, air quality is adversely affected by various mobile sources including automobiles, trucks, buses, jeepneys, trains, boats and airplanes. Industrial sources affect the air quality through emissions from its operations including odors, dust, and smoke.

During the past few years, air quality monitoring has been primarily confined to the Metropolitan Manila area. Air quality in Manila is the worst in the country with other heavily populated urban areas showing evidence of degradation. Monitoring efforts have been hampered by equipment failures and sampling and analysis procedures. As a result, the data collected is very difficult to correlate. High levels of total suspended particulates (TSP) have been registered at a number of the Metropolitan Manila area stations. A reading of 340 micrograms per cubic meter (mg/m^3) at Valenzuela Station in 1987 is an example. Readings in the range of 205-250 mg/m^3 were recorded in Malate, Ermita and Pasay. (9) A trend indicating deterioration of air quality was observed during the monitoring period. Other urban areas around the country, such as Iloilo and

Davao, have also shown some monitoring stations with exceedingly high total suspended particulates. Although monitoring data are scarce, it is evident that the levels of pollutants in the air across the country, particularly in working areas, are placing the citizens of the Philippines at a high risk.

The air pollution evident in the urban areas and in the workplace clearly indicate that the existing environmental laws and regulations are not being adequately enforced.

These problems have been born out by discussions with representatives of industry, local government, and regional offices of national government agencies, notably EMB. Lack of monitoring equipment and analytical capacity have severely limited enforcement and data collection.

Research Information and Technical Assistance

The "Air Pollution Emission Inventory in Metropolitan Manila for calendar year 1987" covers the National Capital Region, plus Regions III and IV. This inventory covered five air pollutants. The inventory was prepared by EMB, with assistance from UNDP.

The NEPC in 1983 conducted a study on the uptake of air pollutants by Philippine plants to determine impacts on plants and their effectiveness in removing or utilizing these pollutants from the air. The mechanisms used by these plants to detoxify the pollutants were also investigated.

In 1986, the EMB conducted an "Investigation on the Acidity of Rainfall and Particulate Matter in Metropolitan Manila and Vicinity". Rainfall samples were collected and analyzed for pH, SO₂, NO_x, TSP, TDS and acidity. The samples were collected from 16 stations in the provinces of Bataan, Bulacan, Laguna and Rizal over a two-year period.

Conclusions and Recommendations

The team concludes that air pollution control activities and management needs to be expanded in the Philippines. The greatest need exists in Metropolitan Manila, but all urbanized areas are being adversely affected, particularly by mobile sources. The current Anti-Smoke Belching Program should be continued and evaluated for its effectiveness in removing vehicles which are violating the particulate standard. It is also recommended that the program be expanded to include studies on levels of carbon monoxide, hydro-carbons and lead to determine the extent of health risk.

It is recommended that an air pollution monitoring program be developed nationwide to measure ambient air quality and incorporate into a data base. Existing regulatory programs should be implemented with incentives provided to reduce pollution. A public awareness campaign should also be pursued which would make the public aware of the air pollution problems and encourage them to take action on their own such as to tune up their personal vehicles to reduce pollution.

The GOP should consider stopping the import of engines from abroad for use in the Philippines, if the engines cannot meet the air pollution standards of the exporting country.

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APPENDIX A.B. PERSONS CONTACTED

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Dept. of Environment and Natural Resources

**ANNEX B. LEGAL AND
REGULATORY FRAMEWORK**

**Sustainable Urban and Industrial
Environmental Management Review**

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ANNEX B - LEGAL/REGULATORY FRAMEWORK

CHAPTER B.1. OVERALL CONCLUSIONS AND RECOMMENDATIONS

Status of Existing Laws and Regulations

An extensive body of laws and regulations currently exist that address urban and industrial environmental management in the Philippines. The more pertinent laws and regulations considered in our analysis are discussed in Chapters 2 through 5 of this annex.

Viewed in the abstract, the various air quality, water quality, waste management and land use regulations established over the past two decades should provide a mechanism to control the major sources of environmental pollution in the Philippines. In fact, with the notable exception of certain program components discussed in Section under the heading "Recommended Supplements to Existing Regulation," the existing laws and regulations are comparable to those in place in the U.S. and the European Economic Community (EEC) countries (particularly with regard to the protection of air and water quality). However, a tour of Metropolitan Manila or other urban areas or even a cursory examination of environmental monitoring data has been collected over the past decade (1) demonstrates that the existing environmental programs are not providing the anticipated levels of environmental control. For example, although pollutive industries have been required to install pollution control devices and obtain permits since 1980, a substantial percentage of these facilities have failed to comply with one or both of these requirements (1). Similarly, four major river systems that discharge into Manila Bay are reported to have become biologically dead (1).

Need for Implementation/Enforcement of Existing Regulations

Clearly, a disconnection exist between the enactment of environmental laws and regulations and their implementation. Although numerous reasons for the lack of implementation can be offered, some of the more critical reasons likely include:

- o Inadequate government resources,
- o Percieved cost of installing pollution control equipment for many small-and medium-sized businesses

- o Failure of the public to recognize the importance of environmental protection and reasonable alternatives for reducing the impact of individual activities.

A detailed evaluation of the effectiveness of various components of the existing air quality and water quality regulations is hampered somewhat by the lack of comprehensive, long-term environmental quality monitoring programs. Although air quality and water quality have been monitored in certain areas (1), these monitoring programs have been limited in scope and have suffered from equipment failures and inconsistency in sampling and analytical methods.

Because the existing air quality and water quality regulations have not been fully implemented to date and little data exist to establish environmental quality trends, the team does not recommend extensive revision of these existing regulations or an increase in their stringency. Instead, the team recommends that resources be directed at full implementation of the existing regulatory programs. We believe that an extensive revision of the existing air quality and water quality rules would be detrimental to DENR staff and those businesses that have come into compliance. Furthermore, an extensive revision of the rules may provide a signal to industry not to act; businesses may interpret further revisions of the rules as a sign that the government is unsure what standards should be applied.

We have however, identified certain gaps in the existing regulatory coverage that we believe need to be addressed. Our recommended programs for dealing with these gaps are discussed later. To the extent feasible, we have attempted to coordinate our recommendations with the existing air quality and water quality regulations.

In implementing the existing regulatory programs, it is important that an implementation plan be developed that considers the variety of "polluters" that exist in the Philippines. These range from large, multinational manufacturing concerns, to small businesses in the informal sector and the general public. The approach for controlling pollution from these various groups will necessarily be different.

We do not suffer under the delusion that full implementation of the current regulations will be a simple task or that urban and industrial environmental problems will be solved overnight. Indeed, the staggering variety and magnitude of urban/industrial environmental problems in the Philippines could itself be a cause for inaction. As a result, we recommend that a phased implementation approach be employed in which DENR could identify the highest priority problems and maximize the environmental "return" for its resource "investment".

One area of possible improvement is the permitting and compliance monitoring program. In many countries, the permitting program is the primary mechanism for transforming regulation into action by regulated businesses. It is our understanding that, while air quality/water quality permits are currently issued to some businesses Department of Environment and Natural

Resources, Government of the Republic of the Philippines, (DENR) resources have limited the number of permits that have been issued to date. In addition, it is our understanding that permits are valid for one year.

We recommend that a management review of the existing permitting and compliance monitoring system be conducted. For example, it may be reasonable to issue permits for a period longer than one year, so long as permittees are required to demonstrate compliance with permit conditions on a regular basis. Following a review of the permitting system, DENR could prioritize the currently unpermitted businesses and establish a schedule for permitting these sources. Priorities could be established based on magnitude of emissions/ effluents, source location, and other factors. DENR should also review permits issued in the past for possible revision. This process is illustrated in Figure B.1.

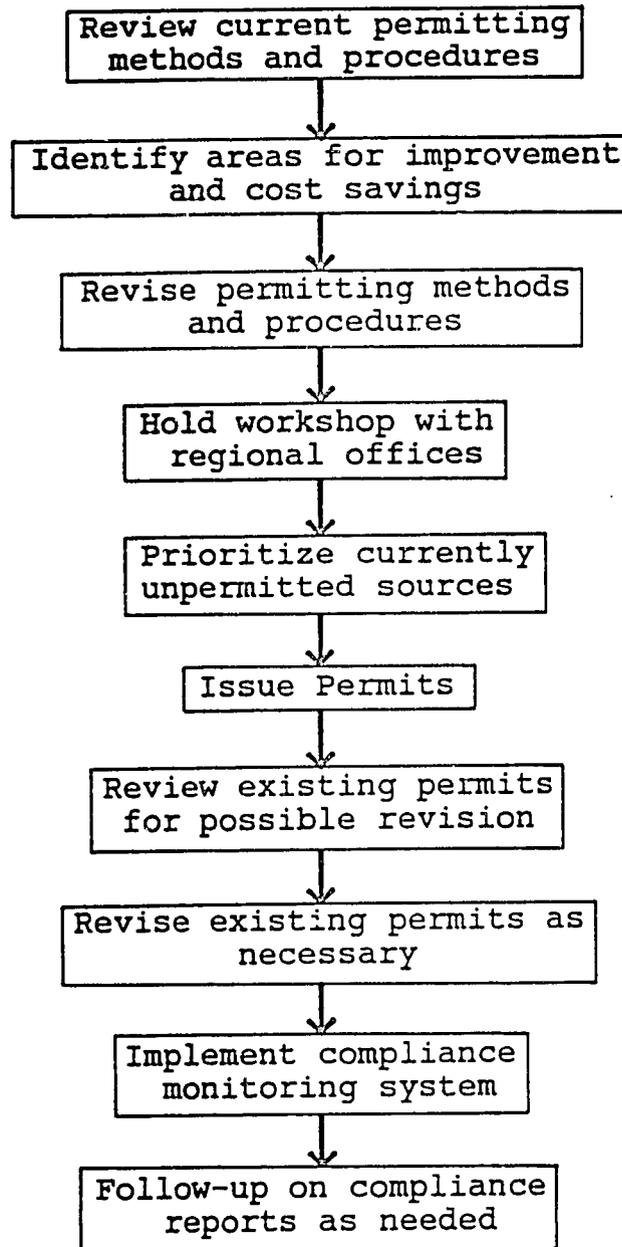
In addition to identifying the specific emission and/or effluent limitations to which the facility is bound, permits should specify other general conditions such as proper operation and maintenance of pollution control equipment and periodic sampling and analysis to demonstrate compliance. In theory, new facilities are expected to demonstrate compliance with air quality and water quality standards through the Environmental Impact Assessment (EIA) process, which requires a "Certificate of Compliance" (2). However, it is less clear how compliance is to be demonstrated after a project is actually constructed and operating. Thus it may be difficult to ensure that even "newer" projects or facilities (i.e. those that have gone through the EIA/Environmental Impact Statement (EIS) process) are in compliance with the environmental standards. This again reinforces the need for routine reporting of compliance data to DENR.

It is unlikely that sufficient resources currently exist within DENR to issue permits to all of the businesses that are (theoretically) covered by the air quality and water quality regulations. Likewise, many small businesses probably lack the technical and financial resources necessary to obtain and maintain permits. Permits for small businesses may be phased in over time, and will likely require technical assistance from DENR.

In addition, it may be possible to develop tools that would increase the efficiency of DENR compliance monitoring efforts. Through use of such tools, existing DENR staff resources could be used more effectively. One such tool would be a handbook for

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Figure B.1 Permitting implementation plan



regulated businesses that clearly explains the environmental standards and the permitting process.

It should also be noted that the current administrative procedures used to develop new regulations may limit public participation, including participation of the regulated community. At present there is no formalized process for informing the regulated community that new rules are being developed or collecting information from potentially affected companies on the impacts of new rules. Likewise, there is no formal requirement to propose regulations, accept public comment, and factor these comments into the final standards. Establishment of such a process would help to achieve more active participation by NGO's and businesses in the regulatory process.

Integrated Pollution Prevention Approach to Regulatory Programs

Traditionally, developed countries have followed a piecemeal approach to environmental regulation. Air quality and water quality programs are generally established first, and as new problems are identified new programs are added. Typically, these environmental regulations have been "end of pipe" programs that regulate contaminants at the point of discharge to the environment.

Experience in the U.S and elsewhere has shown that this approach to regulation has several shortcomings. Examples of where pollution has been transferred from one medium to another are rampant. In addition, by viewing environmental problems as distinct "air quality" or "water quality" concerns, cost-effective solutions have been often overlooked.

As a result, we recommend that a pollution prevention approach to regulation be adopted. In its most basic sense, the goal of pollution prevention is to eliminate pollution at its source, through changes in production processes or reduced reliance on environmentally harmful chemicals and materials.

The pollution prevention approach has a number of advantages over traditional regulatory approaches. First it minimizes the use of cross-media transfer to achieve compliance. Second, pollution prevention can actually save money by reducing raw material losses, the need for costly end of pipe control technology, and long-term liability for environmental damage.

Pollution prevention may be an attractive approach for DENR, which is limited in its resources. By establishing a philosophy of reducing pollution in all media and making continuous reductions in pollution loadings, pollution prevention reduces reliance on resource intensive evaluations of pollutant sources and their impact on the environment. Such evaluations are subject to ever-changing scientific understanding of environmental processes and the health and environmental effects of different pollutants.

Pollution prevention can also be a beneficial approach for the regulated community. Programs

can be designed to allow businesses to "exchange" minor decreases in discharges from one source for larger reductions in discharges for other sources, for example. In addition, programs for "trading" discharge reductions between regulated companies fit well within an overall pollution prevention framework.

We believe that a pollution prevention approach would be well suited to the Philippines situation for the following reasons:

1. It could encourage voluntary private sector actions by giving businesses flexibility to reduce pollution in the most cost-effective way.
2. As a long-term process, it allows the private sector to plan its pollution prevention efforts in conjunction with other capital outlays for new equipment.
3. Small businesses can adopt pollution prevention practices as an alternative to installing expensive pollution control equipment.
4. It is likely that simple pollution prevention practices could result in significant environmental progress in the short-term.
5. Pollution prevention could potentially reduce pressures on DENR resources.
6. It can incorporate a significant public participation component, which may result in benefits in other environmental protection areas.

It may also be possible to introduce pollution prevention concepts by incorporating them into enforcement settlements. In the U.S., EPA frequently requires a company to conduct a pollution prevention "audit" as a condition for settlement. In the Philippines, such a program could serve as a training mechanism for DENR staff. As a result of such an audit could be transferred to other companies in the same type of industry.

It should be cautioned that pollution prevention does not eliminate the need for existing regulatory programs. For example, ambient water quality standards will still be needed to ensure that water bodies are adequately protected. It is important that pollution prevention efforts be integrated with other environmental regulations. As a result, any new regulations should be designed to mesh with the pollution prevention approach. As part of this evaluation, new standards should be reviewed for consistency with the following waste management hierarchy:

- o Reduce pollution at the source
- o Recycle/reuse any waste which cannot be eliminated at the source and

- o Effectively treat any remaining wastes.

Possible elements of pollution prevention that could be incorporated into existing and future regulatory programs are shown in Figure B.2.

Coordination of Regulatory and Non-Regulatory Mechanisms **Environmental Protection**

Well-crafted, comprehensive environmental regulations by themselves will not solve the urban/industrial pollution problems that exist in the Philippines. These regulatory programs must be coordinated with other efforts to increase public awareness of environmental concerns and encourage voluntary compliance actions by industry.

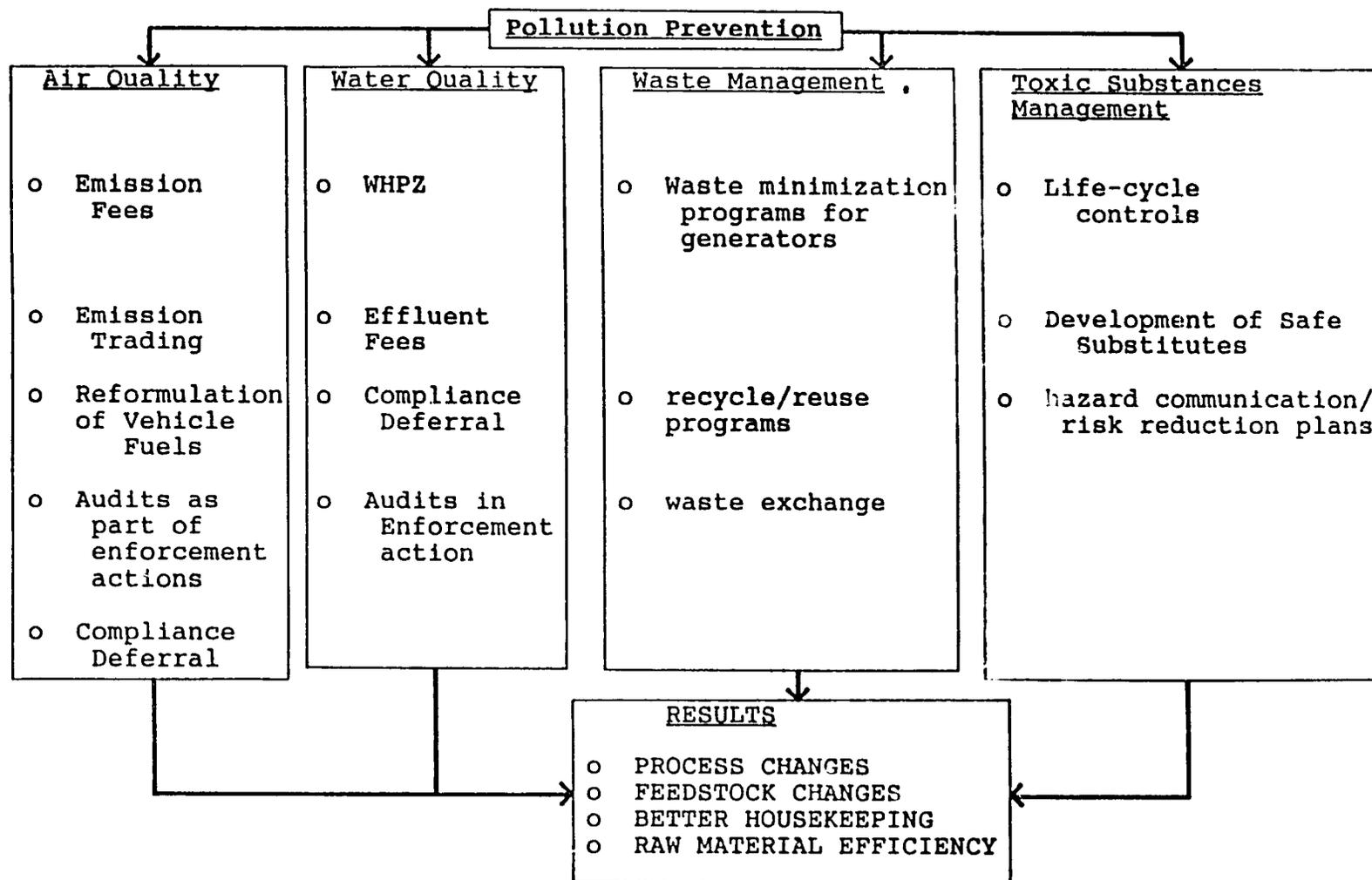
As one of the major sources of air and water pollution in urbanized areas, individual citizens must be educated as to benefits of environmental protection and their roles in protecting resources. In addition, the infrastructure must be established to provide reasonable alternatives to the public's polluting activities, notably the disposal of solid wastes on river banks, the discharge of untreated sewage, and improper maintenance of automobiles and truck, among others.

Businesses of all sizes must be made aware of the benefits of voluntary actions to reduce pollution. In particular, businesses must recognize that pollution prevention can actually reduce the costs of doing business by reducing raw material inputs.

However in order for the pollution prevention approach to be successful in the Philippines, regulated businesses must have confidence in the stability of DENR actions and must be informed of future regulations well in advance of their implementation.

Alternatives such as solvent recycling and waste exchange are good examples of actions that could both protect the environment and lower manufacturing costs.

Figure B.2 Elements of pollution prevention in the existing and recommended regulatory programs



Recommended Supplements to Existing Regulations

As noted above, while we do not recommend extensive changes to the existing air quality and water quality rules, we have identified certain gaps in the existing regulatory structure that we believe should be addressed. Recommended approaches to address these gaps are summarized below.

Ground Water Protection

Approximately 28 percent of the domestic water supply in the Philippines is obtained from ground water (1). The quality of the ground water supply is threatened by a number of different contaminant sources, including but not limited to septic systems, pesticide application, above- and below-ground storage of hazardous materials, and waste disposal sites.

Protecting ground water supply for domestic water use might be accomplished through the establishment of well-head protection zones (WHPZ) around water public water supply well and wellfields. Similar programs have been established or are currently under development in Europe and the U.S.

Such a program should consider methods for delineating WPHZ's and controls needed for contaminant sources within these zones. Protection measures could include prohibitions on certain activities and/or special design and operating requirements for contaminant sources that are located within a WPHZ.

The recommended framework for a WPHZ program is discussed in Chapter B.2.

Hazardous Waste Management

The recently enacted law, "The Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990" (3) authorizes DENR to develop a regulatory program for the control of hazardous and nuclear wastes. (The same law also establishes a ban on the import of hazardous and nuclear waste into the Philippines, even for mere transshipment). The new law provides a great deal of discretion to DENR in developing the structure and content of a hazardous waste management program.

We believe that hazardous waste regulations are a necessary component of an overall environmental protection program. In particular, as the existing air quality and water quality regulations are enforced, it is likely that the amount of hazardous waste generated in the Philippines will increase (due to the generation of pollution control dusts/sludges and other materials that are prohibited for discharge to surface water). Such wastes could pose threats to human health and the environment when disposed of on land in an uncontrolled fashion.

A recommended framework for the hazardous waste management regulations is described in Chapter B.3 and includes the following elements:

- o Identify of hazardous wastes;
- o Standards for hazardous waste generators;
- o Standards for hazardous waste transporters; and
- o Standards for facilities that store, treat or Dispose of hazardous wastes.

Control of Toxic and Hazardous Materials

The Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 also calls for the establishment of regulations to control the importation, manufacture, processing, sale, distribution, use, and disposal of chemical substances and mixtures that present on unreasonable risk of injury to human health or the environment. The law requires DENR to establish regulations for, among other things:

- o An inventory of toxic substances imported or manufactured in the Philippines;
- o Chemical testing;
- o Pre-manufacture and pre-importation notification; and
- o Regulation of toxic substances, where appropriate.

We have provided recommendations regarding the structure of this regulatory program in Chapter B.5. In addition, we discuss certain issues that have arisen in establishing similar programs in the U.S., Canada, and Europe.

Chapter 5 also provides our recommendations regarding two other important elements of a toxic substances control program, which are:

- o Emergency planning and
- o Hazard communication/risk reduction planning.

These elements are important to an effective and comprehensive toxic materials management program and fit well with the overall pollution prevention strategy discussed above and illustrated in Figure B.2.

Hazardous Waste/ Hazardous Material Transportation

In line with the recommended requirements for safe management of toxic substances and

hazardous waste, the team believes that a system to ensure the safe transportation of these materials must be developed and implemented. The team believes that a single system may be appropriate to control the shipment of both hazardous materials and hazardous wastes. A recommended framework for such program is discussed in Chapter B.5.

CHAPTER B.2. WATER QUALITY

Overview of Chapter Findings

In accordance with the mandate of Executive Order No. 192 (1987), the primary government agency responsible for the conservation, management, development and proper use of the country's environment and natural resources (including water) is the Department of Environment and Natural Resources (DENR). Regulation of water resources is also tasked to the Department in order to ensure equitable sharing of the benefits derived therefrom for the welfare of the present and future generations. Under the administration of the Department is the Environmental Management Bureau (EMB), the agency charged with recommendatory, advisory, and rule-making powers.

The Bureau is tasked to recommend possible legislation, policies, and programs for environmental management and pollution control, as well as rules and regulations for proper disposal of wastes. It may likewise recommend rules and regulations for environmental impact assessment (EIA/EIS) and provide technical assistance for their implementation and monitoring. The Bureau also advises the regional offices on the efficient and effective implementation of policies, programs and projects for environmental management and pollution control.

Apart from the DENR and its sub-agencies, several other government offices have been charged with the function of maintaining water quality in the country. These are the Philippine Coast Guard Authority [Presidential Decree (PD) No. 600, as amended], the Metropolitan Waterworks and Sewerage Systems [Republic Act (RANo.) 6234], the Local Water Utilities Administration (Presidential Decree (PD) No. 198), and the Metropolitan Manila Flood Control and Drainage Council [Executive Order (EO) Nos. 52 (1986) and 124-B (1987)].

A considerable body of laws and regulations have been established to address water quality, flooding, and other related aspects of urban and industrial environmental management. These laws designate various government agencies responsible for implementation and define national policy for protection of water quality. Several laws deal specifically with problems in the Metro Manila area.

Regulations were issued in 1978 (and revised in 1990) which establish criteria for classifying water bodies and limitations for effluent discharges. (4)

While significant surface water pollution clearly exists in the Metropolitan Manila region, as well as other parts of the country, we do not view this as an indictment of the existing water quality regulations. Instead, we believe that a chronic lack of implementation and enforcement of the existing regulations is the larger problem. This lack of implementation has been clearly documented.

As a result, we do not recommend sweeping changes to the existing regulatory framework for surface water protection. Rather, we recommend renewed emphasis on implementation and enforcement in order to provide a basis for determining the adequacy of these regulations. The authors have provided certain recommendations for improving the current program.

Groundwater serves as the drinking water supply for a large percentage of the population in urban areas. Although groundwater was formerly perceived as an essential clean source of water, it is now generally recognized as a sensitive resource that is vulnerable to contamination from a variety of sources. Protection of ground water resources that supply drinking water should be a high priority.

The Water Quality Criteria and Rules and Regulations Relating to Water Pollution Control (5) formerly designated classifications for groundwater for domestic water supply as well as for industrial/irrigation supply. However, the 1990 revisions to the water usage and classification rules (4) removed the groundwater classifications. Thus, it appears that mechanisms for groundwater protection are severely limited at the present time.

It is recommended that a wellhead protection zone (WPHZ) system be considered as a mechanism for protecting groundwater quality. A recommended framework for this system is discussed in section C, Issues and Opportunities.

Current Status of Water Quality Laws and Regulations

Statutory Provisions

The protection of water quality and related urban/industrial environmental management has been the subject of many laws over the years. Some of the more important laws related to water quality are summarized briefly below:

Act No. 2152, as Ammended

Otherwise known as the "Irrigational Act", this law has undergone at the very least four express amendments under Act Nos. 2652, 3208, 3523, and 4157. Passed on June 6, 1912, it is totally repealed by Presidential Decree (PD) no. 1067. The objective of the law, however, remains similar, such is the authority to order the removal or alteration of dams, by filling in or opening canals or ditches and to order the construction of gates, and installation of gauges among others. Examination of streams and works diverting therefrom and to measure the discharge of streams, carrying capacity of canals and ditches and approximately measure lands irrigated as well as apportion waters to appropriators were included among the powers provided. Implementation is carried out by the National Irrigation Authority.

The order of preference for the use of waters was given as follows: domestic use first, then

agricultural use, industrial use, ponds for fisheries and mining or milling in mines.

Act No. 4062

The State made development of hydraulic power a national policy. Through Act No. 4062, the Philippine legislature put into law the policy for hydraulic power to be developed for private or domestic use and not for sale to the public. As to franchises existing, or rights acquired prior to the passage of the Act, nothing contained therein prohibited or restricted the use of hydraulic power for irrigation purposes. At the same time, it preserved to the Philippine Legislature the disposition of waters of the public domain for the utilization and development of hydraulic power.

Commonwealth Act No. 383

Recognizing that any action on the waters of rivers and streams may cause harmful effects to water quality, the legislature prohibited dumping which may cause an elevation in the level of river beds or block the course of streams. Known as the "Anti-Dumping Act", the prohibited act therein is one which is to cause alluvial formations of whatever means or device that may give rise for river banks to expand, or by similar process, reclaim a strip of land through accretion, except only with the authority of the Secretary of Public Works now Secretary of Public Works and Highways) when such action is necessary for the protection of private property against the destructive action of the waters.

Letter of Instruction No. 376

Though issued much later than Commonwealth Act (CA) No. 383, this Letter of Instructions (LOI) created a committee to "recover" creeks, rivers, esteros, drainage channels, and similar bodies of water in the Greater Manila area which have been illegally filled up.

Republic Act No. 1899

Though prohibited under CA No. 383, reclamation as a practice was recognized to maximize and utilize, as well as extend, State policy on land-use. Reclamation of foreshore lands has been reserved to charter cities and municipalities. To them is granted the power to undertake, at their own expense, reclamation by dredging, or filling of any foreshore lands while reserving these areas as government property. The law does not provide for any qualification as to the applicability of the law in case the action of reclamation creates harmful effects to bodies of water in the area. Hence, unless such is provided in subsequent laws, reclamation will remain an exception to the rule pronounced in CA No. 383.

Republic Act No. 128

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This Act requires district health officers or their authorized representatives to inspect the sanitary condition of marine passenger vessels calling at ports in their district. These officers are also required to make a report of their findings to the Bureau of Health and provide a copy to the Bureau of Customs.

Republic Act 428

The first Act which prohibited the use of dynamite and other explosive or toxic substances in fishing grounds and waters. The intent of the Act was to protect water resource in the Philippines. This law has been repealed by PD No. 704 or the Fisheries Code.

Republic Act No. 1378

Otherwise known as the "Plumbing Law", RA No. 1378 provides that sewage and other waste from plumbing systems which may not be deleterious to surface or sub-surface water shall be discharged into the ground or into any waterway unless it has first been rendered innocuous through some acceptable form of treatment. It also provides that all premises intended for human habitation, occupancy, or use shall be provided with a supply of pure and wholesome water.

Republic Act No. 1383

For more efficient utilization and appreciation of water resources, the Metropolitan Waterworks and Sewerage Systems was created under RA No. 6234, dissolving the National Waterworks and Sewerage Authority under RA No. 1383. Amendments were provided by PD No. 425. The MWSS under its Charter (RA No. 1383) is empowered to issue such regulations as may be necessary for the sanitary sewers and for the protection of water and sewer service.

Republic Act No. 2056

In line with the objectives of Act No. 2152 or the Irrigation Law, RA No. 2056 prohibits construction of dams, dikes or any other works in public navigable water or waterways and in communal fishing grounds which restrict the efficient utilization of water resources. The authority to remove and or demolish all obstructions has been granted to the Secretary of Public Works and Communications (now Secretary of the Department of Public Works and Highways).

Republic Act No. 4850

In 1966, Congress created the Laguna Lake Development Authority under RA No. 4850 with the objective of harnessing the potential of Laguna de Bay. An amendment to said law is PD No. 813, expanding the functions of the Authority to include a comprehensive water quality management program for the lake designed to preserve its ecological balance.

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Republic Act No. 2370 and Republic Act No. 409

Under these Acts, the Barrio council has been given the power, duty and responsibility for constructing and maintaining, within its boundaries, water supply systems, drainage, irrigation, public toilet facilities, and sewerage facilities. In the same light, RA No. 409, the revised Charter of the City of Manila, gives to the Municipal board the power to legislate and provide for the maintenance of waterworks for the purpose of supplying water to the inhabitants of the City and the purification of the source of water supply in the places through which the same passes, to regulate the construction, repair and use of hydrants, pumps, cisterns and reservoirs, and to provide for the establishment, maintenance and regulation of the use of public drains, sewers, latrines and cesspools.

Presidential Decree No. 198

In promulgating this decree, the President recognized that one of the prerequisites to an orderly and well-balanced growth of urban areas is an effective system of local utilities, the absence of which is realized to be a deterrent to economic growth, and a hazard to public health. At that time, when the decree was made, domestic water systems and sanitary sewers did not exist in many communities. In those areas where systems existed, they failed to meet the needs of community. Hence, the need to create, operate, and maintain a reliable and economically viable and sound water supply and wastewater disposal system was imperative.

Presidential Decree No. 296

In line with the program adopted in RA No. 2056, PD No. 296 directs all persons, natural and jurisdictional, to renounce possession and move out of portions of rivers, creeks, esteros, and all drainage channels and other similar waterways encroached upon them.

Presidential Decree No. 424

The government foreseeing the conflict of interest among water users, created the National Water Resources council to coordinate, integrate and develop water resources.

Presidential Decree No. 856

The health of the people being paramount importance, the Code of Sanitation prescribes the standards for drinking water and bacteriological and chemical examination with evaluation to conform to the National Development Water Standards Criteria.

Presidential Decree No. 1160

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Under this Decree, laws which have for their purpose environment pollution control are to be enforced by Barangay Captains.

Executive Order Nos. 30 [1954] and 24 [1966]

Both of these EO's created the Interim Water Resources Development Authority. At that time no government agency was tasked to regulate water and sewerage systems (prior to establishing the MWSS and the LUWA).

Republic Act No. 3931

The creation of the National Water and Air Pollution Control Commission (NWAPCC), later renamed the National Pollution Control Commission (NPCC) under terms of PD No. 979, was meant to effectively determine whether pollution exists in any of the waters, among other forms of natural resources. The Commission is tasked to adopt and prescribe rules and make orders for discontinuance of pollution due to discharge of sewage, industrial and other wastes. (Now the Pollution Adjudicatory Board.)

Presidential Decree No. 600, as amended by Presidential Decree No. 979

The Marine Pollution Decree of 1974 was promulgated to give the Philippine Coast Guard the responsibility of preventing, containing, and controlling pollution of the seas and other bodies of water within the territorial jurisdiction of the Philippines, including industrial pollution.

Philippine Coastguard Memorandum Circular No. 022-77 (May 20, 1977)

The Circular defines violations that describes the administrative penalties therefore and exacting, among others, compliance with preventive requirements for the shipping and maritime sectors and the oil industries, consistent with the policy set up against marine pollution.

Presidential Decree No. 1252

The PD was promulgated in recognition of the damage caused by pollution in waters due to the operation of mining industries. A Mine Wastes Tailing fund was established for the purpose of extracting fees from the mine operators and such would accrue to the 'reserve' fund to be used exclusively for payment of damages caused by the operation of mining companies.

Presidential Decree No. 602

In 1974, the National Operation Center for Oil Pollution (NOCOP) was created under the Philippine Coast guard for the special purpose of enforcing the provisions of PD No. 600 and

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Annex B. Legal and Regulatory Framework

further designated the NOCOP as the contact agency for similar agencies of the Association of South East Asian Nations (ASEAN) to promote mutual assistance in cases of major oil spills in any member country.

Presidential Decree No. 1067

More commonly known as the "Water Code", the law generally provides for the "use" of waters and easements to waters, with the basic consideration of public health and welfare.

Presidential Decree No. 1152

Under Secs. 14, 15, 17, and 18 of the Philippine Environment Code (PD No. 1152), the water of the Republic have been classified according to their beneficial use with the goal of upgrading water quality.

Republic Act No. 4850

RA 3850 Recognizes that the pollution and indiscriminate use of Laguna de Bay, one of the major inland waters of the country, has caused great extensive damage to the Bay, the Laguna Lake Development Authority was created for the special task to harness the potentials of the waters therein and to secure it fit for beneficial purposes.

Presidential Decree Nos. 274 and 381

One of the more beautiful rivers during the olden days, the Pasig River has been degraded faster than any other body of water in Greater Manila. To prevent more deterioration, PD No. 274 was promulgated in response to the apparent necessity to clean the waters of clutter wastes, and debris and likewise rid it of pollutants surrounding it.

The Pasig River Development Council was created to remedy the problems relating to the discharge of harmful substances, the lack of control over the use of waterways, and continued presence of constructions even when illegal. The Council is charged with the duty to implement the Pasig River development program and administer its trust account.

Letter of Instruction No. 712 (1978)

Having in mind the need for an express provision banning the use of waters as a waste depository, a more specific LOI was deemed necessary to ban the use of Manila Bay and Laguna de Bay as a waste depository, despite the existence of a general prohibition on such practice. Under the same LOI, a hydraulic survey of Metropolitan Manila was ordered.

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Republic Act No. 6978

Passed on December of 1990 and approved by the President on January 24, 1991, this law provides that the National Irrigation Authority shall undertake a 10-year program for the construction of irrigation projects in the remaining 1,500,000 ha. of unirrigated but irrigable lands priority is to be given to communal irrigation projects and beneficiaries of the CARP and indigenous cultural communities.

Water Quality Standards

Surface Water

In 1978, standards were published for water quality classification and effluent limitations. While implementation of these standards was never particularly effective (1), the rules were re-evaluated and revised in 1990.

The revised water usage and classification standards (1990) require that all Philippine waters be maintained for their best usage. Classifications are provided for both fresh (surface) waters and coastal and marine waters. Surface waters are classified for use as public water supply (Classes AA and A), recreation (Class B), fishery/recreation/industrial supply (Class C) or agriculture/irrigation/ industrial supply/other (Class D). Coastal and marine waters are classified for use as shellfish propagation, recreation, fishery, and industrial water supply.

The objective of the water quality criteria established for different classes is to maintain minimum conditions needed to ensure water is suitable for its designated use. Reclassification of water is allowed in limited circumstances and must be approved by DENR.

Numerical criteria for different classes of fresh and marine waters have been established for a variety of conventional, indicator, and toxic parameters. The water usage and classification standards also specify approved methods of analysis for the pollutant parameters covered by the rules.

Effluent Regulations

The revised effluent regulations (1990) apply to all industrial and municipal wastewater effluents. These regulations are more flexible than the 1978 effluent standards in that separate limits were set for different classes of fresh or marine waters (see above). In addition, existing dischargers were provided a grace period to come into compliance with the more stringent limitations for new dischargers. Less stringent requirements apply to industries with "strong waste" (defined as those wastewaters whose initial BOD value before treatment is equal to or greater than 3,000 mg/L).

A zero discharge standard has been set for certain toxic pollutants (including cadmium, chromium, lead, mercury, and PCB's) for those waters classified as Class AA or Class SA (the highest classification for fresh waters and marine waters, respectively). Existing industrial discharges of strong wastewater that cannot meet the interim standards for BOD may be allowed to continue operation under a "temporary permit" for an indefinite period of time. A penalty fee must be paid, and the effluent must not pose a threat health or environment.

Groundwater

With regard to protection of groundwater supplies, the existing legal/regulatory framework appears to be limited, even with regard to groundwater currently used (or potentially used) as public water supply. As noted above, the 1978 water quality criteria and classification rules established two classes of ground water quality. Class GA was reserved for sources of domestic water supply, while Class GB was intended for groundwater used for irrigation or industrial water supply. The revisions to the water usage and classification regulations issued in 1990 dropped these groundwater classifications.

Toxic, Hazardous and Nuclear Substances

It should be noted that regulations developed pursuant to the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (3) will likely have a beneficial impact on both surface water and groundwater quality. This Act is discussed in Chapter B.3.

Issues and Opportunities

Surface Waters

Recent reports (1, 6) have indicated that most of the pollution in Metropolitan Manila and other urbanized areas comes from domestic sources (70 percent) with the remainder attributable to industrial sources (30 percent).

Clearly, the individual contributions of eight million plus residents in Metropolitan Manila (or large populations in other urbanized areas) to deterioration in surface water quality will be difficult to control by regulatory means alone. Non-regulatory efforts to control solid waste dumping in stream channels, to increase the number of areas serviced by sewage treatment plants and similar efforts may be more effective in controlling water pollution from domestic sources. However, DENR may wish to consider the development of guidelines or standards for the siting, installation, and maintenance of septic systems.

With regard to industrial sources of water pollution, a recent Supreme Court decision (PAB vs. Court of Appeals, March 11, 1991) may provide some impetus to the implementation of effluent limitation standards. This Court decision upheld the authority of the PAB to issue ex parte cease

and desist orders for pollution of surface waters.

The "zero discharge" standards that have been adopted for certain toxic pollutants in Class AA of SA waters may have the effect of prohibiting industrial discharges to these protected waters. However, the overall impact of this is unknown, since data were not available to indicate how many (if any) waterbodies would be able to meet the water quality criteria for these protective classifications.

With regard to Metropolitan Manila, some consideration should be given to eliminating the overlapping/conflicting jurisdiction of LLDA and DENR over industrial pollution sources. One option would be to transfer LLDA to DENR, directly under the Office of the Secretary. Such an action could be accomplished by Executive Order.

DENR may also wish to consider regulations to reduce the likelihood of spills of oil or other hazardous substances into surface waters. Such requirements could include special provisions for storage of oils and other toxic materials and could be developed pursuant to the authorities found in the Toxic Substances and Hazardous and Nuclear Wastes Control Act (discussed in Chapter B.3).

Groundwater

The Government of the Republic of the Philippines (GOP) should have as one of its primary goals the protection of ground water resources that may be used currently or in the foreseeable future. Development and implementation of WHPZ's could be a significant means of providing such protection. However, because land use decisions are primarily made at the local level, the success of WHPZ program will require education of and coordination with local government and private landowners.

The goal of the WHPZ program would be to designate zones around public wells or wellfields for the prevention, detection, and possible remediation of ground water contamination. It is recommended that the WHPZ program consist of the following minimum elements:

- o Delineation of protection zones;
- o Inventory of contaminant sources within the zones;
- o Establishing controls for contaminant sources;
- o Monitoring water quality within the zones;

- o Planning for future wells; and
- o Educating the public and encouraging public participation

Each of these elements is discussed below.

Delineating Well Head Protection Zone

A number of methods are used in other countries for delineating WHPZ; these methods vary with regard to technical and financial input required. In general, the more complex, costly methods provide a more accurate delineation with regard to ground water flow characteristics. For example, a fixed radius zones uses a circle of specified radius around the well or wellfield, with the size of the circle based on judgement and political considerations. A calculated fixed radius zone employs analytical equations to define the size of the circle based on hydrogeological characteristic and/or time of travel criteria. A simplified variable shaped zone uses geologic mapping and analytical equations to define the appropriate shape, based on flow characteristics pumping conditions, and other information. Hydrogeologic mapping can be used to define the zones, based a field study and survey.

Selection of the appropriate delineation method can be based on available geologic/hydrologic data, staff and financial resources and other considerations. Initially, DENR may wish to establish simple fixed radius zones, or calculate a fixed radius zone based on a selected time of travel criterion (Travel times from 50 days to one year or more are used in the U.S. and Europe). Time and resources permitting, more sophisticated delineation can be carried out for critical wellfields. For purposes of establishing controls, WHPZ can be designed with one or multiple sub-zones, with more stringent requirements applied in the sub-zone closest to the well or wellfield.

Inventorying Potential Contaminant Sources

Within a delineated WHPZ, potential contaminant sources should be identified. These might include: pesticide or fertilizer application, waste disposal areas, mining operations, underground storage tanks (at gasoline stations, for example), above ground storage/use of hazardous materials and construction activities. In addition, transportation of hazardous materials or waste through the WHPZ should also be considered.

Controlling Contaminant Sources

Controls for key contaminant sources should be developed; these controls may vary in stringency based on proximity to the well or wellfield. For example, in a sub-zone closest to the well or wellfield, underground storage tanks might be prohibited altogether, while in other zones, underground tanks using protective design (e.g., double-walled with interstitial leak detection) may be allowable. Likewise, above ground-storage or use of hazardous materials might be prohibited close to the well or wellfield, while secondary containment of hazardous materials might be appropriate at further distances.

Monitoring within the WHPZ

It is recommended that a water quality monitoring program be established to provide an "early warning system" of possible contamination. The monitoring system would allow for remedial activities when contamination is detected; or, in the worst case, would allow sufficient time to find alternative water supply.

The location of monitoring and frequency of sampling could be tied to the designation of sub-zones and the flow characteristics within the WHPZ.

Planning for Future Wells

It would also be advantageous to identify and protect land areas that have a high likelihood of being used for water supply in the future. By limiting certain potentially-contaminating activities, DENR could help to ensure that these areas would be suitable for future water supply. It is our understanding that some water inventory activities have been conducted; these activities might serve as a suitable starting point for protecting future wells/wellfields.

Educating the Public and Inviting Public Participation

As with many other elements of environmental programs in the Philippines, education and involvement of the public would be critical to the success of the WHPZ program. Sources of underground water contamination are numerous and varied. Regulatory programs and land use controls, by themselves, would likely be unable to provide the necessary level of protection. The public involvement program should explain the importance of groundwater, describe potential sources of contamination, and identify steps that individuals can take to protect groundwater resources.

Conclusions and Recommendations

Renewed emphasis should be placed on issuing permits to industrial pollutant sources and ensuring that all permitted sources are complying with applicable standards. In significantly impaired areas, DENR may need to establish permit conditions more stringent than the existing effluent limitations in order to achieve water quality standards.

We also recommend that DENR consider the establishment of a system of effluent fees. Such a fee system could provide additional funds for DENR permitting and enforcement activities, and could provide significant incentives for reducing discharges, consistent with the overall pollution prevention strategy. Fees could be increased over time to provide additional incentives to reduce discharges.

With regard to ground water protection, the feasibility of a WHPZ program should be explored. Coordination of this effort with local land use controls would be required.

At some time in the future, wastewater treatment plants may be constructed to handle both domestic sewage and industrial wastewater. Prior to the design of such facilities, DENR may need to establish pretreatment standards for those industry categories that may discharge to the combined treatment facilities. Standards for pretreatment should take into account the inability of the combined wastewater treatment facility to handle certain toxic components of industrial wastewaters.

Non-regulatory mechanism to control non-point pollution sources of domestic origin are needed. These efforts should be integrated with recommended controls for solid waste management.

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CHAPTER B.3. SOLID/HAZARDOUS WASTE MANAGEMENT AND LAND USE

Overview

A variety of laws have been enacted in the Philippines for the proper management of solid waste. However, these laws have been ineffective in controlling the collection and disposal of solid wastes. Solid waste management efforts may have been hampered by the essentially local nature of land use planning and approval.

The implementing regulations needed to provide for effective controls on solid waste management will depend on the results of additional study and demonstration projects that evaluate the feasibility of different solid waste management options. It is likely however, that this process will require the development of regulations or guidelines for the proper siting, design, and operation of sanitary landfills and possibly other treatment/ disposal facilities.

The Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990 [RA 6969, (3)] grants DENR the authority to establish a management program for hazardous and nuclear wastes. The Act also prohibits the entry, even in transit, of hazardous and nuclear wastes and their disposal in the Philippines.

A hazardous waste management program is a necessary complement to the existing air and water quality regulations. In fact, experience in other countries has shown that strong enforcement of air quality and waste quality regulations can actually increase the amount of hazardous wastes generated (such as pollution control dusts and sludges, and other materials that cannot be discharged directly to water).

A proposed framework for a hazardous waste management program is provided below: "Issues and Opportunities." In keeping with the overall pollution prevention strategy, waste minimization should be a central element of the waste management program. The role of recycling must also be considered.

Current Status of Waste Management and Land Use Laws/ Regulations

Land use management and controls over solid and hazardous wastes are derived from a variety of laws and regulations. However, land use decisions are typically made at the local level through zoning and development controls.

National laws regarding solid waste management and land use are briefly summarized below:

Presidential Decree No. 856

Perhaps the most important contribution to waste disposal legislation is the Sanitation Code. Covering both solid and liquid waste disposal, the Code prescribes standards and procedures for drinking water, sewage collection, refuse and excreta disposal. It assigns to cities and municipalities the responsibility to provide for efficient disposal of proper waste (solid and liquid) disposal; nuisances and offensive trades and occupations; disposal of dead persons; and pollution by pesticides, chemicals, etc. The law empowers the Secretary of the Department of Health to prescribe rules and regulations therefor.

The important aspects of waste management embodied in the law can be summarized as follows:

- o Waste Management
 - Waste management programs are required for all provinces, cities and municipalities.
 - The now Department of Interior and Local Government (DILG) is authorized to promulgate guidelines for the formulation and establishment of the program.
- o Measures to facilitate the collection, transportation, processing and disposal of waste are the responsibility of local governments.
- o The national government shall provide necessary subsidy to local governments.
- o Methods of solid waste disposal.
- o Methods of liquid waste disposal.
- o Prohibits dumping.
 - Dumping into the sea and other navigable waters is prohibited. Under CA No. 384, dumping into the river of refuse, waste matter or substance of any kind is prohibited; penalty of six months imprisonment or a fine of ₱200 or both is imposed (law repealed by PD No. 1067 but prohibition still provided thereunder).

Presidential Decree No.825

Under this decree, penalties for the improper waste disposal of garbage, requiring that all garbage, filth and waste be placed in proper receptacles. Supervision over proper disposal of garbage is lodged with the Department of Public Works and Highways. The penalty imposed is

imprisonment of five days to one year or a fine of ₱100-₱2000 or both.

Presidential Decree No. 984

Defining "industrial waste" and "other waste", the decree prohibits pollution of such wastes in water and land resources.

Presidential Decree No. 1152

This decree provides for a Waste Management Program under sections 42 and 45 for proper disposal of wastes.

Presidential Decree No. 6969

This Act mandates the policy of control of toxic substances and hazardous and nuclear wastes.

Presidential Decree No.1251, as amended by Presidential Decree No. 1720

The decree imposes a fee on operating mining companies, the fee called a "Mine Wastes and Tailing Fee" to compensate for damages due to mining operations. A committee to evaluate charges and fees was established composed of the Commissioner of the National Pollution Control Commission (NPCC), the Directors of the Bureau of Lands, the Bureau of Plant Industry, the Bureau of Fisheries and Aquatic Resources, the National Environment Protection Council, the Bureau of Soils, and the Executive Director of the Bureau of Food and Drug.

Presidential Decree No. 1152

Under Sections 22 and 23 of the Philippine Environment Code, the policy on land-use is provided.

Presidential Decree No. 399

Providing a restriction to the exercise of the attribute of jus utendi of the right of ownership, the decree limits the use of a strip of 1,000 meters of land along any existing, proposed or on going public highway or road, until the government shall have a competent study and have formulated a comprehensive and integrated land use and development plan.

Presidential Decree No. 757

The enabling law of the National Housing Authority, the law dissolves all existing agencies exercising functions pertaining to housing settlements and defines the powers and functions of

the NHA and providing funds therefore.

Presidential Decree No. 933

The law creates the Human Settlements Commission.

Presidential Decree No. 957

Under this legislation, the sale of subdivision lots and condominium is regulated.

Presidential Decree No. 1084 and 1396, and Executive Order No.98

Another agency created for the purpose of land use management is the Public Estate Authority under Pres. Decree No. 1084. Under Pres. Decree No. 1396, the Department of Human Settlements Development Corporation was established. In 1946, the National Urban Planning Commission was created.

Executive Order No. 215

In 1968, a Presidential Committee on Housing and Urban Development was created under EO No. 135. In 1970, the same committee was reorganized under Exec. Order No. 215, as well as its powers defined under EO 208, "strengthening the Cabinet to make it a more effective vehicle for the attainment of development goals."

Executive Order Nos. 383 and 419

In 1972, under EO No. 383, the Caliraya Development Commission was created and in 1973, under EO No. 419, a Task Force on Human Settlements was organized.

Letter of Instruction Nos. 401 and 511

This LOI mandates the implementation of the Manila Urban Development project which prescribed an order for systematic classification and survey of all lands within Manila. By virtue of LOI No. 511, an ad-hoc National Coordinating Council was created which was to oversee and assure the preparation and development of town plans, housing and zoning measures.

Republic Act No. 2264

Under the "Local Autonomy Act", municipal and city governments are empowered to enact zoning regulations so that desirable patterns of land use can be attained. Interestingly enough, however, the national government also exercises general powers in providing for zoning measures such as, that through the National Building Code (PD No. 1096) prescribes zoning

regulations and requirements in general, and the uniform application of measures prescribed by the Housing and Land Use Regulatory Board (HLURB).

Land Office Circular No. 29

Following the regalian doctrine in disposition of lands of the public domain, thereby recognizing acquisition of lands thru accretion, precaution as to disposition of riparian lands abutting rivers, streams, lakes, etc., is to be observed, though. This policy is laid down in the circular.

Republic Act No. 5752

Land use is restricted by this Act by its mandate for the establishment and maintenance of a permanent forest and watershed by and within every city or municipality with a size equivalent to at least 2 percent of its entire area.

Presidential Decree No. 953

Even in use of privately-owned land, a restriction is provided by this decree in providing for the allocation of at least 20 percent of the entire area of a subdivision or industrial estate for and as an open space.

Letter of Instruction No. 511

This LOI creates an ad-hoc National Coordinating Council to oversee and assure preparation and developing town plans, housing and zoning measures.

Presidential Decree No. 2

This decree proclaims the entire country as a "land reform area" thereby reserving the use of lands for agricultural purposes. The decree was intended to accelerate the land reform program which to date, is still subject to much controversy. Implementation has still to move on a faster scale.

Republic Act No. 6969

One additional law that deserves special attention is RA 6969. RA 6969 empowers DENR, in consultation with an Inter-Agency Technical Advisory Council, to prepare regulations implementing the provisions of the Act. It is our understanding that a task force is currently drafting such regulations.

While the requirements for a chemical inventory, testing, and regulations are fairly explicit in the Act, the provisions regarding waste management are relatively limited. The exception to this is

the ban on importation of hazardous and nuclear wastes in the Philippines. Such wastes are not to be permitted in the country, even for purposes of trans-shipment.

The definition of hazardous wastes included in the Act refers to "by products, side-products, process residues, spent reaction media, contaminated plant or equipment or other substances from manufacturing operations", and as "consumer discards of manufactured products".

Nuclear waste is a subset of hazardous wastes derived from the production or utilization of nuclear fuels. It is unclear whether low-level radioactive wastes from medical diagnostic equipment or similar sources is intended to be covered by this statutory definition.

The Act authorizes DENR to publish regulations covering the importation, manufacture, processing, handling, storage, transportation, sale distribution, use and disposal of chemical substances and mixtures that present unreasonable risk of injury to health or the environment. (For purposes of this analysis, it is assumed that "hazardous waste" would satisfy the definition of either "chemical substance" or "mixture" and that this defines DENR's authority to regulate hazardous wastes). As mentioned earlier, the Act is not specific as to the regulatory framework for hazardous waste management. As a result, our proposed management system is based on experience in analyzing and developing hazardous waste regulatory programs in other countries.

Issues and Opportunities

Solid Wastes

A clear need exists to improve the current solid waste management system. Depending on the results of an evaluation of the technical, economic, and institutional aspects of the recommended system, it may be necessary to revise the existing regulatory framework or to add to it. This evaluation should consider not only the environmental aspects of effective solid waste management but also methods for coordinating solid waste management with local land use planning and controls.

The solid waste management system will likely require the development of new standards or guidelines for the siting, design, and operation of sanitary landfills (as well as other treatment/disposal options).

A program for the proper disposal of hospital wastes should be established. Existing information on the disposal of hospital wastes in the Metropolitan Manila area (7) indicates that much of these hospital wastes are entering the municipal refuse disposal system, where potential exposure to scavengers and others exist. Other hospital wastes are managed by open burning and on-site burial, among other methods that may threaten health. The management program for hospital wastes should address on-site storage, collection, transportation and disposal.

Hazardous Wastes

This section provides our recommended framework for the hazardous waste management program. Prior to describing the proposed framework a number of issues should be highlighted:

Waste generation in the informal sector

A large proportion of the environmentally damaging waste disposal in the urban areas may be caused by small and household industries. Many small and household industries do not even maintain rudimentary effluent and waste treatment. If large and medium industries' hazardous waste is effectively regulated, the smaller operations will become a relatively greater part of the problem.

The problems of accurately assessing these sectors are overwhelming. It is likely that a significant percentage of small businesses in Metropolitan Manila and other urban areas are unregistered. Thus it is unlikely that DENR can effectively regulate hazardous waste management in the informal sector, at least in the near term. However, efforts should be made to study this sector, evaluate the risks posed, and educate these businesses regarding safe disposal options.

Hazardous Waste Definition

In a newly-developing hazardous waste regulatory program, there is a tendency to adopt a wide-ranging list of hazardous wastes, using both hazard characteristics and list of wastes from specific industries and processes. There is a further tendency to define this list in very broad terms, for three reasons:

- o Sanitary wastes are not always treated in conventional sewage treatment plants, so that even effluents treatable by conventional biological systems can become environmental hazards when discharged.
- o Solid wastes and sludges are often disposed by methods more resembling open dumps than sanitary landfills. Consequently, even relatively low-hazard substances may become mobile in air and water and thus greater environmental problems.
- o Limitations in numbers of skilled chemistry and legal specialists make it difficult to consider individual waste streams. It is easier to apply categorical definitions.

Once a conservatively-defined list (in environmental protection terms) is compiled, even in draft form, there is a tendency to resist narrowing or shortening the list. However, fairness, regulatory efficiency, and the economics of waste disposal argue persuasively that a method be established for industries or individual companies to prove their waste are not hazardous. This could include approval of waste disposal method requirements less stringent than using a hazardous waste

treatment, storage, and disposal facility (TSD) but corresponding to the wastes' actual hazard.

The definition of hazardous wastes should be sufficiently flexible to control changes in the waste stream that occur over time. Industrial processes and materials change, and new industries will be introduced to the Philippines in the future. Thus the designation of what wastes are considered hazardous should be able to accommodate these changes. However, a very broadly defined list will lead to confusion, non-compliance and over-regulation of some wastestreams.

Recycling and Reuse

When conducted in an environmentally sound manner, recycling or reuse of industrial residues can be an important component of a pollution prevention strategy. However, defining certain residues as hazardous wastes often creates a stigma that reduces the opportunities for recycling or reuse. Allowing the continued use of legitimate recycling/reuse methods while controlling environmental threats from poorly-designed methods has proven to be one of the most vexing problems in the U.S. hazardous waste management program.

Based on the definition of "hazardous waste" provided in RA 6969, many materials that could potentially be recycled or reused could conceivably be regulated as hazardous waste. Thus, the team recommends that the management system be carefully constructed so as not to unnecessarily regulate legitimate and environmentally sound recycling operations as hazardous waste activities.

Recommended Regulatory Framework for Hazardous Waste Management Identification of Hazardous Wastes

A variety of options exist for identifying waste subject to the hazardous waste regulations. In other countries with developed hazardous waste management program, a waste may be considered a hazardous waste if one or more of the following conditions exist:

1. The waste meets or exceeds predetermined hazard criteria.
2. The waste is specifically listed in the regulations.
3. The waste is a discarded chemical , or off-specification substance that is specifically listed in the regulations.

The hazard criteria typically include waste characteristics such as toxicity , flammability or ignitability, reactivity and corrosivity. These criteria are defined in terms of specific parameters or test methods.

In the Philippines, it may be difficult initially to employ hazard characteristics as a basis for

identifying hazardous wastes (due to the scarcity of qualified analytical laboratories). However, the use of such criteria may be desirable in the long run as an alternative to frequent expansions on the list of hazardous wastes.

Waste Generator Regulations

Generators of hazardous waste should have a variety of responsibilities under the regulations. Briefly, these include:

- Properly sampling, analyzing, and classifying their waste streams.
- Managing wastes onsite safely or shipping wastes to a licensed offsite TSD facility
- Proper labelling, packaging, and manifesting of all hazardous wastes transported offsite,
- Providing safe onsite temporary storage of wastes
- Reducing waste volumes to the minimum amounts economically practicable
- Maintaining certain records and submitting certain reports (including an annual report).

In order to reduce economic impacts on small businesses, small quantity generators (SQG) could be exempt from these requirements. The SQG cut-off level could be set at 100 kilograms per month, except for certain acutely toxic, explosive, or radioactive wastes where a cut-off 1 kilogram per month may be more appropriate. Waste that are recycled or reused on a generator's site could also exempt from the regulations.

It may be appropriate to allow temporary waste storage at a generator's site for up to 6 months without a TSD facility license. Storage for more than 6 month (or some other defined period) should require a TSD license and compliance with the applicable TSD regulations.

Waste Transport Controls

The safe transportation of hazardous wastes could be accomplished under the hazardous waste management regulations by means of:

- (1) a comprehensive manifest system for waste shipments, and
- (2) standards applicable to waste transporters.

Both the DENR and the Department of Transportation may have regulatory roles in ensuring proper waste transport.

The proposed manifest system would be similar in design to those "cradle-to-grave" systems in place in many other countries. The rules should specify the contents of the manifest form; designate the roles of generators, transporters, and TSD facilities in using the manifest system; describe the number of copies needed and who will maintain these copies; and describe follow-up procedures in the event that the generator does not receive the return copy of the manifest form within a specified period.

Transporters of hazardous waste should be required to conduct their activities in a safe manner. In addition, waste transporters would be responsible for cleaning up any spills that take place in transit, and would be required to notify the local authorities in the event of such spills.

General Requirements for Treatment, Storage, and Disposal Facilities

A number of general requirements should apply to all TSD operations. Specific design and operating requirements for different types of units (e.g., landfills, incinerators, etc.) could also be included in the regulations or these specifications could be included in guidelines for hazardous waste unit operations.

Briefly, the general requirements which could apply to all TSD operations include the following:

- o Complying with all permit conditions and conduct of site activities in a safe manner
- o Using of the manifest system
- o Maintaining appropriate records on site activities
- o Demonstrating financial responsibility for site operations, closure, and post-closure (for land disposal)
- o Conducting waste analysis based on a written plan
- o Implementing security measures
- o Conducting site inspections based on a schedule
- o Preparing and implementing contingency and emergency response plans

- o Giving personnel adequate training
- o Managing incompatible, ignitable, and reactive wastes in an appropriate manner
- o Conducting of adequate closure and post-closure activities.

In addition, the regulations should specify what types of environmental monitoring (air, surface water, ground water) must be conducted during the operating life of the TSDF. Land disposal facilities might also be required to conduct groundwater monitoring for a specified period following closure.

Conclusions and Recommendations

Programs should be designed for the effective management of solid wastes and hospital wastes. These programs will likely require standards or guidelines for storage, collection, transport, and disposal (or treatment). Siting requirements for sanitary landfills or other treatment/disposal facilities may also be required. It may be appropriate to coordinate the development of the medical waste program with the preparation of the 15-year hospital services development plan (to be developed under ADB grant).

The recommended hazardous wastes management regulations are intended to provide a baseline for environmental protection and further incentives to minimize wastes and prevent pollution. The program should adopt the waste management hierarchy of:

1. Eliminating waste at its source,
2. Recycling/reuse when source reduction is not feasible, and,
3. Waste treatment as a last recourse.

It will be necessary to carefully craft the regulations so that environmentally sound recycling/reuse is not inhibited. In addition, DENR may wish to explore the feasibility of setting up regional waste exchanges, through which one generator's waste maybe used as a feedstock in a different generator's process. Such programs have the potential to both reduce waste generation and save money for those companies that can use waste materials in place of virgin materials.

Finally, an effective industry communication program may be critical to the success of the hazardous waste regulatory program. Industry should be informed about the initial regulations going into force and alerted to any likely changes to the program in the future. Suggested components of the industry communication program may include:

Annex B. Legal and Regulatory Framework

1. Workshops and conferences with representatives of key industrial sectors,
2. Pamphlets and compliance handbooks to alert industry to the publication of the rules, to explain what the regulations require, and to provide recommendations for achieving compliance
3. Meetings with industrial associations and other business organizations to increase awareness of the regulations and solicit information on industry's efforts.

Portions of the regulations with may require particular emphasis in the communication program include: licensing, waste analysis and classification, monitoring requirements, the manifest system, and emergency planning.

CHAPTER B.4. AIR QUALITY

Overview

Air quality in Metropolitan Manila is adversely affected by emissions from mobile and stationary sources. A variety of laws and regulations have been published in an attempt to control pollution from these sources. The standards issued in 1978 establish National Ambient Air Quality Standards (NAAQS) for particulates sulfur dioxide (SO₂), photochemical oxidants, nitrogen dioxide (NO₂), and carbon monoxide (CO). These standards also specify maximum permissible emission standards for specific pollutants from stationary sources and designate maximum permissible ambient concentrations for certain metals and other pollutants. An anti-smoke belching program was established in 1981 to reduce pollution from mobile sources in Metropolitan Manila; this program was strengthened in 1989.

Despite the regulatory efforts described above, implementation and enforcement efforts for both mobile and stationary sources have been hampered by resource constraints, overlapping regulatory jurisdictions (at least in Metropolitan Manila) and other problems. The lack of implementation of existing laws and regulations as well as the lack of adequate monitoring data on ambient conditions make an evaluation of the adequacy of the existing regulations extremely difficult.

Rather than recommending extensive revisions to the existing regulatory structure, the authors recommend strengthening of the current implementation/enforcement efforts, particularly with regard to mobile source pollution. We also make certain recommendations for reducing pollution from industrial sources, in line with the overall pollution prevention framework.

Current Status of Air Quality Laws and Regulations

A variety of laws and regulations have been issued for controlling air quality from mobile and stationary sources. The more pertinent laws are summarized briefly below:

Statutes

Republic Act 3931

This Act created the National Water and Air Pollution Control Commission; defining pollution and providing penalties therefor.

Letter of Instruction 247

Deputizing the Constabulary Highway Patrol Group (CHP) to enforce provisions of PD 552

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prescribing sanitation requirements and facilities for the convenience of the travelling public.

Letter of Instruction 551

Requiring all public utility, government and private vehicles to install anti-pollution devices, with authority to immediately ground apprehended vehicles. Such vehicles are to remain grounded until the deficiency has been corrected.

Requiring the listing of all factories discharging offensive effluents into the air or waters to be submitted to the President; encouraging citizens to report to the National Pollution Control Commission (NPCC) the nuisances created by factories and vehicles.

Presidential Decree 1160

Vesting authority in Barangay Captains to enforce pollution and environmental control laws.

Presidential Decree 1181

Providing for the prevention, control and abatement of air pollution from motor vehicles and providing the penalties therefor.

Regulations

Regulations intended to control air pollution from mobile sources were issued in 1978 (8). Section 61 of these standards provide the maximum permissible emission standards for mobile sources for both gasoline-powered and diesel-powered vehicles.

Emission standards for mobile sources limit particulates or visible emission only. For gasoline-powered vehicles, air emissions at the point of discharge into the atmosphere must not be visible for a continuous period of more than 10 seconds. For diesel-powered vehicles, air emissions at the point of discharge to the atmosphere must not be a shade (or density) greater than 20 percent opacity for a continuous period of more than 10 seconds.

The standards for mobile sources do not limit emissions for CO, hydrocarbons, lead, or other typical pollutants from mobile sources.

The 1978 standards also establish emission standards applicable to stationary sources. Limitations on visible emissions and particulates are provided for both new and existing fuel burning equipment, boilers, and incinerators. In addition, emission limitations for certain metals, acids, ammonia, and other pollutants are provided. While these limitations are generally applicable to any emitting source, in some cases, different limitations are applied to different industrial operations.

The regulations also provide certain general restrictions on fugitive emissions, volatile organic compound (VOC) emissions from VOC storage/handling, and open burning.

The air pollution standards also establish National Ambient Air Quality Standards (NAAQS) for particulates, SO₂, photochemical oxidants, NO₂, and CO. NAAQS are designed to protect human health and welfare from pollutants emitted by both mobile and stationary sources.

Issues and Opportunities

Mobile Sources

Current regulatory controls on mobile sources are limited to particulates/visible emissions. To our knowledge, no efforts are underway to control lead, hydrocarbons, carbon monoxide or other pollutants from mobile sources. Although the limitations of the air quality monitoring studies conducted to date have been readily acknowledged (1, 6), no conclusive studies have established a correlation between mobile source emissions and health problems in the Philippines (1).

While we do not recommend new standards for lead, hydrocarbons or CO at this time, we believe that additional study of these pollutants is a critical issue. Despite the lack of hard data, empirical evidence and professional judgement would indicate that commuters and other members of the public may be subjected to mobile source emissions at levels of concern. An on-going study by the World Health Organization may provide valuable insights to as to the potential health impacts of mobile source emissions in Metropolitan Manila (9). Additional study of mobile source emissions could include both ambient monitoring and vehicle testing. Possible regulatory responses (if needed) could include a phased reduction in the use of leaded gasoline, requiring catalytic converters or other pollution control equipment for new vehicles, and more frequent vehicle testing for a broader range of emissions with mandatory maintenance for vehicles failing the test. The existing Anti-Smoke Belching Program could serve as a starting point for such an expanded vehicle testing program.

In the interim, the team believes that the current Anti-Smoke Belching Program in Metropolitan Manila should be continued and perhaps expanded to other urban areas. However, the results of this program from 1980 - 1989 (Reference 1) are cause for some concern. In 1989, when the program was strengthened, only approximately 80 percent of the vehicles that were apprehended actually reported for testing. It is not clear whether in the other 20 percent of cases, the vehicles were abandoned or the owners simply disregarded the citation. Some type of follow-up sanctions may be needed for vehicles that fail to report for testing. The data from 1989 also indicate that nearly 70 percent of the vehicles tested were issued Certificates of Compliance. This may indicate that the confirmatory testing procedures are not adequate to identify vehicles that fail to meet the standard. Testing procedures and follow-up actions should be evaluated to ensure that the Anti-Smoke Belching Program is actually reducing vehicle emissions to a

significant degree.

Major Industrial Sources

As noted earlier, it does not seem reasonable to recommend a major revision of the current laws and standards, but rather an increased emphasis on implementing and enforcing the standards. These implementation and enforcement efforts should be integrated with the overall pollution prevention strategy.

Recent case law (TDI vs. Court of Appeals, January 21, 1991) may strengthen the air quality enforcement efforts. In this case, the court upheld the power of a mayor to close down a factory for a violation of pollution laws and regulation, predicated on the general and broad police powers of the municipal government. It may be possible to increase the incentives for LGU's to enforce pollution control regulations by sharing any fines or penalties collected between DENR and the LGU.

Pollution prevention could be initiated in the existing air quality framework by establishing emissions fees for industrial sources. The fee structure could accommodate particular DENR concerns (for heavy metal emissions, for example) and could be phased-in such that emission fees would increase over time.

In addition, DENR may consider establishing a program for emissions trading. Under such a program, new sources (or sources that currently do not meet certain standards) may have the option to "purchase" emission "rights" from other sources that meet the standards. Such a system could encourage companies that have the ability to reduce emissions cheaply to sell these emission "rights" to companies that would need to spend more money to achieve the same emission reduction.

These last two concepts (emission fees and emission trading) would be particularly effective in areas that currently do not meet NAAQS. However, due to the lack of adequate ambient monitoring, it is unlikely that the areas failing to meet NAAQS can be accurately identified at this time. This situation again points to the importance of strengthening air quality monitoring.

The enforcement program can also be used to encourage pollution prevention by requiring pollution prevention audits as a condition of the enforcement settlement.

Area Sources

Significant amounts of air pollution may be caused by small businesses and the public. Enforcement and implementation of regulatory programs to control air pollution from these sources is extremely difficult at best. However, the cumulative impact of air pollution from these small and varied sources could be significant.

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It is recommended that public education and technical assistance provide the framework for controlling air pollution from these sources. In addition, DENR should study the impacts of emissions from area sources in order to determine if regulatory controls are needed and, if so, how they could be implemented.

Conclusions and Recommendations

Improvements in air quality are needed in Metropolitan Manila. Other urbanized areas also have air pollution problems or are likely to in the near future. Existing regulatory programs should be implemented, with incentives provided to reduce pollution.

With approximately one-half of the registered vehicles of the country operating within its borders it should be no surprise that mobile sources are an important source of air pollution in Metropolitan Manila (1). The current Anti-Smoke Belching Program should be evaluated to ensure that vehicles that violate the standards are properly maintained. Studies should also be conducted on lead, hydrocarbons, and carbon monoxide in order to determine if standards are required. Each of these pollutants can pose significant health risks.

Significant revisions to the existing standards for stationary sources have not been recommended by the team. Instead, we recommend that DENR resources be focused on issuing permits to currently unpermitted sources and reviewing (and possibly revising) permits for currently permitted sources.

Emission reductions from stationary sources may be accomplished through the establishment of phased emission fees and by initiating a program of emissions trading. As noted earlier, these tools could be particularly important in those urban areas that fail to meet one or more NAAQS. Significant improvement in the ambient air quality monitoring programs in urban areas will be needed in order to identify areas that fail to meet NAAQS. When such areas are identified, emission reductions can be achieved by revising permit limits, establishing emissions fees, and requiring new industrial facilities to purchase emissions "offsets" from existing sources.

The contribution of area sources has not been examined to date. Further study would be required prior to the development of standards.

CHAPTER B.5. TOXIC/HAZARDOUS MATERIALS MANAGEMENT

Overview

The Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (RA 6969) grants extremely broad regulatory powers to DENR. It is our understanding that a task force is currently drafting regulations as required by this statute. Unlike many other environmental statutes which focus primarily on wastes and discharges ("end of pipe" controls), RA 6969 grants DENR broad authority to regulate the entire "life cycle" of a chemical or chemical mixture, from its point of manufacture to ultimate disposal.

The team believes that a well-defined regulatory program for toxic/hazardous materials is a necessary complement to the existing environmental regulations in the Philippines and can be designed to complement the overall pollution prevention strategy discussed earlier.

In addition to the testing, inventory and other regulatory controls prescribed by the statute, we recommend that consideration be given to building on these programs with:

- o Emergency planning/community right to know programs
- o Hazard communication/risk reduction planning

The addition of these program components could help to raise the level of public awareness (especially among workers) of environmental and health risks and encourage businesses to take steps to reduce risks from toxic substances.

Recommendations for the structure and content of the toxic/hazardous materials management program envisioned by RA 6969 are discussed in this chapter. These recommendations build considerably on the experiences in the U.S., Canada, and Europe in implementing similar programs.

Current Status of Toxic Materials Laws/ Regulations

The Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 addresses the importation, manufacture, processing, handling, storage, transportation, sale, distribution, use and disposal of chemical substances and mixtures in the Philippines. (It should be noted that the provisions of these statute related primarily to hazardous/nuclear waste management and transportation are covered elsewhere in this report). The objectives of the RA 6969 are to:

- o Develop and maintain an inventory of chemicals imported or manufactured in the Philippines

Annex B. Legal and Regulatory Framework

- o Monitor and regulate these chemicals where they pose unreasonable risks to human health or the environment, and
- o Inform and educate the public regarding risks associated with toxic chemicals.

The Act requires DENR to publish implementing regulations in coordination with other national agencies. It is our understanding that a task force is currently drafting such rules.

Under RA 6969, DENR is empowered to maintain an inventory of chemicals manufactured or used in the Philippines. The inventory is to be updated through the submittal of pre-manufacture and pre-importation notifications for any "new" chemicals (e.g., chemicals not included in the inventory).

RA 6969 also authorizes DENR to require testing of new chemical substances and mixtures that present unreasonable risks to human health or the environment before they are introduced into commerce. DENR can also require testing of existing chemicals based on the same criterion. The cost of such testing is to be borne by the manufacturer or importer of the chemical to be tested. DENR is also granted the authority to inspect establishments, confiscate or impound chemicals, conduct research, and educate the public, as well as to exercise other such powers as required to carry out its duties under the Act.

RA 6969 empowers DENR to control risks associated with chemicals or mixtures. Following submittal of pre-manufacture or pre-importation notification, DENR may prohibit or regulate the import, manufacture processing, sale, distribution, use or disposal of a chemical.

Issues and Opportunities

Chemical Testing and Inventory

Programs similar to that envisioned by RA 6969 have existed for some years in the U.S., the European Economic Community (EEC), and (more recently) in Canada. These programs have resulted in extensive testing and data collection on a wide range of industrial chemicals. Last year, the Organization for Economic Cooperation and Development (OECD) initiated an assessment of more than 1,300 chemicals that are produced in large quantities in the 24 OECD member countries. It is estimated that the OECD list of chemicals represents between 90 -95 percent of the total global chemical production volume (10).

As a result, a considerable body of information on health and environmental effects of existing chemicals should be available to DENR, either currently or in the near future. This may be advantageous, as the costs of conducting such testing can be quite high and the time required can be quite long. With regard to new chemicals, DENR will need to establish policies and criteria for determining when up-front testing will be required and what level of testing will be

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adequate. In consideration of the potential costs of conducting such testing, these testing requirements should be evaluated carefully. Tools such as the use of structure-activity relationships (SAR) should be considered for screening chemicals for possible testing.

One of the first challenges facing DENR will be the establishment of the chemical inventory. It is our understanding that EMB has already begun to compile such an inventory (1). This inventory will have considerable importance as any chemicals not found on the initial inventory would likely be considered "new" chemicals and thus subject to pre-manufacture or pre- importation notification. This situation has the potential to disrupt the importation and use of some chemicals that may have been used in the Philippines for many years, simply because these chemicals were not included on the initial inventory. One option that EMB might explore would be to adopt and modify an existing chemical inventory (such as the U.S. TSCA Inventory) as the initial Philippines chemical inventory. This approach has the advantage that many of these chemicals have been subject to some level of scrutiny already. A similar approach was recently adopted by the Environment Canada (EC). EC divided the U.S. TSCA Inventory into a "Domestic Substances List" and a "Non-domestic Substances List", distinguishing those chemicals on the TSCA Inventory that are currently manufactured or imported into Canada from those that are not. This approach does have certain problems; however, as there is a portion of the TSCA Inventory that is confidential. Thus, chemicals covered by "confidential" listings in the TSCA Inventory would not be included in the Canadian inventory unless the manufacturer of the chemical specifically requests that U.S. Environmental Protection Agency (EPA) release the information. In summary, the method that DENR chooses to create the Philippines chemical inventory could potentially have significant implications for Philippine manufacturers as well as for trade with chemical producers outside the Philippines.

An additional inventory issue concerns the nomenclature employed to list new chemicals on the chemical inventory. In the case of the TSCA Inventory, chemicals are named on the Inventory based on their precursors; that is, chemicals are listed based on "what they are made of" rather than "what they are". A problem arises when a chemical can be made from different starting materials. For example, assume that a polymer X made from precursors A, B, and C is already listed on the TSCA Inventory. If a second company wants to manufacture the same polymer X from precursors B, C, and D this would require a new pre-manufacture notification.

Emergency Planning/Community Right To Know

RA 6969 also authorizes DENR to inform and educate the public regarding the hazards and risks arising from the manufacture, handling, storage, transport, processing, distribution, use and disposal of toxic chemicals and other substances. Such a program can serve multiple purposes to:

- o Assist local governments in emergency planning efforts,

- o Encourage companies to examine the types and quantities of hazardous materials they keep on-site and how these chemicals are used,
- o Create an incentive for companies to reduce their emissions/effluents/wastes, and
- o Create more awareness within small companies and the general populace regarding the health and environmental risks posed by their own activities.

Consideration should be given to establishing a data base of chemicals used by individual companies, as well as the quantities of these chemicals and methods of storage/use. Information collected in the course of preparing the Philippines chemical inventory could be used as a starting point for this data base. Information on health and environmental risks posed by chemicals could be made available by requiring chemical suppliers to provide Material Safety Data Sheets (MSDS) with their chemical shipments. MSDS are currently available for most hazardous materials used in the U.S. Data on chemical use as well as on emissions/effluents controlled by existing regulations could be made available to local governments, NGO's and the general public and used to assist energy response efforts in the event of a fire, explosion or major spill.

Hazard Communication/Risk Reduction Planning

Under the authorities of RA 6969, DENR might also consider requiring that companies prepare hazard communication and risk reduction plans. Such plans could be designed to inform workers about the risks associated with chemicals used at the plant and provide guidance on their proper handling and disposal. Again, chemical inventories and MSDS could be the starting point for such plans. The guidance provided in these plans need not be overly technical or complicated, but could initially be limited to steps such as labelling or marking of chemicals, description of fire or explosion hazards, good housekeeping techniques to reduce worker exposure and leaks/spills, and disposal guidance. Such an approach would have the potential to reduce worker exposure to toxic materials, minimize leaks or spills to the environment, and raise the level of awareness of businesses and workers concerning health and environmental risks posed by different chemicals. For smaller companies, a handbook or model plan could be developed to facilitate this process.

Conclusions and Recommendations

RA 6969 provides the opportunity for DENR to develop an important component of the overall environmental protection framework. Such a program could be designed to reduce worker exposure and provide useful information to the national government, local governments, and the public.

Methods and criteria for inventory development, chemical testing and regulatory controls (such

as prohibitions on the use of chemicals) should be evaluated carefully due to their potential impacts on the business community. There is a temptation to collect considerable information on chemical use and health/environmental effects without a clear picture of how such information would be used in a decision-making framework. It is recommended that DENR establish specific criteria for when testing would be required, the types of testing necessary, and how this information would be used in the regulatory process.

Evaluating and regulating chemicals on a "life-cycle" basis provides certain advantages over the traditional regulatory approach of controlling wastes, emissions, and effluents. The primary advantage is that "life-cycle" regulations can deal with many different exposure pathways and focus in on those exposure pathways of greatest concern. This approach; however also has some disadvantages. The cost of evaluating even a single toxic substance on a life cycle basis can be prohibitively high. DENR resources would probably preclude a detailed evaluation of many individual chemicals on a life cycle basis. In addition, new chemicals will likely be introduced more quickly than DENR would be able to evaluate and take regulatory actions. DENR may need to consider grouping of chemicals with similar characteristics for possible control.

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ANNEX C. INSTITUTIONAL FRAMEWORK

**Sustainable Urban and Industrial
Environmental Management Review**

By:

**William J. Hart
and
Geoffrey T. Waite**

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ANNEX C. INSTITUTIONAL FRAMEWORK

INTRODUCTION

Scope of Coverage

Directed at Organizational Arrangements

Institutions, per se, can be thought of in several ways. To some, the discussion of institutions is related to arrangements that define property rights in resources and the rights and obligations of individuals and groups with respect to natural resource use as defined in law and custom.(1) To others, institutions mean the policy framework erected by law and rules and regulations governing resource use. To still others, the term applies to collections of physical facilities and personnel designed for specific purposes, such as a university campus.

Many of the first two aspects are parts of the economic and legal frameworks for urban and industrial environmental management in the Philippines. The definition for this Annex is the alignment of organizations that impinge, in one way or another, on managing the quantity and quality of water, land, and air resources. To a degree, the matter of facilities and personnel will be dealt with as well.

Multi-Sectoral, Multi-Level Organizations

Public Sector

This is the set of organizational relationships that are first considered when institutions are to be analyzed. The sector is complicated by the fact that it is multi-level.

At the national level, the most prominent organization is the Department of Environment and Natural Resources (DENR) and its several Bureaus, most particularly the Environmental Management Bureau (EMB). Since urban and industrial environmental management is more comprehensive than most substantive concerns of the DENR -- forest management, for example -- authority is shared with a substantial number of departments, boards, authorities, councils, and other arms of the national government. This poses significant coordination problems with respect to national policy when the mandated goals and objectives of the constituent bodies are in conflict with one another. There are also substantial operational coordination issues.

The first multi-level complication is the replication of the Departmental arrangements in the 13 administrative regions, including the National Capital Region (NCR). There are relationships between the central headquarters of each agency and their Regional Executive Directors,

between the Regional Executive Directors and the technical staffs representing the specialized bureaus of the parent organization, between the broad national interpretation of policy and the regional variations in conditions, and among the Regional Offices of the various Departments.

The second multi-level complication is the strong mandate to devolve responsibility and authority to Local Government Units (LGUs): the provinces, cities, and municipalities. This complication is typified by the question of the degree of technical capability that exists at the LGU-level and the reliance of those units on technical expertise possessed by the Departments of the national government. Also of concern is the degree to which LGUs are involved in the prioritization of development goals in their jurisdictions and the seeming reliance upon the national government for financing infrastructure required to realize those goals.

The third multi-level complication is the authority granted directly to LGUs and their ability to meet their responsibilities under those authorities. Cities and municipalities have responsibility and authority for management of municipal solid waste; they do not, typically, have either the technical expertise to manage those wastes nor the financial resources to provide the infrastructure necessary for proper management.

The structure and interaction among the agencies at national, regional, provincial, and municipal levels constitute the public sector.

Private Commercial Sector

This sector is frequently referred to, but seldom are all the implications fully understood. This is particularly true with urban and industrial environmental management.

The prevailing view is that this sector is the origin of environmental management problems and, to a degree, this view is correct. The private sector encompasses, however, a wide range of activities and types of firms. There are manufacturers and other industrial activities that result in residuals that require proper management to ensure that environmental quality is maintained. These residuals include those in aqueous, gaseous and solid forms and range from innocuous to highly toxic and hazardous, these firms range in size from very small, family enterprises to very large government corporations. Indeed, the private sector ranges from unregistered firms to internationally-known multinational enterprises. As can be perceived, the capacity and capability of the industrial private sector to meet the challenges posed by management of their wastes and residuals varies widely as does their record of undertaking environmental management.

The overlooked view is that the private commercial sector can be a major part of the solution to environmental management problems. Private entrepreneurs are currently engaged in materials separation and recycling. Throughout the world, there are numerous examples of private commercial firms profitably engaged in the business of solid waste collection, separation, exchange, and disposal/ treatment systems operation.

Another aspect of the sector are the consulting firms. The most directly involved are the consulting engineers, economists, management consultants, and accountants. These firms are in the business of assembling high quality professional talent and making that talent available to public and private entities. Most professional practices are regulated public oversight to keep standards high.

There are inter-relationships with the public sector to the degree that exclusive franchises or other licenses are issued by agencies in the public sector for any of the private commercial firms to operate and to the degree that the private sector is required to meet the environmental standards established by the government.

Precedent Conditions

Our discussion of institutions includes precedent conditions. The term is used in the context of licenses, permits, franchises, standards, and procedures that are required prior to certain actions taking place.

Consideration of this aspect of institutions is important because the conditions precedent represent points of leverage for environmental decision-making. Examples abound: the issuance of business licenses by mayors, operating licenses for boilers, and clearance of major investments by the Interagency Coordinating Committee of the National Economic and Development Authority are a few.

Organization of the Annex

The first chapter of the annex will deal with the current institutional situation. The emphasis will be upon structure, organization and responsibilities. There is greater coverage of the public sector simply because of the complications that exist in the management of the urban and industrial environment, and the proclivity over the past decade to place layers of regulation on the activities of local governments and the private commercial operators.

The major concerns and opportunities are described in chapter two. The range of concerns and opportunities is as broad as the field. In other words, there are many more opportunities than can be reasonably taken advantage of in the short-run.

In chapter three, the conclusions and recommendations are presented. They deal with actions in the public and private sectors.

CHAPTER C.1. CURRENT INSTITUTIONAL STRUCTURE

Overview

The current urban and industrial environmental management structure is a complex, three dimensional edifice that depends on the private sector for momentum, but is dominated by agencies of the national government.

While there are clearly roles for both the public and private sectors in achieving better urban and industrial environmental management, the role for each has not been clearly defined. This occurs either as a result of mixed approaches to environmental management (such as in Metropolitan Manila) or a lack of attention being given to urban and/or industrial environmental management concerns (as is the case in most urban/industrial areas outside Metropolitan Manila). Particularly acute in this context has been the lack of constituency building amongst the LGUs (primarily Mayors and Governors). This is precisely the level of government at which implementation and operation of environmental management should be undertaken.

The public sector has assumed to itself policy, regulatory and implementation roles in environmental management. Environmental policies are set by the national government, as are implementing regulations. Implementation of the regulations (i.e., through enforcement actions) is undertaken at both the national and regional levels (through the regional offices of the national government in each administrative region). Infrastructure for water supply, etc. is undertaken by the public sector within the priorities established by the national government in conjunction with the Regional Development Councils (and often in conjunction with the development assistance donors). Additionally, the national government has assumed responsibility for development of much of the infrastructure required for environmental management, such as municipal wastewater treatment facilities, water supply systems, and solid waste management systems. As a result of constraints on the availability of funds to undertake and operate these facilities and systems, the national government has not been able to meet the needs. At the local levels of government, the lack of funds has been even more constraining.

The private sector is comprised by a wider range of entities, including industrial firms, for-profit service firms, and private voluntary organizations, among others. Each of these entities can play a vital role in improving urban and industrial environmental management. To date, however, the private sector has played only a limited role in this arena. Many industrial firms, particularly multinational and larger domestic corporations, have constructed wastewater treatment facilities and/or installed air pollution control equipment to meet regulatory requirements. Some, the most notable of which is San Miguel Corporation, have provided assistance in the implementation of anti-pollution campaigns mounted by DENR (for example, San Miguel has been instrumental in the "Ilog Ko, Irog Ko" river revival program). Most industrial firms have, however, been more reticent in their acceptance of environmental regulation. In terms of public awareness, the NGO community has played a vital role through air and water pollution education and citizen action programs.

Public Sector

National Government

A partial picture of the multiplicity of agency involvement in urban and industrial environmental management is depicted on Table C.1.

Department of Environment and Natural Resources

The first entry of the Government of the Republic of the Philippines (GOP) in what is now urban and industrial environmental management occurred in 1964. RA No. 3931 contained provisions for the establishment of the National Water and Air Pollution Control Commission (NWAPCC).

PD No. 984, still one of the principal urban and industrial pollution control statutes, revised the functions of the NWAPCC and renamed it the National Pollution Control Commission (NPCC). The clear focus of the NPCC was to be upon industrial pollution. To do so, the staff of the Commission was vested with powerful enforcement powers. However, the official stand of the national government was that the powers were to be selectively applied and then through the courts. In other words, the Commission did not consider itself to be empowered to sit and act as an administrative tribunal.

In 1976, the Inter-Agency Committee for Environmental Protection was formed. This action served as the platform for the creation, under the terms of PD No. 1121, the National Environmental Protection Council, chaired by the President. The NEPC chose to organize a series of inter-agency committees to conduct its work. For example, an Inter-Agency Committee on the Proliferation of Toxic and Hazardous Waste was formed in 1977. It has, however, taken more than 13 years for serious action to be

Table C.1 Areas of Responsibility - Selected Agencies

Organization	Air Quality	Water Quality	Waste Management	Land Use
Dept. of Environment and Natural Resources <ul style="list-style-type: none"> o Environmental Management Bureau o Pollution Adjudication Board (PAB) o Regional Offices 	<ul style="list-style-type: none"> o Promulgation of policies and standards o enforcement policies o ambient air quality monitoring o staff support to PAB o Enforcement decision o Schedule of fines for non-compliance o Compliance schedule o Closure notices o Monitoring o Enforcement 	<ul style="list-style-type: none"> o Promulgation of policies and standards o ambient water quality monitoring o effluent discharge monitoring o staff support to PAB o Enforcement decisions o Schedule of fines for non-compliance o Compliance schedule o Closure notices o Monitoring o Enforcement 	<ul style="list-style-type: none"> o Promulgation of toxic and hazardous waste management regulations (RA 6969) o Promulgation of solid waste management rules o Inter-agency coordination o Future enforcement actions - RA 6969 o Future monitoring and enforcement of RA 6969 	<ul style="list-style-type: none"> o Issuance of EOC as precursor to HLURB approvals o Input to EOC decision
Department of Health	<ul style="list-style-type: none"> o Protection of public health o Monitoring 	<ul style="list-style-type: none"> o Protection of Public Health o Monitoring 	<ul style="list-style-type: none"> o Management of hospital wastes 	
Department of Public Works and Highways	<ul style="list-style-type: none"> o Traffic management responsibilities for emission control 	<ul style="list-style-type: none"> o Maintenance of drainages 	<ul style="list-style-type: none"> o Maintenance of drainages o Construction of sanitary landfills (in Metro Manila) o Coordination with Presidential Task Force on Solid Waste Management 	
Metropolitan Waterworks and Sewerage System Local Water Utilities Administration	<ul style="list-style-type: none"> o None 	<ul style="list-style-type: none"> o Construction and operation of municipal wastewater treatment systems o Provision of water supply 	<ul style="list-style-type: none"> o Disposal of sludges from wastewater treatment facilities 	<ul style="list-style-type: none"> o Land use patterns affected by availability of water supply and wastewater treatment capacity
Department of Trade and Industry	<ul style="list-style-type: none"> o Licensing (BOI) of firms that could emit air pollution o Promotion of adoption of indigenous technologies o Promotion/development of industrial estates 	<ul style="list-style-type: none"> o Licensing of firms (BOI) that could have wastewater discharges o Promotion of adoption of indigenous technologies o Promotion/development of industrial estates 	<ul style="list-style-type: none"> o Licensing of firms (BOI) that would generate solid waste o Promotion/development/operation of industrial estates 	<ul style="list-style-type: none"> o Promotion/development of industrial growth and industrial estates o Promotion and operation of export processing zone through EPZA.

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Annex C. Institutional Framework

taken with respect to control and regulation of hazardous and toxic materials through passage of RA No. 6969 in 1990.

Shortly after the ascension of the current government in 1987, EO No. 131 was issued, which formed the statutory authority for transforming the former Ministry of Natural Resources into the Department of Energy, Environment and Natural Resources. EO 192 (June 1987) reorganized the Department into the Department of Environment and Natural Resources (DENR) and provided its current structure and organization.

A major accomplishment of the DENR management was the adoption by the Cabinet of the Philippine Strategy for Sustainable Development [Cabinet Resolution (CR) No. 37]. For the first time, the strategy ties government development policy to the principle that economic growth and ecosystems protection are compatible.

Operations of the Department

DENR is the premier environmental agency of the national government. This description stems from EO No. 192 creating the Department. Unfortunately, DENR is not necessarily the agency that most influences the quality of the urban and industrial environment. There are many other actors that influence the number and location of industries, housing sub-divisions, and the location of transportation and water resource development infrastructure.

Organizationally, DENR shows a classic line and staff appearance (Figure C.1.). Line and staff organizations typically provide for a command line that extends from the chief executive officer (Secretary) to the lowest operating level (the Community Environment and Natural Resources Officer (CENRO)). The chain of command, if DENR was operating in a typical line and staff manner, would flow through an Undersecretary to the Regional Executive Directors (RED), Provincial Environment and Natural Resources Officers (PENRO), and CENRO.

The staff is usually organized along technical specialty lines. In the case of DENR, the specialties are represented, essentially, by the staff Bureaus: Forest Management, Environmental Management, Lands, and Mines and Geosciences, etc. And there is always one or more service staff bureaus to handle the routine business of any enterprise: budgets, personnel, accounting, and the like. Some agencies also organize as staff bureaus such support functions as information and education. The staff expertise is replicated at each of the line command levels to the degree that the work load warrants. That is, in areas where logging from secondary forests constituted a major part of a PENRO's work load, the forestry staff would be larger than the urban planning staff and in a region which is largely urban, the urban staff would be larger than the forest management staff.

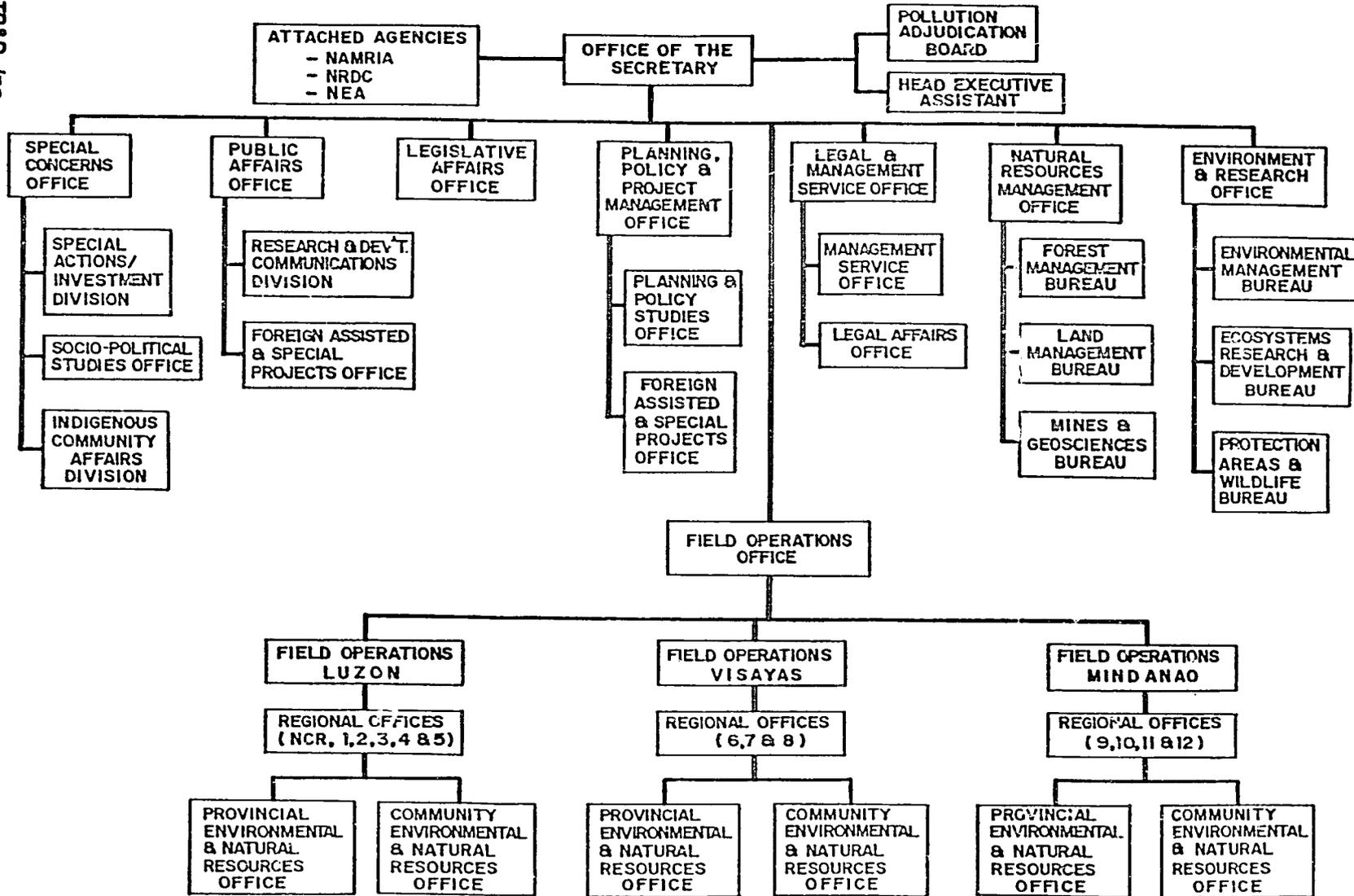


Figure C.1 ORGANIZATIONAL STRUCTURE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

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Since the staffs at each level have strong professional and technical bonds, there is usually provision for technical communication between the staffs at all levels. Thus, changes in technical surveying procedures would be relayed from Bureau Director to Regional Technical Director to Provincial technical director and so on.

However, DENR does not operate in that fashion. The "Department" considers itself to be an entity separate and distinct from the professional and technical Bureaus. Department information is explicit in referring to the regional staffs as DENR regional offices¹. Under such a construct, the staff Bureaus, such as the Environmental Management Bureau, exist only in the national headquarters. All communications, both command and technical, pass through the Undersecretary and three territorial Assistant Secretaries for Operations, none of whom have subordinate technical staffs.

A great deal has been said about the effectiveness of the secretariat of the DENR.(2) The situation continues to be positive, but there are problems. One source of problem is the Congressional mandate to reduce the number of positions (including management) in each department. At any time other than the run up to national elections, there could be another staff reorganization in DENR. At present, an Assistant Secretary is the Officer in Charge of the Office of the Undersecretary for Environment and Research.

Forestry/Reforestation Bias

An examination of the budgets for the DENR over the past three years indicates that forestry is the dominant activity (Table C-2). There are many reasons for this. Some of the reasons are deliberate actions; others are reflections of external interests and priorities. Arguably, the dramatic loss of the tremendous biological diversity of the old growth dipterocarp forests took on the mantle of a national emergency. This was matched by a sharply heightened international interest in tropical forests in general and Philippine forests in particular. Thus, very substantial sums of international assistance were funneled into the DENR to support a series of very innovative and effective forest management and reforestation programs.

¹ The specific language used is : "These (DENR Regional) Offices are not under the Environmental Management Bureau. They are under the supervision of the Office of the Undersecretary for Field Operations of the Department of Environment and Natural Resources."

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Table C.2 Comparative budgets - environment and forestry
(000 Pesos)

Year	<u>ENVIRONMENT¹</u>		<u>FORESTRY²</u>	
	<u>Amount</u>	<u>% NAT'L BUDGET</u>	<u>AMOUNT</u>	<u>% NAT'L BUDGET</u>
1980	13,133	0.035	149,294	0.394
1981	15,458	0.0307	182,759	0.363
1982	17,436	0.0305	229,715	0.402
1983	16,876	0.0303	234,200	0.379
1984	16,995	0.0318	159,232	0.298
1985	16,995	0.0291	169,336	0.290
1986	24,920	0.037	200,228	0.297
1987	23,910	0.0301	744,081	0.938
1988	20,969	0.009	No data	
1989	41,574	0.035	No data	

Source: DENR, 1991.

Notes:

1. From 1980-1987, budgets are for NEPC and NPCC; 1988 and 1989 are for EMB and Environmental Management Sector of Regional Offices.
2. Includes budgets for Bureau of Forest Development and Forest Research Institute.

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On the down side of this picture is the scarce resources available to deal with urban and industrial problems. Only one of the 13 administrative regions of the DENR, XIII -- the National Capital Region (NCR) -- has an environmental management staff of any real consequence. This in spite of the growing number of heavy industries located outside the NCR in response to national dispersal policies and the growing urbanization of most of the regional cities and municipalities of the country.

Another disturbing thing about the current DENR organization is a perception that there is a distinction between environment and natural resources. Part of this is due to the weight of the National Reforestation Program, but lumping protected areas, research, and environment on one side and forestry, mines and geosciences, and lands on the other creates the impression that environment is limited to one of the six staff Bureaus.

The observation may be deemed of little consequence in terms of department values and priorities. However, when the statutory requirement for an environmental unit in all major agencies is considered, the DENR argues, rightfully, that the statute means that major Departments, such as the Department of Public Works and Highways -- a Department that significantly affects the environment -- should locate an environmental management unit where it can influence management decisions. Where should such a unit be located in DENR? The Planning, Policy, and Programs Office? Certainly not in one division of one Bureau.

Attached Functions

The functions attached to the DENR are specialized agencies and corporations. Two are important to urban and industrial environmental management: the National Mapping and Resource Information Agency (NAMRIA) and the Natural Resource Development Corporation (NRDC).

NAMRIA has been charged with the responsibility to undertake a comprehensive data acquisition and mapping program for the Philippines. Among the principal recipients of assistance from the Australian Government under its Natural Resources Management Project, NAMRIA has compiled aerial photography and has begun compiling maps for much of the Philippines. The data that have been collected by NAMRIA would be particularly appropriate for land use planning, environmental impact assessments, and other environmental planning activities. Time series aerial photography can be a powerful tool in the identification and assessment of pollution problems. NAMRIA has, however, been less than forthcoming with respect to making data and/or maps available. The utility of its holdings are of only minimal value in addressing urban and industrial environmental management.

NRDC is a government-owned corporation attached to DENR. Governed by a Board of Directors, of whom the Secretary of DENR is the chairman, the NRDC is intended to serve as a facilitator between government and the private sector. To date, NRDC has entered into public-private sector agreements with respect to minerals development and reforestation.

Mid-Term Investment Program

The DENR management have devised 10 strategies as part of the DENR's programs in support of the Philippine Strategy for Sustainable Development (PSSD). These strategies form the basis for the Mid-Term Investment Program of DENR and the overall strategy for integration of environmental and natural resources management and economic development.

The PSSD holds as its goal "to achieve economic growth with adequate protection of the country's biological resources and its diversity, vital ecosystem functions, and overall environmental quality".(3) To achieve this goal, 10 strategies have been identified (4):

1. Integration of Environmental Considerations in Decision-Making.
2. Proper Pricing of Natural Resources.
3. Property Rights Reform.
4. Conservation of Biodiversity.
5. Rehabilitation of Degraded Ecosystems.
6. Strengthening of Residuals Management.
7. Control of Population Growth and Human Resources Development
8. Inducing Growth in Rural Areas.
9. Promotion of Environmental Education.
10. Strengthening of Citizen's Participation.

These strategies lie at the core of the PSSD and are aimed at resolving and reconciling the diverse and sometimes conflicting issues involved in resource allocation and economic growth. Among the institutional measures called for are:

- o establishment of an NGO Desk (to be headed by the Director of EMB) to strengthen government/NGO linkages and to initiate NGO participation;
- o institutionalization of Inter-agency and inter-organizational approaches in program/policy formulation, implementation, monitoring, and evaluation;
- o strengthening of the EIA system and expansion of its scope and use; and,
- o ecoprofiling and land use planning.(5)

The PSSD strategy statements have been translated into an action plan by DENR that addresses each of the 10 strategies (plus the integration of strategies) in terms of the programs and projects needed for implementation/realization of the strategy. The implementation period for these program and project generally conforms to that of the Mid-Term Investment Program (1990-1995); the costs associated with the action plan are shown in Appendix C.B. The expenditure level for project included in the Mid-Term Investment Program are shown in Appendix C.C.

Environmental Management Bureau

The Environmental Management Bureau (EMB) operates under a Bureau Director who reports to an Assistant Secretary who is the Officer-In-Charge of the Office of the Undersecretary of Environment and Research Office.

EMB consists of the Office of the Director (which contains most of the managerial, administration and support functions) and four divisions: legal, environmental quality, research and development, and environmental education. EMB is the vehicle used by DENR management to influence environmental policies and actions; the principle instruments for doing so are the Environmental Impact Assessment/Statement System (EIA/SS) and the Environmental Compliance Certificates (ECC). EMB is also responsible for establishing air and water quality standards, and will be responsible for establishing regulations of toxic and hazardous materials management under RA No. 6969. EMB also sets conditions for, and issues, permits for air and water discharges. EMB provides assistance to regional offices on a request basis and maintains regulatory/enforcement responsibility for the NCR.

According to a recent study (6), the specific objectives of EMB are:

1. To strengthen the Environmental Impact Statement (EIS) Systems;
2. To formulate a Conservation Strategy for Sustainable Development;
3. To establish a New Regulatory Regime for Pollution Control;
4. To establish a comprehensive and aggressive Environmental Information/Education Campaign;
5. To conduct research activities on the application of appropriate technologies and methods of pollution control to discover economical and practical methods of preventing air, water and other types of pollution; and,
6. To assist the Regional Offices in the discharge of their environmental related functions.

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According to the same study (6), the functions of the EMB are:

1. Recommend possible legislations, policies and programs for environmental management and pollution control;
2. Advise the Regional Offices in the efficient and effective implementation of policies, programs and project for the effective and efficient environmental management and pollution control;
3. Formulate environmental quality standards such as the quality standards for water, air, land, noise and radiations;
4. Recommend rules and regulations for environmental impact assessments and provide technical assistance for their implementation and monitoring;
5. Formulate rules and regulations for the proper disposition of solid wastes, toxic and hazardous substances;
6. Advise the Secretary on the legal aspects of environmental management and pollution control and assists in the conduct of public hearings in pollution cases;
7. Provide secretariat assistance to the Pollution Adjudication Board;
8. Coordinate the inter-agency committees that may be created for the preparation of the State of the Philippine Environment Report and the National Conservation Strategy;
9. Provide the Secretary and the Regional Offices with technical assistance in the implementation of environmental and pollution laws; and
10. Provide scientific assistance to the Regional Offices in the conduct of environmental research program.

The EIA/SS is the cornerstone of the environmental management system in the Philippines. It is, however, employed more in a regulatory context than as a planning tool. It serves as the basis for issuance of the Environmental Compliance Certificate, which is, in turn, required as a precursor to most other governmental approvals (including Housing and Land Use Regulatory Board and Board of Investment approvals).

The Environmental Impact Statement System

Assistant Secretary Delfin Ganapin, Jr. points out that the Philippine approach to environmental management is a mirror image of the United States.(7) If the analogy is correct, then the intent

and attributes of the National Environmental Policy Act (NEPA) should be applicable. Among the most salient features of the U.S. system are:

- Concern for the Human Environment - A major concept of NEPA is the concern for the human environment. Not just the biological or physical aspects, but all aspects, including economic, social, and institutional/political. This same concept is also found in the literature supporting comprehensive city/regional/state planning. It is nearly axiomatic that no single agency can encompass all of the disciplinary skills and range of value judgments implied when dealing with decisions affecting the human environment.
- Location in the Executive Office of the President - Central to NEPA is a Council on Environmental Quality (CEQ) in the Executive Office of the President. The clear intent of the framers of the legislation was to locate the environmental review process in a place that would enable it to coordinate the actions of all the agencies of the national government. The CEQ was the last leg of a powerful executive troika that could assist in the shaping of national plans and programs. The other two legs are the Council of Economic Advisors and the Office of Management and Budget.²
- Budgetary teeth provided - The intent of the NEPA was to seek ways to achieve consensus on the social values of proposed actions. Procedurally, the Environmental Impact Statement (EIS) moved decision-making out from closed internal agency preserves and made it open to all agencies and citizens. While there is no enforcement power beyond the requirement that an EIS be filed, OMB has interpreted the NEPA to apply to any action that requires Federal money or action (such as a license or permit). And to enforce that view, OMB issued circulars making the use of Federal funds contingent upon the demonstrated completion of the NEPA process (i.e., leading to an EIS).
- Local government required to assess impact of Federal actions - The OMB circulars went further. Proper completion of the process leading to an EIS included the requirement that state and local governments assess the impact of proposed Federal actions -- including licenses and permits -- on their human environment. In those cases where the proposed action was found to be incompatible, the Federal action could be blocked.

² In reality, only perceptive planners in the Office of Management and Budget (OMB) and some economists on the staff of the Water Resources Council (WRC) acted on the opportunities presented by the enactment of NEPA. The first members of CEQ saw themselves in an adversarial position viz a viz the Council of Economic Advisors rather than as part of the same analytic process and the opportunity to deal more rationally with national choices was lost.

- o There are no absolutes - The U.S. environmental planning process has few absolutes. That is, very few projects are environmentally bad just as there are few that are environmentally good. All decisions are based on relative values that change with place and time and involve a series of trade-offs between competing value systems.

Water resource planners inserted intangible values that did not register in the market place in their formulae for calculating total benefit and cost ratios for water resource development projects. Unfortunately, this sort of discipline was not applied to any other form of major capital investment program, such as highway construction.

The Philippine Experience

All of the characteristics of the U.S. NEPA exist on the Philippine statute books. It is not accident that the leverage made possible by an environmental review process was recognized by the national government of the day. In the interest of international appearance, a pattern that followed the most advanced model in the world was adopted. A National Environmental Protection Council was created and was chaired by the President of the Republic. It was no accident that the administrative staff of the Council was lodged in the Ministry of Human Settlements.

The National Environmental Protection Council (NEPC) established the Environmental Impact Statement System. Under the terms of Presidential Decree (PD) No. 1586 (1978), elaborate definitions were promulgated and the procedures to be followed by "project proposers" and reviewing specialized agencies were spelled out in detail. The detail included the proper forms to be used. Also created was a technical review panel that was to review the content of environmental impact assessments and advise the NEPC.

By specifying national government agencies that were to exercise technical review of the environmental impact assessments made by proposers, each agency was to create a unit specialized in environmental matters. What was not clear was how major projects proposed by agencies of the national government were to be reviewed by other agencies, by other levels of government, particularly those to be directly affected by proposed actions, or how the public was to be involved. The process was to be objective and scientific.

Once a proposed action was assessed, a determination was made by the review committee whether a formal Environmental Impact Statement would be required.

The culmination of the process was to be issuance of an Environmental Compliance Certificate (ECC) by the National Pollution Control Commission -- the Philippine equivalent of the U.S. Environmental Protection Agency (EPA). The ECC indicated that the proposer would comply with the set of conditions.

What was substantially different from the U.S. model was the absolute power given to the President to designate environmentally sensitive areas and to judge whether environmental impact assessment was necessary. Also, there is no indication in the documents issued by the NEPC that it was ever conceived that there would be a build vs. no-build decision to be made. The assessment was to determine the proper mitigating actions required to minimize the negative impacts on the "environment." U.S. CEQ regulations require careful examination of the "null alternative," i.e., a full examination of what would happen if the proposed action were not taken on the Philippine side.³ There was a presumption that the imperatives of economic development preempted that option. Naturally many concerned with the Philippine biologic and physical environment were dismayed by Presidential decisions that exempted major power and oil refining facilities from the requirements of the EIA/SS.

Some indication of the level of importance attached to the EIA/SS can be gained from an evaluation of environmental assessments reviewed by DENR staff in the period 1980 to 1989. During that time, 519 EIAs for metallic and non-metallic processing plants were reviewed and 4,366 EIAs for and gravel excavation activities were reviewed.

Effect of Government Reorganization

EO No. 192, creating the DENR, transferred the function of the NEPC and the NPCC to DENR and the Environmental Management Bureau. In one fell swoop, what had been a mechanism operating at the Presidential level became a bureau within a department. As a result, both the intended enforcement and the policy and interagency coordination functions do not operate as they should.

The EIA/SS is more a pro forma exercise than a substantive part of decision-making. This is so for several reasons. First is the lack of a clear understanding of what the EIA/SS can accomplish, among which is to assist coordinated planning of activities among the national government agencies. This does not mean a small staff of "environmental impact assessment specialists" in each department whose role is to complete the assessment paper work so that an ECC is issued. It does mean a more balanced set of disciplines in the planning and policy arms of each of the Departments, including those whose major responsibility is to issue licenses and permits. The location of the planning and policy units should be in a position to influence decisions by top management of the Department. Project proposals would automatically contain assessments of impacts on the human environment. These proposals would be the subject of review by the policy and planning units of all other government agencies, particularly those whose specific jurisdictions are involved.

³ Full advantage of this analytical tool is not always taken. The deficiency is based on the assumption that current conditions are bad and that the proposed action will make them better. Failure to adequately assess the null alternative has led to projects that ignore cultural community strengths, for example. In sheer economic terms, the expected benefit cost ratio of null alternatives can be higher than those of the proposed action.

JTA

The operation of the EIA/SS within the DENR again becomes an issue. For instance, let us assume that the Mines and Geosciences Bureau proposes to issue a lease for development. How will the environmental planning be done within DENR before an assessment is released to other Departments, such as the Department of Public Works and Highways, for their assessment of the potential impacts of the alternatives proposed. Even more problematic is where in the national government that a decision in favor of the null alternative is made, perhaps on the basis of evidence presented by the Department of Interior and Local Government and the Bureau of Fisheries and Aquatic Resources.

The current situation is made even more cloudy by the delegation of EIA/EIS responsibilities to the regional offices and the mandate of the recently enacted Local Government Act that LGUs establish and staff environmental units.

Pollution Adjudication Board

Under EO No. 192 (1987), the various duties and functions of the former National Pollution Control Commission (NPCC) were taken over by the Pollution Adjudication Board, the Environmental Management Sector of the DENR's Regional Offices, and the EMB. The Pollution Adjudication Board (PAB) is chaired by the Secretary of DENR and consists of two Undersecretaries of the department, the Director of the EMB, and three other members designated by the Secretary of DENR. The PAB exercises administrative law powers under the terms of RA No. 3931 and PD No. 984.

Staff for the PAB is drawn from the Legal Section of the EMB. Orders of the PAB are executed by the Environmental Quality Section of the EMB.

Of particular note is the action of the courts sustaining the authority of the PAB to issue cease and desist orders to industries found in violations of their discharge permits without recourse to lengthy court procedures. Support for the authority in the hands of the DENR is a potent stick that, if even-handedly applied, will encourage compliance.

Urban Development

Following the dissolution of the Ministry of Human Settlements after 1986, the Housing and Urban Development Coordinating Council (HUDCC) was given the mantle of coordinator of the urban sector as a whole. In practice, however, the HUDCC has concentrated on housing. Again, part of the priority is recognition of serious housing deficiencies and in part by willingness of donor agencies to assist housing projects. Falling within the ken of the HUDCC are the National Housing Authority (NHA), National Home Mortgage and Finance Corporation (NHMFC), the Housing Insurance and Guaranty Corporation (HICC), and the Housing and Land Use Regulatory Board (HLURB). The HLURB is responsible for physical planning, zoning, and related regulatory matters, such as the permitting industrial and housing estates.(7)

Department of Interior and Local Government

The Department of Interior and Local Government (DILG) absorbed the functions and responsibilities of the former Department of Local Government. One of the mandates inherited by the DILG is promoting legislation to assist local governments and formulating plans, policies, programs, and projects that will strengthen the capabilities of local government offices and personnel. Even though there is new direction from the Presidential Commission on Government Reorganization that the DILG not control local governments, it continues to monitor, supervise, and assist the operation of the local governments. The Bureau of Local Government Development was established to promote local autonomy.

Importantly, the Local Government Academy is an operating unit of the DILG.

Department of Trade and Industry

The Department of Trade and Industry (DTI) is charged with the promotion of industrial development in the Philippines. Within this Department are the Board of Investments, which is the primary licensing agency for all private sector organization, and the Export Processing Zone Administration, which is responsible for developing and operating Government-owned export processing zones (industrial estates) in Cavite, Cebu, Baguio, and Bataan, and for the approval of special, non-government-owned processing zones. DTI is also responsible for promoting the use of indigenous technologies and materials by industries in the Philippines. The promotion of investments in Regional Industrial Centers is done under the auspices of DTI as is the promotion of foreign-investment in the Philippines. Through an attached agency, the National Development Corporation, the GOP is able to undertake joint public-private sector investments to develop industrial estates. One such estate is being pursued with Marubeni Corporation of Japan in Cavite.

Department of Public Works and Highways

The Department of Public Works and Highways (DPWH) is the national government agency with primary responsibility for development of the nation's infrastructure. Under its traditional auspices are such activities as road and highway construction, flood control systems, public buildings construction (including markets and slaughterhouses), municipal fishing ports, and other public infrastructure. At the direction of the Presidential Task Force on Solid Waste Management, DPWH has been charged with responsibility for design and construction of solid waste transfer stations and sanitary landfills for Metropolitan Manila.

National Economic and Development Authority

The National Economic and Development Authority (NEDA) serves as the principal agency for economic planning for the Philippines. As such, it is responsible for prioritizing investments by the government and for monitoring the economic effects of those decisions. It serves as the lead agency with respect to acquisition and negotiation of foreign development assistance (both

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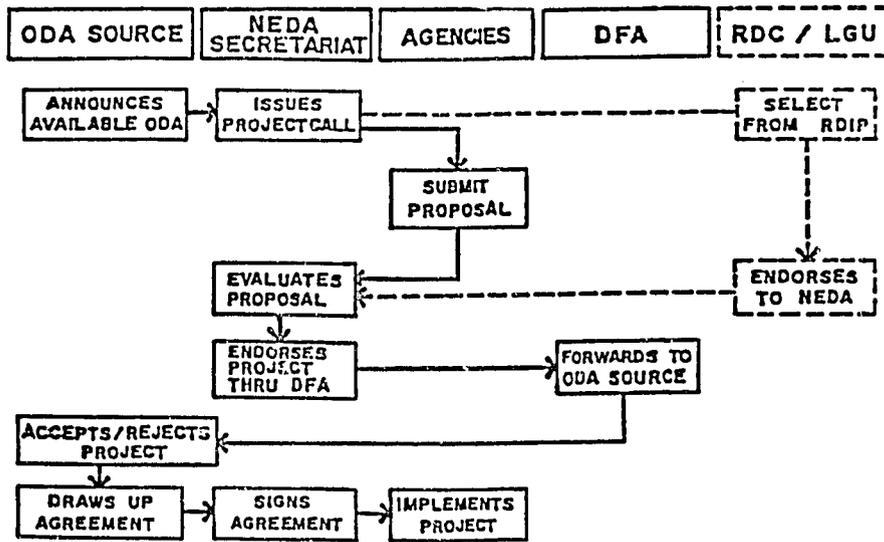
grants and loans) and has approval over all such assistance extended to governmental agencies. NEDA Regional Offices provide staff assistance to the Regional Development Councils, the function of which are discussed below. The process by which foreign development assistance is programmed is shown on Figure C.2.(8)

Department of Health

The Department of Health (DOH) is responsible for public sanitation and inspection of foods and crops. DOH has also been charged with responsibility for developing and implementing a plan for management of wastes (including toxic and infectious waste) from hospitals.

Other Organizations

The Philippine Coast Guard has primary responsibility for enforcement of marine pollution regulations, including oil spill response and contingency planning (in conjunction with EMB). Among the other governmental agencies that have air involvement in urban and industrial environmental management are: the National Housing Authority (development of public housing), National Water Resources Council (water rights and use), Fertilizer and Pesticide Authority (regulation of pesticides and fertilizers), and the Bureau of Fishing and Aquatic Resources (granting of licenses for fishpond development and regulation of the fishing industry). The Economic Support Fund (ESF) Secretariat is responsible for development of public infrastructure (such as roads, markets, schools, etc.) at the direction of the President and officials in concerned areas.



Grants



Loans

Figure C.2 Flowchart for Processing ODA Grants and Loans
Source : NEDA , 1988

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Provincial and Local Government

The Provincial and local governments are the creatures of the sovereign national government. That means they are able to do only what is specifically delegated to them by the national government.

There is a clear and explicit thrust in the current GOP to delegate both responsibility and authority to the provincial, city, and municipal governments. But the reality is that it will take more than one six-year administration to alter the patterns and habits of decades if not centuries. With a history wherein the conscious objective was to exercise thorough control from the capital, the professional talent pool in the public service was, and remains, concentrated in the national agencies. This creates clear bifurcations in values. It is one thing for a police chief to be responsible to an elected municipal government, and in fact police officers are responsive to the local government in which they serve, but the ultimate line of authority -- performance reports and promotions -- rests with the Integrated National Police. It is simply very difficult to serve two masters.⁴

The condition is acute in the urban and industrial environmental management field. This is because a substantial number of decisions involve sharp differences in values. Said simply, what is in the local interest is not always in the national interest either in the short-run or the long-run.

There are 73 provinces and two sub-provinces, 58 cities, and 1,562 municipalities.⁽⁹⁾ Cities and municipalities are classified in accordance with their income. First class cities are those with revenues more than ₱30 million. Sixth class cities enjoy revenues less than ₱5 million. Municipalities are classed as first class if revenues exceed ₱15 million, second class municipalities are those with revenues that range between ₱10 million and ₱15 million. there are 11 of the former and only four of the later. Sixth class municipalities have revenues of less than ₱1 million.

Sources of revenue

⁴ A recent Philippine Supreme Court decision provides a case in point. At issue was the appointment of a Provincial Budget Officer. The Department of Budget and Management (DBM) held that, as always, it possessed the sole power of appointment. This position was disputed by the Provincial Governor who claimed that as the chief elected official of the Province the choice should come from a list of persons acceptable to him. The Court found for the Governor. The Budget Officer, however, does not work for the Governor but for DBM and is responsible for ensuring that the national interest is met with respect to the budget.

The principal source of revenue for local governments is the ad valorem real property tax. The wrinkle is that the LGUs, specifically the cities and municipalities, are responsible for the collection of the taxes, but do not retain and budget them. Tax receipts are transmitted to the GOP Treasury and are then redistributed under a complicated formula. The basic local government budget is, in fact, determined by the national government's Internal Revenue Allotment (IRA). The allotment formula essentially allots to local units of government (provinces, cities, municipalities in toto 20 percent of collections from national internal revenue taxes, excluding special funds and special accounts in the general fund. The formula also caps the amount of increase at 25 percent per year. In fiscal year 1990-91, the formula was broken in both dimensions: the percent of the revenue distributed to the LGUs, represented a 42.1 percent increase over the amount distributed in the previous year.⁽¹⁰⁾ This is tangible evidence of the sincerity of the national government in honoring its decentralization objectives. But it is not the same as raising revenue and budgeting it on your own.

The national government also distributes financial support through the National Assistance to Local Government Units. A recent analysis of this fund showed that out of ₱15.1 billion, "...only 49% are under the direct control of LGUs. The rest of the allocations still go through line agencies or are earmarked for national programs purportedly meant for local communities."⁽¹⁰⁾

Four agencies exercise oversight over local government budgeting and spending. One of them, as noted above, is the Department of Interior and Local Government. The Department of Budget and Management reviews local budgets to ensure that they are in compliance with statutory requirements; the Bureau of Local Government Finance, Department of Finance, oversees the distribution of national government support grants and the financial management and revenue operations of LGUs; finally, the Commission on Audits conducts annual audits of the financial records of the LGUs to assure there has been no diversion of money.

Decentralization

The current situation described above does not bode well for true decentralization. The true test of autonomy (read decentralized decision-making) "... rests on the power of local governments to generate the resources to sustain governance ... "⁽¹⁰⁾ The Cabinet Action Committee for Decentralization has described a three-phase decentralization process that the national government seems to be pursuing. The phases consist of budgetary decentralization, regional or provincial financial management, and, finally, local government operations management of national agency functions. The authors of a perceptive study of the success of decentralization observe:

On closer look, however, the program thrust leans more toward administrative decentralization or deconcentration, which is essentially delegation of authority and responsibility, rather than toward political decentralization or devolution which implies the transfer of state power germane to local governments.⁽¹⁰⁾

The distinction is important for the sustainability of urban and industrial environmental management programs for two major reasons. The first is the matter of allowing the LGUs to have the resources and flexibility to meet those environmental management responsibilities placed upon them by statute. Second, diverse, multiple local governments do not suddenly change priorities in one fell swoop as is possible when all public sector responsibilities are redeemed by line agencies of the national government and controlled by and from the center.

Environmental Responsibilities

Water Supply

In the area of urban and industrial environmental management, the national government, as noted above, has retained strong direct supervision over the supply of water. The supervision is exercised primarily through the Local Water Utilities Administration (LWUA). The Administration is both a regulator and a facilitator. In the first instances, LWUA rules and regulations require that an autonomous local water district be established to manage water supply. The carrot for doing so is the financing role played by the LWUA. As a national agency, the LWUA is able to approach donor organizations for grants and loans at concessionary rates. These funds are then passed on the local water utility districts to finance the development of water supply systems. Further, water supply development permits from the National Water Resources Council are required prior to beginning work on a water supply system.

Without a reasonably detailed study, it is not possible for the authors to assess the degree to which the operation of the autonomous districts are tied to elected local government decision making or the amount of control exercised by LWUA and NWRC in the location or quantities of water actually withdrawn or stored.

The quality of the water supply is the concern of the Local Health Officer. Again, this official is an employee of the national Department of Health (DOH).

Wastewater

The statutes authorizing LWUA contain an equal mandate for the agency to deal with problems of wastewater on par with water supply. Similarly, the autonomous water districts are authorized to construct and operate wastewater collection, transport, and treatment facilities. This simply has never been done. No instance of the LWUA seeking capital to finance local wastewater system has been found. Water districts have, however, used emergency money to make repairs on and improvements to existing wastewater outfalls. Therefore, there are virtually no new municipal wastewater treatment systems that include treatment operating in the country. The most modern wastewater treatment plants now operating have been installed by private industries and developers – not by LWUA.

The role of the Local Health Officer (LHO) in protecting the public health and welfare by assuring the quality of wastewater discharges is unclear. There is no experience with publicly operated

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facilities, and there is no record of DOH involvement with privately owned and operated package treatment plants or treatment facilities internal to industrial facilities.

Terrestrial

Solid Waste

Management of terrestrial affairs has been delegated to the LGUs. Total responsibility for collecting and ultimate disposal of solid wastes has been delegated to the cities and municipalities, but very little authority has been delegated to pay for the responsibility.

Land Use Controls

In the critical area of land use controls, responsibilities and authorities are again divided. There is provision for local land use planning, including establishing zoning districts. Very few jurisdictions have the skills or have seen the need for such elaborate urban planning mechanisms. In any case, the Housing and Land Use Regulatory Board (HLURB) hold the basic power for controlling land use. As noted above in the description of the agency, it holds the permitting authority for subdivisions and industrial estates.

Capital Improvement Budgeting

Virtually none of the requirements are present for preparing Capital Improvement Budgets for a province, city, or municipality. For Local Government Units (LGUs) to prepare a rolling five year forecast of investment capital needs, there should be a comprehensive plan for the development of the jurisdiction. Such plans are usually divided into sectors, such as transportation, land use, utilities, water, education, and so on. Based on trends anticipated in the demand for services, and the age of the existing stock of capital resources, the LGU administration schedules the replacement and the construction of infrastructure needed to meet the needs of the jurisdiction.

Other than the preparation of Capital Improvement Folios for the now defunct Metropolitan Manila Commission, the authors are not aware of any LGU that has prepared anything resembling a Capital Improvement Budget upon which even minimal requests for funding of mandated urban environmental management could be based.

Closely related to the Regional Development Councils, the operation of which is described below, is the addition of the National Economic and Development Authority (NEDA). As part of the initiative to develop Regional Development Investment Programs, NEDA is now to review the Capital Improvement Budget proposals of the LGUs. This adds a fifth national agency to the panoply currently charged with some phase of overseeing local government decision making. The relationship of NEDA to the others and whether this will be an improvement is unknown. What is clear, however, is that there has been no improvement in the underlying planning information base at the local level upon which to base a capital improvement program.

Regional Development Councils

The formation of Regional Development Councils (RDC), has sought to provide an element of "bottom up" planning to the formulation of development strategies. These RDCs are comprised of provincial governors, mayors of chartered cities, mayors of the regional center in each region, mayors of municipalities designated as provincial capitals, regional directors of line agencies represented in the NEDA Board, and private sector/NGO representatives. The RDCs are charged with formulation of a regional development strategy and identification of infrastructure and other capital budget requirements necessary to achieve the development goals of the region (NEDA and the Department of Finance are responsible for prioritizing among the Regional requirements, particularly when foreign-assistance is involved). The formation of a Regional Development Assembly, whose membership includes Congressmen, Senators, the RDC Chairman, local officials, and NGO representatives is an attempt to increase participation in the identification and programming of national funding of local infrastructure programs as recommended by the RDC.(11)

Under revised procedures, NEDA (ICC) requires RDC endorsement of projects as a prerequisite for approval and funding. Additionally, funds have been made available to each RDC to undertake feasibility studies of potential projects. As stated above, NEDA Regional Offices provide technical staff assistance to the RDCs and have been engaged in institutional strengthening activities to increase the capabilities of the RDCs.

The Extra Metro Manila Layer

The National Capital Region and its surrounding area are the most urbanized and industrialized in the country. In recognition of conditions unique to the country, the national government has accorded special attention to the governance of the region. Before describing some aspects of the regional layer, it is well to remind the reader that each of the four cities and 13 municipalities - as well as the portions of several provinces -- within Metropolitan Manila have all the same constraints and controls as any other LGU anywhere in the country. The LGUs elect Mayors and Provincial Governors, just as such officials are selected elsewhere in the country. The fact that these jurisdiction are within Metropolitan Manila simply superimposes another layer of agencies and arrangements. By the same token, all of the line agencies of the national government have exactly the same responsibilities within Metropolitan Manila as they have in any jurisdiction elsewhere in the country (with the exception of NEDA because the regional budgeting function is assigned to the Metropolitan Manila Authority staff). For example, maintaining stream channels and building drainage works in Metropolitan Manila is the job of the Department of Public Works and Highways as it is in any other LGU. What is unique is the layering of several regional or metropolitan institutions between the LGUs and the national government and its agencies. These layers include the Metropolitan Manila Authority and Laguna Lake Development Authority, whose jurisdictions, authorities, and responsibilities overlap.(12)

Metro Manila Authority⁵

Coordination of activities between the national government and the LGUs of the defined region is the task of the new Metropolitan Manila Authority (MMA) organized under the provisions of EO No. 392. The MMA replaced the Metropolitan Manila Commission which was a quasi autonomous body administered by a Board chaired by a Governor (which was at one time, ex officio, the Minister of Human Settlements. In contrast, the MMA is governed by a Council. The Council is composed of the Mayors of the four cities and 13 municipalities -- a total of 17 equal members. The chairmanship of the Council is rotated among the members. Funding for support of the MMA staff and whatever operation are undertaken outside of national budget releases comes from contributions made by the constituent cities and municipalities.

It should be noted that EO No. 392 serves as an interim measure. A permanent regional organization is to be formed under provisions of an act of Congress. It is uncertain when that will happen or what shape the final regional body will be given.

The MMA has jurisdiction over the delivery of basic urban services in Metropolitan Manila, such as land use planning and zoning, traffic management, public safety, urban development and renewal, sanitation and waste management, and disaster relief. While the MMA performs the role of overall coordinator of urban development activities as well as having management functions in Metropolitan Manila, actual project operation and maintenance, including enforcement of development controls and anti-pollution measures, are undertaken by the national line agencies. There are two exceptions: solid waste management and land use planning and zoning. It was noted above that solid waste management is solely a responsibility of municipal government; there is no national line agency with which to share the task. Similarly, land use controls, such as zoning, are usually police powers of the state delegated to LGUs.

Financing

With the creation of the MMC and its successor MMA, all local legislative councils were abolished and the power to tax was transferred. The MMC enacted a Revenue Code (MMC Ordinance No. 82-03) and 11 ordinances dealing with overall fiscal management for the MMC.

PD No. 921 modified the structure built by the MMC. The decree defined the financial arrangements for revenue sharing between cities and municipalities and MMA. Table C.3, makes a comparison of revenue sharing of local governmental units outside and within Metropolitan Manila. The data presented are valuable in understanding the complex restraints imposed on the operation of all LGUs.

⁵ Major parts of this discussion have been taken from: GOP, DENR, EMB. 1990. Manila Metropolitan Region Environmental Study (Draft Final Report). Manila: Prepared by James M. Montgomery in Association with Philnor for the Asian Development Bank.

Annex C. Institutional Framework

Table C.3. Comparative revenue sharing of local government units
(All figures in percent)

Revenue Source	Outside Metro Manila		Within Metro Manila	
	Province	Municipality	MMA	City Municipality
TAXES				
o Tax on Transfer of Real Property Ownership	100		100	
o Tax on Business of Printing and Publication	100		-	100
o Franchise Tax	60	40	100	
o Sand and Gravel Tax	70	30	-	100
o Occupation Tax	70	30	100	
o Amusement Tax on Admission	100		-	100
c Fees for Sealing and Licensing of Weights and Measures	-	100	-	100
o Tax on Peddlers	100		100	
o Tax on Delivery Trucks/Vans	100		100	
o Tax on Business		100	-	100
o Individual Residence Tax	47.5	47.5	-	95
o Corporate Residence Tax	47.5	47.5	95	
o Cultural Dev't. Fund Tax	47.5	47.5	100	
REGULATORY FEES				
o Mayor's Permit Fee		100	-	100
o Building Permit Fee		80	20	80
o Zoning Fee		100	95	5
o Sanitary Inspection Fee		100	40	60
o Health Certificate Fee		100	-	100
o Excavation Permit Fee		100	80	20
o Civil Registration Fee		100	-	100
o Secretary's Fee				
o Traffic Violation Fine			100	
o Police Clearance Fee		100	-	100
SERVICE/USER CHARGES				
o Garbage Fee		100	50	50
o Cemetery Charges		100	-	100
o Public Market Rental	-	-	-	100
o Hospital Charges	-	-	-	100
o Public Utility Charges	-	-	-	100
o Tolls	-	100	-	100
o Towing of Stalled Vehicles			100	
o Rentals	-	-	-	-
o Interests	-	-	-	-
o Fees from Parking at Public Streets/Areas	-	-	100	-
o Pay Parking Yards	-	-	50	50
o Night Parking Fee				
NATIONAL ALLOTMENT				
o Internal Revenue Allotment	-	-	-	-
o Specific Tax Allotment	-	-	-	-

Source: GOP, DENR, EMB. 1990. Manila Metropolitan Region Environmental Improvement Study.

- Notes: a. All income of cities & municipalities except those earned from commercial activities, garbage fees and specific tax allotments are subject to the 15% mandatory contribution to the MMA.
- b. 10% of collections from basic real property taxes go to the barangays.
- c. 20% of collections from the 1% additional tax on real properties go to the national treasury.
- d. 5% of collection from residence tax go to the national treasury.
- e. No entry means absence of taxing powers while dash (-) means no direct revenue share/sharing.

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Land Use Planning and Management

The functioning of the solid waste system in Metropolitan Manila is not a matter for judgement in an annex on institutions. The operation of the metropolitan area-wide land use planning and zoning function is. There is no evidence that the master plans and zoning ordinances have any significant effect on the region. And this is largely because there is no mandate for those at other levels, particularly the HLURB, to honor regional land use distinctions. Further, regional land use judgements are not necessarily the same as those in individual cities and municipalities. It is an important fact that regional planning is not city planning made larger.

The current subdivision ordinance for Metropolitan Manila dates from 1977; the current Metro Manila Zoning Ordinance was adopted in 1981; and the only land use policy recognized by the national government is the Regional Development Framework Plan of 1982.

Inter-Agency, Inter-Level Coordination

The involvement of national government agencies in Metropolitan Manila is achieved through the Metro Manila Inter-Agency Consultative Committee (MMIACC). The MMIACC is chaired by the Cabinet Officer for Regional Development of the National Capital Region; the vice chairman is the former Governor of the MMC. It is not completely clear who has the responsibility for preparing the Metropolitan Manila Region Medium Term Regional Development Plan. The actual process was a design by 17 committees with 16 different national lead agencies. Not one sector was chaired by an official of an LGU. Part of the complication arises from the fact that Regional Development Councils have been formed and are operating in the other 12 regions of the country. With staff support from NEDA, Councils have an authorized channel into the Department of Finance and the annual budgeting process. Metropolitan Manila already has a regional agency with quite a different make up from the other regional councils and does not have NEDA staffing.

Other mechanisms for coordination exist. They include program- or project-specific inter-agency committees or by MMA membership on the board of directors of the Metropolitan Manila Waterworks and Sewerage System (MWSS), the Metro Manila Transit Corporation, the Laguna Lake Development Authority (LLDA), and the Light Rail Transit Authority.

Capital Budgeting

It was noted in the discussion of local government capacity that only Metropolitan Manila had devised a system of capital improvement budgeting. Under the Regional Development Framework Plan (1982), a system of Capital Investment Folios was developed. The objective was to remedy the problem of programming capital investments within the context of need and availability of resources. However, the committee designed Mid-Term Investment Program did not pursue the process.

Laguna Lake Development Authority

The Laguna Lake Development Authority (LLDA) was formed by EO 927 in 1983 and was to have exclusive jurisdiction over the Laguna de Bay Region and other bodies of water within the Lake Region. As has been discussed (and is shown on Table C.4), there is considerable overlap in jurisdiction among the MMA, NCR, and LLDA.

LLDA is an organization of the national government and as such derives its authorization and finances from NEDA, with whom it is affiliated. LLDA is responsible for a wide range of activities within its jurisdiction. These range from promotion of industrial development, regulation of land use and other activities, protection of water quality of Laguna de Bay, enforcement of environmental quality regulations and standards, and coordination with other governmental agencies with regard to the needs of the area. Of these, it has been most effective in establishing land use controls (primarily with regard to industrial estates) and environmental quality enforcement; these have been most effective in the non-overlapping jurisdictional areas.

Status of Major Present and Probable Projects

Interest in the urban and industrial environmental management sector has grown spectacularly in the past two years. Both donors and economically developing countries are realizing that sustainable development depends on a healthy environment. They are startled by the news that the cost of rapid, uncontrolled development in some places, such as Formosa, is beginning to be realized as high and likely to become much higher both in market and non-market terms.

The Philippines is no exception. Some development agencies have been toiling in some aspects of the field for some time. For example, an examination of a listing of USAID-supported projects

Table C.4. Jurisdictional Comparison - Metro Manila

<u>City/Municipality</u>	<u>MMA^{1/}</u>	<u>NCR</u>	<u>LLDA^{2/}</u>
Manila	x		x
Quezon City	x		x
Pasay City	x		x
Caloocan City	x		x
Makati	x	x	
Las Piñas	x	x	
Malabon	x	x	
Mandaluyong	x	x	
Navotas	x	x	
San Juan	x	x	
Parañaque	x	x	
Pasig	x		x
Valenzuela	x	x	
Marikina	x		x
Taguig	x		x
Muntinlupa	x		x
Pateros	x		x

Notes:

1. Municipalities are located in parts of Bulacan, Rizal, and Cavite Provinces.
2. Also included are the Provinces of Rizal and Laguna; San Pablo City; towns of Tanauan, Sto. Tomas, and Malvar in Batangas Province; Tagaytay City; towns of Silang and Carmona in Cavite Province; and, the town of Lucban in Quezon Province.

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reveals a substantial support for urban housing projects and for encouraging industrial development. Similarly, the World Bank has consistently offered to support what are called urban development projects. But none of these have specifically been designed to deal with the issues posed by urban and industrial environmental management.

As in other aspects of this description of the current situation, it is well to divide discussion between Metropolitan Manila and the rest of the country.

Projects for Metropolitan Manila

As noted earlier in this chapter, 14 or more studies of one phase of urban and industrial environmental management have been completed for Metropolitan Manila and environs. The most report released is: Manila Metropolitan Region Environmental Improvement Study.(12) The work was done for DENR, EMB by James M. Montgomery, Consulting Engineers, Inc. in Association with Philnor Consultants and Planners, Inc. The bibliography lists the majority of the earlier studies and reports. In addition, the Montgomery Report, which was funded by a Technical Assistance Grant from the ADB, recommends a series of strategies for dealing with environmental improvement. The total estimated cost for the recommended "Integrated Environmental Improvement Action Plan is \$610 million dollars, \$297 million dollars are for flood control which has not been considered in the statements of current condition presented in this chapter. That still leaves \$313 million dollars for solid waste and water quality management.

Very similar data were developed by Myra Hechanova, a consultant to the World Bank. (13)

Water and Sewer

Loans

There exists a masterplan for a regional waste water interceptor system. Budgeting for its construction is segmented. The first phase of funding, dubbed Metropolitan Sewer System I (METROSS I) has been disbursed. Loan funds to pay for construction of METROSS II are being sought. These costs are estimated to run in the hundreds of millions of dollars.

The ADB Office of Environment contemplates a \$200 million Environmental Sector Loan. The details for the loan are not established. It is understood that there is disagreement among staffs within the ADB whether the focus should be upon Metropolitan Manila or limited to other areas of the country or both. The intent of the loan is comprehensive: Systems to deal with liquid, solid, or gaseous waste could be financed.

The Manila South Water Distribution Project is financed by an ADB loan.

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Grants

The Pasig River Rehabilitation Project is financed by a grant from the Danish International Development Agency (DANIDA). The approach is to catalog the location and characteristics of all effluents discharged into the Pasig River and to make recommendations for restoring the river to life.

An ADB Technical Assistance Grant is the basis for the DENR, EMB directed work to Revive the Bulacan River. There is a heavy PVO involvement.

ADB Technical Assistance Grant funds are being used for the design of the Montalban/San Mateo/Marikina Water Supply Project.

Industrial Environmental Management

The World Bank has made available a Technical Assistance Grant to support a major study of Industrial Efficiency and Pollution Control in Metropolitan Manila. The project is to be jointly managed by the DENR and the Department of Trade and Industry.

USAID has provided a grant to assist the Environmental Management Bureau and Mines and Geosciences Bureau to formulate standards and policies for mine tailings management.

Gaseous

ADB plans a Technical Assistance grant for a Mobile Emission Source Study for Metropolitan Manila.

The Italian government has made a grant to support the design and implementation of Air Quality Management in Metropolitan Manila.

Projects in Metropolitan Cebu

Water and Sewer

With technical assistance grant through the Japan International Cooperation Agency (JICA) and loan funds from the Japan Overseas Economic Development Fund (OECD), plans for water supply and waste water collection and treatment are being made and implemented in Metropolitan Cebu.

Further development planning for Metropolitan Cebu water supply is to be supported by a Technical Assistance grant from the ADB.

Solid Waste

Technical Assistance for solid waste management is being provided by the German Technical Assistance Agency (GTZ). It is not certain whether the planning will become operational.

Regional Projects

Luzon

The active Energy Sector Project, assisted by loan funds from the World Bank, is limited to Luzon Island. There is a significant environmental component within the project.

Western Visayas

A Development Master Plan is envisioned for the Western Visayas area under terms of a planned ADB technical assistance grant.

Unlimited

Urban Development

The ADB has had under preparation for some time an Urban Development Sector Loan. The terms of reference for the consultants engaged to design the project suggest many areas that deal directly with issues directly involved in urban and industrial environmental management.

The grant component of the USAID-assisted Decentralized Shelter and Urban Development Project seeks to have those chartered cities desirous of securing the housing loan guarantees that are the backbone of the project, they must prepare acceptable capital improvement budgets.

Coastal Zone

The USAID-assisted ASEAN Coastal Resource Management Project is active. These are grant funds.

In addition, the Australian International Development Assistance Bureau (AIDAB) is assisting the ASEAN-Australian Coastal Living Resources Project.

Other

Active

The World Bank is assisting with loan financing an Industrial Restructuring Project.

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The Canadian International Development Agency (CIDA) is supporting with grant funds the operation of a pilot Industrial Waste Exchange System Project.

The CIDA is also supporting with grant funds an Environmental Management Project.

The Australian International Development Assistance Bureau (AIDAB), through several grant funded projects, the most notable being the Land Survey and Titling Project, provides grant support for the operation of the National Mapping and Resource Information Agency (NAMRIA).

Planned ADB Projects

Technical Assistance grant to assist in Developing a Computer Based Information System.

Technical Assistance grant to assist in Developing and Environmental Education Program.

Technical Assistance grant to Improve and Strengthen the Environmental Impact Assessment process.

Projects With Potential for Environmental Improvement

There are several on-going or planned donor-assisted projects that have potential to be useful for urban and industrial environmental management. The majority of them are designed to support GOP polices for industrial dispersion. The quotation from a report analyzing the dispersal policy's performance, cited earlier, presented clear evidence that the industrial and export zone estates did not pay careful attention to their impacts on the human environment. Projects, such as the USAID-assisted Southern Mindanao Development Program, illustrate how planning for economic, social, biological, physical, and institutional concerns can be applied.

The record is not clear whether project thrusts, such as the CALABARZON development project, will help alleviate, or will contribute to, the urban environmental management problems in the areas where new estates are being encouraged.

Similarly, the planned ADB Technical Assistance grant for Developing Hospital Services may or may not include an element that addresses the problem of medical waste. If it deal only with expanding hospital numbers and capacity, then the contribution to the waste stream will become worse; if it deals with finding economically feasible solutions, then it may aid in alleviating the problem.

Summary

In summary, there is not a great deal of donor support activity in the urban and industrial environmental management area. The major loan assisted projects are concentrated in Metropolitan Manila, but even though quite large in absolute terms, they constitute only a small

portion of the estimated total costs of meeting the back-log of liquid, solid, and gaseous issues in the metropolis. Other than three projects in Metropolitan Cebu, there are no problem specific projects elsewhere in the country.

Non-Governmental Organizations

Non-governmental organizations (NGOs) involved in urban and industrial environmental management range from trade and industry associations to firms providing engineering and related services to private voluntary organizations. Each of these groups can make positive contributions to the field.

Trade and Industry Associations

The largest and most influential trade and industry association is the Philippine Chamber of Commerce and Industry (PCCI). PCCI has recognized the growing concern over environmental quality and has organized a committee on energy and environment. PCCI serves as the umbrella organization for other, specialized trade groups. To date, 30 trade associations whose member companies are concerned with environmental policy and pollution control have been identified.(6)

Also, the multinational firms are represented by a number of associations, including the American Chamber of Commerce, the Australian-New Zealand Chamber of Commerce, and the European Chamber of Commerce. Of these, it is known that the American Chamber of Commerce has formed a committee on environment and has an interest in the development of industrial compliance programs.

The Pollution Control Association of the Philippines should also be noted. PCAP is the professional organization of engineers and scientists involved in environmental engineering and pollution control.

Private Voluntary Organizations

The 1987 Philippine Constitution's mandate for broad-based, participatory, and sustainable development opens up the field of environment and development debate to interest groups and sectors that were previously excluded from, or peripheral to, the policy-making process. The large and increasingly active community of non-governmental organizations (NGOs), including private voluntary organizations (PVOs), will continue to be a force the business and government sectors must reckon with.

NGOs have been very active in calling attention to environmental issues, leading protest against polluting firms and proposed projects with potentially polluting effects, and monitoring the environmental impact of projects. In a 1990 consultation of provincial NGOs, demands were made for the collection of more provincial and regional data on natural resources and their exploiters; for a mechanism for pressuring government into adopting and enforcing ecological

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policies; and, for technical assistance for bio-chemical analyses of the ecological effects of development projects both government and private.

From the practical point of view, however, since they are able to operate in areas in which the government has proven to be absent or ineffective, NGO's are a highly valuable, ever if vociferous, institutional asset. Indeed, the DENR has taken steps to formally integrate NGOs into the department's activities by opening a NGO Desk in 1989 under the Special Concerns Office directly under the support staff of the Office of DENR Secretary. However, the lack of a regular budget for the Desk raises questions about its future sustainability as an institutional unit. There are about 250 NGOs that have projects with DENR, most have rural development or upland and forestry based concerns. However, they are getting increasingly involved in urban and industrial environmental issues. The total number of NGOs currently operating in the country is unknown.

At the moment, the NGO Desk, in cooperation with other DENR units, is drafting a plan for Awareness and Emergency Preparedness at the Local Level (APELL). Since for most industries there are no existing plans for dealing with emergency situations, this is a welcome effort. APELL is designed to assist decision-makers and technical personnel in improving community awareness of hazards in plants and in preparing response plans, should accidents or other events at these plants pose danger to life and the environment. Other important players in the Philippine environmental scene include private interested groups such as the chambers of commerce and lobbyists for specific commodity and industrial sectors. These various interest groups attempt to swing the pendulum in the direction of greater economic development and less restrictive environmental regulations.

Training and Research

Training

In a field, such as urban and industrial environmental management, that uses such a broad range of disciplines, it is not surprising that there are no single training or educational institution that can be identified as answering all or even a part current needs.

Having said this, however, there is a shortage of undergraduate and graduate faculties that are producing professionals for the urban and industrial sectors. Environmental Engineering is available only at the University of the Philippines at Diliman (UPD).

Equally, or even more, acute is the shortage of faculties devoted to the training of resource economists, particularly those with skills in the urban and industrial areas. It is true that micro and macro economists who understand the complexities of externalities can make contributions to environmental management. There is also an need for practitioners who can make contributions into the economics of urban land resource use and the use of total or social benefit-cost analyses for public policy decisions.

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There are two synthesis faculties offering work toward formal degrees in environmental issues. Miriam College has the only faculty offering training in Environmental Planning; the University of the Philippines at Los Banos houses a faculty that offers course work toward degrees in Environmental Science and Management.

Another faculty that could serve as a synthesis for many of these issues at the graduate level is the School of Urban and Regional Planning, University of the Philippines at Diliman (UPD). Preference for admission is currently given to those who have two or more years of work experience in planning and who had their first degree in planning, architecture, economics, business administration, engineering, geography, law, and public administration. There is, however, no block against entry of anyone with a degree from a recognized university, say in biology or ecology.⁽¹⁴⁾ A close alliance of the school with the School of Public Administration could make for a joint program suitable for urban and industrial environmental management. Such a curriculum does not, to our knowledge, exist today.

Similarly, the Local Government Academy has not had occasion to offer intensive training in urban and industrial environmental management simply because very few of the LGUs have any call for such expertise.

There is a long standing relationship between the Philippines and the Asian Institute of Technology. Many of the leading Filipino environmental engineers received their training in the AIT under some participant training program. There are currently scheduled AIT short courses in July of 1991 to which Philippine personnel will travel.

There is no formal preparation for personnel who are to operate water supply or wastewater treatment plants.

Research

With no core faculties engaged professionally in the field, there is also very little research that is being done as well.

There has been published, under impetus from the Office of the Undersecretary for Environment and Research, the "Integrated Research and Development Plans and Programs of the DENR, 1989 - 1995."

Within the EMB, a leachate trace project is the only research topic identified.

The Council for Health Research and Development is reported to be conducting research into the environmental determinants of environmentally-related disease.

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CHAPTER C.2. MAJOR CONCERNS AND OPPORTUNITIES

Overview

Environmental Management Bureau⁶

The Environmental Management Bureau is understaffed, overworked, and not equipped with the facilities necessary to perform the tasks assigned to it by law. Even more serious, however, is the poor structure for environmental concerns within the Department of Environment and Natural Resources (DENR). The Office of Environment and Research is the sole unit within the department that, theoretically, interfaces with comparable environmental planning units in the other departments, commissions, authorities, and corporations of the government. The EMB is legal staff to a quasi-judicial regulatory body (the Pollution Adjudication Board), environmental advisor to the Secretary, final judge of the merits of the impact of proposed projects and programs through the issuance of Environmental Compliance Certificates, monitor of the quality of Philippine air, water and land conditions, and policeman that detects and cites those who break the law.

The break in the line of technical communication between the top EMB staff in headquarters and the regional technical staffs is unfortunate. The field officers are isolated in regional offices where the work load and staff reflects the priority given to the National Reforestation Program and the Integrated Social Forestry Program. As a result, morale is very low.

The deficiencies are even larger than those facing the DENR four years ago when the National Reforestation Program was initiated. At least the DENR had large numbers of trained foresters to operate the programs. This is not true of the EMB. To bring the environmental function of the DENR up to par with the other functional areas -- particularly forestry -- will take investments of the magnitude seen in the forestry sector in the past two years. Even such an expansion in manpower, facilities, and equipment is not likely to have an impact comparable to that seen in the forestry sector. This is simply because the sector is far more complicated and there are (and always will be) a variety of actors. Not all of the land use regulatory authority, water resource development authority, or solid waste management responsibility will be vested in a single agency.

Environmental Impact Assessment/Statement System and Planning

The Environmental Impact Assessment/Statement System (EIA/SS) has not been allowed to be fully effective. The most important aspect of a national environmental policy is to effect inter-agency policy and coordination. It is ironic that the government should take such pride in

⁶ When used in this chapter, the term "Environmental Management Bureau" means the staff in headquarters--that entity generally referred to as the EMB--and all of the environmental staff posted to the Regional Offices, the PENROs, and the CENROs.

what is called a "new" strategy for sustainable development that alleges synthesis between development and maintenance of ecosystems. This is precisely what a national environmental policy, implemented by an EIS System, was supposed to accomplish. Currently, the management of the DENR treat the two topics as though they are completely unrelated.

The principal reason it has failed is that the process has not been used to plan or to coordinate, but to regulate. The coordination required is not only among the line agencies of the national government, but among the several levels of government and among the decision making bodies that enforce their decisions by issuing or denying permits.

Whether completion of an assessment is tied to some sort of permit in addition to those required to discharge into the water, land, and air resources managed in trust for all Filipinos is a completely separate issue.

Manpower

We cited in Chapter C.1. the paucity of trained personnel in all aspects of the public sector. The shortages extend, we are sure to the private sector as well. (Of the top 15 Corporations in the Philippines only four had identifiable environmental units. Others may well have installed pollution control systems or have personnel responsible for environmental compliance at the plant-level but not have a unit capable of advising corporate management on such matters).

There is an element of cause and effect at work. As long as there are not sufficient trained manpower in the public side to enforce the conditions of emission permits at all levels and in all places, there will not be a demand for trained personnel in the private side. When it is clear that the price for remaining in operation is compliance, then the demand for trained manpower in the private sector will rise comensurately.

The EMB currently has a staff complement of 169 persons divided into the Office of the Director (42 persons), Legal Division (31), Environment Quality Division (44), Environmental Education Division (21), and Research and Development Division (31). Additionally, there 41 persons in positions coterminous to EMB⁷.

Of the staff complement, there are:

Chief Environmental Management Specialist	3	
Supervising Environmental Management Specialist	20	
Senior Environmental Management Specialists	19	
Environmental Management Specialists	2	
Engineers		7

⁷ A comparable analysis of the staff serving in the Regional Offices should also be done; the data on the staffing levels and training of that staff complement was not provided by DENR staff during the course of this study. It is understood that the staff capability of the Regional Offices is somewhat below that of the headquarters staff. The impression garnered by those team members that visited Regions V, X, XI, and XII was that there were very few personnel of any kind and even fewer with specific environmental training.

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Legal Officers	14
Attorneys	10

In addition, there are various other technical specialists (statisticians, media specialists, planning officers, etc.). Of the above staff, the total complement in the Environmental Quality Division, which has principal responsibility for establishing standards for air and water quality, development of new regulatory programs (such as those required under the Toxic and Hazardous Waste Act RA 6969), review of Environmental Assessments, enforcement of environmental regulations (albeit in a limited geographical area), and providing staff assistance to the Department and to the Regional Offices, is simply insufficient.

It has been observed that:

"The Philippines therefore has a dire shortage of environmental professionals. In the Environmental Impact Assessment (EIA) section of the Environmental Management Bureau, for example, a sensitive section that receives as many as 150 submissions a month for review, there are only 10 full-time staff. Only three had some sort of format training in EIA, the rest have gotten their training through actual practice."

"This lack of highly trained staff was further exacerbated by the regionalization of the environmental management service. That makes the lack of vertical technical. The country now has a full spread of offices for environmental management but the goal of trained professionals that was formerly centralized is now too thinly diffused. In one region, for example, of five provinces where pollution cases are rampant, there are not more than three truly capable persons to do the proper environmental education, monitoring and problem-solving."(7)

Training

There are those who believe that there can be developed an academic discipline called environmental science that will graduate individuals into the EMB in the same fashion that schools of engineering graduate persons into jobs in the Department of Public Works and Highways. There is no merit to this idea. It was noted briefly in Chapter C.1 that only the University of the Philippine at Los Banos has a faculty called environmental science, the university does not award baccalaureate degrees in whatever is environmental science. They should not. No single discipline has a corner on what impacts the human environment. Engineers design actions that modify the human environment; whether for the better or the worse becomes a matter for the economist, the sociologist, other engineers, the ecologist, the educators and extensionist, and the politician and all the specialized subdivisions within each of the disciplines. All are trying indicate society's judgement of value. To incorporate all of this within single individuals bearing the label "environmental scientist" is not possible. The very best that can be hoped for are generalists that have some ability to synthesize the inputs of the various value systems into some coherent form upon which society's representatives pass judgement.

Because the EMB has perforce been preoccupied with regulatory concerns, there has been very little attention paid to the person power requirements and the training needs in the sector as a

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whole. It follows that there are very few people trained to do any of the work required. For example, there is no program to train and retain people qualified to operate water supply or waste water treatment facilities; there is no program that sets standards or provides certification for those possessing the minimum requirements to conduct environmental audits of industrial facilities.

If the serious deficiencies in urban and industrial environmental facilities are to be overcome, there should be a sound "bottom up" planning process that sets out the public capital requirements for the requisite facilities. The process requires persons with knowledge and skills in comprehensive urban and regional planning. The skills should include the ability to draw upon biological information to identify, map, and devise protective mechanisms for areas judged of local and regional importance and to collaborate with national agencies in recognizing areas of national importance; they should be able to synthesize comprehensive plans from sectoral plans, and translate the local government responsibilities into capital plans and programs. The importance of such personnel looms even larger as the movement toward the decentralization gains momentum.

Opportunities

There are enormous opportunities to shape and facilitate sustainable Philippine urban and industrial environmental management through training. The substance and priorities for the training will have to be refined through technical assistance both in the field of training needs assessment and in the substance of what should be conveyed in the training.

Facilities

Monitoring

Permanent Recording Stations

There are no permanent environmental monitoring stations other than those associated with those gathering standard meteorological data. The case is often made that effective regulation is not possible without knowledge of the condition and trends of the air, land, and water bodies. The very best methods involve the placement of sensors with recorders and telemetry capability in statistically determined locations. Such data serve at least two purposes: 1) triggering alarms when the measured parameters exceed specified levels, and 2) contributions to continuous modelling of environmental factors, such as liquid and gaseous dispersal patterns. To instrument the entire country will take an enormous investment.

Some industries have installed as part of their liability reduction programs, permanent monitoring devices. Others may be encouraged to install such sensors to monitor the effectiveness of their internal efficiency programs. The only public operated stations are those in Metropolitan Manila that were installed to measure ambient air quality parameters.

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The opportunity rests in finding ways to either cover some portion of the marginal cost of new sensors or adding telemetry devices to the monitoring stations installed and maintained by industry. These could be the first key units in the development of at least a rudimentary system of permanent monitoring stations. The keys are complementarily and supplementarily.

Systematic Measurements

Either lacking permanent stations, or to supplement the data being regularly collected by the permanent sensors, systematic sampling regimes with portable measuring devices yields extremely useful data. The objective is to mimic the permanent stations by taking measurements/samples from pre-determined stations on pre-determined schedules. These data are also useful for modelling and for recording trends, but often miss damaging peaks that occur between measurements.

The constraint is that there is very little equipment available, even relatively inexpensive portable kits, and there are few personnel available that can or should devote full time to visiting the prescribed stations and taking measurements.

The opportunity is to equip and train interested and qualified citizens to take measurements as part of an organized program. There are many models of such action in the economically developed world. For example, in the U.S., local chapters of the Sierra Club establish "stream watch" programs. Members rotate responsibility to take water quality measurements at established points and on appointed schedules. The data are made available to the cognizant enforcement agency. The system has the added advantage of having concerned individuals follow through with the agency personnel to be sure aberrations are investigated and enforcement actions are taken when a violation is shown to have occurred.

Laboratories

It is said that "the Environmental Management Bureau laboratory, the focus of environmental research and monitoring, is housed in an old condemned building so shaky that sensitive balances do not give accurate readings when heavy vehicles pass by. Only half of the regional environmental units have laboratories, with incomplete equipment at that."⁽⁷⁾ We have seen nothing, and have heard nothing from our colleagues, to disprove the validity of the statement. Not only is the laboratory equipment and space completely inadequate, but so is the skill level of employees hired to use it.

There are, however, modern laboratories in the country. Some of them are in new industrial facilities. Others are in universities.

The opportunity to be seized is providing access to adequate quantities and quality of laboratory equipment without having to completely equip facilities for the exclusive use of the EMB staff.

Regionalization/Decentralization

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Regionalization

The process of agency regionalization has proceeded quite well. There are serious gaps, however. The most serious stem from the imbalances among staffs within the regional offices and the lack of vertical technical support through the specialized bureaus. The situation is particularly acute with respect to the environment and research functions. Just as at the national level, the lack of manpower and equipment can be traced directly lack of money. Given the deficit condition of the national budget, the money, if it to be available at all, will come from donor sources. As we have already noted above, even if money is available for EMB functions, there may not be a sufficient pool of skilled people to fill the new slots.

In our judgement, there is confusion about what is "the environment." The notion that "environment is limited to one set of individuals within one technical office that advises the Regional Executive Director (RED) is very strong in the regional offices with which we have any experience.

The fact is the RED is the chief environmental officer for the region. He needs a coordinative arm to focus the attention of all the regional technical directors on the fact that each shares, diciplinarily and statutorily, with parts of the biological and physical environment. In addition to accomplishing horizontal coordination among the functions of the DENR in the region, the coordinative arm should be the point of horizontal interface with the other line departments of the national government in the region and vertically with the local government units (LGUs), particularly the provincial governments.

Another problem exists with respect to the delineation of spheres of influence. The lines dividing issues which are referred to Manila and those which are resolved in the region are, by and large, set by peso amounts. That is, if the decision involves a contract of less than ₱500,000, the RED is authorized to enter the agreement and make the disbursement. Other criteria ought to be equally valid. For example, the matter of a new road through a designated unit of the Integrated Protected Area System (IPAS) would be referred to Manila for decision-making since the IPAS represents national values, but decisions on similar standard roads, with no expenditure internal to DENR might be made by the RED if regional issues are at stake or even at the provincial level if only provincial values are involved.

The opportunity exists to unify the DENR posture in the regions to make the department the point agency is bringing together the line agencies and the LGUs in dealing with the urban and industrial environmental management issues. As been repeatedly pointed out in this annex, urban and industrial environmental problems now, and always will, cut across disciplinary and jurisdiction lines. To successfully redeem its responsibilities as the lead environmental agency, DENR will have to become adept as a planner and synthesizer.

Other Agency Relations

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Very little need be said about the horizontal coordination with other national line agencies at the regional level. However, the regionalization of the permitting authority of some agencies may need examination. The matter of putting an industrial/residential estate on the ground may serve as a case in point. In the first instance, a permit will be required from the National Land Use Review Board. Will that function be regionalized? Second, a source of water supply will be required. The odds are that the source will be ground water and a permit will be issued by the National Water Resources Council. Will that function be regionalized? At the moment, no one at any level imposes a requirement that a volume of water equal to the amount fed into the system be treated and discharged at the same quality as it enters. Who will make that determination at the regional level?⁸ It will do little good to have a strong EMB regional presence if permits continue to be issued in Manila by agencies that are not required to pay attention to regional physical plans.

Decentralization

We agree with the analysts that hold that by the terms used and the success to date, the national government mean deconcentration of functions rather than decentralization.(10)

The major show piece for bottoms up planning is the advent in the last year of the Regional Development Councils. As the discussion of the councils in Chapter C.1 notes, this mechanism is largely concerned with ways to divide up what is essentially a national pie. This is evidenced by the eager participation of national officials, such as Congressmen, in the regional assemblies. Even the optimistic view taken of the increases in the amount of the Internal Revenue Allotments confuses this with local autonomy when, actually, it also is concerned with dividing up the national pie.

True decentralization will come when a part of the tax base is marked for the discretionary use of the various levels of government.⁹

The distinction is important in urban and industrial environmental management simply because a substantial portion of the serious problems are those which no one at the national level finds rewarding and which are left for the LGUs to handle. Let us consider what happens if a progressive city administration grows tired of the solid waste mess and the number of scavengers that are showing up in the hospital wards with anemia and decides to act. First would come the factual studies of the waste stream for volume and content. Then physical

⁸ A further complication could be postulated if wastewater treatment is to be done in a "package" plant-- is there a master plan that calls for extension of gravity or pressure lines to collect the effluent from the plant?

⁹ as a purely illustrative example, ad valorem real property taxes could be allocated for the support of cities and municipalities, VAT and franchise fees for the support of provincial government, and external revenue and income taxes for the support of the national government. It should, however, be noted that there are currently fewer income tax returns filed than there are national government employees.

investigations for the most cost and socially efficient ways to sort and handle the waste stream. Thereafter, physical studies will be required to, let us say, find a site for a high technology land fill operation. This is followed by engineering estimates of the cost of the system. This is the bare minimum for making an item to insert in a capital improvement budget. But the city does not have to make choices about priorities in allocating its own resources. It goes hat in hand to the national government for a project.

A good question here is: What are the roles of the regional and provincial EMB staffs in solving the city's solid waste problem.

An enormous opportunity exists to assist with true decentralization. By definition, a project that deals with urban environmental problems must find a way to make local decision-making work. It will take substantial national leverage to have significant change take place.

Environmental Impact Assessment/Statement System and Planning

Coordinating Decision-Making

From the evidence presented in Chapter C.1, it is clear that the Environmental Impact Assessment/Statement System (EIA/SS) is not effective as an instrument of national environmental policy. The mere fact that the national government has only recently adopted at Cabinet level a Philippine Strategy for Sustainable Development that parrots the objectives of the old National Environmental Protection Council is a strong indication that there is something wrong with the system as presently applied.

The location of the administrators of EIA/SS is indicative of the relative importance accorded to what is called a sensitive process. The staff, so vividly described above, is a section of a division of a bureau in a department.

Implementing the New National Environmental Policy

If the Philippine Strategy for Sustainable Development is now the national environmental policy, then the EIA/SS should be the implementing arm. The present Environmental Compliance Certificate is of little consequence and the responsibility for such compliance permit issuing could be shifted to the sections dealing with the issuance of discharge permits. This simplifies that part of the process. But it can be simplified even farther.

Mandate Environmental Impact Assessments

The key to using the EIA/SS as a tool to implement policy is to require that all projects, public and private, that use public money or use resources held and managed in trust of the people of the Philippines by the GOP for conduct an environmental impact assessment.

For those who argue that such a requirement is onerous and adds costs to development, the answer is that an EIA is simply good planning and good planning is good for the public or private entity involved as well for the public.

Make All Permits Contingent Upon One EIA

A major purpose of the EIA is to achieve coordination and agreement on policy. Let us say that a major land development company desires to develop an industrial estate in open land. The proposal and applications for the legally required permits will be accompanied by an assessment of the impacts of the project: economic benefits, social dislocations, reduced agricultural production and income, and so on. The key permitting agency will circulate the EIA to the environmental units of all other agencies, affected LGUs, and PVOs. The Department of Public Works and Highways would comment upon the adequacy of traffic data and the implications of increased highway loads on future highway construction costs; the National Water Resources Council would comment on the adequacy of data for water supply; EMB would comment on the solutions offered for wastewater and whether there will be hazardous and/or toxic chemicals involved and if so, what will be the methods of ultimate disposal; the Department of Agriculture could comment upon the loss of crop production; and the LGUs can deal with both their desire for the increase in jobs and the marginal increase in the solid waste management job. The views of the public, particularly the PVOs, could be solicited in public hearing and/or an open record for the filing of statements. If no comment is adverse, the HLURB could issue the permit. The decision is binding on the other permiters.

Some new permitting authority may be required. For example, there is now no requirement for, nor competent agency named, permits to construct and operate solid waste landfills. There should be, and proposals to construct such environmental improvements should be subject to the same EIA/SS requirements.

In the event of conflict, the conflicting values must be resolved. If DENR's comments point out that the development will impact upon a rare or endangered species, the public value would automatically prevail and the application would be rejected. On the other hand, if there is simple disagreement between values -- open space versus congestion -- then the impasse will be either resolved through negotiations between the contenders or by Cabinet or Presidential Management Staff, or some administrative law body. Of course, all decisions would be subject to appeal to the courts. Before the final decision is taken, however, the objections and requests for additional data would be responded to in writing and become a formal EIS.

Three-Stage Approach

The EIA/SS could be employed in three tiers. The approach would ease the complexity of decision-making and reduce the costs to those who propose projects or programs. The first tier is the conceptual one. The application for the permit to develop a private industrial estate is

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presented in sketch form. If there are clear objections, the application is rejected at that stage.

If the concept is acceptable, then additional detail of the proposed development is proposed. Such refinement might include minor highway realignments for acceleration and decelerations lanes, and the location of the internal roadways, water lines, and waste water collection system. If the layout detail is acceptable, then the applicant moves on to the third tier.

The third tier deals with the details of construction. For example, what provision will be made during construction to prevent the movement of silt into the surface streams. The third tier will be, in fact, the EIA upon which the decision to grant or deny permits will be based.

Multi-Tiered Approach

Depending on the location of the ultimate decision-making for the issuance of permits, the EIA/SS could be moved downward to at least the regional level and perhaps the provincial level. As noted above, determination of the appropriate level will hinge upon the level of significance of the proposal. The industrial estate issue used as the example in this chapter could be decided at the regional level.

Availability of Data

In setting the guidelines for the preparation of EIA's, great attention should be paid to the categorization of the data that will be presented. This emphasis would replace the procedural focus of the current guidelines which, it should be noted, have been effect since the days of the NEPC.

The purpose of the new focus is to give organization to the data that are collected, particularly new data collected specifically about the site of the proposed action. The structure for biologic, physical, social, economic, and institutional data can be prescribed so that all demographic information will use the same age divisions, and income will be broken into uniform categories. Similarly, well log information from borings to determine subsurface strata would be entered in a standard format. The organization will permit data from secondary sources to be merged with primary data. The combined information can be the beginning of a standard planning information base (SPIB) for a PENRO or a Regional Office. With the completion of each EIA, the depth of the will increase.

The advantages of such a cumulative data base are obvious. The most obvious is the ability to build resource profiles for specific areas. Also, there will be a base of reliable information which can be used to assess the impact of future proposals and to measure trends.

Since assessment work is largely site specific, it is not likely that the provincial SPIB's will be aggregated into some sort of national data base that requires large-scale electronic data storage and manipulating capabilities.

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Recognizing Ecologically Sensitive Areas

A basic approach environmental planning is the identification of ecologically sensitive areas. Clear delineation of the spatial boundaries of the systems helps determine the level of significance that will apply in decision-making.

The literature uses a variety of titles for the areas designated. In some areas they are called "areas of environmental concern," while in others they are designated "unique resource areas." By whatever name, the areas can be accorded special protection by those making resource management decisions, especially those engaged in land use planning.

Examples abound. Among them might be migratory bird nesting areas or beaches used by sea turtles for nesting. Of more direct application to urban and industrial environmental management are aquifer recharge areas and stream channels with their adjacent flood plains.

Establishing levels of significance is the equivalent of determining the distribution of benefits in equity calculations. If the operating system is confined entirely to a municipality, including the receipt of benefits, then the level of significance for decision making is the municipality. Once the system extends beyond the single jurisdiction, the level of significance rises. Hence, most stream systems have at least provincial significance and many have regional significance. There would have to be extenuating circumstances for national significance to figure in the decision making.

In the Philippines, however, the regions are simply organizational creatures of the national government. Thus, it can be argued that once regional significance is determined, there is a national interest in the planning and decision making for that ecosystem.

Economic Efficiency

Many of the environmental management studies made for Metropolitan Manila and other urbanizing areas highlight the problems caused by the blocking of stream channels and encroachment by squatters on the flood plains. The problems are generally approached from a physical standpoint: the impediments stop water movement causing water to overflow and cover not only the traditional flood plain, but extensive additional areas as well.

The fact is that a stream system that is operating in a natural way is and economically efficient system. Following each major event that causes flooding, estimates are made of damage. If the normal flood plain were unoccupied, there would be no damage, physically, socially, or economically. Equally, if not more important, is the cleansing action that occurs in a naturally flowing stream. The vegetation acts as a trap for organic wastes. Some systems are so efficient that artificial marshes are being used for treating waste water. Some species of plants take up heavy metals held in solution in the water. Very little work has been done to indicate the marginal utility for water quality improvement of investments in re-establishing or maintaining the several sub-systems that make up a stream ecosystem.

Another system that may have significant economic efficiencies is the protection of aquifer recharge areas.

These areas, once identified and the operation of the systems reasonably understood, should be accorded special treatment in the course of development decisions. There are many devices that can be used. One of the more common is creating a conservation zoning district or a conservation overlay district. Other devices used elsewhere, such as acquisition of easements may not be appropriate in The Philippines.

Sustainability

Recognizing and delineating the operating ecosystems in the beginning of management whose objective is maintaining the function of the systems. The objective is, clearly, maintaining conditions under which the system is able to sustain itself and continue the flow of benefits.

Shifting the Process

There is currently a constraint in urban and industrial environmental management caused by the lack of a methodology for regional resource planning. A major opportunity, therefore, exists in going through one or more experimental or demonstration plans.

Regions II and X Selected for Piloting

A constraint in the preparation of truly comprehensive regional resource plans stems from the dominant forces driving DENR. The plans proposed in the Mid-Term Investment Plan, 1990-1995, do not include urban and industrial components.(15, 16)

Part of this is a semantic problem. It is not conceivable that even a "trees and grass" inventory for a resource management plan would ignore the rivers and streams. What is lacking is understanding of the role of the resource patterns, particularly ecologically sensitive areas, in urban and industrial environmental management as well as rural environmental management. Working out a regional resource management plan presents a fine opportunity to explore ways to effect horizontal coordination within the DENR regional offices and among the national line agencies.

Regional-Provincial Interface

An important ingredient in the regional plans will be the vertical relationship between the national agencies organized at the regional level and the provincial governments served by PENRO's. There are two constraints. The first comes from the lessons learned with the first year of the Regional Development Councils: the regional organizations are, in fact, national and reflect national values more than local values.

The second constraint has two parts. One is the absence of professional staff at the provincial level and the lack of discretionary budget with which to hire them. The second is the perception that the PENRO staff can simply be detached and become the Governor's staff. The arrangement will work fine if the financing came from the Province in which case there would be little question about who is the master. An interim step might be the severing of the line of command from the Undersecretary for Operations at the regional level. In short, the PENRO would not report to the RED.

The opportunity presented by doing one or more regional resource management plans will be to work out the answers to these inter-level questions.

Local Planning

At least some portion of the comprehensive regional resource planning should include preparing one or more comprehensive city/municipal plans. The constraint in terms of urban and industrial environmental management is that without the land use sector of a comprehensive plan, use of the zoning authority of the local government cannot be used as part of a complementary management program. An additional objective would be to determine the need for land use control powers that should be granted to the provincial government.

The relevance can be illustrated by a major municipal environmental management issue: solid waste management. It is very easy to conceive that the most desirable location for a sanitary landfill to serve a city would be outside the territorial jurisdiction of the city. Elevating the issue to being more than internal to one municipality makes it a matter of provincial significance. But what should be the role of the provincial government? At present, there is no authority for the provincial government to regulate or control land or resource use.

Since at this time there is neither national support or local resources available to support the staff work, it will be of interest to see if there are technically qualified private firms that could undertake to be the contract employees of the municipality for the purpose of preparing the planning documents and for assisting in the implementation of the adopted plan.

Comprehensive Planning by Sector

There is a substantive model metropolitan planning by sector set by the MMA in 1989-90. Each sector was under the leadership of a national line agency. The synthesis was to be done by the MMA or its staff. In the case of the plans to be made here, the synthesis is to be done by the municipal government. The term synthesis is used because a comprehensive plan is, in effect, an environmental plan for the jurisdiction. Many of the same techniques for citizen involvement, inter-disciplinary review and comment, and political decision making are used as were described in the section on EIA/SS.

The impact of such planning on urban and industrial environmental management are quite clear. Will streets and thoroughfares impinge upon ecologically sensitive areas? Maintaining river and

stream systems will involve actions in the housing sector and vice versa. An important consideration will be the effect of the ecologically sensitive areas upon the land use sector of the plan. Another consideration will be the integration of the institutional aspects into the plan, such as the relationship of the land use plan sector and the issuance of business licenses.

Capital Improvement Budgeting

Two opportunities are apparent for pushing forward rational allocation of capital resources for urban infrastructure improvement. There is the surging interest in the Regional Development Councils, discussed above, and there is the momentum for decentralization.

If and when the Congress enacts amendments to the local government code and the revenue code that accomplish a measure of true decentralization, the LGUs will need workable models for identifying solutions to urban and industrial environmental management problems, programming the activities needed to accomplish the solution, and budgeting money to pay for them.

Control the Use of Land

The only reasonably complete zoning ordinance that exists was enacted for Metropolitan Manila by the old MMC. It is not known by the authors what is the statistical base upon which the zoning districts were drawn and regulatory language drafted. Observation and anecdotal information strongly suggest that the zoning and land use controls are not working well. Similarly, no one has offered advice about the implementation of the subdivision¹⁰ ordinance.

Since these ordinances were enacted by the MMC, inherited by the MMA, and there are no local legislative bodies, there seems to not be more than one or two LGUs with what can be called "modern" land use control instruments in force. This is almost entirely due to having the national government do everything. We understand that most municipalities and cities have some sort of land use plan on the shelves. The plans were required to be made by the old Ministry of Human Settlements. There are only three land use classes: residential, industrial, and agricultural. Until the last year, HLURB permits could ignore the plan by simply accepting a resolution from the legislative body and a certification from the Mayor.

The importance of local land use controls for urban and industrial environmental management is very clear. The opportunity comes from the growing encouragement of residential and industrial estates. For example, considerable quantities of Philippine Assistance Program money, supplied by a variety of donors, are going into estate development in Provinces, such as Cavite

¹⁰ A thorough subdivision ordinance that requires developers to submit preliminary plats, sufficient data upon which to judge environmental impacts, and detailed construction drawings showing all utilities and infrastructure can serve as part of the EIA/SS.

and Iloilo. Except where the unique LLDA operates, the only environmental quality controls governing these developments are administered by the national agencies.

The estate development initiatives offer opportunities to tie local land use controls and the EIA/SS together in support of the Philippine Strategy for Sustainable Development.

7/6/05

CHAPTER C.3. CONCLUSIONS AND RECOMMENDATIONS

Overview

Restructure and Strengthen the National Environmental Policy

We conclude that the Philippine Strategy for Sustainable Development (PSSD) is the current national environmental policy of the Government of the Republic of the Philippines (GOP). It would, of course, be a much more convincing conclusion if the policy was encompassed in an act of the Congress endorsed by the President. It seems that the intent of the PSSD is quite similar to PD No. 1586 that established the National Environmental Protection Council.

The Environmental Impact Assessment/Statement System (EIA/SS) as it is presently operating is not an adequate tool for the implementation of the policy. The recommendations for restructuring and strengthening take four thrusts.

Change National Policy

The location of the environmental impact review function in the Environmental Quality Division of the Environmental Management Bureau is appropriate to a regulatory and enforcement body. It is not appropriate for administering a process that is central to vital national policy.

It has been argued in other reports on the subject of DENR policy making that functions that directly support the Secretary in shaping national policies vis a viz the interests, goals and objectives of the other agencies of the national government should have a direct relationship to that office. If recent organograms are any indication, some progress has been made in that the Office for Policy and Plans has been located within the secretariat rather than at the level of the Office of Natural Resources and the Office of Environment and Research. More needs to be done in this regard so that the Office for Policy and Plans is possessed of a staff that represents the diversity of the human environment: biology, engineering, sociology, economics, and public administration.

It is important for the DENR to set such a model. It is the model that the Secretary is, and should be, encouraging the other agencies of the national government to establish. It will be parity among these policy and planning units of the departments that will make the inter-departmental communications on environmental impact policy -- or horizontal coordination -- operative.

There will still need to be determined a higher authority to arbitrate and make decisions in the case of conflict. We suspect that this will be a matter with which the Cabinet will have to deal.

Tie Impact Assessments to the Permitting Process

There is discussion of using the Environmental Compliance Certificate serve as the keystone of a "one window" permit system. We think it too weak a reed. We do recommend, however, that the GOP require an Environmental Impact Assessment at one or all three levels/stages be performed for any project of program proposal that will invest public monies or use resources held in trust by the GOP for the people of The Philippines.

The Environmental Impact Assessment data would be the subject of horizontal interagency review, public comment, and vertical review by affected local units of government (LGUs). Permits would issued only after the process is completed and a consensus decision is reached on whether to go or not to go, and if the decision is to go, then the conditions that are to be attached. The conditions would become parts of the compliance schedules for the permits. The compliance schedules would cover both the construction phases and the operating phases of the proposal and serve as the basis for monitoring and for enforcement.

In The Short-Run

The recent moves by the DENR secretariat to achieve memoranda of understanding with major permitting agencies is commendable. For example, a memorandum of understanding exists with the Interagency Investment Coordinating Committee in the Department of Finance to require that an ECC be in hand before investments of more than ₱300,000 are to be invested. Other memoranda are sought with other agencies of the national government. It works toward the long-term restructuring described above. To the degree that donors can support the DENR initiative by making the ECC or some reformed EIA/SS process a condition precedent for the release of grant or loan money would facilitate the horizontal and vertical coordination of GOP environmental policy.

National policy should also deal with urban and industrial environmental management at the lower levels as well.

Regional Planning

We conclude that all of the conditions that exist in the national capital also exist in exaggerated form in the regional offices of the DENR (and probably most of the other agencies as well). The situation is typified by poor horizontal coordination both within the agency and with other agencies of the national government as well.

It is clear, however, that vertical relationships with LGU's takes on a much more important role in the regional structure than is true at the center.

We recommend that one or more of the contemplated regional natural resource management plan programs be expanded to explicitly address urban and industrial environmental management issues. The proposal to conduct the planning exercise in Region X seems desirable: doing

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another one in an essentially rural setting in Region II seems a poor choice. We would favor such a planning exercise in some more urbanized setting, such as Cavite, but Metropolitan Cebu would be acceptable.

The objective would be to define the problems confronting the DENR in meeting its obligations under the PSSD at the regional level. All of the multi-disciplinary, inter-governmental level, participatory planning, and the involvement of the business community should be included. The final product should not be a multi-colored map of resources, but a comprehensive document that describes the roles the respective entities will play in achieving environmental management goals in the region.

The lead role for the planning could very well be a unit in the office of the Regional Executive Director (RED) that approximates the Policy and Planning Office in the DENR secretariat. There will have to be a unit that will be able to deal with all of the same specialties and coordinative matters at the regional level that must be met at the national level. This is in the interest of regionalization as well as decentralization.

It will have to be a very bold move because DENR will have to enter substantive areas in which its staff has no prior experience. Land use planning is a case in point. Yet the DENR expertise is mandatory if the ecologically sensitive areas are to be identified and translated into effective local land use plans.

Compliance

It is desirable that compliance regimes be flexible. Policies of this sort will impact most heavily on the workings of the Pollution Adjudication Board. In our view, the Board should be reconstituted as an administrative law panel. The flexible compliance schedules, that recognize the present wide disparities between ambient stream standards and actual ambient water quality and the quality of liquid effluents, would be attached to the discharge permits. Violations would be dealt with by the enforcement officer directly, including the authority to issue cease and desist orders. Appeals from the decisions of the enforcement arm of the Environmental Management Bureau would be made to the PAB.

Training

The restructuring of the EIA/SS outlined above will not require massive amounts of training. Clearly, some attention to training will be required.

We do not share the view that intensive training in EIA/SS methodology which could lead to some sort of licensing of impact assessment specialists is desirable.

Training of Professionals

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Attention should be given to the university curricula. The emphasis should not be upon turning out another specialty called environmental scientist, but upon more generalist training that enables persons to understand diverse points of view and values, is able to synthesize, in classic staff fashion, the pluses and minuses of proposals, from the standpoint of the decision-maker at hand, and to follow through with the decision once made.

There is little question that there is a shortage of a trained pool of people with the skills required in many aspects of urban and industrial environmental management. Some examples are sanitary engineering and resource economics. The former situation will improve markedly if there is a flow of money into the sector and professionals are required to design and build facilities. The supply of the latter has been worrisome for several years. Expansion of the teaching of urban and industrial environmental economics could be shifted to the colleges of business administration. One part of the field is, after all, industrial.

Other disciplinary areas will require only moderate adjustments. By this we mean, for example, that ecologists should realize the value of their discipline in urban and industrial environmental management and the EIA/SS in particular.

Training Technicians

Field personnel will require substantial training in a number of fields. Among them are understanding the chemical substances and manufacturing processes that they are supposed to be regulating. Another field will be the construction and operation of standard planning information systems -- with or without electronic data processing support.

It is also necessary that DENR personnel be trained in the basic skills of urban and regional planning if the EIA/SS process is to successfully integrate the relevant LGUs in achieving the PSSDs objectives.

Other Public and Private Entities

In this area, massive amounts of workshop/seminar type training is recommended. The fact is that the majority of personnel in the planning units of the other national agencies, the regional staffs of the DENR, and the environmental management units in those industries that have them do not understand the environmental planning process.

The training should begin with the outlines of the operational aspects of the EIA/SS and the commitment of the GOP to the PSSD. From that point, the training would be directed at improving understanding of the process and the role of the various disciplines and organizations in fostering economic growth while maintaining the viability of Philippine ecosystems.

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Encourage Private Sector Activities

A major initiative recommended is a system of certified environmental audits. Such a system will require statutory definition and regulations establishing the standards and operations of the system. The parallel is the system employed for accounting audits.

Training

In a general sense, the training support we recommend resembles in some ways the more specific training associated with national agencies and the EIA/SS. This is because making the EIA/SS work deal with nearly all aspects of the human environment. Therefore, training on that aspect will cover nearly all aspects that will be required for more specific training in urban and industrial environmental management. There are two areas of concentration.

Professional

Professional training, as indicated in the discussion of EIA/SS-specific training, should be more concerned with synthesis rather than the development of a new discipline. Two areas are in the most dire need of support.

Environmental Planners and Managers

We have noted that, with the exception of the Institute of Environmental Science and Management in UPLB, the other institutions that offer educational opportunities related to urban and industrial environmental management are concentrated in Metropolitan Manila.

We offer three recommendations.

- o Make Urban and Industrial Environmental Management a Graduate Program - There is no reason to have under-graduate curricula in something called environmental management. The prerequisite skills are the specialties involved in the various aspects of urban and industrial environmental management. Thus, in the fashion of the School of Urban and Regional Planning cited earlier, persons with baccalaureate degrees in any field related to urban and industrial environmental management. Some obvious examples are sanitary engineers, urban planners, and biologists. Some obvious less examples are public health medicine, economics, and sociology.
- o The Curriculum Should Be Broadening Not Narrowing - The basis of the curriculum should be inter-disciplinary seminars where students of varying backgrounds interact with faculty of equally diverse interests. Core curricula would vary with each student: those with no economics would take courses in economics and economists would take courses in ecology, for example.

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Given this focus, the staff of the institution ought to be primarily administrative. The teaching and research faculty would be drawn from other already existing faculties either from within the host institution, say UPD, and from other universities as well. For example, a chemical engineers who is enrolled should be able to take classes in marine biology in UPD and ecology in UPLB.

- o Two Centers Outside Metropolitan Manila Should Be Established - In view of the strong emphasis detected for shifting the basis for urban and industrial environmental management planning and management to the regions, LGUs, and private enterprises, it is clear that more than a single center is needed for training and research in the field. At a minimum, there should be inter-disciplinary urban and industrial environmental management institutions in Visayas and Mindanao.

This recommendation is not intended to exclude strengthening a graduate institution described above in the Metropolitan Manila region. We have no strong preference for its location.

At the outset, there will be a strong need for long- and short-term overseas training opportunities. This is true for both faculties and for students.

Undergraduate Instruction

Our analysis made earlier indicates there is no need for support at the undergraduate level. With a few exceptions, Philippine faculties have a good reputation for balancing intake with expected employment level. We think the Marine Science Institute in UPD is an excellent example of this sort of balance.

When there are solid, long-term employment prospects in any of the urban and industrial environmental management fields, we believe the faculties will respond and more sanitary engineers, epidemiologists, and water chemists will be graduated. There is no reason to tinker with what is essentially a market driven system.

Certified Environmental Auditors

This training is recommended to support the implementation of the certified environmental audit system. It should be made clear: the focus is not upon preparing EIAs. It is upon creating a professional cadre that will work almost entirely within industry.

Basic training would be offered by designated units of the university system. Personnel with training and experience in industrial processes and would be admitted. They would be required to take and pass certification examinations in order to practice.

The basic training would be supplemented by regular refresher courses. Passing the refresher courses would be part of a periodic re-certification procedure.

In-Service Training

In all likelihood, training in this area will pay the largest returns on investment. The training is badly needed in both the public and private sectors.

Public Sector

The training needs for the EMB personnel to operate both the planning/policy aspects and the regulatory aspects of the EIA/SS have been discussed above. In addition, there is a crying need for integrating training for all personnel euphemistically referred to as being part of the Environment and Protected Area Service. This means that all of the personnel in the regional offices and the PENROs should be treated to inter-regional training so that all understand exactly what is required of them, the methods of operation to be employed, and relationships between the field and Manila. This is particularly important as the move toward regionalization and decentralization gains momentum.

It is imperative that the personnel posted to the planning units of the several national agencies receive instruction in the way the EIA/SS system is intended to operate and their specific role in making that system support the PSSD. We believe that this training should be preceded by Cabinet-level endorsement of the training and organization within the several departments, and that the first training should be for the secretariat level in each agency. It is apparent from our surveys that simply placing an environmental unit on an organogram and posting staff does not gain leverage for that staff. Most agency management does not use or rely on the limited environmental expertise they have.

Finally, there is also a dire need for training in urban and industrial environmental management for officials of LGUs. The training would focus upon needs analysis, the role of the comprehensive plan, innovative financing arrangements and the role of the private sector in redeeming the responsibilities currently placed on local governments. To the extent that our recommendation for preparing capital improvement budgets at the local level are accepted, there must be training in how it is done. Equally important will be training for the National Economic and Development Authority staffs supporting the Regional Development Councils in how to interpret and use the capital improvement investment proposals made by the LGUs.

Private Sector

The training needed parallels that identified in the public sector. The training should start with members of top management. Their awareness of the problems and the use of environmental staffs to their advantage is the key to environmentally sensitive industrial behavior.

The next level, assuming the training is accepted by management as important, would involve the environmental management units within each of the manufacturing facilities.

Private Voluntary Organization

It is the intent of the GOP to encourage the participation of citizens in the protection and management of their environment. There are a growing number of organization made up of people committed to environmental conservation.

Urban and industrial environmental management will benefit if the members of private voluntary organizations (PVO) are given training. At first, we recommend training of two kinds. The first is in the area of awareness. The second is in the rudiments of monitoring.

In the first category, leaders and members would be exposed to the types of urban and environmental problems exist and their cause. For example, it would be helpful if the PVO community was aware of the proportion of the liquid and solid waste threat to the coastal environment comes from domestic sources and not industry. They should also be aware of the kinds of materials that industry uses and how to look for the danger signs. "A dirty stack may not be the most dangerous stack" would be the theme.

In the second category, the basics of operating monitoring equipment would be taught. Networks of modestly well trained and equipped citizens can develop a surprising amount of monitoring information. The development of provincial and/or regional standard planning information bases would be the starting point for these data.

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**ANNEX D. DEMOGRAPHIC AND
REGIONAL FRAMEWORK**

**Sustainable Urban and Industrial
Environmental Management Review**

By:

Joshua C. Dickinson

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**ANNEX D. THE GEOGRAPHY OF URBAN-INDUSTRIAL
ENVIRONMENTAL MANAGEMENT**

INTRODUCTION

Why are the people and government of the Philippines concerned about urban and industrial pollution? Urbanization and industrialization are inextricably linked, vital elements of Philippine development. Of immediate concern is the impact of pollution on human health and productivity, and secondly the impact on ecosystems (primarily aquatic) that provide food and support an important component of the tourism industry. Third in the order of concern is the visual and olfactory impact of pollution - mostly trash, smoke and smells - on people's aesthetic sensibilities and thus their quality of life. Success in the first two areas above will resolve many of the aesthetic problems - We don't expect the project will be promoting anti-littering jingles.

Is pollution inevitable? Yes, as long as the Second Law of Thermodynamics remains valid, i.e. as long as energy is consumed, humans continue to metabolize wastes, industries produce unusable residuals and things wear out. Can the problems of pollution be solved? Partially yes, but at a considerable cost associated with education, changes in human behavior, changes in industrial processes, treatment facilities and planning of the distribution of population and industry. Failure to implement policies and actions to curb run-away pollution would be a serious mistake, by both government and industry. Such a failure would (a) be seen by the public as condoning human suffering, (b) augment environment versus development, anti-industry sentiments, and (c) damage the investment climate of the Philippines.

Is urban growth inevitable? Yes, if indeed the Philippines are developing they will join the developed world via a rapid rural-urban demographic transition accompanied by industrialization. In contrast to rural areas, the city constitutes an information and opportunity "rich" environment with DeSoto's underground economies; its complex interpersonal and media networks; and tips on employment, birth control, location of "squattable" land or how to tap into water and electrical lines.(1) A major paradigm shift may be afoot in which we no longer see as goal of rural development the slowing of rural-urban migration. Rather, we may find that both the conservation of biological diversity and human well-being will be served by making cities a more attractive habitat for humanity. A co-financed urban and industrial environmental management project constitutes a major step toward making Philippine cities more productive and habitable.

From a demographic perspective, the following questions will be addressed in subsequent sections:

1. Who suffers from pollution?
2. Who benefits from pollution abatement?
3. How do population numbers, gender, growth rate and distribution relate to pollution?

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Rationale for Choice

Where to focus the scarce resources of the U.S. Agency for International Development Mission to the Philippines (USAID/P) - on all urban areas, on Metropolitan Manila or on selected secondary cities - has been discussed at length. The recommendation is made to focus on selected secondary cities based on the following considerations:

- o There are some 60 "Charter Cities" in the Philippines.(2) To address such a large number of cities would result in a highly diffuse impact. Many of the cities have common problems. Needed are broadly applicable and innovative approaches to public/private sector collaboration, policies and procedures that favor problem solving and adaptive technology transfer. Solutions can best be developed with an intensive focus on a manageable number of representative cities.
- o Exclusive focus on Metropolitan Manila would also result in the absorption of limited funds in addressing an immense problem without the hope of producing clear, replicable results. Solutions to Manila's problems would apply most readily to another primate city like Tokyo rather than Cagayan de Oro. Such an effort would be contrary to USAID/P Philippines Assistance Strategy Statement, 1991-1995 which emphasizes support for decentralization of government resources.(3) In addition, major national and donor resources are already focused on Metropolitan Manila.(4) In Manila an estimated 81 percent of the population has running water, while only 24 percent of urban residents of Mindanao have running water.(5)
- o Focus on some five representative cities will allow the demonstration of significant human benefits on the scale of an entire city, particularly if co-financing with Asian Development Bank (ADB) becomes a reality. The vertically integrated approach to selected cities offers clear opportunities for direct private and public sector involvement in environmental management. Policies implemented can reflect participation and consensus by those affected; both industry and the public at the local (Barangay) level. Strengthened regional offices, such as those of the Department of Environmental and Natural Resources (DENR), can become credible supporters of planning decisions as well as effective enforcers of regulations.

Secondary or intermediate-sized cities offer a number of advantages as the focus of urban investment. These include lower per capita cost of service delivery, relief of growth pressure on primate cities, and decentralization of development services benefiting not only the urban population but rural hinterlands as well.(6)

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CHAPTER D.1. SECONDARY CITIES: CURRENT SITUATION

Demographic Context

The official May 1, 1990 population estimate for the Philippines is 60,684,887.(7) Overall density of 196 persons per square kilometer is more than double that of either Malaysia or Indonesia. Population growth rates are said to be in transition towards a slower rate of growth, but at a pace too slow for economic growth to support.(8) This rate of growth in excess of 2.3 percent per year can be traced in part to the lack of an aggressive population limitation program at the national level.(9)

Rapid urbanization is a fact in the Philippines - population growth rate of cities (3.88 percent) exceeds the natural increase of 2.48 percent (1988 estimate) in virtually all cities, in some by more than double that rate.(10) While urban growth is exacerbated by the lack of effective national commitment to birth control, a rural-urban population shift is expected to continue even at the lowest projected rate of natural increase. On a broader developing country scale, only a small percentage of the expected increase in population over the next twenty years is expected to occur in rural areas. Asia's urban population comprised 28.6 percent of the total in 1985; the urban share is expected to rise to 45 percent by 2010.(11)

Overview of Urban Problems

Who suffers from pollution?

It is a basic assumption that the urban poor and the rural poor who migrate to the cities are the most directly and severely affected by the lack of clean water and waste treatment. However, the poor suffer from a lot of things, not just pollution. The first step is to look at the macro-geography of poverty, then home in on who among the poor are most likely to suffer from pollution.

Poverty

Where is urban poverty most concentrated? Rapid growth brings with it an accentuated level of human suffering due to the inability of the public or private sector to keep up with the need for basic services.(11) Concentration of population, commerce and industry in cities inevitably leads to competition for space and high land costs.(12) Metropolitan Manila is fortunate to have the lowest percentage of poor, 43.9 percent. Other urban areas are relatively worse off as shown in Table 1. That Manila is relatively better off is hardly a surprise given the concentration of urban capital investment there.

Table 1. Urban Poverty Levels, Selected Cities

<u>Region</u>	<u>Urban Areas</u>	<u>Urban Poor (%)</u>
Region VII	(Including Metropolitan Cebu)	60.7%
Region VIII	(Including Ormoc)	69.4%
Region X	(Including Cagayan de Oro)	54.9%
Region XI	(Including Davao and General Santos)	60.3%
Region XII	(Including Iligan)	66.5%

Source: NSCB. 1990. 1990 Philippines Statistical Yearbook.

Squatters

Of the poor in Metropolitan Manila, over three quarters are squatters, or 2.5 million people! The existing urban poor population is joined by a stream of migrants, predominantly poor, many of them in densely populated squatter settlements with minimal services. Everywhere that squatters settle is of course illegal, often inconvenient for the delivery of services (steep slopes and at the urban periphery for example), and in some cases inherently unhealthy as in the case of settlement crowded along refuse-clogged drainage ways and in mangrove swamps.

We cannot assume that all cities have the same proportion of squatters as Metropolitan Manila. However, given that provincial cities tend to be growing more rapidly than Manila, that urban land tenure is similar everywhere and that survival strategies of the poor are similar; we may assume that there exists a significant number of squatters in our sample of cities. This is of interest because, of the poor, the squatter as an illegal occupier of the land has little call on urban authorities to legitimize the family's rights to the land by extending urban services. A caution - squatting refers only to the legal status of the persons involved, not necessarily to the quality of housing, the services enjoyed or to the length of time the family has occupied a particular site. People of older squatter settlements tend to bootstrap themselves into relatively better conditions. Incremental capital improvements over time may lead the occupant to opt for staying rather than moving.(1) Extension of urban services and de facto recognition of legitimacy reinforces the tendency for families to stay put, even though topography and drainage make the site inherently inappropriate for residential use. Some "professional squatters" according to Ramos are reputed to be owners of apartments and classy eateries.(14)

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Disease, Water and Pollution

Various diseases are closely linked to poverty and associated conditions (both rural and urban), including low levels of educational attainment, failure to receive immunizations, under and malnutrition, crowding, poor ventilation or exposure, and living in close association with disease vectors. Other diseases that have been more closely associated with rural poverty, such as malaria, dengue and schistosomiasis, are now becoming more common in urban areas.(15) Pollution related diseases are most often associated with contaminated water, either drinking water or water contaminated by inadequately treated wastewater in the vicinity of the home. The probability of pollution related infection is exacerbated by lack of sanitary facilities, insufficient water for washing, poor knowledge of hygiene and living in areas with poor drainage and subject to frequent flooding. Diarrhea, dysentery and infectious hepatitis are among the most common diseases associated with water pollution. Diarrhea is the second largest and growing cause of morbidity.(9) More than half those afflicted with diarrheal diseases are children in the 0 to 4 year old range.

It is not coincidental that the number of people not served by public water supplies in provincial cities [55 percent(9)], or who lack regular sanitation facilities [56 percent(2)], is almost identical to the percentage of urban poor (see Table 1). Waterborne diseases traceable to poor sanitation are second only to respiratory ailments among the burdens of being poor, in both urban and rural areas. Investments in urban sanitation involve off-the-shelf technology, potential for sweat equity participation by beneficiaries and a very short term wait for benefits. Yet water supply and sewerage have never accounted for more than 6 percent of World Bank lending for urban and rural projects combined.(1)

Solid Waste

Solid waste represents both a resource and a hazard to the urban poor. A significant number of the urban poor (organized by the not-so-poor) are involved in a massive solid waste recycling business. The human health hazards posed by solid wastes are:

- o The habitats created for disease vectors such as rats and other organisms which proliferate in un-recycled or un-collected solid wastes.
- o The flooding of low-lying settlements exacerbated by garbage clogged drainage ways.
- o The potential poisoning and infection of solid waste gleaners by toxic industrial wastes and septic hospital wastes.

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Air Pollution

The heavy concentration of vehicular traffic and industry in Metropolitan Manila generates a variety of combustion byproducts. The contribution of these pollutants to respiratory distress has not been documented. Much more so than water-borne diseases, air pollution related illnesses tend to be more democratically distributed over the socioeconomic spectrum of the urban population. It can be assumed, however, that jeepney drivers, street vendors and traffic police will be among those more heavily exposed relative to those who are airconditioned during most of their lives. It is assumed that vehicular/industrial air pollution is a relatively minor contribution to health problems in provincial cities.

Of potentially greater concern is the air pollution occurring inside the houses of the urban poor due to the incomplete combustion of firewood. Large stacks of firewood were ubiquitous in the cities visited in Mindanao. The ability of the urban population to outbid the rural poor for firewood assures a continuing flow, often from considerable distances. The health effects on women and to some extent on small children has not been definitively documented. It is an assumption that in-house air pollution is more detrimental to health and well-being than vehicular and industrial air pollution in provincial cities. However, it is a political reality that neighborhoods dusted by a cement plant will attract far more attention than 50 thousand smokey stoves.

WHERE?

Where are people relative to services, relative to swamps and drainage ways? Where are industries relative prevailing winds, relative to residential areas? Such geographical questions are addressed with variable success in developed countries via land use planning, zoning and permitting, and taxation policies. In developing countries, including the Philippines, highly centralized government has been overwhelmed by the rapidity of the urbanization process, by special interests, and by the lack of policies and trained personnel to guide sustainable urban-industrial development. Aggregated data on pollution, disease, access to services, poverty levels, housing and gender are of limited utility when trying to define problems and opportunities in Metropolitan Cebu or Davao City.

CHAPTER D.2. A SAMPLING OF CITIES

A description of the cities visited during a brief reconnaissance reveals their particular characteristics of potential interest in the selection of representative sites for project implementation (See Map). In the majority of the cases, the cities have been the focus of other complementary USAID activities and current or proposed activities by other donors. The five are presented below

Metropolitan Cebu, Cebu, Region VII

Metropolitan Cebu is a large commercial region of a million inhabitants with many small and relatively few large industries; incipient water supply problems requiring attention to recharge area protection and possible impoundment; and potential conflicts among competing uses of coastal resources, including urban-industrial growth, port operation and tourism on the west side of Mactan Island. The Director of the Metropolitan Cebu Development Project and his cousins the Mayor and the Governor, are all committed to the sustainable development of the Metropolitan region.

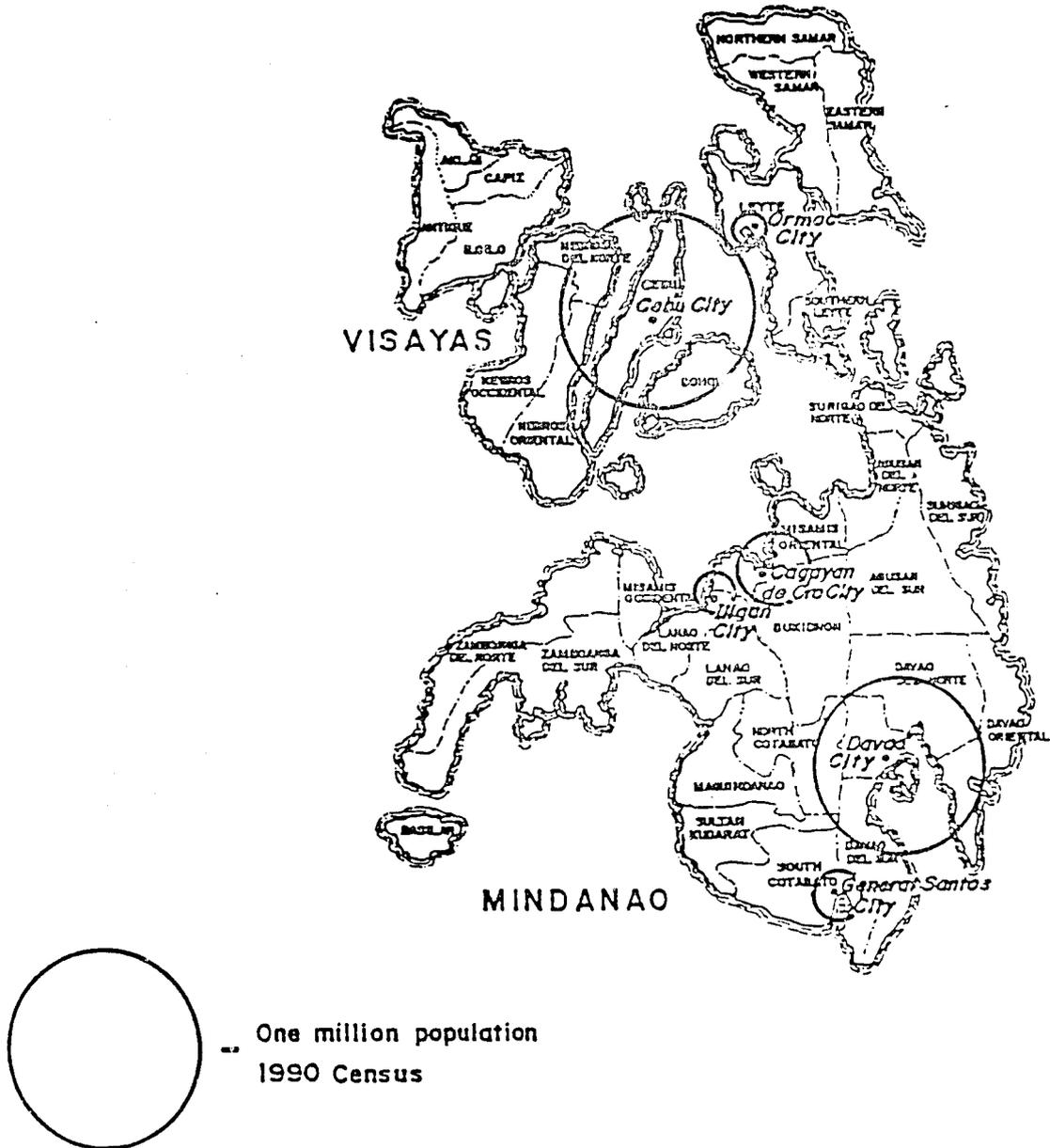
Ormoc City, Leyte, Region VIII

Two major industries - the PHILPHOS phosphate fertilizer plant and PASAR copper smelter have been located on a point surrounded on three sides by the sea. The urban population of the area remains small, some 130 thousand people, and is closely linked to industrial employment. The siting of these industrial facilities provide an object lesson in how location can affect (both positively and negatively) the options available for residuals management. Conflicts have arisen over whether or not industry should have zoned areas where pollution standards are lower than areas zoned for residential or fishing uses. There is a strong private sector interest in negotiating modus vivendi with fishermen, DENR and NGOs.

Cagayan de Oro City, Mindanao, Region X and Iligan City, Mindanao Region XII

Cagayan de Oro and Iligan are linked by a corridor that has been a major focus for settlement and the establishment of large and small industries since the Maria Christina Falls hydroelectric project was built. The corridor population exceeds a half million. Urban, industrial and agricultural land uses are guided by no discernable regulatory process. Fishermen are concerned that industry is negatively affecting coastal resources.

Figure D.1. REPRESENTATIVE CITIES



United States Agency for International Development
Manila, Philippines

TR&D, Inc.

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Davao City, Mindanao, Region XI

This growing urban area of over 850 thousand inhabitants has grown in midst of a major are of agroindustrial development and mining activities. Davao and Cagayan de Oro were the leading commercial centers of Mindanao two decades ago.(16) The area is currently blest by abundant freshwater resources. High rates of localized groundwater withdrawal for agriculture and urban use, coupled with contamination from agricultural chemicals, toxic mine tailings and urban waste discharges threaten the entire water resource including valuable coastal mangrove and reef-based fisheries resources and brackish water aquaculture operations.

General Santos City, Mindanao, Region XI

General Santos is the most distant city in the Philippines from the National Capital in Manila, a factor that perhaps has contributed to its neglect in terms of investments in planning and infrastructure. Growth of a large city within the confines of a bay such as Sarangani Bay represents a real pollution hazard to its people and those in neighboring communities if wastes are not effectively managed. To date unplanned growth has prevailed. However, the current Mayor is vitally interested in environmental management.

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CHAPTER D.3. RESEARCH, INFORMATION AND TECHNICAL ASSISTANCE

Project Elements

The core elements of this project are people and industry and their linkages to air, water, wastewater and solid waste. These linkages can be positive as in the case of drinking water, or negative as in the case of disease organisms in water. In a particular city each element has a unique spatial pattern of distribution. Interactions among elements will be similar but vary greatly in importance and magnitude. Some of these interactions are shown in Figure D.2.

Information Management

An urban and industrial environmental management project carried out at the level of specific cities will require a wide range of biophysical, demographic and technical data. This will require both the disaggregation of existing data and the generation of a large amount of new information. It will be important for analysis to be able to recall and display information from disparate sources at the same scale. For example, a multivariate analysis of the incidence of waterborne diseases may require data from census districts, special surveys, well samples and topographic maps - all at the same scale. This can be accomplished most effectively through the use of a computerized Geographic Information System (GIS). It is important to note that the capability to analyze remote sensing imagery is not needed. This implies significant cost savings.

A GIS strongly supports the decentralization of decision making by providing a local repository of critical information that can be easily accessed and updated. The GIS can be replicated in the offices of several institutions, allowing the rapid and widespread sharing of information.

Baseline Data Generation

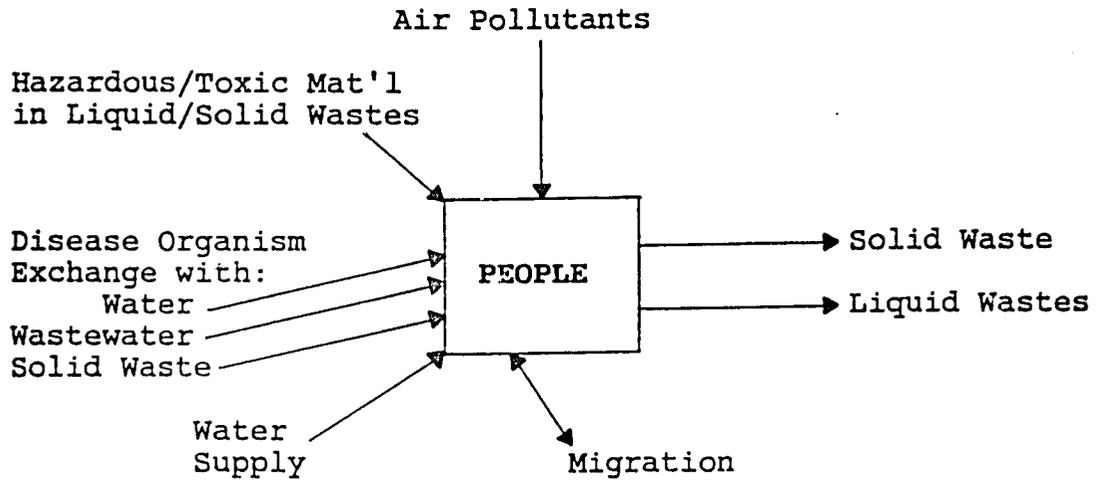
Geography of human Well-being

This activity provides baseline data about people that is critical to the design and implementation of environmental management activities. Types of data include:

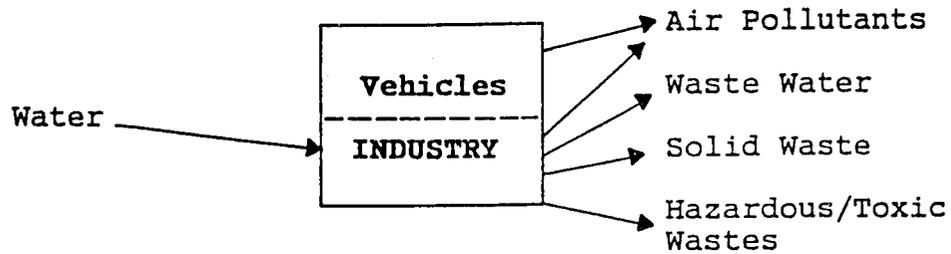
- o Population: Determine and map disaggregated data on population numbers, density and age structure

Figure D.2. Selected interactions among components of an urban-industrial system

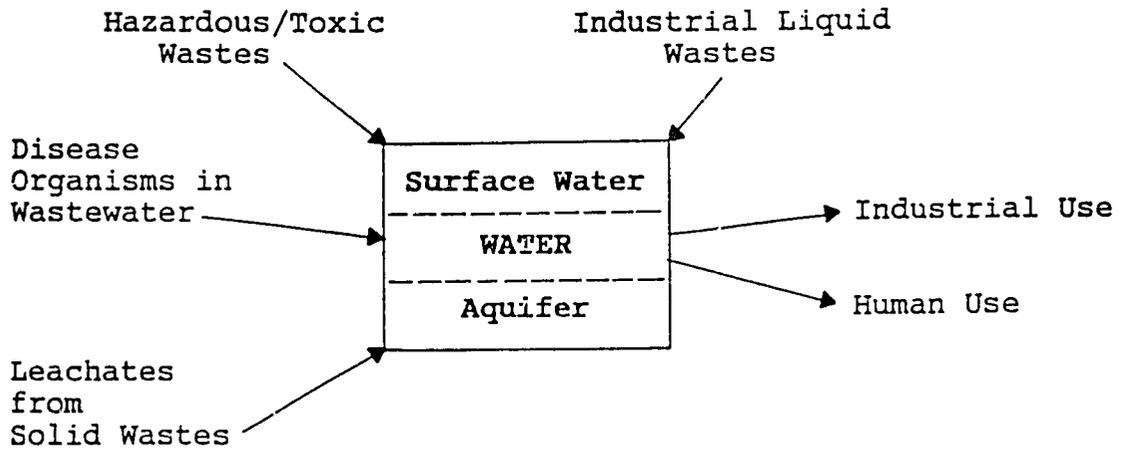
(A) People



(B) Industry



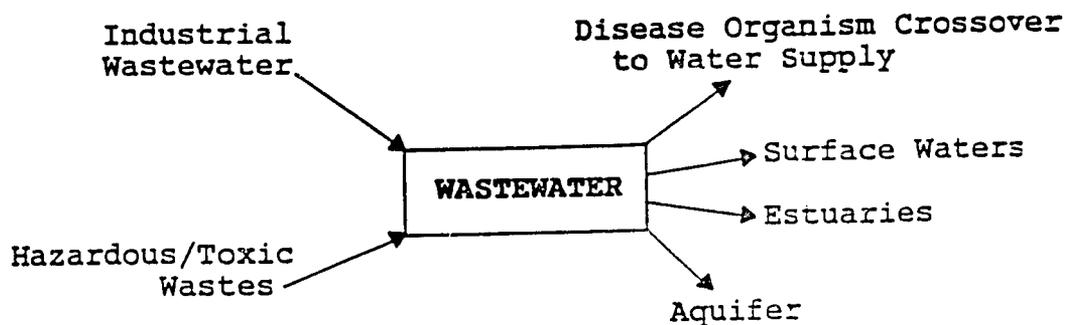
(C) Water



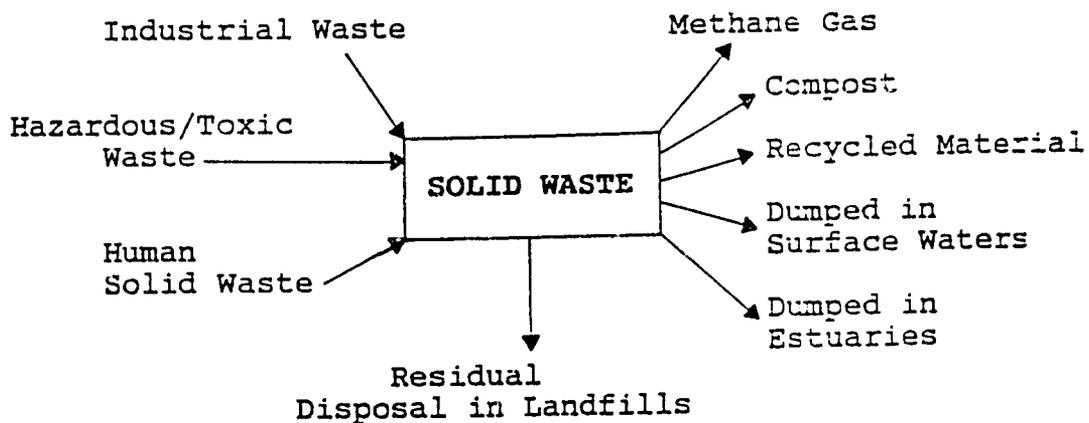
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Figure D.2 (continued)

(D) Wastewater



(E) Solid Waste



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- o Income: Determine the household income considered to represent poverty level
- o Housing: Identify the housing types/construction materials most likely to represent the marginal population that is most vulnerable sanitation related to health problems
- o Waste: Type of waste disposal - sewerage system, privy, etc. and solid waste collection system employed
- o Water: Sources of potable water - surface and subsurface; community supply, private well, communal faucet or delivered containers
- o Health: Incidence of pollution related diseases such as gastro-intestinal ailments, respiratory ailments, effects of hazardous and toxic wastes

These data lend themselves to incorporation into a GIS.

Industrial and Medical Wastes

All significant point sources of hazardous and toxic wastes should be mapped. Field sampling and dispersal modelling should be used to assess the pattern, magnitude and rate of movement of such wastes in the air, soil and/or water and the danger represented. For hazardous/toxic solid wastes, information on the history and locations of disposal should be gathered. Medical wastes represent a special case meriting the same action. Sources of hazardous toxic/medical wastes are relatively few in number, easy to identify, and solutions to the dangers posed relatively straight forward. Precise mapping within the GIS framework of hazardous waste dump sites, contaminated groundwater or areas downwind of pollutant plumes can be a valuable aid to land use planners. Workers in the solid waste resource recovery business would be the immediate beneficiaries.

Groundwater

Heavy dependence on groundwater for urban, industrial and agricultural uses indicates the need to give high priority to baseline aquifer characterization. More than half of the people of provincial cities draw on a water resource about which authorities know nothing as to its quality, rate of withdrawal or even the location of wells. Threats to this vital resource include unsustainable rates of withdrawal, saltwater intrusion, reduction of recharge due to land use changes, contamination of recharge areas and well fields by agricultural chemicals, and contamination of urban groundwater by wastewater and solid waste leachates.

Again, knowing where problems are as well as their nature and magnitude is essential to city decisionmakers as they assume local control over their future.

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Urban Land Capability Assessment

A recent study in Bangkok, Thailand revealed that 65 percent of actual land uses were inappropriate to the particular site.(17) Given the uncontrolled growth of provincial cities in the Philippines one can assume that similar levels of conflict exist. Two types of conflict are common. First is the use inappropriate to site conditions such as drainage or slope stability and the second type of conflict occurs when adjacent uses are incompatible or services unavailable. Conflictive land use can be a threat to health and safety as well as invariably inefficient and costly. Land use planning should be based on a thorough assessment of land capability taking into special consideration the need to maintain fragile coastal ecosystems, competing resource demands (especially water), need of the poor for affordable housing sites and the need for efficient service networks.

Human Needs Assessment

Rehashing national statistics, even if they are disaggregated, is not going to yield the information about people at the scale needed to design and implement water supply and waste management projects. Needed is an understanding of the formal and informal communication networks; the kinship systems, cooperatives and social clubs that link poor neighborhoods. Participation by grassroots organizations will allow local people to articulate their priorities and willingness to participate. Effective communication must be sustained between community groups and local government agencies responsible for adapting innovative engineering solutions to local projects.(18) Project implementation will need to be paralleled by a broad spectrum of training - from treatment plant operators to paratechnicians providing hygiene instruction. It will be found that women and women's groups in assuring that maximum benefit from projects is derived, especially those with health and sanitation elements.

CHAPTER D.4. CONCLUSIONS AND RECOMMENDATIONS

Baseline Data Collection

Baseline data are essential to planning. We need to know how much there is, where it is and what is the direction and rate of change in its magnitude. This applies to mangroves, diarrhea cases, open pit latrines and mercury. Data costs money. An urban and industrial environmental management project team should (a) establish a conceptual model of the urban system it seeks to manage as the basis for determining what data to gather (b) quantify the model, dropping data sets that don't help answer questions, and (c) establish a Geographic Information System as a tool for data management and analysis.

Recognize All Segment of Commercial Sector

The executives of the cement plant and department store may very well be members of the Chamber of Commerce and Industry while the executives of the waste gleaning and icecream pushcart fleet are not. Both groups are, however, major employers, contributors to the economy, and an integral part of the waste management problem and solution.

Participating Community Planning

The most cost effective approach to providing water/wastewater services is to anticipate needs and provide them where planning indicates is appropriate. If solid communications through formal and informal channels are maintained with people - needs can be anticipated and the location and timing of services accepted. The same strategy applies to the industrial sector.

Resettle Inhabitants of Key Urban Areas

Resettlement of people located in hazardous and/or difficult and costly to serve sites should be approached cautiously. Any resettlement should be based on community consensus and timely availability of viable alternatives, not simply eviction.

Water Resources Inventories

Thorough knowledge of the water resource and its quality is essential to urban environmental management.(19) The water resource concept encompasses:

- o Its ecological functions of water in impoundments, rivers and estuaries
- o Its use for human consumption
- o Its use as a domestic and industrial solvent

- Its use for removal and treatment/dilution of domestic and industrial wastes

The hydrological component of a planning model and GIS data set should encompass:

- Precipitation and its variability,
- Aquifer recharge, storage, withdrawal and contamination,
- Specific attention to saltwater intrusion, and
- The capacity of aquatic ecosystems to absorb wastes and the effect of wastes on their ability to provide food and other services.

Begin Social Assessments at Barangay Level

In each pilot activity, the social and political assessment should begin and end at the Barangay level. These geographic units should be mapped in the GIS format to permit correlation of information such as drainage, water and sanitary service level, and disease incidence. It will be through the Barangay structure that projects involving community participation will likely be implemented.

Consider Impacts on Women

Project activities in water supply and waste management can be expected to have major positive impacts on women. Less time spent fetching water will release productive time and energy for other activities. The degree of health benefit to be derived from clean water and waste removal will depend largely on the hygiene training received by women, and through them their children.

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ANNEX E. ECONOMIC FRAMEWORK

**Sustainable Urban and Industrial
Environmental Management Review**

By:

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with assistance from
Marvin Feldman**

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ANNEX E. ECONOMIC FRAMEWORK

CHAPTER E.1. OVERVIEW OF ECONOMIC CONDITIONS

Introduction

This annex presents an overview of economic policy and factors that have to be considered in the sustainable management of the Philippines' urban and industrial environment. Chapter E.1 discusses recent trends in the Philippine economy. Chapter E.2 focuses on the industrial sector, its structure and contribution to the macroeconomy. It also provides a broad picture of the urban sector. Chapter E.3 examines the policy and economic context of urban and industrial environmental management in the Philippines. Chapter E.4 discusses constraints, issues and opportunities for sustainably managing the urban and industrial environment. Chapter E.5 presents some recommendations for residuals management in the industrial sector.

There is a need to understand the importance of economic factors in defining the context of household and firm level decisions with respect to the generation, management, and discharge of residuals if the factors are to be recognized in the design of appropriate intervention strategies for managing the urban and industrial environment.

The quality of the environment in the country's urban and industrial sectors is, in large measure, linked to the structure and performance of the macroeconomy. The Philippine's continuing problem with foreign debt, accelerating inflation, high interest rates and reduced over-all growth affect the capacity of both the public and private sectors to undertake investments in environmental management. They also constrain the public sector's ability to address pressing socio-economic and institutional issues that significantly contribute to the deterioration of environmental quality in urban and industrial areas.

At the same time, rapid population growth, widespread poverty and inequality, persistent rural-urban income disparities, and continuing migration to urban and industrial centers are overwhelming already overburdened social services and infrastructure. Their effects are manifested in rapid urbanization, mushrooming slum communities, and increasing abuse of the natural environment by uncontrolled waste disposal.

Costs of Environmental Pollution

A significant portion of the impact of environmental pollution is borne by individuals in the form of diminished quality of life. Although the costs of environmental pollution are not readily quantifiable, they represent significant costs in terms of their effects on human health, the natural environment, property and materials, and over-all economic activity.

The full impact of pollution on human health cannot be ascertained without knowledge of the nature of pollutants, where they are, who are exposed to them, and what are their effects.

However, a rough indicator of the health impact of pollution is the incidence of diarrheal diseases which are strongly associated with unsafe drinking water. Diarrhea is ranked second among the ten leading causes of morbidity in the Philippines. In 1986, the incidence rate of diarrhea was 990 per 100,000 population. Over the period 1981-1985, the number of reported diarrheal cases increased by 3.2 percent (1).

Pollutants discharged to the natural environment affect flora and fauna to varying degrees. These ecosystemic effects, in turn, can have significant impacts on productivity and long term sustainability of economic processes depending on the affected ecosystems. For example, water pollution has significant impact on fishing productivity. A study on alternative methods of wastewater disposal from the Tongonan Geothermal Power Plant in Leyte placed the value of annual loss of fishery in the Camotes Sea and Ormoc Bay to be in the order of ₱ 11.4 million in 1980. Its present value over a 30-year period at a discount rate of 15 percent was estimated to be over ₱ 56 million.

Pollution also impacts materials and property. These are manifested in terms of reduced property value and increased maintenance costs of buildings and structures. The cost of pollution also includes direct damage or loss of property. In the case of pollution from mine wastes and tailings, total value of damages to crops, land and property were estimated at almost ₱ 3 million in 1979-80 and about ₱ 96,000 in constant 1978 prices (2).

Losses in the tourism industry are another important casualty of urban-industrial pollution. The sight of uncollected garbage, squatters lining the streets, dirty air from vehicles and industrial emissions, and suspect water quality turn away prospective recreation visitors to the country. It is the Government of the Republic of the Philippines (GOP) policy to promote abroad the Philippines as a tourist destination and to provide and encourage investment in tourism infrastructure and services. However, without an aggressive campaign to clean up and to protect the environment, tourism can be expected to remain a relatively minor earner of foreign exchange.

The Philippine Economy

Clarification of Sectors

The following sections review the structure and recent performance of the Philippine economy. The contribution of the economic sectors, agriculture, forestry and fishery, manufacturing, and service, are also discussed. First, however, a clarification of the economic sectors is in order.

The distinctions among what are the agriculture, fishing, and forestry industry, and services sectors is not always clearcut. Activities commonly thought of as being part of forestry, for example, pulp and paper, wood and cork processing, are classified under industry – specifically, under manufacturing – rather than under forestry.

The agriculture, forestry and fishery sector includes only basic production of agricultural crops, livestock, poultry, fish, and timber. The industrial sector, on the other hand, includes mining and

quarrying, manufacturing, construction, and utilities. Note that manufacturing is only one component of industry. Mining and quarrying activities constitute a separate subsector; however, the processing of coal and petroleum, for example, are classified under manufacturing. Finally, the service sector consists of transportation, trade, finance and housing, private services and government services.

It must be noted that residuals which may end up polluting the environment are generated at each stage from basic production or extraction to final consumption of the finished product, not just during the manufacturing process. Even the service sector can be a major source of pollution through the waste it generates from use of intermediate products.

From the standpoint of residuals management, each step along the way from basic production to final consumption has to be considered. The following discussion, however, can only provide a broad, aggregated picture, a glimpse of the context within which economic activities occur and, in the process, generate residuals. The level of production can be a crude indicator of associated waste generation under the current state of technology. Because the figures only indicate broad patterns, they have to be interpreted with caution.

Structure of Production and Expenditures

Almost 40 percent of total domestic output is generated in the service sector. Industry contributes about 33 percent to gross domestic product, and agriculture, fishing and forestry contribute the remaining 27 percent (Table E.1).

In 1989, gross domestic product (GDP) was ₱ 964 billion in current prices or ₱ 107.14 billion in real (1972 prices) terms (Table E.2). Of this total domestic output, 17 percent went to gross investment in the country's capital stock. For the first time since 1986, the rate of investment exceeded the savings rate, calculated at 16.67 percent in 1989.

Consumption expenditures account for the major portion of total expenditures. In 1989, consumption represented over 80 percent of expenditures on GDP. Exports and imports accounted for roughly 25 percent and 26 percent, respectively.

The average debt to gross national product (GNP) ratio for the period 1986-1988 was about 83 percent (Table E.3). From 25 to 30 percent of total export earnings are channeled to debt service. In 1989, the debt service ratio of 25.02 percent was the lowest since 1986. About a quarter of each peso the country generates from export is used to pay for interest on the country's debt. This represents a substantial drain of the country's resource, funds that could have been used domestically.

Inflation and Real Interest Rates

From 1986 to 1989, the average annual inflation rate was only 4.43 percent (Table E.4). In 1989, the rate of inflation hit double digits. The 10.60 percent inflation rate experienced in 1989

continued into 1990 when the inflation rate was estimated at 12.52 percent. Minimum wage increases, oil price hikes and consequent adjustments in electricity and water rates were the major causes of the jump in inflation. Supply bottlenecks due to bad weather and distribution problems following the 1990 earthquake also contributed to increasing prices (1). More recent estimates place inflation rate at 18.3 percent in February 1991 (2).

Rising inflation along with persistent and widening government budgetary deficits raised nominal interest rates. In order to contain inflation, the GOP adopted a contractionary monetary policy towards the end of 1989. As a result of a tight monetary situation, nominal interest rates increased substantially. In April 1990, the interest rate on Treasury Bills reached 25.2 percent.

Real interest rates, however, grew at a more steady pace. Real interest rates averaged 9.10 percent from 1986 to 1988. The

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Table E.1. Sectoral distribution of real GDP 1988, 1989 and 1989 and 1990-1992, in 1972 prices (in percent)

Sector	1988	1989	1990 - 1992 ^a	
			Low	High
Agriculture, Fishing and Forestry	27.4	27.0	27.1	26.8
Industry	32.8	33.2	33.1	33.5
Mining and Quarrying	1.6	1.5	1.3	1.4
Manufacturing	24.9	25.1	24.9	25.0
Construction	4.3	4.6	4.7	5.1
Utilities	2.0	2.0	2.1	2.1
Services	39.8	39.8	39.8	39.6
Gross Domestic Product	100.0	100.0	100.0	100.0

^a Target annual average shares

Source: NEDA. 1989 Annual Report.

Table E.2 Real GDP, savings and investment rates, 1986-1992.

Year	Real GDP (1972= 100)	Domestic Saving Rate	Rate of Gross Capital Formation
1986	91.18	17.98	11.09
1987	95.37	16.97	14.23
1988	101.45	17.15	15.70
1989	107.14	16.67	17.06
1990 (estimated)	109.80	13.92	16.89
1991 (Projected)	112.24	12.20	16.90
1992 (Projected)	116.78	11.22	17.04

Adapted from: Yap, J.T. 1991.

Table E.3 Debt-service ratio, debt to GNP ratio, 1986-1989

<u>Year</u>	<u>Debt-Service Ratio</u> <u>(%)</u>
1986	34.00
1987	32.80
1988	28.20
1989	25.20
	<u>Debt to GNP Ratio</u>
Average 1986-1988	83.02
1989	62.44

Source: Adapted from Yap, 1991.

Table E.4 Inflation and interest rates.

<u>Period</u>	<u>Inflation Rate</u>	<u>Real Interest Rate</u>
Average 1986-1988	4.43	9.10
1989	10.60	8.73
Projected 1990	12.52	10.35

Source of Basic Data: Central Bank, National Statistics
Coordination Board.

Adapted from: Yap, J.T. 1991.

inflationary situation in 1989 reduced the real interest rate to 8.73. In 1990, the tight monetary situation was projected to lead to real interest rates of about 10.4 percent.

Over-all Economic Growth and Employment

After posting negative growth rates in 1984 and 1985, the Philippines' GNP has registered positive growth since 1986. From 1986 to 1989, GNP in real terms grew at an average annual rate of 5 percent (Figure E.1) (3).

In 1989, double digit inflation (10.6 percent) slowed down economic growth.

In 1990, real GNP grew only at the rate of 3.4 percent (3). This reduced growth rate was attributed to supply side shocks, notably, the drought which reduced agricultural output, and power outages which disrupted industrial output. Political uncertainties engendered by the 1989 coup attempt also affected GNP growth.

The high rate of unemployment is a major problem in the Philippine economy. About one-fifth of the population is unemployed (Table E.5). The 19.5 percent unemployment rate in 1989 remained high although lower than the almost 23 percent rate registered in 1986. In 1990, the unemployment rate increased to 20.43 percent.

Table E.5 Unemployment rate and wages, 1986-1990.

<u>Year</u>	<u>Unemployment Rate ^a</u>	<u>Wage Index (1972=100) ^b</u>
1986	22.78	312.65
1987	21.40	319.17
1988	20.02	379.75
1989	19.54	453.97
1990	20.43	492.70

^a Full time equivalent

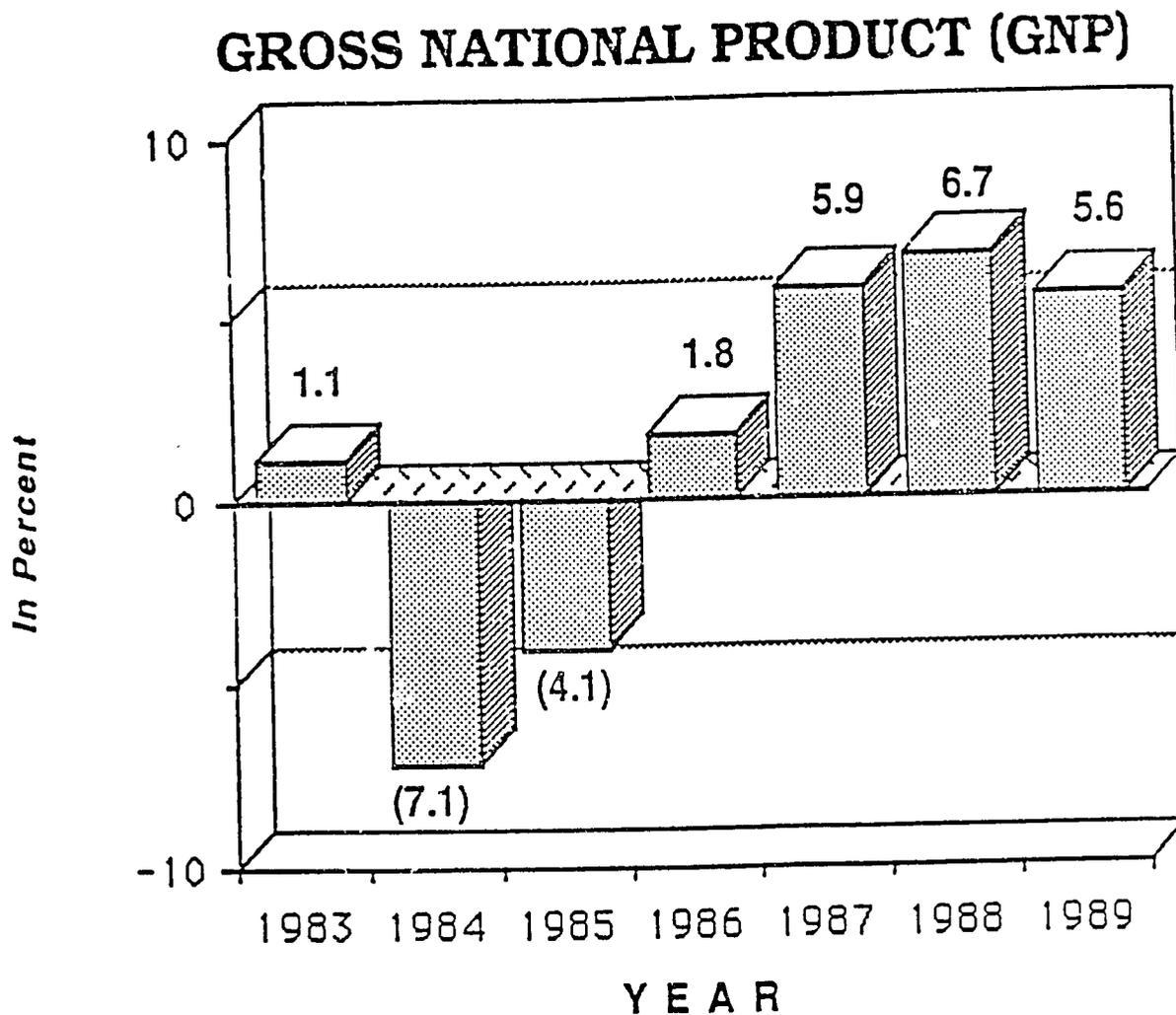
^b Based on rate of unskilled labor.

Adapted from: Yap, J.T. 1991.

Among the major sectors, the agriculture, forestry and fishery sectors provide the main employment for Philippine labor (Table E.6). Of the 21.8 million individuals employed in January 1990, about 45 percent were employed in this sector compared to 40 percent employment in the service sector and 16 percent employment in industry.

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Figure E.1. Annual Growth Rate of Real Gross National Product, 1983-1989



Source: NEDA 1989 Annual Report

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Table E.6. Employment by major industry group
(as of January 1990)

Industry	Number (in 000)	Percent
Agricultural, fishing & forestry	9,750	44.62
Industry	3,491	15.98
Mining and quarrying	139	0.64
Manufacturing	2,309	10.57
Electricity, gas and water	84	0.38
Construction	959	4.39
Services	8,643	39.56
Wholesale & retail trade	3,188	14.59
Transport, storage and comm.	1,062	4.86
Financing, insurance, real estate, and business services	410	1.88
Community, social and personal services	3,983	18.23
Industry not adequately defined as reported	16	0.07
Total	21,849	100.00

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Natural Resource-Based Production

Natural resource-based production is an important component of the Philippine economy. The combined share of forestry, mining and fishery represented about 14 percent of total output in 1988. Gross value added in resource-based manufacturing during the same year was estimated at about 24 percent of GNP. In 1987, almost 49 percent of total employment was in resource-based industries. In some regions, the share of resource-based industrial employment exceeded 60 percent.

Agribusiness

The agribusiness sector includes the farmers-producers producing the food and fiber commodities and the off-farm market services made up of input supplies, processor-wholesales-distributors and retailers.

This important component of the Philippine economy cuts across the traditionally defined sector.

Special note has to be taken of agribusiness because of its large contribution to the economy. The agribusiness share of the economy is estimated at nearly 50 percent – about 24 percent is produced by crops, livestock, poultry, fisheries, and forestry; about 13 percent is produced by industry, primarily agro-based manufacturing; and about 13 percent is from agribusiness services provided by the transport, trade, and finance subsectors (15). The agribusiness sector includes the farmers-producers producing the food and fiber commodities and the off-farm market services made up of input supplies, processor-wholesales-distributors and retailers.

Sectoral Growth

In 1989, industry posted the highest growth rate (6.91 percent) among the economic sectors (Table E.7). The service sector grew by 5.45 percent, and agriculture grew by 4.29 percent. Estimated sectoral growth rates for 1990 show the service sector to be the leading sector with estimated growth of about 4 percent. Industrial growth was estimated at 2.1 percent. Agricultural growth was estimated at a sluggish 0.63 percent.

Projections for 1991 show continued sluggish growth in all sectors with agriculture expected to grow slightly faster than industry. In 1992, however, the industrial sector is projected to be the main growth sector.

The Philippine industrial sector will be discussed in greater detail in the next chapter.

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Table E.7 Sectoral growth rates

<u>Sector</u>	1986	1987	1988	1989	1990	1991	1992
					Est.	Proj.	Proj.
	Economic Growth (Annual Growth rate in constant prices) Percent						
Agriculture	3.27	(1.02)	3.57	4.29	0.63	2.60	3.17
Industry	(2.08)	7.40	8.97	6.91	2.10	2.21	5.20
Services	2.95	6.63	6.26	4.45	4.04	1.98	3.69
GDP	1.42	4.60	6.37	5.61	2.48	2.22	4.05

Source: NEDA. 1989 Annual Report.

CHAPTER E.2. THE INDUSTRIAL AND URBAN SECTORS

Introduction

This chapter examines the structure of the industrial sector and its contribution to over-all growth and employment. A brief overview of the urban sector is also presented.

The Industrial Sector

Industrial Policy

Starting in the 1950s, the Philippines has promoted industrialization by pursuing an import substitution strategy characterized by import controls. In the 1960's and 1970's, industrialization policy was characterized by imposition of high tariffs and quantitative restrictions. This was accompanied by liberal financing, investment incentives, and overvalued exchange rates (4). The incentives provided, however, were heavily biased in favor of large, capital intensive enterprises. This has had a profound impact on the current structure of the country's industrial sector.

In the 1970s, the emphasis was on export-oriented industrialization. During this period, several export oriented industrial zones were established. The 1970s also witnessed the creation of monopolies and increasing direct government participation in industrial production, particularly in the mineral, utilities and agribusiness industries.

These policies created an industrial structure characterized by a poor record of productivity growth and limited contribution to employment generation (4).

Starting 1981, under pressure from external international financial institutions, the government embarked on a medium term structural adjustment program aimed at transforming the basic structure of industry to a more efficient and world competitive one. The program consisted of tariff reform, import liberalization, realignment of indirect taxes, rationalization of the industrial incentives system, sector development programs, and implementation of major industrial projects (5).

Current industrial policy continues in the general direction of the 1980s structural adjustment program. However, its emphasis is focused on regional dispersal and rural-based industrialization and employment generation. Since 1986, reforms were instituted to: eliminate distortions in the incentive structure; dismantle monopolies in the marketing of agricultural outputs and inputs; revitalize private sector initiative; and foster greater reliance on the market mechanism (4,5,6).

Structure of the Industrial Sector

The Philippine industrial sector can be described by the following structural characteristics (4):

- o High geographic concentration of manufacturing activities in Metropolitan Manila and surrounding core regions whether measured in terms of number of firms, employment, value added or fixed assets (Table E.8);
- o Structural bias against small and medium scale industries in areas including investment and exports incentives, access to technology, and credit.
- o Increasing share of nontraditional manufactured exports in total exports. [However, these are concentrated in only three products -- garments, electrical and electronic components, and handicrafts (Table E.9)];
- o Incentive structure biased in favor of capital intensity. In general, capital deepening has not been accompanied by corresponding increases in labor productivity except in the industrial chemicals and in the iron and basic steel industries (Table E.10).

The Philippine industrial sector exhibits a wide range of diversity both in terms of the size of business establishments and the activities undertaken. The gamut ranges from the virtually monopolistic petroleum industry characterized by large scale operation and low employment contribution, to the food industry, which contributes the largest amount to manufacturing employment and which involves a large number of establishments ranging in size of operation from the very large to the very small (Table E.11).

In general, industries' share in manufacturing employment tends to be lower than their proportional share in the number of total establishments. For example, the printing, publishing and allied industries represent over 7 percent of total manufacturing establishments yet contribute only 2.5 percent to employment in the manufacturing sector. Notable exceptions are the textile and the wearing apparel industries which represent only about 5 and 8 percent, respectively, of total establishments, but account for over 11 and 15 percent, respectively, of manufacturing employment.

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Table E.8 Regional distribution of firms by numbers and size, output, employees and fixed assets

Size of Firm in Terms of No. of Employees	Metropolitan Manila	Regions III & IV	Other Regions
<u>1. Percentage by Number of Firms, by Size (1983)</u>			
Less than 10	35.4	24.5	40.1
10-19	49.1	16.8	34.2
20-49	54.2	16.5	29.3
More than 50	62.3	15.8	21.9
Total	40.0	22.6	37.4
<u>2. Percentage of Output, by Size (1978)</u>			
1-9	34.5	26.7	38.4
10 +	57.0	26.3	16.7
Total	56.5	26.4	17.1
<u>3. Percentage of Employees, by Size (1979)</u>			
1-4	14.4	25.6	60.0
5-9	23.8	31.7	44.5
10-19	37.9	25.8	36.3
20-49	59.5	14.2	26.3
50-99	65.4	12.4	22.2
100 +	61.1	17.0	21.9
Total	50.2	19.3	30.5
<u>4. Percentage of Fixed Assets (1980)</u>			
Total	39.1	25.5	35.4

Sources of Basic Data: NSO Census of Establishments, 1978; Annual Survey of Establishments in Manufacturing, 1980; Asian Development (1986).

Adapted from: Pante and Medalla (1990).

Table E.9 Percentage distribution of nontraditional manufactures exports.

Export Items	1970 %	1980 %	1985 %	1988 %
Garments	-- ^a	25.0	22.5	28.2
Electrical and Electronic Components	-- ^a	33.5	38.2	31.6
Handicrafts	6.9	7.4	4.9	5.3
Others	93.1	34.1	34.4	34.8
Memo items: Total exports of nontraditional manufacturers (in US\$ M)	72	2,005	2,765	4,667
Percent of total exports	8.0	46.3	71.6	77.0

^a Less than one percent

Source: DER, Central Bank of the Philippines.

Adapted from: Pante and Medalla (1990).

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Table E.10 Indicators of capital intensity and labor productivity in manufacturing

Code	Industry Group	1960		1980	
		FA/L	VA/L	FA/L	VA/L ^a
311/312	Food	6.52	9.88	10.98	7.40
313	Beverage	5.41	15.20	12.31	14.63
314	Tobacco	2.70	6.53	3.12	18.35
321	Textiles	6.99	4.17	8.80	4.17
322	Wearing apparel except footwear	1.33	2.44	1.26	2.03
323	Leather and products	4.01	4.78	3.13	2.67
324	Footwear	1.48	2.55	1.78	1.57
331	Wood products	4.77	4.01	5.11	13.98
332	Furnitures and fixtures	1.75	2.72	1.52	1.83
341	Paper and products	14.12	10.11	17.88	11.09
342	Printing/Publishing	3.61	5.29	5.59	4.60
351	Industrial chemicals	17.56	7.82	23.48	30.08
352	Other chemicals	6.29	16.72	6.46	14.34
353	Petroleum refineries	62.62 ^b	132.18 ^b	68.89	207.00
355	Rubber products	9.35	11.27	5.24	8.11
356	Plastic products	4.72	6.04	4.90	4.73
362	Glass products	8.54	9.77	8.96	16.29
368	Other non-metallic	12.97	8.76	16.29	8.82
371	Iron and basic steel	9.34	7.48	14.67	35.35
372	Non-ferrous metal	6.77	6.77	5.69	9.13
381	Fabricated machinery	0.06	7.56	3.35	4.10
382	Machinery	4.95	9.07	5.43	4.45
383	Electrical machinery	4.17	8.40	3.26	6.02
384	Transport equipment	4.95	9.07	8.05	9.09

^a The 1980 data have been deflated by an index of 700% which is the approximate price increase for manufacturers between 1960 and 1980.

^b 1962.

FA/L - value of fixed assets per employee in thousand constant 1960 pesos.

VA/L - census value added per employee in thousand constant 1980 pesos.

Source of basic data: Hooley (1985) and World bank (1987c).
From: Pante and Medalla (1990).

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Table E.11 Number and employment for manufacturing establishments
by major industry group, 1987

Code	Major Group	No. of Establishments	%	Average Employment for the year	%
311/312	Food	1163	23.28	133,304	19.73
313	Beverages	80	1.60	27,266	4.04
314	Tobacco	25	0.50	12,974	1.92
321	Textile	297	5.95	76,813	11.37
322	Wearing Apparel except footwear	414	8.29	101,845	15.07
323	Leather and leather products	39	0.78	2,905	0.43
324	Footwear, except rubber plastic or wood furniture	111	2.22	6,557	0.97
331	Wood, Wood and cork products, except furniture	254	0.02	44,574	6.60
332	Furnitures & fixtures except primarily of metal	231	4.62	27,056	4.00
341	Paper and paper products	106	2.12	11,707	1.73
342	Printing, publishing and allied industries	366	7.33	16,819	2.49
351	Industrial Chemicals	89	1.78	9,086	1.34
352	Other chemical products	206	4.12	24,799	3.67
353	Petroleum refineries	4	0.08	2,451	0.36
354	Miscellaneous products of petroleum and coal	7	0.14	382	0.05
355	Rubber products	106	2.12	22,713	3.36
356	Plastic products, n.ec.	162	3.24	13,381	1.98

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Table E.11 (continued)

361	Pottery, China and earthenware	22	0.44	3,624	0.54
362	Glass and glass products	21	0.42	5,115	0.76
363	Cement	15	0.30	4,922	0.73
369	Other non-metallic mineral products	131	2.62	7,779	1.15
371	Iron and steel basic industries	99	1.98	14,383	2.13
372	Non-ferrous basic metal industries	22	0.44	2,578	0.38
381	Fabricated metal products exc. machinery & equipt., furniture & fixtures primarily metal	258	5.17	18,358	2.72
382	Machinery except electrical	299	5.99	12,634	1.87
383	Electrical machinery apparatus, appliances and supplies	151	3.02	43,372	6.42
384	Transport equipment	145	2.90	11,708	1.73
385	Professional and scientific & measuring and controlling equipt., n.e.c. & photographic and optical instruments	11	0.22	3,174	0.47
386	Furniture and Fixture primarily of metal	23	0.46	687	0.10
390	Other industries	138	2.76	12,722	1.88
	ALL STABLISHMENTS	4995	100	67,688	100

The largest increase in value of production and employment since 1985 occurred in the transport equipment industry. The basic metal, non-metallic mineral products, paper and paper products, furniture and fixtures, and wearing apparel industries all doubled their value of their production from 1985 to 1990 (Table E.12). However, just as in the transport equipment industry, the increase in value of employment was less than the increase in value of production. This suggests that some technical substitution away from labor may be occurring at higher levels of production output.

Inter-Industry Linkages

In addition to their contribution to employment generation, the importance of specific industries in the economy can be gauged in terms of their forward and backward linkages with other industries arising from their demand for purchased inputs and outputs. The index of forward/backward marketing linkages measure the strength of these inter-industry linkages (Figure E.2). Calculated indices show the agricultural crops and sectors have the highest backward linkages, reflecting their heavy demand for purchased inputs. On the other hand, the manufacturing, services, and food/ feed processing sectors have the highest forward linkages with the rest of the industries (15). Hence, investment in any of these sectors would have relatively high ripple effects throughout the rest of the economy.

The Informal Manufacturing and Processing Subsector

While the data presented above reflect the broad character of registered enterprises, they ignore an increasingly important element of the Philippine industrial scene. Not reflected in the official statistics are the contribution and characteristics of the large number of small, diverse, and unregistered establishments that make up the Philippines' informal industrial subsector. Little is known about this informal subsector except that it contributes significantly to total output and employment, particularly, self-employment. The contribution of the informal or underground economy to total output is thought to be as much as 40 percent of GNP (3).

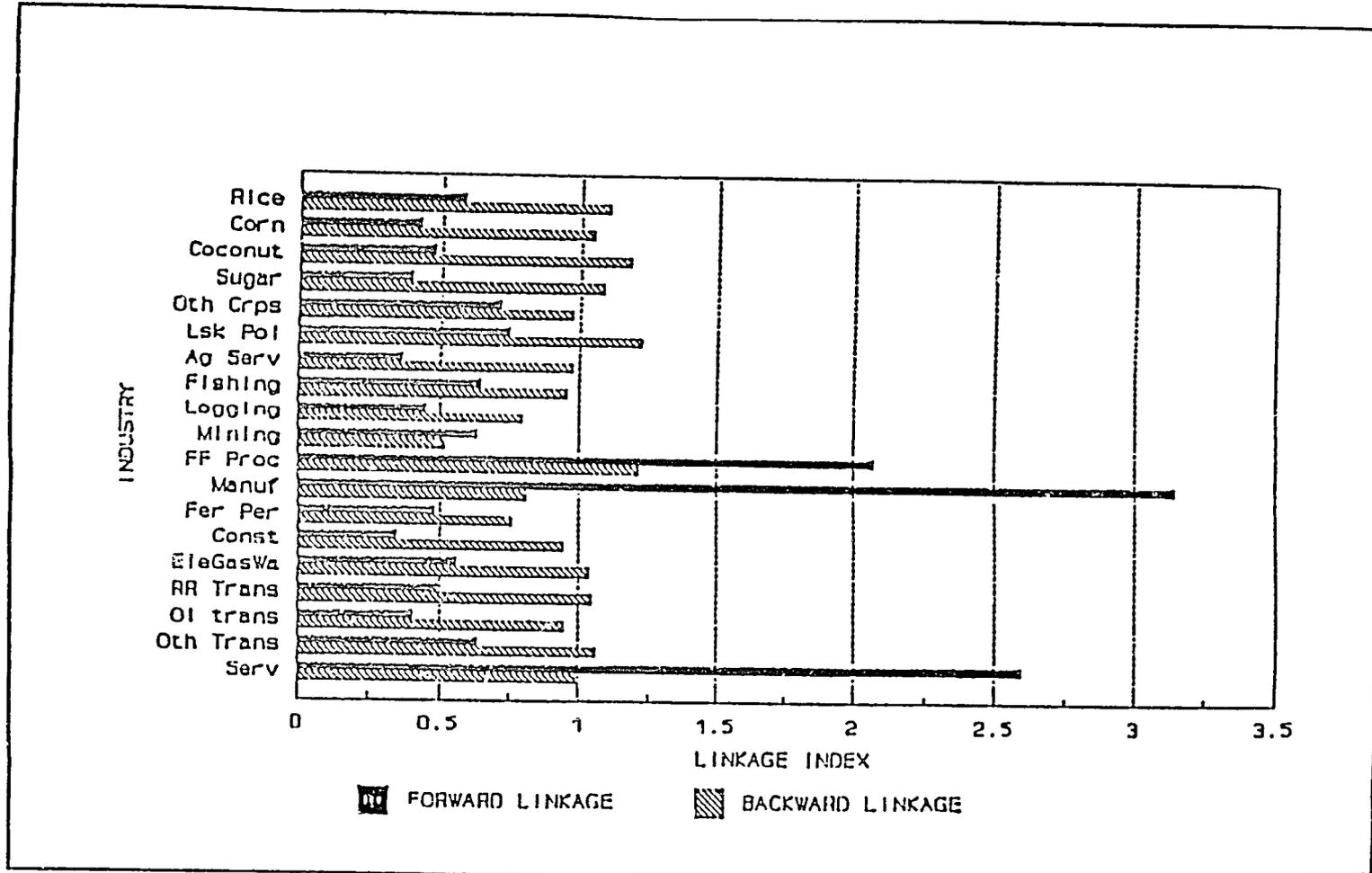
The thriving underground economy bears testimony to the Filipinos' talent for identifying and taking advantage of opportunities for income generation where they are available. The social support system provided by the family unit, e.g. in the form of uncompensated labor, enables entrepreneurs in the informal sector to continue operating at very narrow margins.

Table E.12 Index of value of production and employment of key manufacturing enterprises as of 7 June 1990
(1985 = 100)

Manufacturing Enterprise	Index Value of Production	Index Value of Employment
Food	160.4	121.3
Beverage	177.8	120.5
Tobacco	122.3	100.5
Textile	174.6	119.4
Wearing Apparel	217.9	122.6
Wood and Wood Products	154.2	58.5
Furniture and Fixtures	226.6	143.0
Paper and Paper Products	222.5	110.7
Chemicals and Chemical Products	137.6	110.2
Rubber Products	161.3	95.9
Petroleum Products	95.1	92.9
Non-metallic Mineral Products	201.7	149.5
Basic metal	257.5	118.3
Transport Equipment	856.9	266.8
Electrical Machinery	199.7	87.2
Miscellaneous	44.4	13.1
Total Manufacturing	195.0	115.5

Source: NCSB. 1990 Philippine Statistical Yearbook.

Figure E.2. Forward and backward linkages, 1983



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Source: USAID 1990. Agriculture and Natural Resources Strategy for USAID Philippines.

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Compared to small and medium-sized firms, informal enterprises have even less access to credit and technology, are even less in a position to benefit from tax incentives, and face bigger constraints in making profitable investments. These enterprises generally operate on very narrow margins of profitability and tend to be vulnerable to price and cost changes. These conditions have important implications for residuals management.

Production and Waste Generation

Waste generation is a corollary of production activities. In the Philippines, economic activities that contribute significantly to total output, employment, and foreign exchange generation tend to be pollutive. However, potentials exist for waste reduction through interventions that would encourage use of technology for waste reduction, reuse and recycling.

Pollutive Industries

The National Environmental Protection Council (NEPC) classified industries according to the extent of pollution they generate and the degree of hazard associated with their waste. The chemical and the petroleum industries are considered highly pollutive and extremely hazardous industries. The cement, iron and steel, and non-ferrous basic metals industries are also highly pollutive, hazardous industries. In 1987, for example, it was estimated that the mining industry generated more than 63 million tons of tailings and 27 million tons of other mine wastes that possibly included such dangerous chemicals as acids, cyanide, alkalis and heavy metals (31).

The following industries are also considered highly pollutive and hazardous: sugar milling and refining; wine and spirits; textile spinning, weaving and finishing; leather processing; pulp and paper; and soaps, cleansing preparations and toiletries. Somewhat less pollutive, but extremely hazardous, industries include fertilizer and pesticides, synthetic resins, plastic materials, paints, varnishes and lacquer, tires and tubes and rubber products. The crop, livestock and dairy processing industries are also highly pollutive although the waste they generate tend to be nonhazardous.

Opportunities for Economic and Environmental Complementarity

While waste can not be eliminated, it can be reduced over the long run through economic incentives that favor techniques and methods leading to efficient materials use and reduction in over-all residuals generation. In the short run, however, the type of technology currently in place and the cost and returns associated with shifting to alternative methods largely determine the potential for waste reduction.

The reuse and recycling of residuals have been shown to be potentially profitable and are attracting more attention from industry. The agricultural sector is one sector where residuals are increasingly being reused and recycled. Agricultural waste has long been used as a non-conventional energy source. In 1985, energy from agricultural waste accounted for 12.63 percent

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of total energy (32).

Recent developments in composting technology increase the possibilities for agricultural waste recycling. Calculations show that the use of a fungus compost activator (Trichoderma) on farm waste can cut composting time significantly and cut fertilizer cost by as much as 50 percent (33).

The case of agricultural waste use demonstrates that productivity, growth, and environmental quality can be made complementary. However, in many cases, they still tend to be evaluated by industry, and even the government, as presenting a trade-off. Given the pressing need for foreign exchange to service international debt, and the need to create jobs and generate income for a growing population, the bias has been towards natural resource extraction with minimal environmental safeguards. In the process, the assimilative capacity of the natural environment has been, and remains to be, severely tested.

The next sections present a broad overview of the Philippines' urban sector.

The Urban Sector

The Philippines' urban sector is growing faster than the rural sector. In 1984, about 39 percent of the population lived in urban areas (Table E.13) by 1989, the proportion of urban population has increased to 42 percent. This rapid rate of urbanization is expected to continue given high urban population growth rate (3.7 percent, 1984-89) and continuing high rate of rural to urban migration.

The attractiveness of urban areas to rural migrants stems from the presence of infrastructures, employment opportunities, information network and other formal and informal support services (9). Rural poverty and unemployment, landlessness, lack of necessary services and facilities, natural disasters, and political disturbances continue to push population away from rural areas. The disparity in incomes and opportunities between urban and rural areas is reflected in the higher incidence of poverty (63.2 percent in rural areas compared to urban areas (Tables E.14 and E.15).

Table E.13 Philippine population and population growth, 1984-1989

	Actual					
	1984	1985	1986	1987	1988	1989
Total Population (000)	<u>53,350</u>	<u>54,670</u>	<u>56,010</u>	<u>57,360</u>	<u>58,720</u>	<u>60,100</u>
of which Rural (000)	32,350 60.6%	32,850 60.1%	33,340 59.5%	33,830 59.5%	34,300 58.4%	34,780 57.9%
of which Urban (000)	21,000 39.4%	21,820 39.9%	22,670 40.5%	23,530 41.0%	24,430 41.6%	25,320 42.1%
Population Density (per sq. km)	177.8	182.2	186.7	191.2	195.7	200.3
Annual Growth rate						
Total population	2.5	2.5	2.4	2.4	2.4	2.4
Rural population	1.6	1.5	1.5	1.5	1.4	1.4
Urban population	4.0	3.9	3.9	3.8	3.8	3.7

Source: NCSB. 1990 Philippine Statistical Yearbook.

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Table E.14 Average annual income and expenditures, urban and rural (at 1985 prices)

	1985	1988
PHILIPPINES		
No. of families (000)	9,847	10,534
Average Income (P)	31,052	35,531
Average Expenditures (P)	26,865	28,596
Savings (P)	4,187	6,935
Median Income (P)	20,480	23,472
<u>Urban</u>		
No. of families (000)	3,726	3,985
Average Income (P)	46,127	53,048
Average Expenditures (P)	39,134	41,590
Savings (P)	6,993	11,458
<u>Rural</u>		
No. of families (1000)	6,121	6,549
Average Income (P)	21,875	24,870
Average Expenditures (P)	19,397	20,689
Savings (P)	2,478	4,181

Source: NCSB. 1990 Philippine Statistical Yearbook.

Table E.15 Poverty incidence in the Philippines, urban and rural, 1985.

	Total No. Below Poverty Line (100 Families) ^a	Proportion of Total No. of Families (%)
Philippines	5,803	58.9
National Capital Region (NCR)	572	44.0
Outside NCR	5,321	61.3
Urban	1,363	56.5
Rural	3,868	63.2

^a Poverty lines in 1985 were ₱ 2381 and ₱ 3282 for the Philippines and NCR, respectively.

Source: NEDA, 1990. Updates in the Medium-Term Philippine Development Plan, 1990-1992. Manila. NEDA.

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Metropolitan Manila, with its 8 to 10 million population, is the Philippines' primary urban center. Cebu in the Visayas and Davao in Mindanao are the main regional centers, and are the second and third most important centers after Metropolitan Manila. Cebu has a population of one million and Davao has a population of 850,000. The growth of these major urban centers and those of other smaller cities has been linked with industrialization.

Urban Environmental Problems

Rapid urbanization creates a host of environmental management problems. In many urban centers, particularly in Metropolitan Manila, rapid urbanization is taking its toll on existing infrastructure and is overwhelming the capacity of local governments to deliver basic services (8,10).

Environmental Degradation

Among urban households, 29 percent have no electricity, 50 percent have no running water, and 56 percent have no adequate sanitary facilities. Fifty percent of urban households do not own their homes and 60 percent do not own the land on which their houses are built (18). The effects of this lack of basic facilities and services, along with the high incidence of urban poverty, are manifested in pollution and over-all degradation of the urban environment. These have consequent effects on health and over-all quality of life (8,9,10,11).

Waste Generation

The process of urbanization itself is associated with increasing waste generation. Refuse mounts as lifestyles change toward greater consumption of packaged manufactures. The shift in living pattern from extended families toward nuclear families leads to over-all increase in the number of households and, consequently, in the residuals generated (11). This increasing waste generation is made worse by the fact that local governments, the units responsible for providing waste management services, are often not in a position to perform their assigned task. Local governments have to grapple with problems of finances, lack of technical capability for urban environmental management, and lack of or inability to enforce zoning laws and regulations (8,10).

Slum and Squatter Settlements

Slum and squatter settlements and associated waste disposal problems are, perhaps, the most visible manifestation of the linkage among urbanization, poverty, local government ineffectivity, and environmental deterioration. With urban growth and industrialization, increasing land values shift land use away from residential to higher valued commercial and industrial uses. This creates intense competition for residential lands which, forces the poorest segment of the urban population to settle on any piece of available property, whether public or private, cut off from basic social services and infrastructure.

In many cities, squatter communities are found in unused lands, in swamps, river banks and estuaries, railroad tracks and abandoned buildings (8). It is estimated that the urban poor in Metropolitan Manila number 3 million people, or, 38 percent of Metropolitan Manila's total population. Most of these people live in slum or squatter settlements (10).

It must be pointed out that within squatter communities, various forms of microenterprises abound. These enterprises provide income and self-employment; they commonly involve vending food, plants and junk (8). Squatter communities also provide important waste management services by scavenging for reusable and recyclable garbage. Thus, while squatter communities may be responsible for waste generation and dumping into the urban environment, they also perform an important aspect of urban waste management.

Local Government Finance

Among the problems confronting local governments with respect to the discharge of their environmental management function, the most pressing is the lack of financial resources to construct needed infrastructure (7,10). These stems, in part, from the narrowness of the local government's tax base; local government funds principally come from property and business taxes and from fees and charges on markets and slaughterhouses.

A more important factor contributing to local governments' financial difficulty is the current structure of revenue allocation within the government. Under the existing Manila-centered structure, local funds are channeled to the national government for eventual reallocation back to the local government's remittance. This system has discouraged local initiatives for revenue generation and tax collection. This system, however, is expected to change soon with the changes in the local government code.

Nevertheless, as in many developing countries, most local investment in waste management infrastructure has been undertaken with significant subsidies from the central government (11,12). Financial returns on investment in waste facilities tend to be low because of the unwillingness or inability of the ultimate consumers to pay for the full cost of waste management services (12,14). The unwillingness to pay the full cost of waste management arises largely from the perception that it is government's responsibility to provide such services. In people minds, the fact that waste affects everyone places it within the purview of the public sector.

On the other hand, the inability of major portions of the urban population to pay for waste management services reflects both on the level of household incomes and the cost of waste management.

Studies conducted in Metropolitan Cebu in 1979 showed that if the full cost of a proposed local government project on sewerage and sanitation were charged to water bills, water rate would increase by 95 percent at the minimum (13).

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Several financial and institutional arrangements have been suggested to relax local governments' financial constraints. These include cross subsidies, cost sharing with local communities, privatization of services through award of contracts, franchises or competitive bidding, and, recently, through the build-operate-transfer program (12,14). Experience in other Asian cities show that, in the case of solid waste management, cost sharing arrangements between the community and local government have been demonstrated to be viable and self-sustaining (12).

Likewise, privatization of waste management services with government monitoring and control has been shown to result in cost savings and improved quality of service (11,12,13, 14). For example, experience with private collection of solid waste in industrialized countries resulted in collection costs 20 to 40 percent lower than public service (12). Significant cost reductions with privatization of solid waste management have also been reported in other Asian metropoli (14).

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CHAPTER E.3 POLICY CONTEXT

Introduction

This chapter discusses Philippine development goals and strategies. Within this broad policy framework, urban and industrial environmental policy is situated.

Over-All Development Policy

As a matter of state policy, the Philippines commits itself to a nationalistic development strategy characterized by decentralization, broad-based participation, recognition of the role of the private sector, and harmony with nature.

Essentially, the state views economic growth and development to be interdependent and compatible. This view is articulated in the Philippine Strategy for Sustainable Development which has the expressed aim of achieving and maintaining economic growth without further environmental degradation and depletion of the country's natural resources.

The current development agenda focus on: poverty alleviation; generation of more productive employment; promotion of equity and social justice; and attainment of sustainable economic growth. Because the majority of the Philippines' poor is in the rural areas, development is primarily targeted towards uplifting the rural poor.

Main Policy Areas

Six areas of policy emphasis are identified in the government's 1990-1992 development plan (17). These policy areas include:

- o economic stabilization;
- o countryside agro-industrial development;
- o market liberalization or economic deregulation;
- o human resource development;
- o institutional and administrative reforms; and,
- o decentralization.

High priority is to be given to employment-oriented, rural-based strategies that harness agriculture and industry in a complementary fashion. In pursuit of its rural development and equity objectives, the government plans to invest in physical infrastructures and social services particularly in rural areas. The government also plans to more speedily implement the agrarian reform and decentralization programs.

The emphasis on a rural-oriented growth strategy is partly aimed at dispersing industries away from Metropolitan Manila where they are currently concentrated. It is hoped that such policy will alleviate urban congestion and reduce the urban-rural income differential which leads to

continued migration to urban centers. The expected improvement in the balance between population and industries, on one hand, and infrastructure and environmental carrying capacity, on the other, is expected to result, among others, in improved urban environmental quality.

Agro-industrial Development and Decentralization

Rural agro-industrial development will involve implementation of the following activities:

- Provide support services, public investments and policy framework necessary to support the requirements of a rural agro-industrial development strategy;
- Provide full support to the Comprehensive Agrarian Reform Program, including the strengthening of the administrative machinery to hasten land valuation and distribution;
- Establish and strengthen growth centers to provide the base for agro-based industrial and commercial activities, principally through People's Industrial Enterprises at the district level;
- Disperse industries away from Metropolitan Manila by setting up viable industrial centers in 16 selected regional sites;
- Promote environmental protection, ecological balance, and judicious use of land and other natural resources with equitable sharing of benefits therefrom;
- Promote labor-intensive cottage, small, and medium industries with special attention to countryside industrialization;
- Develop of energy sources, especially non-oil energy; and
- Generate, upgrade, transfer and commercialize new technologies to the maximum extent. (16,17)

At the same time, the decentralization thrust calls for strengthening the capability of local government units to deliver basic services and to implement infrastructure and social projects. The latter task will be accomplished with active private sector participation.

The centerpiece of the government's industrial dispersal program is the concept of industrial estates. Unlike its predecessor, which established government-owned, mainly export-oriented industrial estates, the current administration encourages private ownership, development, and management of industrial estates for both domestic and export markets.

Investment Incentives

To encourage investments in industrial estates and in other government priority areas, the government grants various incentives. These incentives are: enterprise income tax exemptions, capital equipment incentives, incentives for investing in major facilities in less developed areas, and access to bonded manufacturing/trading warehouse systems (19).

In addition, enterprises investing in areas of investment included in the government's Investment Priorities Plan are exempted from all the taxes under the national Internal Revenue Code except income tax for up to 100 percent for the first five years, 75 percent for the sixth to the eighth years, 50 percent for the ninth and tenth years, 20 percent for the thirteenth through the fifteenth year. Other incentives include tax exemption on imported capital equipment; from 50 to 100 percent tax deduction for expansion reinvestment, and tariff protection of up to 50 percent of the dutiable value of imported items similar to those being manufactured or produced by a pioneer enterprise.

Industrial Estates

Aside from the four export processing zones in operation, there are now some 17 existing industrial estates in the country although some will not be fully operational until 1992 (Table E.16). Several more industrial estates are in the drawing board. These industrial estates are expected to attract mostly small and light manufacturing firms including garments, semiconductors, food processing, electronics, paper products and packaging, toys, breweries and appliances [20].

Calabarzon Area

The contiguous provinces of Cavite, Laguna, Batangas, Rizal and Quezon, commonly referred to as Calabarzon, is the government's high priority area for industrial development. The Philippines Assistance Plan (PAP)-assisted Calabarzon Special Development Project is intended to develop the area over a ten-year period. The U.S. Agency for International Development (USAID) and Japan International Cooperation Agency (JICA) are helping fund the project. Calabarzon is a particularly attractive testing area for

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Table E.16. Existing and proposed industrial estates

Name	Location	Land Area (in ha.)	Project Cost (P)
AFP Retirement and Separation Benefits System & Ind'l Area			
Angeles Livelihood Village	Taguig, Metro Manila	10.00	
Ayala-Laguna Technopark	Angeles, Pampanga	33.50	
Bagong Silang I.E.	Binan/Sta. Rosa, Laguna	354.00	1.26 B
Cagayan de Oro I.E.	Novaliches, Q. C.	5.83	
	Cagayan de Oro, Misamis Oriental	12.45	
Dagat-dagatan I.E.	Navotas, Metro Manila	29.00	
Dasmariñas I.E.	Dasmariñas, Cavite	12.81	
EGI Mini-I.E.	Bo. San Isidro, Antipolo, Rizal	38000	
First Cavite I.E. Zone	Langkaan, Dasmariñas, Cavite	12.81	
Gateway I.E. Complex	Gen. Trias, Cavite	400.00	
Gen. Mariano Alvarez I.E.	Gen. Mariano Alvarez, Cavite	9.84	
Luisita Industrial Park	San Miguel, Tarlac	20.00	
Phividec I.E. Misamis Or.	Villanueva, Misamis Oriental	2,367.00	
Sapang Palay I.E.	San Jose del Monte, Bulacan	29.01	
The Science Park of the Philippines	Bo. Diezmo, Cabuyao, Laguna	143.00	500 M
Veterans Federation of the Philippines	Taguig, Metro Manila	50.00	
Yulo Industrial Estate	Canlubang, Laguna	12.45	
Proposed Industrial Estates			
Bulacan I.E.	Plaridel, Bulacan		
Cabanatuan City Industrial Park	Cabanatuan City, Nueva Ecija		
Ecology Village	Sapang Maragul, Tarlac		1.514 B
Gen. Santos Agro I.E.	South Cotabato		
Hacienda Espina Ind. Park	Gen. Santos City	900.00	
Hermosa I.E.	Hermosa, Bataan		
Holy Angel I.E.	San Fernando, Pampanga		
Panay-Negros Agro-Industrial	Panay, Negros	80.00	
Samar Island Dev't. Project	Samar, Leyte		
Tinog Silangan I.E.	Angeles City, Pampanga		
	Bauan, Batangas		
	Bo. del Pilar, San Fernando, Pampanga	50.00	1.265 B
	Clark Mil. Airbase Reservation Area	500.00	
	Pinugay Estate, Tanay, Rizal	168.00	
	Porong Point, La Union	60.00	
	San Antonio and San Marcelino, Zambales	955.00	
	Sitio Maarat, San Mateo, Rizal	2,800.00	

TR&D, Inc.

Source: Ibon Facts and Figures, 15 December 1990.

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the government's industrial estate policy because of its proximity to the capital region, its well-developed infrastructure, and availability of energy and skilled manpower.

The Calabarzon area is already host to most of the industrial estates being put up in the country. These include the ₱ 1.9 billion Canlubang Industrial Estate, the recently launched Science and Technology Park in Laguna, dubbed as the Silicon Valley of the Country. The ₱ 1.2 billion Ayala-Laguna Industrial Estate jointly owned by Ayala Land, Mitsubishi and Kawasaki; the ₱ 2 billion Gateway Industrial Estate in General Trias, Cavite owned by Filipino, Hong Kong, and Indonesian partners; the ₱ 700 million First Cavite Industrial Estate in Dasmarinas, jointly owned by the state-owned National Development Corporation (NDC), the Marubeni Corporation of Japan, and the Japan International Development Organization (21).

The biggest foreign investors in the Calabarzon area are the Japanese who are alleged to fully or partially own 18 firms with equity totalling ₱ 1.5 billion as of February 1990. Hong Kong and Taiwanese investors are the next largest amount with ₱ 1 billion and ₱ 200 million investment, respectively. The Chinese are also important investors with total investments of ₱ 100 million.

Other Industrial Estates

Among the first and largest industrial estates is the 3000-hectare Philippine Veterans Investment Development Corporation (Phividec) Industrial Estate in Misamis Oriental. It is host to the controversial and highly pollutive Philippine Sinter Corporation.

Phividec also manages a 50-hectare industrial zone in Taguig, Metropolitan Manila which it is developing with a private company. A total of 78 companies are situated within Phividec's two sites. Most of these firms are manufacturing and food processing companies.

The government has pinpointed three additional sites for development through the PAP funding. These include (21):

- o The Samar Island Development Project. This project is estimated to cost \$9.9 million (1989-1992) and is expected to benefit 23,000 families.
- o The Panay-Negros Agro-Industrial Project in Pavia, Iloilo. This project is funded by the Asian Development Bank through the PAP. Estimated construction cost (1990-1992) is \$400 million.
- o The General Santos Agro-Industrial Project in South Cotabato. Estimated cost of this project is \$55.04 million.

Other existing industrial estates include the export-oriented processing zones in Baguio, Bataan, Cavite and Mactan.

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Environmental Policy

The DENR, the government agency charged with management of the country's environmental and natural resources, is tasked with the four-fold mission of :

- o Sustainable development of forest resources;
- o Optimal utilization of lands and minerals;
- o Social equity and efficiency in resource use; and,
- o Effective environmental management.

This mission is to be pursued within the context of the government's broad development goals and in line with the philosophy of the Philippine Strategy for Sustainable Development. To achieve its mission, the DENR identified the following eleven strategies:

- o Integrating environmental considerations in decision-making;
- o Pricing of natural resources properly;
- o Reforming property rights;
- o Establishing integrated protected areas system;
- o Rehabilitating degraded ecosystems;
- o Managing residuals in industry (industrial pollution);
- o Integrating population concerns and social welfare in development planning;
- o Inducing growth in rural areas;
- o Intensifying environmental education;
- o Strengthening citizens' participation; and,
- o Preparing integrated strategies.

In support of these strategic concerns, the DENR proposed a total of 127 projects costing almost US\$3.38 billion over the period 1990-1995. The lion's share of proposed spending is allocated for the rehabilitation of degraded ecosystems, mostly involving forestry-related projects.

The relatively low priority given to urban and industrial environmental concerns is apparent in the DENR's programming of its proposed investment expenditures. Only eight of the DENR's proposed projects directly deal with industrial pollution; most involve conducting studies on specific aspects of industrial pollution (Table E.17). The cost of these eight projects is estimated

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at US\$12.25 million, representing only 0.36 percent of total proposed investment cost.

Policy Directions in Pollution Control: Incentives and Disincentives

In order to encourage industrial pollution control, DENR is in the process of modifying the current system of incentives and disincentives for pollution control. Several laws and regulations pending in the Congress are meant to encourage pollution control-related investments through tax and credit incentives, and to encourage compliance with environmental laws by increasing penalties for violations. Several proposals to promote energy conservation, efficient energy and materials use, use of more efficient and less pollutive processes, and research and development are also being considered (Table E.18).

Except for the hazardous and toxic waste substances legislation recently passed as RA No. 6969, the pending bills listed in Table E.18 are still pending (22,23). There seems to be a general feeling among various groups that the prospects for successfully passing the other environmentally-related bills are rather dim at the moment given the general uncertainty about the future environmental policy of the administration that will win the 1992 election. Even within the ranks of DENR, there seems to be some pessimism about the commitment of the government to its explicitly stated environmental policy; a large segment of the public remains skeptical about the government's environmental policy.

The skepticism with respect to GOP's stand on environmental protection may be due, in part, to the realization that the budgetary situation can easily predispose the government towards projects with quick returns but which may not be environmentally sound. Furthermore, in the past, development projects, even those that claim to be progressive on the environmental front, have resulted in greater environmental degradation not to mention social dislocation (34).

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Table E.17 DENR Programs in support of residuals management in industry

Program/Project	Indicative Cost (U.S\$ 000)	Implementation Period	Type of Assistance
Pipeline			
6.1 Leachate Pollution from Dumping Sites in Manila	91	1990-1991	TA -Studies
Proposed			
6.2 Toxic Chemicals and Hazardous Waste Management Program	645	1991-1995	TA -Studies
6.3 Air and Water Quality Monitoring Network	8,423	1991-1995	TA -Institu- tion building
6.4 Developing Air, Water and Soil Quality Standards	70	1990-1991	TA -Studies
6.5 Economic Incentives for Pollution Control	91	1991-1992	TA -Studies
6.6 Pollution Control Technologies and Industrial Efficiency	30	1990-1991	TA
6.7 Developing Recommend- ations to Reduce Pollution from Toxic Materials Used in Small-Scale Mining	300	1990-1992	TA -Studies
6.8 Environmental Impact Assessment of Major Mines in the Philippines	2,600	1990-1993	TA -Studies
TOTAL	12,250		

TA = Technical Assistance

Source: DENR. 1990. DENR Investment Program (1990-1995).

Table E.18 Pending and proposed policies/strategies in support of residuals management in industry

Table E.18 (continued)

STRATEGY/POLICIES	STATUS	REMARKS
<u>Pending</u>		
Granting of tax incentives for the operation and maintenance of pollution control facilities and devices and regulation of discharge of all industrial and other wastes and prescribing a graduated system of effluent charges.	Senate Bill No. 1259	Investigation of new and emerging technologies that may be applicable to pollution control in the Philippines
Regulation of importation of substances (i.e., chloro-flouro carbon (CFC) continuing substances) that are known to deplete the 'ozone layer'.	Senate Bill No. 994	Research and development of pollution control methods using local materials
Prohibition on importation of hazardous waste or garbage	Senate Bill No. 364	Formulation and application of financial schemes to encourage industries and local government units to set-up pollution control facilities
Encouraging improved management of toxic and hazardous substance in industry by a system of penalties and subsidies	There is a draft administrative order entitled "Hazardous Waste Management Policy" being subjected to further reviews before final approval by the Secretary of DENR ^a	The government is considering the financing scheme that involves tax incentives for business enterprises undertaking pollution control measures (e.g., waiver of all taxes on importation of pollution control equipment/facilities). The government may also grant tax credits for corporate research into pollution control.
<u>Proposed</u>		
Investigation of alternative production methods with particular attention to highly pollutive energy conversion and industrial processes and investigation of means of promoting energy conservation and energy efficient production processes	Under PD No. 1068 (1977) providing for acceleration of research, development and utilization of non-conventional/new and renewable sources of energy, the government shall continue to promote the adoption of non-conventional energy technologies that have been assessed to have some potential for commercialization. These technologies are direct combustion systems (biomass-fired furnaces and cookstoves), biogas systems for household and agro-industrial use,	
		<p>solar water heater systems, and windmills for water pumping and irrigation systems.</p> <p>A technological innovation adopted in this proposed policy is the use of biogas digesters to recover methane from piggery or distillery wastes. Attention shall be given to the recycling, recovery and reuse of industrial wastes.</p> <p>This shall be taken up under an environmental research project of the DENR (i.e., Indigenous Pollution Control Technologies).</p>
		<p>^a RA No. 6969, "An Act to Control Toxic Substances and Hazardous Wastes, Providing Penalties for Violation Thereof, and for Other Purposes," was passed by both the Senate and House of Representatives on September 6, 1990. Approved by President Corason C. Aquino on October 26, 1990.</p> <p>Source: DENR. 1990. DENR, Mid-Term Investment Program (1990-1995).</p>

Pollution Regulation

The currently used point system of calculating penalties for pollution is based on the following factors with their corresponding weights (Appendix E.A.):

- o the duration of the violation (6.5);
- o the present resource (air or water) condition (5.5);
- o capacity of source of pollution (4.5); and,
- o average deviation from effluent or emission standards (3.5).

The over-all points are calculated by multiplying the weights assigned to these factors by the categorical points which capture graduations in each of the above factors. The over-all weighted scores correspond to particular levels of daily fines. Industries are given three months to correct their violations before the fines are actually imposed.

While the fine increases with increasing severity of violation, its marginal rate of increase is constant. This constant marginal increase in fines tends to be regressive in that increasingly pollutive firms pay relatively lower increments in fines (24). The structure of fines also tends to ignore the differential potential impact of various types of pollutants. Ideally, the marginal cost of pollution violation should increase

with increasing severity of effects of the pollutants released. To achieve the desired degree of compliance with pollution control regulations, the fines have to be set high enough to be prohibitive. To be economically efficient they should be high enough so that the fine times the probability of conviction exceeds the cost of legal disposal.

Recent DENR Initiatives

In recent years, the DENR has shifted from a regulatory focus to a developmental focus. Along this line, it has undertaken various initiatives in the areas of environmental regulation, enforcement and conflict resolution. These initiatives include (24):

- o Targeting the largest polluters for environmental monitoring, in effect, using them to not only achieve the greatest publicity and potential pollution reduction, but also to communicate the DENR's intention to be tough on polluters.
- o Expanding the powers of the Pollution Adjudication Board to issue ex-parte cease and desist orders (CDO) to firms found in clear violation of air and water quality standards.

- o Encouraging greater people's participation by institutionalizing NGO participation through the NGO Desk within the DENR and by encouraging NGO, PVO and community participation in public hearings, early scoping sessions, and environmental monitoring. Originally focused in rural development and advocacy for disenfranchised sector's of society and specific elements of the flora and fauna NGO's and PVO's have become increasingly involved in pollution monitoring, environmental education, and other environmental protection-related activities.
- o Linking governmental review and permits so that, for example, major projects for national or international funding would require an Environmental Compliance Certificate (ECC) from the DENR before they could be endorsed by National Economic and Development Authority (NEDA).
- o Setting up an Environmental Guarantee Fund out of which multipartite monitoring activities, compensation for damages, environmental projects, and ecosystem rehabilitation can be financed.

However, while DENR's programs and projects represent innovative approaches to the problem of waste management, the problem lies in implementation. Visits to DENR field offices revealed problems with lack of equipment, trained personnel, and facilities. This inadequacy is affecting the agency's effectivity in implementing its program and discharging its functions.

CHAPTER E.4. TRENDS, CONSTRAINTS, AND OPPORTUNITIES

Introduction

This chapter begins by briefly summarizing the important characteristics, trends, and constraints affecting Philippine urban and industrial environmental management. Based on the situation summarized, it goes on to identify and discuss opportunities which have the potential for improving the management of the urban and industrial environment. The chapter concludes with a discussion of the Philippine environmental situation in terms of the economic concept of externalities.

Economic Characteristics and Trends

The context of Philippine urban and industrial environmental management can be characterized by the following major indicators and trends:

- o About 25 to 30 percent of export earnings go into debt service;
- o The unemployment rate is about 20 percent;
- o Nation-wide poverty incidence is about 60 percent;
- o Rural income and opportunities are considerably lower than those of urban areas;
- o Urban growth rates (1984-1987) were 3.7 percent;
- o Rural growth rates (1984-1987) were 1.4 percent;
- o Urbanization is increasing and with it the rise of slum communities;
- o Interest rates for capital improvements are very high, especially for small to medium size firms;
- o Credit availability is biased against small and medium sized enterprises;
- o The formal industrial sector has limited labor absorption potential;
- o The informal part of all sectors shows significant growth;
- o There is a trend towards rural-based industrialization; and industrial estate development;
- o There is a trend towards decentralization; and
- o There is a trend towards greater private sector participation.

Constraints

Several factors in both the public and private sectors constrain effective management of the urban and industrial environment. The major constraints from the point of view of the public sector include:

- o Budgetary problems at the local government level arise from the Manila-centered allocation of tax revenues;
- o Credibility of the government's commitment to environmental management is still under question;
- o Inadequate facilities, equipment, and trained personnel at the DENR limit its environmental management effectiveness;
- o Poverty limits the ability of communities to contribute to the cost of environmental management services and facilities; and
- o High rates of population growth and urbanization are overwhelming the capacity of existing infrastructure and services especially those related to by-products and residuals collection, treatment, and disposal.

From the private sector point of view, adoption of measures for residuals management is controlled by a complex set of incentives and disincentives. Compliance with existing environmental rules, regulations and investments in pollution control is limited by the following considerations:

- o Lack of access to credit, particularly for small and medium-sized firms, and low internal savings generation;
- o Lack of access to technical information on process engineering, waste management, reuse, and recycling;
- o Fines and penalties that are too low to induce compliance with rules and regulations;
- o Low probability of enforcement further reduces incentives for compliance; and
- o Little economic incentive for residuals management.

Opportunities

Several characteristics of the economic and social system represent important opportunities for promoting improved management of and investment in urban and industrial environmental quality. Each of these characteristics is also associated with a set of problems which can also be turned into opportunities. They could be channelled toward design of possible intervention strategies in urban and industrial environmental management.

Filipino Entrepreneurial Spirit

The Filipino propensity to "go it alone" (kanya-kanya mentality) is at once a problem and an opportunity. That it is a problem is manifested in the lack of concern for protection of public facilities and resources. A history of bureaucratic incompetence and corruption has repeatedly demonstrated that the common "tao" must look out for his/her personal interests because the government will not. Under this set-up, common property resources are, for all intents and purposes, open access resources to be overexploited on a use-it-or-lose-it basis.

However, this individualistic spirit, coupled with Filipino resilience, creativity, and ingenuity, is the driving force behind microenterprises and other small scale economic activities that make up the country's informal economic sector. This same spirit underlies activities in the formal enterprise sector. Business activities thrive where profits can be realized. The Filipino entrepreneurial spirit can be an important asset in the design of intervention strategies for environmental protection. It suggests the potential success of incentive-based strategies to induce compliance with environmental rules and regulations. In this context, the market presents itself as an adaptable and flexible mechanism that could orchestrate various possible incentives.

Capacity for Import Substitution in Environmental Technology

The presence of a local manufacturing enterprises with skilled machinists, technicians and laborers provides an opportunity for domestic production of some pollution control equipment and spare parts under licensing or franchise agreements with foreign firms. Domestic manufacturers could specialize in the production of parts and equipment which are labor intensive and able to utilize domestic resources. By tapping this domestic manufacturing capacity, investments in environmental management can be linked not only to employment creation but also to technology transfer. Once developed, the manufacture of pollution control equipment and devices suited for use in the Philippines can be an important growth industry. The Filipino entrepreneurial spirit also enhances this opportunity.

Policy Supportive of Private Involvement in Environmental Management

State policy favors environmental protection and broad-based participation in environmental management activities. This provides an opportunity for firms, non-governmental organizations (NGO), including private volunteer organizations (PVO), and other groups to define and assume the role they can perform best in the area of urban and industrial environmental management.

This policy context encourages various sectors, particularly the private sector, to become involved in environmental management activities and ventures in which they have competitive advantage can generate profits. This flexibility can encourage innovative and creative approaches to urban and industrial environmental management. At the same time, it can help promote efficient allocation of private and public sector resources and capabilities.

Technology Advance in Waste Reuse and Recycling

Recent advances in technology to manage, reuse, and recycle waste provides important opportunities both for profiting from environmental management. Such technologies, as using agricultural waste for energy production or fertilizer, can also help reduce the country's dependence on imported inputs. Incentives have to be provided in order to induce the adoption of waste management, reuse, and recycling technologies. This presents an opportunity for government intervention in the incentive system to encourage adoption of these technologies.

Industrial Estate Development

A policy of locating industrial estates in outlying areas is meant to alleviate rural poverty and to decongest Metropolitan Manila. In the past, industrial estates have not adequately dealt with the problem of industrial waste. New industrial estates being established show similar inattention to problems of waste disposal and industrial pollution. This presents opportunities for intervention leading to incorporation of waste management in these new and proposed industrial estates. The fact that firms are concentrated in industrial estates makes them easier to monitor. With the cooperation of firms located therein, industrial estates can become the venue for testing promising and innovative approaches to residuals management on a pilot basis.

DENR Willingness to Try Innovative Solutions

The openness of the current DENR leadership to innovative approaches provides opportunities for finding creative solutions to problems of environmental management. Despite the constraints the DENR faces in discharging its functions at the local and regional levels, the over-all direction provided by the national leadership creates an atmosphere that encourages new ways of looking at and dealing with environmental problems.

Synergies

The opportunities identified above interact and reinforce each other. Together, they create an atmosphere which fosters application of potentially workable strategies for environmental management. Private sector participation in various aspects environmental management is encouraged both by GOP policy and DENR's receptivity to innovative ideas and approaches. Advances in residuals management technologies could build on the existence of domestic manufacturing capacity thus creating a local residuals management industry. Enhanced economic incentives for adoption of these technologies can encourage Filipino entrepreneurs

to take advantage of potential profits in environmental management. Over-all, these interactions can lead to a positive feedback loop that simultaneously promotes economic gain and improved environmental quality.

Problems, Externalities and Solutions

The foregoing discussion has treated the environmental management situation in terms of the macroeconomy. Constraints are presented from the national perspective. The same picture can be viewed from the microeconomic perspective. The picture can focus on how incentives for individuals and firms have created the existing situation. The concept of externalities provides a convenient framework for characterizing the microeconomic situation. Externalities (also known as external costs or social costs) refer to costs which are disregarded in the usual decision making processes of firms and individuals. Externalities can also be beneficial (also known as external benefits or social benefits). Economic theory assumes that firms maximize profits and individuals maximize utility. Only individual costs, not costs which are borne by society as a whole, are normally considered in this maximization process. The disparity between the private decision making process and the public good is referred to as the externalities problem. This framework is useful in identifying the root cause of problems and thereby suggesting methods for their solutions.

In general, the premise of the entire study can be expressed in externality terms. Namely: Environmental controls are being under utilized in the Philippine economy. In theory, environmental management efforts should be utilized up to the level at which the marginal benefits are equal to the marginal management costs. In reality, any reduction in the huge health costs, productivity losses, and damage to materials and the natural environment can be viewed as benefits that accrue to environmental management. Enhanced tourism is also a benefit from environmental management. The lack of enforcement and the other impediments to environmental management all tend to encourage the externalization of pollution-induced social costs.

The general economic prescription for externalities is to adjust the incentives and institutions so that the parties imposing the costs bear the full social costs of their actions. When that condition is met, private decisions are harmonized with social costs and benefits so that the externality is internalized.

In the following paragraphs each of the constraints discussed above are viewed from the externalities standpoint. In addition to describing the source of the externality, a general approach to internalizing the externality is identified.

Industrial Compliance

Industries have little incentive to comply with regulations and thus avoid polluting the common property resources of air, water and land. The internal costs of any one firm's pollution is a combination of the expected cost of fines and penalties and the costs associated with its own

use of the polluted environment. As noted, above the likelihood of enforcement is slight compared with the considerable cost of compliance. The amount of its own contribution to the environmental pollution which a firm must consume is slight. Remediating the problem involves increasing compliance. Ideal environmental regulations are a means of internalizing the externality. Although it is not clear that the environmental regulations now on the books require the economically optimal level of pollution, the widespread lack of compliance makes that problem moot. Increasing compliance could be accomplished by increasing the probability of enforcement or decreasing the cost of compliance. Both of these issues are addressed below.

DENR Enforcement

Although DENR is improving its record of enforcement, there is still a great deal of room for improvement. Inadequate DENR enforcement can be viewed as a case of externality in bureaucracy. The benefits to more aggressive enforcement could produce more revenues for the agency, allowing it to fund additional employees, employee training and monitoring activities. But these incentives, which should motivate a bureaucratic firm, are being diluted. Only part of the fines which are collected are channeled back to DENR. The kudos and thus increased budgetary support which might result from aggressive enforcement is reduced by political pressures to make exceptions. Finally, the agency is caught in a negative feedback loop. Insufficient funds result in reduced enforcement which in turn reduces availability of funds. The solution to the externality is to adjust to incentives within DENR by increasing revenues from fines or by reducing political pressure for exceptions.

Local Government Solid Waste Management

Solid waste and its detrimental effects on the environment is an inherently local problem. The manifestations of the pollution have characteristics which depend on local conditions. However, in the Philippines, the funding to deal with these problems are allocated from the national government to local governments but not necessarily in any optimal fashion. An externality thus exists because of the lack of feedback between the local government which experiences the impacts of the pollution and the national government's budgetary allocation incentives. The externality could be internalized by improving the feedback by placing more fiscal control for solid waste management at the local level.

Pollution Control Equipment Manufacturing

A potential external benefit could be realized if local manufacture of environmental control equipment could be increased. Such equipment could be inexpensive and rely on local resources. This would benefit the national economy through import substitution. It would reduce the costs of compliance and thus increase the compliance levels. The firms which are in a position to do so are small to medium sized companies which typically have high labor to capital ratio and could thus employ under utilized labor. However, the market for environmental equipment is depressed by poor enforcement. Also, entrepreneurs in small to medium size firms have great difficulty raising capital. The prescription for reducing this externality is additional

enforcement and some form of governmental assistance to encourage this fledgling industry.

Scavengers at Dumps

A microenterprise has arisen at dumps, with households earning a meager living by scavenging reusable and recyclable materials from the waste. This activity has external benefits to the economy by providing work to an otherwise unproductive segment of the labor force, by reducing the volume in the already overstrained facilities, and by providing useful materials to the economy. Although the people working at the dumps do receive compensation for their efforts, this compensation is not commensurate with the external benefits. The externality could be internalized if the recipient of the benefits, namely local governments, were to provide some additional support. This would encourage additional scavenging activities as well as providing humanitarian aid to a very needy segment of the population. Reallocation of budgets for solid waste management to the local level would further assist this process.

Congestion Due to Excess Urban Population.

Congestion costs are a classic externalities problem. Individuals following personal economic incentives are increasingly migrating to urban areas, particularly to the Manila area. The congestion which this has created further degrades the environment and contributes to the decline of already overburdened infrastructure. A policy for rural industrialization would reduce this externality by adjusting the private incentives by making the less congested rural areas more attractive places to migrate to or remain in.

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CHAPTER E.5. RECOMMENDATIONS

Introduction

This chapter begins by defining a set of criteria by which potential interventions can be evaluated. Several potential interventions are then evaluated according to these criteria. Finally, a set of recommendations are made regarding the need for further study.

Criteria for Intervention

Potential interventions in environmental management must be consistent with the Philippine government's development goals and must meet the basic conditions of economic feasibility and political viability. From the point of view of a budgeting authority, the following criteria would have to be considered:

- o Political viability: Whether the intervention can be done within the existing political structure, judged in terms of the political constituencies which might favor or oppose change.
- o Economic feasibility: Whether the economic benefits exceed the costs of the intervention.
- o Sustainability: Whether the intervention, in ecological and economic terms, has the ability to continue beyond the period of the funding agency's involvement.
- o Participation: Whether the intervention encourages private sector participation, and by inference, participation in project benefits by many segments of the population as possible.
- o Demonstration effect: Whether the intervention provides lessons and experiences which could be transferable to other settings.

Potential Interventions

Strengthen DENR Capability for Environmental Management

The DENR's capability for monitoring, evaluating and enforcing environmental rules and regulations could be strengthened. Necessary equipment and facilities could be provided to regional offices where they are currently very deficient. Field personnel could be trained in various aspects of environmental management and regulation.

Political viability

This potential intervention would have strong support from various environmental interest groups and the environmentally concerned public. Opposition might arise from industry groups that could be threatened by a stronger, more effective DENR. Likewise, politicians fearing slower economic growth with stricter environmental enforcement might not favor this intervention.

Economic feasibility

Seed money would be needed to purchase equipment, put up facilities, and train personnel. Expected benefits include the reduction of external costs due to more effective environmental management. From the national standpoint, benefits would be expected to exceed the costs of this intervention.

Sustainability

Infusion of external funds would not be required on a continuing basis. The DENR would have to find additional funding for maintenance of facilities and equipment.

Participation

This intervention would involve private suppliers of equipment and facilities. It would also require the participation of trainers from academic and private training institutions. Technical personnel at DENR regional offices would participate in the training programs.

Demonstration effect

Experiences and lessons learned would be transferable to other institution-strengthening efforts. The trainees could become a core cadre, sharing their expertise throughout the agency.

Revision of the System of Pollution Fines

At present, environmental violation fines are set lower than the full social cost of pollution. To induce compliance with pollution regulations, the system of fines could be revised to reflect full social costs of pollution. The social costs of pollution include not only the direct external costs but also the cost of monitoring and enforcement. A penalty component should be included in the fine. The level of fines would have to be periodically updated to reflect cost changes.

As a further related intervention, a mechanism could be put in place to allow the fines collected to remain within the agency. This would create an incentive within DENR to aggressively enforce regulations.

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Political viability

This intervention would have strong support from various environmentally concerned interest groups and from the general public. Initially, industry would be expected to protest, possibly, with large firms being more vocal in their opposition. However, in the long run, improvement in environmental quality would ultimately benefit industry as well.

Economic feasibility

Determining the appropriate fines would require budgetary support. Once the system is implemented, the funds transferred from industry to government would improve market incentives for appropriate use of the assimilative capacity of the environment. Revenues from the fines could be used fund continuing research on setting optimal fines. Revenues could also be used to fund measures to further strengthen DENR.

Sustainability

Once in place, the system of fines and penalties and the mechanism for revising them would not require outside funding.

Participation

The revised system of fines would be applied to all firms. The environmental quality improvement resulting from a more rational structure of pollution fines and penalties would benefit society as a whole.

Demonstration effect

The lessons to be learned from this intervention would be relevant to on-going research on proper pricing and valuation of environmental resources.

Technical Assistance for Small and Medium Sized Enterprises

Small and medium-sized firms could be provided technical advice and assistance on ways to improve efficiency of materials use, residuals reuse, and recycling. This could be done on a pilot project basis. Funds could be made available to cover the cost of technical consulting services. These services may be provided by academic institutions and technical consulting firms. Currently, there is little domestic technical capability in this area so that expatriate firms would have to be involved. Eventually, increased demand for technical assistance would encourage the development of domestic technical capability for materials and residuals management.

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Political viability

Assistance to small and medium-sized firms would have good political support because these firms provide most of the employment in the economy.

Economic feasibility

The benefits include the savings to be realized from more efficient materials use, recycling of residuals, and reduced environmental waste load. These would be translated into increased enterprise profitability on an on-going basis. The cost would initially have to be funded externally. Eventually, the profits to be realized from more efficient materials use would provide enterprises continuing incentives to adopt the recommended management practices.

Sustainability

Funding would be required to cover cost of assistance to firms included in the pilot. No further funds infusion would be necessary beyond the the pilot project phase.

Participation

Initially, only the firms selected for the pilot would participate. Over time, this intervention could include many more firms, possibly, even informal sector enterprises.

Demonstration effect

This intervention is expected to have strong demonstration effect.

Credit Support for Pollution Control-Related Investments

Enterprises could be provided access to credit for waste management and pollution control-related investments. The credit could finance the cost of switching to technologies that reduce waste generation and discharge. Small and medium-sized enterprises could be the target beneficiaries.

Political viability

This intervention would be supported by environmentally concerned groups and by business enterprises that could avail of the credit support.

Economic feasibility

Funding could come from several institutions. If credit is provided at rates that cover real interest costs, the funds could be efficiently allocated to pollution-reducing activities and investments with the highest returns.

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Sustainability

The sustainability of the intervention would depend on the continued profitability of management practices adopted and investments made by participating firms.

Participation

This intervention would require the participation of financial institutions through which the funds would be channeled. Only firms that could realize positive returns from pollution-reducing activities and investments would be expected to participate.

Demonstration effect

Experience gained and lessons learned by participating firms could eventually be transferred to non-participating firms.

Greater Use of Environmental Impact Fees

To internalize the external costs of new development projects, impact fees could be imposed. The fees could be used to cover part of the cost of investment in infrastructure and measures necessary to increase environmental carrying capacity to accommodate new development projects. The fees could also go into a municipal fund to rehabilitate the natural environment or compensate parties adversely impacted by the project.

Political viability

This intervention would be supported by local communities and by environmentally concerned groups. However, initially it is expected to meet with opposition from developers and private industries.

Economic feasibility

This intervention would provide local communities regular source of funds for mitigating negative environmental impacts of new economic activities. The benefits are expected to exceed the costs of imposing and administering the fees.

Sustainability

Once instituted, this intervention is expected to be self-sustaining because it will be self-funding.

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Participation

This intervention is expected to elicit greater local level participation and interest in development projects.

Demonstration effect

The lessons to be learned from this intervention would have wide applicability. Hence, the demonstration effect of this intervention is expected to be high.

Policy Studies and Technical Assistance

Based on the criteria considered, the potential interventions outlined above appear to be practicable. However more information is necessary before these interventions can be adopted and successfully implemented. A combination of policy studies and technical assistance would have to be undertaken.

Policy Studies

Further studies are required in the following areas:

- o Institutional incentive structure that would promote optimal DENR performance;
- o Firm-level environmental management decision analysis including responsiveness to fines and penalties;
- o Technical constraints to residuals management, by industry and size of firm;
- o Responsiveness of environmental management-related investment to credit and financial incentives; and
- o Environmental management, developmental, and distributional effects of impact fees.

Technical Assistance

The following types of technical assistance would have to be provided:

- o Training for DENR field personnel on aspects of environmental management, monitoring and equipment use;
- o Assistance in setting optimal pollution fines and penalties;
- o Transfer and extension of appropriate technology to increase efficiency of

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materials use and waste recycling;

- o Assistance in identifying potentially profitable environmental management-related investments;
- o Assistance in designing system of impact fees that would promote optimal level of development and environmental protection.

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Appendix E.A. Rating System for Pollution Fines, 1988

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Annex E. Economic Framework

Pollution Factor	Weight	Categorical Points				
		1	2	3	4	5
(1) Duration of Violation	6.5	< 1 year		1 to 2 years		> 2 years
(2) Present Resource Condition	5.5					
(a) Water		any parameter fails to meet criteria provided that discharge not more than 500 cubic meter/day		2 to 4 parameters fail to meet criteria		at least 5 parameters fail to pass criteria
(b) Air		rural industrial/commercial	rural residential	urban industrial	urban commercial	urban
(3) Capacity of Source	4.5					
a. Water (cubic meter/day)		below 30	30 but <100	100 but <500	500 but 1000	1000 and above
b. Air pollution:						
b.1. Steam boilers/ Oil heaters						
Rated Hr		up to 50	up to 100	up to 200	up to 300	over 300
kgs/hr.cap. (steam)		up to 784	up to 1568	up to 3136	up to 4704	over 4704
kcal/hr.(steam)		up to 422	up to 844	up to 1476	up to 2531	over 2531
kcal/hr. (oil)		up to 375	up to 750	up to 1500	up to 2250	over 2250

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Appendix E.A. (cont.)

b.2. Other fuel burning installations						
Grate surface, area	up to 0.9	up to 1.8	up to 2.7	up to 3.5	over 3.5	
Slids Fuels, kgs./hr.	up to 112	up to 225	up to 340	up to 473	over 473	473
Oil, liter/hr.	up to 112	up to 225	up to 340	up to 473	over 473	473
Gas, cubic meter/hr.	up to 118	up to 225	up to 337	up to 474	over 474	474
b.3. Electric furnaces/ovens						
KW	up to 75	up to 125	up to 175	up to 225	over 225	225
Capacity, kg./hr. (steel)	up to 100	up to 185	up to 270	up to 375	over 275	275
Capacity, kg./hr. (bronze)	up to 180	up to 350	up to 515	up to 680	over 680	680
Capacity, kg./hr. (iron)	up to 110	up to 205	up to 300	up to 405	over 405	405
b.4. Incinerators						
Grate surface area, sq.m.	up to 1.0	up to 1.75	up to 2.75	up to 3.5	over 3.5	3.5
Capacity, kgs./hr.)	up to 115	up to 225	up to 340	up to 475	over 475	475
b.5. Air Pollution Installations (cubic meter/min)						
	up to 50	up to 125	up to 200	up to 275	over 275	275
b.6. Process equipment						
(1) other raw materials, (MT/hr.)	up to 1	up to 5	up to 7.5	up to 5	over 10	10
(2) odorous raw materials, (kgs./hr)	up to 10	up to 500	up to 750	up to 1000	over 1000	1000
(4) Average deviation from effluent or emission standards						
	3.5					
a. Water						
a.1. heavy metal and toxic substances	below 10%		10%-20%		over 20%	
a.2. physical and chemical substances	below 20%		20%-40%		over 40%	
a.3. BOD	below 25%		25%-75%		over 75%	
b. Air						
	below 20%		20%-40%		over 40%	

Source: PAB Resolution No. 10, Guidelines for Rating Fines.

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ANNEX. F COASTAL ZONE FRAMEWORK

**Sustainable Urban and Industrial
Environmental Management Review**

By:

**Harvey Van Veldhuizen
and
Naniel V. Aragonés**

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ANNEX F. COASTAL ZONE

CHAPTER F.1. CURRENT SITUATION

Overview

The rapid rate of urbanization and industrialization, along with the drive for economic development, is taking its toll on the coastal zone. The toll is paid by Filipinos in terms of the decline of coastal resources such as corals, mangroves, fishes and other marine resources due to coastal degradation and perturbation. This has been further aggravated by the increase in demand for these resources due to the overwhelming population growth. Another problem is the characteristic multiple use of the coastal zone creating conflicts over environmental protection, urban development and resource utilization. Consequently, coastal resources have disappeared at an alarming rate brought about by lack of concern by the general populace on conservation and sustainable utilization of resources.

This brings us to the concern of coastal zone management in the context of development in the country. Generally, coastal zone management efforts in the Philippines are beset with problems revolving on implementation and enforcement of various legislation and policies, as well as resource use conflicts.

Policy Framework

Coastal Zone Management

Policies regarding coastal zone management consist of an array of legislation, Presidential Decrees and Letters of Instruction. These have been classified into the following categories:

- o General policies - those with general applicability such as the creation of the National Environmental Protection Council (NEPC) which is now merged with the National Pollution Control Commission to form the Environmental Management Bureau (EMB); formulation of the Philippine Environmental Policy; and the creation of the Philippine Environment Code, among others.
- o Policies on coastal resources - those that limit and regulate the exploitation and use of coastal resources such as mangroves, coastal fisheries, coral reefs, and mineral resources.
- o Policies on coastal development - those that regulate the development of the coastal zone in the pursuit of economic development such as the building of infrastructures, ports, and land reclamation.
- o Policies on coastal hazards - those that concern flood control and drainage

programs and marine pollution, such as wastewater and solid waste management, including toxic and hazardous wastes.

Urban and industrial-related problems in relation to the coastal zone are categorized on policies regarding coastal development and coastal hazards.

As a whole, the planning framework for environmental management is centralized in Manila in EMB. Implementation and monitoring proceeds on a slow phase, if at all, due to lack of well-trained personnel and equipment. Furthermore, implementation is hampered due to the considerable time lapse for decisions regarding regulations, which are formulated in Manila by EMB, to reach the provinces where they are to be implemented by DENR Regional Officers.

Environmental Impact Assessment

The National Environmental Protection Council was formed in 1977 and directed that the environmental impacts of development projects would be assessed. The policy framework for environmental impact assessment was established, and in 1978 the Environmental Impact Statement (EIS) System was also established and reduced the types of projects subject to the EIS requirement to those located in environmentally critical areas.

With reorganization of natural resources management in 1987, responsibility for oversight of the EIS System and noise, air, and water quality standards is now placed on the EMB within the Department of Environment and Natural Resources (DENR) which leads and coordinates with various government agencies in the preparation and review of the EIS.

Under the present set-up, EMB staff in Manila is responsible for review and recommending certification of EISs by the Secretary of DENR. An Environmental Compliance Certificate (ECC) is issued when a project proponent has complied with the requirements of the EIS System.

Waste Disposal

There are at present several legislation enforced in the country concerning waste disposal. Most of these are embodied in the Pollution Control Law and include regulations on effluents. Other pertinent laws include regulations on radioactive wastes and disposal of mine tailings. Enforcement of these statutes are delegated to various government agencies which have provisions in their charters for protection of the environment from water pollution. However, it is still EMB, which has integrated in its functions those of the defunct National Pollution Control Commission (NPCC) and the former Environmental Center of the Philippines, which oversees the implementation of waste disposal regulations.

Administrative Responsibilities

Coastal Zone Management

At present there is no single government agency which oversees coastal zone management. Before, a Coastal Zone Management Program existed under the National Environmental Protection Council. Under this Program, a Master Plan for Coastal Zone Management was formulated and completed in 1985. An inter-agency task force (Coastal Zone Management Task Force), which took responsibility for enforcing the Master Plan, was created under the supervision of NEPC.

Management is now delegated to government agencies which address a specific coastal resource, such as coral reefs, mangrove forests, and other coastal resources. These are mainly line agencies such as the Bureau of Fisheries and Aquatic Resources (BFAR) in the Department of Agriculture, and the Forest Management Bureau (FMB). However, it is still EMB which spearheads the government's effort on the development of effective strategies for environmental management which also covers the coastal zone.

Environmental Impact Assessment

Enforcement of the Environmental Impact Statement (EIS) System is the responsibility of the EMB with proper coordination with other government regulatory agencies and bureaus. Table F.1 presents these government agencies together with their respective roles.

Waste Disposal

The EMB is now given the task of adopting and promulgating effluent regulations for industrial plants and domestic water treatment plants to prevent pollution which used to be the function

Table F.1 Selected regulatory agencies and their environmental roles.

Government Agency	Role
Bureau of Forest Development (BFD)	Land classification/regulation of forest lands and products.
Bureau of Fisheries and Aquatic Resources (BFAR)	Fishing privileges; licensing; fishpond development.
Mines and Geosciences Bureau (NGB)	Mining rights.
Environmental Management Bureau (EMB)	Air/water quality; EIS System
Fertilizer and Pesticides Authority (FPA)	Pesticides and fertilizers
Department of Health (DOH)	Sanitation/inspection & regulation of food and drugs.
Laguna Lake Development Authority (LLDA)	Program clearance relative to pollution and ecological balance in Laguna de Bay watershed area.
Philippine Coast Guard	Marine pollution
Philippine Nuclear Research Institute (PNRI)	import/export of atomic energy facilities; radioactive materials.
Philippine National Oil Company (PNOC)	handling distribution & sale of crude oil, oil exploration
National Water Resources Council (NWRC)	Water rights/use.

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of the defunct NPCC. Thereafter, it coordinates with other government agencies, such as the Philippine Coast Guard (PCG), Laguna Lake Development Authority (LLDA), Department of Health (DOH), Bureau of Fisheries and Aquatic Resources (BFAR), Bureau of Mines, Fertilizer and Pesticide Authority (FPA), National Water Resources Council (NWRC), and local government agencies for assistance relating to environmental protection through proper waste disposal and management.

Past Activities in Coastal Zone Management

Most of the past projects relating to coastal zone management are mainly focused on coastal resource assessment particularly on coral reefs, mangroves, and coastal fisheries. Assessment of these resources was necessitated to address their rapidly depleting numbers. Many of these projects were made possible through the support provided by the local offices of international financing institutions in the form of loans, grants or technical assistance (1). These international financing institutions include the International Bank for Reconstruction and Development (World Bank), the Asian Development Bank (ADB), the United States Agency for International Development (USAID), the Japanese International Cooperation Agency (JICA), the Australian International Development Assistance Board (AIDAB), and the Canadian International Development Agency (CIDA). Other environmental programs conducted by the government were done in conjunction with universities and non-governmental organizations (NGOs).

Some of the more important projects done on the coastal zone and the implementing agencies are the following:

- o Coral Reef Assessment Project - UPMSC (now UPMSI)
- o Coastal Zone Management Program - NEPC
- o National Mangrove Program - DNR, NEPC, NFRMC
- o Pawikan Conservation Project - DENR
- o Natural Resources Management Development - DENR
- o Seagrass Habitat Restoration Project - EMB
- o Marine Parks/Reserves Development Program - MNR
- o Marine Conservation and Development Program - Silliman U.
- o Coastal Living Resources Project - UPMSI, Silliman U., BFAR
- o Operation Bantay Dagat - Composite Task Force

- o Netsman Project - Haribon
- o Artificial Reef Development - SUML, UPMSC, BFAR

Many of these projects are site-specific and carried out by government agencies in coordination with NGOs and university researchers.

On-going and Proposed Activities in Coastal Zone Management

On-going Projects

At present, there is a major project being administered by the International Center for Living Aquatic Resources Management (ICLARM) with funding from USAID which aims to promote sustainable economic development through the proper management of coastal resources in the Association of South East Asian Nations (ASEAN) region. The pilot site in the Philippines is in Lingayen Gulf and the project addresses fisheries, marine parks, aquaculture, tourism and water quality management issues. To date, the following action plans have been formulated: (1) fisheries management; (2) environmental management; (3) aquaculture management; (4) community mobilization management; (5) tourism management; and (6) coral reef and marine parks management.

Another on-going project is the Australian government-funded ASEAN Coastal Living Resources Project which is now in its second phase of implementation. The project involves several studies on coral reefs, reef fishes, mangrove forests, seagrass beds, soft bottom communities and remote sensing.

The Integrated Protected Areas System (IPAS), with funding from the World Bank, is another project which recently started. The IPAS aims to establish, manage, develop, protect, and conserve areas in a manner that will leave them un-impaired for the benefit and enjoyment of the present and future generations (2).

Assessment of fisheries resources is also currently being undertaken through the Fisheries Sector Program with funding from the Asian Development Bank.

Aside from coastal resources management, some projects concerning pollution of coastal waters are being undertaken. The Calanacan Bay Rehabilitation Project is an example.

Proposed Projects

The thrust of past and on-going projects on coastal zone management are mainly on resource assessment and coming up with management action plans. Thereafter, proposed projects related to coastal zone resources and management are now mainly integrated in proposals for environmental protection in general. Some of these projects on environmental protection are listed in Table F.2.

Waste Disposal Practices

One of the major industries which contribute to the socio-economic development of the Philippines is mining. A large volume of mine tailings is transported into the coastal zone (3). Most, if not all, of these are dumped directly into the sea via pipe-line systems. Other industrial wastes are dumped directly into the ocean.

Domestic solid waste which is chiefly garbage, on the other hand, are:

- o Discharged to drains and rivers without treatment;
- o Dumped at municipal dumps;
- o Buried;
- o Dumped openly on a private land operated by a haulage contractor; or
- o Dumped into the ocean.

Hazardous wastes are simply disposed in municipal dumps or on-site with little regard to the impact on public health and the environment. These municipal landfills, particularly in Manila, are characterized by uncontrolled dumping, no cover materials, and extensive scavenging. Therefore, these conditions can be a direct health hazard to scavengers and contribute to both the leachate problem from these sites and direct entry into tidal waterways (4).

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Annex F. Coastal Zone

Table F.2 Some proposed projects in environmental protection.

Title of Project	Proponent/ Implementing Agency
National Institute for Environmental Research and Training (NIERT)	DENR/EMB
Rehabilitation of major river systems	DENR
Environment and Natural Resources Sector Adjustment Loan Program	DENR
Urban Environment Sector Loan	DENR/EMB
Integrated Risk Assessment and Management Project in Laguna de Bay	DENR/EMB
Environment Impact Assessment	EMB
Strengthening the Philippine EIA System	EMB
Pasig River Systems Rehabilitation and Restoration Project Preparation	EMB
Navotas-Malabon-Tullahan-Tenejeros (NMTT) Pollution and Flood Control Program	Inter-agency
Water Quality Audit on Water Bodies Pssibly Affected by the July 16, 1990 Earthquake in the provinces of Nueva Ecija, Nueva Viscaya, Benguet, Pangasinan, and La Union	Bureau of Mines and Geosciences
Rehabilitation of Environmentally Degraded Areas Caused by Small-scale Mining and Quarrying Operations	MGB
Developing Recommendations to Reduce Pollution from Toxic Materials used in Small-scale Mining	DENR/EMB
Environmental Impact Assessment of Major Mines in the Philippines	EMB/DENR
Toxic Chemicals and Hazardous Wastes Management	EMB
Air, Water, and Soil Quality Monitoring Network	EMB
Air Quality Management of the Metro Manila and Laguna de Bay Area	EMB/LLDA

Source: Lorenzo, P.T., Jr. et.al. A Market Study on Environmental Equipment and Services in the Philippines.

TR&D, Inc.

CHAPTER 2. POLLUTION PROBLEMS IN THE COASTAL ZONE

Overview

Very little information on pollution problems in the Philippines is available. Studies have been scarce and are not consistent enough to indicate definite trends. As a consequence, public perception about pollution is very limited. Pollution effects and risks on health and coastal resources, such as fisheries, are vaguely understood in many coastal communities. This is because concepts such as toxicity, bioconcentration, biomagnification, and the like, which are very well studied on different marine organisms in other countries, are relatively unknown to the general public and even decision-makers.

When decisions are made to address pollution problems in the coastal zone and budgets are limiting, the public and the environment are best served when the limited funds are used to address those issues that have: (a) the highest risk of adverse effects on public health and livelihoods, and (b) a reasonable prospect of being solved with available funds. Although little data exist on these potential effects in the Philippines, a review of the large body of information from urbanized and industrialized coastlines elsewhere in the world can be useful in helping to develop a preliminary risk assessment.

A review of literature on pollutant effects and consideration of industrial and urban activities in the Philippines indicates the following deserve further consideration as potential trouble spots:

- o urban and industrial pollution in the vicinity of coral reefs and mangroves;
- o urban and industrial pollution in shallow water and poorly flushed bays and estuaries;
- o discharges of mercury and chlorinated hydrocarbons (PCBs and pesticides) anywhere in the marine environment; and
- o discharge of BOD, sulfides, ammonia, and sediments to shallow water and poorly flushed bays and estuaries.

With the possible exception of mercury effects on public health, benthic communities (plants and animals living on or in the sea bottom) are at greatest risk.

It is important that the public be made aware of pollution and environmental issues so that they can work together with government and private entities to control, if not abate, pollution and degradation in the coastal zone.

Public Perceptions

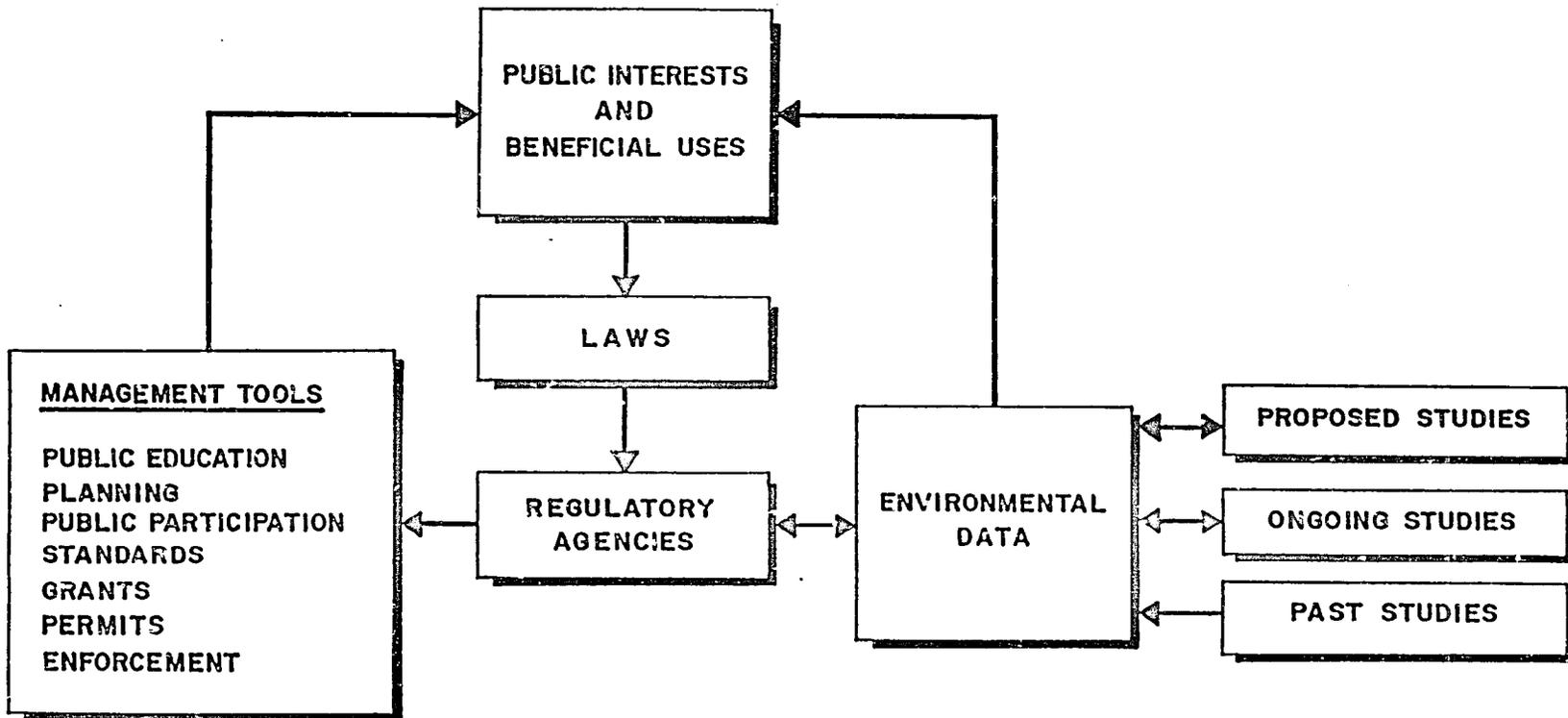
The driving force in resource management is the public. Long before modern governments were established, people had already established through common practice what and how resources would be used to their benefit. In one form or another, these beneficial uses remain. The objectives of resource management are to minimize resource use conflicts and maintain their sustainable use.

Efforts to solve ecological problems caused by urban and industrial pollution in the coastal zone are doomed to fail unless resource managers consider both public input and scientific input as to what are the important issues. If public input is not obtained or is ignored, there is a high probability that management approaches will be unimplementable or management priorities will not coincide to the public's priorities. If scientific input is not obtained, there is a high probability that management approaches will be ineffective because they violate natural laws or overlook key ecological processes.

The primary task of effective resource management, including control of urban and industrial pollution, is to nurture the interaction between public and scientific input and the policies, regulations, and enforcement measures that arise from this interaction. The interaction is a two-way street. Public perceptions and interests produce the laws that authorize and govern resource management decisions, but scientific data must be used by resource managers to educate the public so that reasonable laws are enacted and public support is obtained for effective enforcement. Similarly, public perceptions and management needs influence the nature of scientific research that must be obtained and how it is used to make decisions. Figure F.1 illustrates the interaction between public and scientific input in the management of resources for the benefit of society.

People in the provinces, especially in coastal areas, seem to be more aware of their surroundings since their means of livelihood are susceptible to degradation and resource use conflicts. An example is the deterioration of Calancan Bay due to the Marcopper mine tailings which has stirred active protests among the displaced fishermen in the area. Another example is the campaign against dynamite fishing by the resort owners of the Batangas coast to protect the coral reefs which attract SCUBA divers from all over the world.

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FIGURE F.1. RELATIONSHIP BETWEEN BENEFICIAL USES OF RESOURCES, REGULATORY AGENCIES, MANAGEMENT TOOLS, AND ENVIRONMENTAL DATA

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On the other hand, there is still limited awareness and concern about environmental degradation, especially in urban areas where people are preoccupied with other concerns. However, a number of activities have been intensified to alleviate this situation. There is now more media coverage, especially the print media, of environmental issues. Some of the more controversial issues on the coastal zone which have received a lot of media attention include:

- o the Bataan oil spill which affected a whole coastline and the associated fishery in the area;
- o the Leyte Industrial Development Estate (LIDE) for allegedly spewing toxic waste in the sea and air;
- o the controversial use of Tubbataha, the country's first national marine park, for seaweed farming by Shemberg, Inc., and;
- o the controversial muro-ami fishing method which is destructive to coral reefs.

Non-governmental organizations, with particular interest in the environment, are now increasing in number and pressuring the government on educating the public about the environment. In addition to this, more NGOs are now spearheading seminars and workshops dealing on the environment for the different sectors of society including government personnel. This is to make the latter realize that a community that is aware of their environment is the best protection from environmental degradation. Hence, an active participation of the public is needed for the success of resource management thrusts.

Fate of Pollutants

In determining priorities for pollution control, it is important to understand the fate of pollutants in the environment. Pollutants can be broadly classified in several broad categories as to their fate in the sea. These include: biodegradable pollutants; other non-persistent pollutants; and persistent pollutants.

Biodegradable Pollutants

Biochemical Oxygen Demand

The most common biodegradable pollutants in the Philippines include sewage and putrescible solid wastes. Their pollution potential in the marine environment is measured by the amount of oxygen (biochemical oxygen demand) that is required by bacteria to metabolize them. Biochemical oxygen demand (BOD) is typically measured and reported as the amount of oxygen consumed in 5 days (BOD₅). An alternative measure that is occasionally used is the chemical oxygen demand (COD), which is the amount of oxygen necessary to completely break down organic material by chemical and biological processes into carbon dioxide and water.

By lowering the levels of dissolved oxygen in the water column to critical thresholds [approximately 3.5 to 5 milligrams per liter (mg/l)], high BOD results in the death of fish and shellfish. A decline in oxygen content, especially when imposed by high organic enrichment of the sea bottom, results in a transition into anaerobic conditions in which sulfide concentrations begin to rise as a result of anaerobic bacterial action. Hydrogen sulfide tends to be highly toxic to marine biota, further exacerbating the toxic effects of decreasing oxygen concentration. In well flushed marine environments, BOD can be readily assimilated with little ecological harm because the oxygen content of the seawater is rapidly replenished by mixing and circulation. Poorly flushed or confined water bodies such as estuaries and certain embayments, however, are often highly susceptible to oxygen depletion.

The Philippines Country Profile (4) prepared as part of the COBSEA Report identifies BOD as the pollutant of greatest concern with reference to volume of waste and its impact on rivers, estuaries, and the coastal zone. It is estimated that the average Filipino typically generates 35-70 g BOD/person/day as sewage and 640-1,600 g BOD/person/day as solid waste (4). If it is assumed that seawater contains approximately 7 mg/l dissolved oxygen, then the untreated organic wastes produced every day by each individual is potentially capable of completely depleting oxygen from 100 to 240 m³ of seawater every day. If it is assumed that many fish and shellfish species will suffocate when dissolved oxygen drops to 3.5 mg/l, then each individual is potentially capable of rendering uninhabitable 200 to 480 m³ of seawater each day. Although these numbers are ridiculously high because they do not account for various natural mechanisms for replenishing dissolved oxygen in seawater, the impact of thousands or millions of people in a coastal urban area dumping essentially untreated wastes into rivers or estuaries in the coastal zone is potentially significant.

The largest source of BOD discharge to the coastal zone of the Philippines is domestic sewage (4). In Metropolitan Manila, for example, BOD loading to the rivers and estuaries from wastewater discharges was contributed in the mid-1980s at the estimated rate of:

sewage	25,550 tons BOD/yr
food processing industry	1,849 tons BOD/yr
textile industry	313 tons BOD/yr
piggeries	298 tons BOD/yr
other industries	204 tons BOD/yr.

To more fully understand these figures, it is useful to note that only 19 percent of Metropolitan Manila's population, which is less than 2 percent of the resident households (1), is served by a sewage collection system, and 70 percent of the nation's industries are located in the Metropolitan Manila area. Adequate sewage collection and treatment systems would significantly reduce these values. At the present time, Metropolitan Manila's rivers are incapable of supporting aquatic life because of depletion of dissolved oxygen in the water.

The second largest source of BOD discharge to the coastal zone is wastewater discharge from sugar mills and distilleries (4). Sugar mills typically generate wastewater streams with BOD

values of 120-1700 mg/l, and distilleries 170-11,300 mg/l, compared to raw sewage which may be on the order of 200-250 mg/l. Gonzales and Fernandez (4) report that the large number of sugar mills in Negros Occidental and their seasonal discharge of high BOD wastes to coastal streams have produced corresponding declines in fish harvest yields from nearby fish ponds.

The main industries in the Philippines include mining, textile, pulp and paper, sugar mills, alcohol distilleries, food processing, plastic goods, and other consumer goods. Of these, textile, pulp and paper, sugar mills, distilleries, and food processing typically generate high BOD wastewater. The majority of industries reportedly equipped with some form of wastewater treatment processes, however, are located in Metropolitan Manila. In the second largest urban area, Cebu, the majority of industries are not equipped with pollution control equipment. Thus, in terms of industrial-related BOD pollution, the majority of sources (85 percent) which are known to exceed effluent limitations are in Cebu (4).

The contribution of solid waste to BOD loading in the coastal zone is poorly understood. Solid waste in the country is improperly dumped on the ground and burned, or eventually winds up in rivers, estuaries, or ultimately the coastal zone.

Nutrients

A second major category of biodegradable pollutant is the nutrient load (nitrogen and phosphorus compounds) associated with sewage and certain types of industrial wastewater, especially fertilizer manufacturing and agro-processing facilities. Nitrogen and phosphorus are typically limiting in seawater and control the growth of phytoplankton and algal populations. Discharge of nutrients to the sea increases algal growth, which may be beneficial in cases where the marine environment is well-mixed and circulation is good. In estuaries and confined bays with poor circulation, however, algal blooms can cause significant environmental problems. In particular, the decay of dead algal matter may deplete oxygen, and sudden reductions in nutrient concentrations may encourage the growth of blue-green algae, which are better able to take up nitrogen but are poor food sources for most fish and shellfish species. There are very few data on nutrient-related problems in the coastal zone of the Philippines. It is well known from toxicological studies, however, that ammonia and nitrites are particularly toxic to fish.

Non-Persistent Pollutants

A few pollutants are not readily susceptible to biodegradation but nevertheless are not persistent in the environment. For example, high temperature and either high or low pH wastewater discharges may elicit an adverse ecological effect in the immediate vicinity of the discharge point, but rapidly disappear outside this limited zone through physical processes of dispersion and dilution. Seawater has high buffering capacity, and significant changes to pH are only likely to be observed in confined or poorly flushed water bodies. Similarly, the heat sink capacity of the ocean is immense, and temperature changes are difficult to induce except in water masses with poor circulation or of relatively low volume compared to the volume of discharge.

Viruses and pathogens are an important constituent in sewage and solid waste, and exert potentially significant adverse effects on public health. They are eventually killed by the bacteriocidal effect of sunlight or by consumption as a food source by protozoans and other microscopic organisms in seawater. Because it is difficult to easily detect viruses and pathogens in the environment, fecal coliform bacteria are used as an indicator of the presence of human wastes and the viruses and pathogens associated with them. A variety of governments and international health organizations have recommended guidelines or standards for fecal coliform contamination of seawater for the protection of public health. An intensive study of water quality in Manila Bay from 1982-1985 revealed that fecal coliform contamination exceeded standards for recreational use by swimmers at the majority of stations tested (4,5), and the levels of contamination have increased 10-fold since then (1,6).

Persistent Pollutants

Persistent pollutants include those which are not degraded in the environment or are degraded very slowly. The most common pollutants of this type include silts and sediments, heavy metals, and certain pesticides and chlorinated hydrocarbons that degrade very slowly. Silts and sediments reduce productivity of marine ecosystems by reducing the penetration of sunlight for algal photosynthesis and smothering benthic (bottom-dwelling) organisms. Heavy metals and certain persistent chlorinated hydrocarbons, including some pesticides, are known to be toxic to marine biota at low concentrations.

Silts and Sediments

Discharge of large volumes of silts and sediments to shallow water usually results in significant adverse impact over an area much larger than the primary area of sediment deposit. In shallow water, winds and waves often keep the water column well mixed, and winds and tides effectively move water masses over large distances. Thus, silts and sediments that are discharged to shallow water are likely to remain in the water column for longer periods of time and transported farther away from the discharge point before settling out. Finer silts are subject to frequent resuspension by waves and currents and advection to another location.

Discharge of tailings from a mine's milling operation is one model for evaluating the effects of a large scale discharge of silts and sediments. It has also generated much interest and controversy in the Philippines regarding its discharge to rivers and the marine environment (7,8). Tailings from a milling operation consist of a liquid and solid fraction. The liquid fraction is primarily fresh water, although it may also include small quantities of various reagents used to separate the target metal from unwanted minerals. The solid fraction is finely ground rock from which the target metal has been removed at the mill. As finely ground rock, tailings solids typically differ from the silts and sediments of eroded topsoil only in their degree of weathering and the fraction of organic soil matter.

Discharge of mine tailings to the sea has been the focus of detailed studies from several parts of the world, including the Philippines. Discharge of mine tailings by Marcopper to the sea

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approximately 1.5 km north of the mouth of Calancan Bay on Marinduque Island occurs with the outfall located above sea level at the end of a causeway. This type of discharge to shallow water results in high potential for wave action to resuspend finer fractions of tailings solids and for currents to advect the suspended solids for considerable distances. Studies of benthic communities in the area indicate that effects on biota are evident over an area much larger than that showing smothering of benthic communities by tailings deposits (9).

Marcopper (9) has been monitoring fish catches around the island of Marinduque. When discharge of mine tailings to Calancan Bay began in late 1975, fish catches in the bay apparently dropped significantly (7). Since the early 1980s, when discharge began to occur to deeper water outside of Calancan Bay, fish catches in Calancan Bay have recovered to levels comparable to those in other areas around the island. Over the years, however, the fish catch has declined in all areas around the island, most likely as a result of severe overfishing and the widespread destruction of coral reefs by dynamite fishing. Furthermore, the species composition in the catch has changed during the period of monitoring, but it is not known how well current species composition compares to pre-discharge conditions, as pre-discharge baseline studies of biological communities examined benthic communities and not fish communities.

Marcopper (9) has been studying recolonization and recovery of benthic communities on tailings deposits in Calancan Bay. A comparison of data collected in 1982 and 1987 shows significant recovery of seaweeds, seagrasses, and macrofauna in areas severely impacted in the 1970s but no longer subjected to thick tailings deposition. The data also show, however, that deposition of the finer fraction of the tailings solids still affects an area much larger than that affected by actual smothering of benthos.

Open-water disposal of dredge spoils represents another model of large-scale discharge of silts and sediments to the marine environment. Smothering of benthos and disruption of fish and plankton communities have been extensively investigated in the US as a result of concern about the effects of open-water disposal of dredge spoils. Studies have been made of the ability of clams and crustaceans to survive burial by sediments (10,11,12,13,14), but not of other benthic organisms. Impacts varied with the amount of silt and clay in the sediment, the depth of deposition, and the species tested. Generally, depths of more than 10-20 cm were fatal for most species of clams and crustaceans that were tested. Corals, however, are expected to be very sensitive.

Toxic Chemicals

In the case of heavy metals and most persistence organic compounds, there is a high affinity for adsorption to particulate matter. These persistent pollutants usually settle to the sea bottom along with associated particulates and gradually build up concentrations in the sediments as long as the source of the discharge remains. In the case of toxic chemicals, toxic effects can soon be exerted on benthic organisms. The rate at which persistent pollutants build up in sediments is dependent not only on the rate of discharge but also the flushing characteristics of the

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overlying water column. In quiescent conditions, particulates and the persistent pollutants associated with them will settle rapidly. The zone of impact will be small, but the degree of impact will be high under quiescent conditions.

There are few data on quantities of persistent toxic chemicals in the marine environment of the Philippines or their effects on marine biota and human health. Data on mercury contamination is beginning to emerge, particularly in industrial areas in Leyte and in watersheds of Mindanao that are occupied by gold rush sites.

Toxic Effects of Pollutants

A review of readily available information compiled for this broadly scoped work effort indicates that very little information exists on documentation of toxic effects on pollutants on marine biota in the Philippines. There is a substantial body of information on the condition of reef habitats in various locations around the country, but most of this is oriented towards the very destructive practice of dynamite fishing. Therefore, a review of literature from urbanized and industrialized harbors, bays, and coastlines elsewhere in the world was briefly conducted in order to begin the process of identifying potential pollutants of concern to the Philippine coastal zone.

There is frequent confusion about what is meant by "toxic" effects of pollutants. When most people think about toxic effects of pollutants on marine life, they think about dead fish and dead corals. In other words, "toxicity" is usually thought to correspond to "lethality."

Toxicity, however, refers to effects that decrease prospects for survival, growth, or reproduction. In short, toxic substances are poisons, but they do not necessarily result in death. There are more likely to be other harmful effects, e.g., reduction in growth rates, reduction in reproductive success, increase in susceptibility to disease or parasites, but these are often difficult to observe in the marine environment let alone to demonstrate cause-and-effect relationships with pollutants.

Measurements of Toxicity

When discussing toxicity in the marine or aquatic environment, measurement is reported as the concentration which has a stated effect on 50 percent of the exposed organisms. For example, if death is the measure of toxic effect, then the measure of toxicity is reported as the LC50, or the lethal concentration at which 50 percent of the exposed organisms are expected to die. If for example a change in growth, swimming activity, or reproductive success is the stated measure of toxic effect instead of death, then the measure of toxicity is reported as the EC50, or the effective concentration at which 50 percent of the exposed organisms are expected to show the stated effect. These concentrations are usually determined in laboratory tests (bioassays) in which groups of organisms are exposed to one of several concentration levels of pollutant. The LC50 (or EC50) is statistically calculated from the percent mortality (or percent response) observed at each of the test concentrations.

Toxicity of a substance is determined by the concentration of the substance in the environment

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and the length of time of exposure. It is a well known phenomenon in toxicology that the lower the concentration in the environment, the longer it takes for the toxic effect to occur. For example, a toxic substance at 1000 mg/l may kill or harm 50 percent of the population after only a few hours exposure, whereas the same substance at 500 mg/l may take several days or weeks of exposure before 50 percent of the population dies. Looking at this same phenomenon from the opposite side of the coin, the longer organisms are exposed to pollutants, the lower the concentration required to produce a toxic effect. Zooplankton tested with a suspended particulate phase preparation of mine tailings (15) showed no mortality over 96 hours with concentrations up to 1,100 mg/l. By increasing the exposure duration to 1000 hours, a decrease in median survival time was detected at a concentration of 560 mg/l.

Therefore, it is important when analyzing the results of toxicity bioassays to consider the length of exposure as well as the concentration of the substance. In the U.S., 96 hrs exposure is generally accepted as the standard bioassay duration to determine the LC50.

Acute and Chronic Toxicity

Toxicity is typically reported in terms of either acute toxicity or chronic toxicity. The terms broadly refer to the type of exposure.

Acute toxicity generally indicates short-term exposure. Occasionally the term is used to mean exposure to a single dose, and less correctly to a lethal dose. Problems arise in deciding what constitutes short-term exposure. The generation time of phytoplankton, for example, may be a few hours, whereas 96 hrs is a short time in the life span of most fish.

Chronic toxicity generally indicates long-term exposure. Occasionally the term is used to mean exposure that results in sublethal effect, but this use is less correct.

Problems often arise in interpreting the meaning of these terms. The blurred use of the terms arises from the observation that usually the only effect that can be observed from short-term exposure is a lethal effect; whereas with long-term exposure, one or more sublethal effects can be observed before death occurs (and "long-term" exposure implies that the test organisms have not yet died).

In response to concerns about toxic effects of pollutants on marine biota, many countries, including the Philippines, have established water quality standards that establish maximum allowable concentrations of known toxic materials in wastewater and the receiving water. In the case of the Philippines, these standards vary according to a classification system that corresponds to several categories of beneficial uses of the marine environment. The water quality standards and their application are discussed elsewhere in this volume.

Special Forms of Toxicity

Literature on toxic effects may refer to a pollutant's ability to produce carcinogenic, mutagenic,

or teratogenic effects. Carcinogenic effects consist of production of tumors (cancers). Mutagenic effects usually refer to damage or modifications to chromosomes (genes) during cell division. Teratogenic effects are those that produce birth defects. These special forms of toxicity are not well understood with respect to marine species. It has been observed in the US, however, that demersal (bottom-dwelling) fish in highly polluted embayments often display various forms of tumors (16), and fish eggs are often used as a test model for determining mutagenic potential of a pollutant.

Toxic Effects in the Coastal Zone

Identifying toxic effects of pollutant discharges in the coastal zone represents a major challenge to the environmental scientist. Major obstacles to demonstrating an effect are as follows:

- o Most fish, birds, and mammals are very mobile, and can easily avoid harmful conditions if they can detect them, or are only briefly exposed to the discharge as they move along from place to place.
- o Open coastal water is subjected to current and wave action which quickly disperses the pollutant discharge and reduces concentrations (dilution) to levels where harmful effects are not detectable or do not occur.
- o Populations of fish and other organisms naturally undergo wide fluctuations in abundance and diversity as a result of tidal, diurnal, seasonal, and annual changes in physical and biological conditions.
- o Most waste discharges to the marine environment are complex mixtures of chemical contaminants; rarely is an individual pollutant the only contaminant in the environment. Toxicity tests in the laboratory, however, are rarely conducted on complex mixtures. Therefore, the interaction of various pollutants on an organism are poorly understood.
- o Because of the problems noted above and the recognition that the marine environment is not the natural habitat of the human observer, collecting the necessary information to demonstrate the effect usually represents a major expenditure of time and special equipment.

Consequently, toxic effects in the coastal zone are usually based on laboratory determinations of LC50 or EC50 of individual chemicals, and estimating the concentration of the pollutants in the environment as the wastes are dispersed and diluted by currents.

Nevertheless, lethal toxic effects can be observed in the marine environment under certain circumstances. Most dramatic of these are fish kills in bays and estuaries, bleaching and death of corals, and the death of other organisms that live in or on the sea bottom (benthos).

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Poor Flushing Actions

Fish kills in the marine environment are most likely to occur in relatively confined water bodies such as poorly flushed bays or estuaries where concentrations of toxic substances can build up to lethal levels. In warm tropical waters, fish are particularly susceptible to declines in dissolved oxygen and increases in ammonia and hydrogen sulfide. Although fish are also susceptible to changes in pH, sea water has high pH buffering capacity and it usually requires a poorly flushed bay or estuary with a relatively high volume of low or high pH waste discharge to result in toxic effects.

Metals

Most of the metals with higher atomic weights are known to be toxic in their ionic form at elevated concentrations in the marine environment. Their ability to act as poisons depends on their chemical state, i.e., whether appearing as dissolved ions in water, as salts, or as insoluble mineral compounds. Toxicity usually occurs only when the metal is in the ionic form, almost never when the metal occurs in a mineralogical state. The one important exception is elemental mercury, which is known to be toxic and readily absorbed into living tissues.

Metals that occur as salts can disassociate in water into their respective ions. The rate of disassociation is highly variable for each salt compound, and it is significantly influenced by pH, temperature, and the presence of other chemicals in the water column. Generally, metals that occur as salts, particularly organic salts, should be considered available as toxic compounds.

When combined with the sulfide ion or incorporated into other mineral compounds, most metals become insoluble in water and therefore unavailable biologically. Problems with toxicity arise only if pH is sufficiently low (acidic) to release the metals in their ionic state, or oxidation of the metallic sulfide occurs and converts the compound into a disassociable salt. Certain bacteria have the ability to cause oxidation of metallic sulfides, generating soluble salts and acids and liberating heavy metals so that they can be readily dissolved in water.

Reduction-oxidation processes in benthic marine sediments may affect the release of dissolved metals into the water column. Metal ions from the overlying water or upward migrating pore water may be sorbed or co-precipitated onto manganese- and iron-oxide layers near the sediment surface (17). If these minerals were to undergo reduction during periods of low oxygen concentration, the metal ions could be released. However, over periods of extended low dissolved oxygen concentration, sulfide produced by bacterial activity would tend to reduce the mobility of these dissolved metals. Studies on the distribution of iron, manganese, molybdenum, and copper in interstitial waters collected from mine tailings and natural sediments in the marine environment of British Columbia showed that leaching of metals from deposited tailings is likely a minor contributor to the total dissolved metals in the receiving waters (18).

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Copper

Copper in the ionic state is known to be toxic at low concentrations in the marine environment, particularly to larval fish and shellfish (19). Copper sulfate is also toxic to aquatic vegetation. Copper bound in mineral material (e.g., tailings solids) is harmless to biota unless the mineral matrix is subjected to low pH or extensive oxidation in the environment. In this case, copper ions will be liberated, or the copper will form oxidized salts (e.g., copper sulfate) which can readily disassociate into the toxic ionic state.

Marcopper (9) has examined leaching of metals from tailings deposited in the shallow marine environment. Samples collected from interstitial water in exposed deposits at low tide show that copper, molybdenum, and lead undergo slight dissolution; manganese undergoes extensive dissolution. Heavy metal enrichment of the marine environment as a result of tailings disposal is most likely the result of dissolved metals content in the tailings discharge. Once the metals are adsorbed to deposited marine sediments, they tend to remain unavailable to biological uptake.

Benthic organisms tend to have little or no mobility. As a result, it is much easier to observe toxic effects in benthic species such as corals, clams, sea urchins, sea stars, and worms. In addition to the pollutants noted above as particularly important to toxic effects on fish, benthic organisms are susceptible to chronic exposure to toxic chemicals in wastewater discharge plumes and to deposition of silts and sediments.

Contaminated Sediments

The incidence of fin rot and liver abnormalities in demersal (bottom dwelling) fish has been well documented in a number of polluted marine environments. Sherwood (20) has reviewed considerable information from Puget Sound, Southern California, and New York Bight (U.S. coastal environments with high urban and industrial development). Although clear information on causal agents and mechanisms of impact is not available, a large amount of circumstantial evidence points out that highly contaminated sediments are linked to incidence of these pathological conditions. For the contaminants considered, the common factors linked to occurrence of these diseases and abnormalities include exposure to PCB, as reflected in tissue concentrations, and exposure to heavy metals in sediment even though the evidence indicated that the heavy metals in sediments were not readily available for uptake. The levels of PCB in muscle, liver, and brain tissues were higher in fishes with fin erosion. Changes in liver size, color, or lipid content appear to be related to exposure to chlorinated hydrocarbons, particularly PCB and DDT.

A few laboratory studies have specifically examined the relationship between body burdens of toxic chemicals and reproductive success of demersal fishes. For example, Smith and Cole (21) observed that sublethal DDT exposure of adult winter flounder adversely affected fertilization of eggs and survival of embryos. Fewer studies have focuses on demersal fish in the wild. Von Westernhagen et al. (22) collected and fertilized eggs from Baltic flounder and compared larval

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appearance to PCB levels in ovaries and livers of the females. Adverse effects on egg development and larvae were noted when PCB levels in the ovaries exceeded 120 ppb (wet weight). Spies et al. (23) reported a significant negative correlation between PCB concentration in eggs (5-30 ppm, adjusted for lipid content) and percent embryological success for San Francisco Bay starry flounder. There were no significant correlations, however, between concentration of PCB in the liver and embryological success. Comparison of fish from a site with contaminated sediments and a site with less contamination revealed significant reductions in fertilization success for fish from the contaminated site, but no significant difference in embryological success. This observation suggests that egg development and fertilization may be more sensitive than larval development to exposure to PCBs.

Silt and Sedimentation

Tropical coral reefs are particularly sensitive to silt and sedimentation. The effect of silt and sedimentation on coral reefs is usually smothering, rather than a chemical effect. Effects are therefore more often measured as rates of sedimentation (mg sediment/cm²/day) or depth of deposition. However, EC50s can also be used because effects of suspended silts include interference with feeding, growth, or reproduction. In areas receiving only light deposition, suspension feeders such as corals, crinoids, ophiuroids, some bivalves, and some polychaetes are often the first to suffer adverse impacts (24).

Organisms in the water column may also be affected by discharges of silt and sediments. Most cases of toxicity tests of mine tailings (8), volcanic ash and mudflows (25), and other forms of suspended sediments (26,27) indicate that lethal effects on fish are most likely experienced at very high concentrations (1,500 to 54,000 mg/l) due to physical effects such as abrasion of gills. Exceptions occur when the silts and sediments are contaminated by toxic chemicals.

A wide range of sublethal effects, however, are readily observed with suspended sediments. Respiration, feeding activity, and behavior of zooplankton were monitored as part of the Anderson and Mackas (15) study of toxicity of mine tailings. Because no mortality was observed after 96 hr at concentrations ranging from 0 to 1,100 mg/l, the tests were extended to about 1,000 hr (42 days). Respiration increased somewhat after 24 hrs at low concentrations (<40 mg/l) and decreased at higher concentrations (100 mg/l) in some tests. Feeding activity responded similarly. No significant effects on behavior were apparent.

Sensitivity of Biota to Pollutants

Based on literature reviews, various groups of organisms can be considered more sensitive to certain types of pollutants than other kinds of organisms. At the risk of over-simplifying the findings, the following appears to be the general trends observed in the literature.

Phytoplankton

Plankton refers to that group of plants and animals found drifting or floating in the water column, unable to swim against currents for significant distances. Phytoplankton refers to planktonic organisms capable of manufacturing their own food, i.e., usually single-celled algae.

Phytoplankton are adversely affected by suspended sediments and toxic constituents in the water column. Turbidity affects phytoplankton by reducing the penetration of light into the water column. Toxic chemicals of most concern to phytoplankton appear to be biocides (used in cooling water systems), heavy metals (especially copper), and dissolved petroleum hydrocarbons. Sanitary waste discharges typically are beneficial to phytoplankton because of the nutrient supply, unless the discharge is turbid or contains toxic chemicals.

Detecting effects of pollutants on phytoplankton in the sea is difficult because currents constantly move phytoplankton into and out of impact zones. Furthermore, populations are highly variable in abundance and distribution on a very small spatial scale and temporal scale.

Zooplankton

Zooplankton refers to planktonic animals, including not only those animals that spend their entire life cycle as plankton, but also those life stages of eggs, larvae, or juveniles of organisms who as adults are capable of swimming against the current for significant distances.

Zooplankton are adversely affected by turbidity, high BOD, and toxic chemicals in the water column. Turbidity interferes with feeding and by fouling respiratory structures. Generally zooplankton, especially the larvae of most organisms, tend to be among the most sensitive to high BOD and toxic chemicals. Larval stages in particular are generally more sensitive to toxic chemicals than are the egg or adult stages. Effects, however, are as difficult to detect in the sea as they are for phytoplankton.

Benthos

Benthic species are those that live in or on the bottom. In the broad sense, they also include bottom-dwelling fish (such as flounder and sole). Benthic species are most likely to be affected by a waste discharge because the impacts they are subjected to are likely to be the most persistent, and most of these organisms have little or no mobility.

Benthos will be most susceptible to deposition of sediments, high organic enrichment of the sediments, and the uptake of toxic chemicals and heavy metals that are discharged and settle to the bottom with particulate matter. Of these, smothering by sediments or suffocation due to consumption of oxygen by organically enriched sediments are most likely to be observed in the environment as a lethal effect.

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Reef Fish

Reef fish tend to be limited in their mobility in the sense that they tend to stay near the coral reefs that provide them with food and shelter. Although reef fish may not be particularly susceptible to turbidity and suspended sediments, the corals upon which they depend are very susceptible. Oil spills may also have a significant adverse effect, not only from the standpoint of sublethal toxic effects on the fish themselves, but also on the reefs.

Pelagic Biota

Pelagic biota includes those species that feed and swim primarily in the water column. These include fish species that typically do not associate themselves with reefs, and marine mammals. Because of their mobility, these species are likely to avoid adverse water quality conditions or suffer only brief exposure to discharges. Detecting effects of toxic constituents or turbidity in the field may be difficult because of the mobility of these species.

Marine Birds

Without question, marine birds are most susceptible to the adverse effects of oil spills. Marine birds are likely to forage over a large area, minimizing the risk of long-term exposure to a polluted area. However, once exposed to spilled oil, most marine birds rapidly lose body heat because the oil destroys the insulative capacity of feathers, and the birds die from hypothermia. Lightly oiled birds may survive the exposure, but in the process of preening the oil from feathers they ingest sufficient quantities to reduce egg-laying capacity or cause other detrimental physiological effects.

Biological Uptake of Contaminants

The appearance of potentially carcinogenic, mutagenic, or toxic chemicals in fish and shellfish tissue is commonly accepted as proof that a variety of pollutants bioaccumulate in organisms and eventually will adversely affect human health. Concern about bioaccumulation is fueled by well-publicized harmful effects such as the effect of mercury on humans (Minamata disease) who have consumed contaminated fish and shellfish, the known linkage between PCBs and cancer in humans, and DDT's effect on eggshells of predatory birds (eagles, osprey, and pelicans).

Little information exists on the uptake of toxic chemicals by biota in the Philippine coastal zone. Much of the following discussion is drawn from the literature pertaining to a wide variety of urbanized and industrialized harbors and embayments around the world. The reviews are useful in identifying potential pollutants of concern in the coastal zone of the Philippines.

Review of a portion of the growing body of scientific literature, however, suggests that caution is needed in discussing bioaccumulation of contaminants. Although there are clearly effects in nature that are attributable to bioaccumulation of contaminants, there are also many assumptions about harmful effects that do not withstand rigorous scientific analysis. Care must be taken

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therefore, to ensure that regulatory actions focus on issues that really matter from an ecological standpoint, and that public attention is drawn to them.

Definition of Terms

The terms "bioconcentration," "bioaccumulation," and "biomagnification" are frequently used by the public, by resource managers, and occasionally by research scientists as if these terms were equivalent. Incorrect assumptions arise in part because of misuse of these terms. Macek et al. (28) have commented on the confusion, and have recommended use of the terms as defined in one of the leading reference texts in aquatic toxicology.

Bioconcentration

Bioconcentration is the process by which chemical pollutants enter aquatic organisms by diffusion through gills, the skin, or other tissues exposed to the outside environment. Reviews of the literature by several authors suggest that bioconcentration is the primary process by which contaminants appear in living tissues, at least in lower levels of the food chain and for most heavy metals. Bryan (29) states that most of the evidence for heavy metals suggests that uptake from solution is passive, with more acutely toxic metals absorbed most rapidly. Young (30), in reviewing the data from New York Bight and the Southern California Bight, noted that fishes collected from discharge zones exhibited relatively little or no detectable elevation of metals in their tissues, whereas invertebrates typically did show elevation. Young (30) observed that these data suggest that uptake of metals from contaminated food is not important in fish, with the exception of mercury.

Macek et al. (28) examined DDT in detail and noted that 40-75 percent of the DDT found in animal tissues was taken up as a result of bioconcentration. Scura and Theilacher (31) examined laboratory data on a planktonic food chain (algae-rotifer-anchovy larvae) exposed to chlorinated hydrocarbons and concluded that uptake was due primarily to bioconcentration.

Bioaccumulation

Bioaccumulation is the uptake of chemicals via both bioconcentration (through external tissues) and from food sources (i.e., through the intestinal wall).

It is difficult to separate the uptake of contaminants due to bioconcentration from uptake through dietary sources. Macek et al. (28) reviewed literature that rigorously examined the relationship between bioconcentration and dietary uptake. They pointed out that few studies quantitatively examined the contribution of each. Upon examining their own work and the few studies that have rigorously examined this matter, they concluded that dietary uptake is rarely a concern, except for those chemicals that have a long half-life (low depuration rate) in organisms. Chemicals that appear to have a long half-life in organisms are typically lipophilic (fat-loving), with PCB as a prime example.

Other authors have reached different conclusions about the importance of dietary contributions to body burdens. Thomann (32) noted that dietary uptake augmented PCB tissue levels in top predators 10-fold from that taken up through bioconcentration. Weininger (33) examined uptake of PCB in lake trout and concluded that only 2-3 percent of the PCB in the tissues could be attributed to bioconcentration. Bryan (29) states that all the evidence for fish and crustaceans points to food as the main source of chlorinated hydrocarbons such as DDT and PCB, whereas the evidence is mixed for the uptake of metals by fish and crustaceans. These various investigations indicate that the relative importance of dietary contribution increases for higher trophic levels, particularly when PCB is the contaminant under investigation.

Absorption of metals from food is highly variable in part because of the variety of free and bound forms of the ions that are possible in the environment. Demersal fish (plaice) absorbed more zinc from zinc-starch and zinc-gelatin pellets than from zinc-contaminated worms offered as food (34). Johnston (35) reviewed data on tissue burdens of several metals in phytoplankton and zooplankton of Monterey Bay, California. Johnston (35) concluded that cadmium, lead, copper, and zinc were the metals most likely to be significantly retained from food sources; whereas the data showed little or no effective uptake from food sources for other metals. Work on several filter-feeding organisms (e.g., clams and oysters), suggests that uptake of contaminants from ingested suspended particulates may be an important route of bioaccumulation (29).

Bryan (9) has conducted a review of several studies examining the uptake of chemicals from contaminated sediments. The evidence suggests that sediment characteristics are critical to the availability of adsorbed contaminants. Work with Macoma balthica, for example, showed that availability of zinc, cobalt, and silver to this deposit-feeding bivalve depended on the type of sediment.

Body burdens of selected heavy metals have been evaluated in resident organisms at tailings disposal sites of various mines throughout the world. Uptake of lead, copper, zinc, and cadmium have been noted in deposit-feeding bivalves (36). Marcopper has conducted extensive analyses of heavy metal uptake by several species of commercially important pelagic and reef fish from Calancan Bay and vicinity (37). Results from analyses of fish muscle tissue are as follows:

	Calancan Bay max. in ppm	Control max. in ppm
Copper	2.00	1.25
Zinc	9.0	4.3
Lead	1.3	0.9
Mercury	0.157	0.151
Arsenic	0.151	0.074

These data show insignificant uptake of heavy metals by fish in the vicinity of the tailings discharge. Respective Canadian Food and Drug standards are 100 ppm for copper and zinc, 10 ppm for lead, 0.5 ppm for mercury, and 5 ppm for arsenic. Oysters, which are known to

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readily take up copper, from Calancan Bay contained up to 300 ppm copper compared to about 50 ppm in specimens from control areas. Zinc, lead, mercury, and arsenic showed no significant differences in oysters.

DENR Region IV (38) examined water quality conditions in Calancan Bay and heavy metal burdens in biota following resumption of marine discharge by Marcopper. DENR observed that the levels of cadmium, lead, and total solids in the tailings discharge violates DENR standards issued in 1990 for industrial effluent. DENR also found that lead and cadmium in the water column at some stations in the coastal and offshore areas around the outfall exceeded standards issued in 1990 for receiving water. However, stations more than 1.5 km from the outfall generally showed high water column transparency, indicating that solids deposited near the discharge or settled out of the upper water column within a relatively short distance. A review of the field data suggests that mercury levels in the environment could also be high, but that levels in the effluent were not. Therefore, it may be that mercury levels in coastal waters in the area are high due to natural sources.

The DENR study (38) also indicated that heavy metal levels in fish tissues were acceptable by Canadian and Australian standards, but copper and zinc levels were above these standards in oyster tissue. These data are consistent with those presented by Marcopper (9). Thus, although the discharge violates some of the regulatory standards recently established for marine waters, it does not appear that heavy metal levels are producing toxic effects. In addition, consumers of seafood from the bay would not suffer ill effects unless oysters from the bay were a significant component of the diet.

Bioaccumulation of water soluble petroleum hydrocarbons is a well documented phenomenon (39). Uptake from water can result in tissue concentrations as much as 1,000-fold over ambient water (40). Hydrocarbons are known to adsorb readily to sediment and may often persist for years (41). Biological uptake of petroleum hydrocarbons from oiled sediment is also well known (42).

Biomagnification

Biomagnification is the process by which the concentrations of contaminants in tissues substantially increase as these contaminants move up the food chain to higher trophic levels. For example, if the concentration of DDT in the tissues of a top carnivore were 10-100 times higher than the concentration of DDT in the tissues of an herbivore in the same contaminated body of water, biomagnification of DDT occurred in that food chain.

Biomagnification is a measure of the persistence of chemical contaminants once they enter living tissues. Few chemicals are known to biomagnify in the aquatic food chain. But those that are known to biomagnify are the ones that have led to adverse effects on higher trophic levels, including human consumers of seafood. Thus, chemicals that have high potential for biomagnification are those of greatest concern in the marine environment.

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Care must be taken, however, in examining biomagnification potential. For example, most higher trophic level organisms are long-lived and have relatively high lipid content, and concentration of lipophilic chemicals must be normalized to lipid content rather than total biomass. Portmann (43) observed that DDT concentrations showed a drop in biomagnification from several orders of magnitude to less than one order of magnitude when the data were adjusted for lipid content of the various trophic levels. Furthermore, data from Southern California (44) show that levels of DDT and PCB in fish liver vary over the reproductive cycle, even when the effects of changes in lipid content are accounted for in the analysis. Changes in concentration of PCB and DDT in the liver, when normalized for lipid content, can vary 2- and 3-fold and as much as an order of magnitude over the course of the reproductive cycle in female fish.

Macek et al. (28) in reviewing their own work as well as key studies on the subject, have suggested that only DDT was likely to biomagnify in food chains. Later work by Thomann (32) showed that PCBs also magnify. Data from southern California suggest that methyl mercury, DDT, and PCBs have biomagnification potential (45). They used the cesium/potassium ratio in tissue to calibrate trophic level organization in three marine ecosystems; the data were then used to examine the uptake of ten metals, PCB, and DDT through trophic levels. Young et al. (45) found no evidence of increase in concentrations in nine of the ten metals, methyl mercury being the exception. Bryan (29) also concluded from his review that the more persistent organochlorides, such as DDT and its metabolites, and methyl mercury show appreciable biomagnification.

Once in the aquatic environment, mercury tends to adsorb rapidly to organic and inorganic materials. Thus, suspended solids and bottom sediments rapidly scavenge mercury from the water column. Bottom sediments in particular will develop high concentrations of mercury relative to the water column. In anaerobic bottom sediments, the mercury rapidly reacts with sulfides to form cinnabar. In oxygenated sediments, bacteria will slowly transform inorganic mercury into methyl mercury, which is highly reactive with organic matter and is rapidly taken up by biota.

Mercury is a heavy metal that is being discharged in large quantities to the environment in the Philippines because of its widespread use by small-scale miners in gold rush areas. A review of files from DENR sources indicate that a limited amount of environmental monitoring for mercury has occurred in the Philippines, primarily in Regions X and XI (on Mindanao Island). The main source of information in Region XI is a draft report by Magpantay et al. (46), whereas data from Region X appear as tabulated data compiled by regional DENR staff.

The Ngan River, in southeastern Mindanao, drains an area with extensive small-scale gold mining activity. Use of mercury is widespread, with little effort to use retorts to reclaim the mercury vapor, in spite of extensive extension efforts by Mines and Geosciences Bureau personnel to explain the health hazards and offer low-cost retorts to gold processors. Mercury contamination in the Ngan River is reported as high as 2.598 mg/kg (ppm) in fish, 1.004 mg/kg (ppm) in sediment, and 0.009 mg/l (9 ppb) in water. DENR has established a criterion of 2 ppb total mercury for all categories of uses of freshwater and seawater, unless it can be shown that natural background levels are higher. The US Food and Drug Administration recommends an action

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level of 1 ppm methyl mercury in the edible portion of fish. It is not known what portion of the mercury contamination reported in fish is methyl mercury.

In the gold rush area of Diwalwal in Mindanao, stream sediments are reported to have 28-79 ppm mercury and water is reported to contain 0.0068 to 0.0456 mg/l (6.8-45.6 ppb) mercury. This is a significantly higher level of contamination than reported for the Ngan River, but no data have been taken from fish in the stream. Approximately 16 km downstream from Diwalwal, stream sediments and water show 0.457 ppm and 0.0007 ppm, respectively. The mouth of the Hijo River (Davao Gulf), which also drains extensive small-scale gold mining operations, shows 0.069 ppm (69 ppb) mercury in sediment and 0.00073 ppm (0.73 ppb) in water.

These data indicate that high levels of mercury contamination are expected in the vicinity of gold rush areas. Although evidence of contamination can be found downstream, particularly in the sediments, the level of contamination drops sharply within a few kilometers of the source. Eventually, however, this contamination is expected to appear in the coastal zones near the river mouths. Generally, the water quality monitoring data from Region X show similar trends. Although the data are not extensive, they can be used to identify potential problem areas, e.g., Wawa River and Agusan River near Esperanza and the Agusan River near Santa Josefa and Veruela.

Methyl mercury is rapidly absorbed by living tissues, perhaps at a rate as high as 90 percent in the human intestine. Once in the body, methyl mercury compounds tend to be stored for long periods of time in tissues, and therefore often build up over time in long-lived organisms that are exposed to mercury-contaminated environments. Thus, low levels of contamination in food (e.g., fish and shellfish) may eventually produce high levels of mercury in the humans that habitually eat fish from a contaminated water body.

Cadmium displays relatively high toxicity to marine life and is readily bioaccumulated by marine invertebrates (47). Biomagnification of cadmium has been reported for lower trophic levels (primary producer to grazer), but does not appear to occur at higher trophic levels (48).

Persistence and Detoxification

Toxicity, bioconcentration, and bioaccumulation alone are not useful measures for assessing risk to biological communities or human health. Many chemicals undergo some degree of bioconcentration and bioaccumulation; but when organisms are transferred to a clean environment, many of these chemicals are rapidly excreted. An equilibrium is maintained by cell membranes between concentrations in the internal and external environments.

Macek et, al. (28) note that a critical factor in the hazard of bioaccumulated contaminants is their persistence in tissues. Thus, lipophilic chemicals are readily absorbed by tissues and are persistent, and these compounds are most likely to biomagnify in food chains to levels at which risk to human health or health of fish is expressed.

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Both the toxicity and bioaccumulation potential of a toxic compound are greatly affected by the rate of elimination from the organism. Common processes by which organisms can cleanse themselves of contaminants include excretion, defecation, diffusion, body secretions (e.g., mucus), and molting (in the case of crustaceans) (29). Jennings and Rainbow (49) found that 59-80 percent of the cadmium and Renfro et al. (50) found that 61 percent of the zinc absorbed across the gills of a crab was lost in the molt. PCBs, on the other hand, were not observed to be lost at the molting of an amphipod (51).

In most cases, self-cleansing (depuration) implies that the organism is exposed to reduced external levels of contamination. This is the case, for example, of a pelagic fish species that might briefly spend time in an area contaminated by wastewater discharge, but then travels on to a cleaner area.

There is evidence that some marine organisms are capable of regulating tissue levels of certain metals while still in the contaminated environment. Polychaetes, decapod crustaceans, and fish show some evidence of regulation of metals in tissues, whereas bivalve mollusks do not (29).

Most animals that have been examined have been observed to harbor a group of proteins of the metallothionein type. These proteins bind metals, including mercury, thereby making the metals non-toxic and biologically unavailable (19). Normally occurring at relatively low levels in tissues, synthesis of these proteins is induced by exposure to contamination by metals (29). Research on this detoxification process suggests that metallothioneins are effective detoxification mechanisms for metals unless the metal levels in the environment are so high or increase so rapidly as to exceed the body's capacity to manufacture and store these proteins.

Metabolization of toxic organic compounds can result in detoxification of the contaminant but it also can result in production of equally or more toxic byproducts. Storage of lipophilic contaminants in fat deposits is common, and their subsequent fate is dependent on the processes of fat mobilization and metabolism. There are examples of organochlorine pesticides stored inert in fat deposits of marine birds until a period of starvation mobilized the pesticides for a lethal effect (29).

Assessment of Risk

The above discussion of toxic effects and biological uptake of contaminants is only a preliminary summary of a small fraction of the total information on pollution effects on marine biota. Unfortunately, very little of that data comes from the Philippines. At first glance, the large volume of literature on pollution effects from other places can be bewildering to resource managers. In an environment of limited or shrinking agency budgets, how does one sort through the information and establish priorities?

Factors that should be considered in establishing priorities include:

- o public perceptions and resource uses;

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- o existence of sensitive or critical habitats and species;
- o fate of pollutants;
- o toxic hazard, persistence, and natural detoxification mechanisms; and
- o exposure.

In the decision-making process, a matrix approach may be useful in establishing priorities. In other words, a situation in which three or four different factors of those listed above rate high in degree of concern may be classified as higher priority than a situation in which only one or two of the factors listed above rate high.

Public Perceptions and Resource Uses

Based on current public interests and controversies, the major issues appear to be:

- o effects of oil spills on fishermen's livelihood;
- o effects of toxic pollutants on public health; and
- o Discharge of mine tailings to shallow water in the coastal zone and the effects on fishermen's livelihoods.

The increasing concern of coastal resort owners, such as those in Batangas, regarding coral reef habitat destruction is strong evidence that economic interests can be brought to bear in protecting the coastline from pollution and destructive use of coastal resources.

Habitats and Resources

The occurrence of sensitive or critical habitats and species will vary from situation to situation. In the Philippines, however, a few general principles apply. Mangroves and coral reefs are already well recognized in regulations as sensitive and critical habitats. Both protect shorelines from erosion and are important spawning and nursery areas for coastal fish and shellfish species. The tropical coral reef is the analog in the marine environment to the tropical rain forest in the terrestrial environment, in that both are habitats supporting the highest abundances and diversity of species on the planet. When corals die, the wide variety of reef fish and other animals on which reef fish feed also die. The overall cumulative effect is a great reduction in the productivity of marine fisheries in the coastal zone, and a potentially significant loss to the planet's biodiversity. This problem is particularly acute in the Philippines because the country has no extensive continental shelf or areas of oceanic upwelling to support productive fisheries. Fish production is highly dependent on the narrow band of coral reefs and mangroves.

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A preliminary analysis suggests that urban and industrial pollution that occurs in the vicinity of coral reefs and mangroves represents candidate priority sites for pollution abatement and waste management.

Fate of Poilutants

The fate of pollutants is closely tied to the environmental conditions into which they are discharged. In particular, the degree of mixing and flushing of the receiving water affects the rate at which pollutants are diluted, dispersed, and deposited. Their potential for building up to levels that affect ecological conditions, therefore, also depends on the degree of flushing and mixing.

A preliminary analysis suggests that urban and industrial pollution that occurs in poorly flushed water bodies, e.g., bays and estuaries, and shallow water environments are potential candidate priority sites for pollution abatement and waste management.

Toxic Hazard and Persistence

When present in the human body in high concentrations, methyl mercury compounds produce irreversible damage to the brain and nervous tissues. The first signs of damage to the nervous system usually are damage to the peripheral sensory nerves, i.e., damage to vision, and later to the sense of touch, hearing, and balance. Loss of intellectual ability is associated with methyl mercury poisoning. Damage to the structure of the brain occurs long before signs of toxicity begin to appear. Minamata disease (mercury poisoning) was discovered and diagnosed 20 years after 220 tons of mercury were discharged to Minamata Bay (Japan) over a 4-year period. Thus, methyl mercury poisoning of nervous tissue is particularly deadly because the victims have suffered irreparable harm long before the symptoms may begin to appear. Furthermore, the symptoms may appear long after exposure has ended.

Data from a wide range of polluted estuaries, harbors, and coastal areas in industrialized countries indicate that PCBs and DDT are directly implicated in sublethal toxic effects with potentially significant impact on the health of fish populations. These are synthetic compounds of comparatively modern (post World War II) origin against which most organisms have had no time to evolve suitable detoxification mechanisms.

Persistence in the environment is also one aspect in selecting which pollutants may be of greater concern for abatement. Those that persist in the environment may be of greater concern in terms of long-term build-up to harmful levels in sediments or biota.

From the standpoint of toxicity and detoxification mechanisms, PCBs, chlorinated hydrocarbons, and mercury are clearly candidate priority pollutants. From the standpoint of persistence in and the assimilative capacity of the environment, chlorinated hydrocarbons (including pesticides and PCBs), mercury, and to a lesser extent other heavy metals may be candidate priority pollutants of particular concern. In shallow water environments and poorly flushed water bodies, BOD, sulfides, ammonia, and silts and sediments may also be of priority concern.

Exposure

Organisms such as pelagic fish species, birds, and mammals are highly mobile and often able to avoid areas of poor water quality. If exposed to a wastewater plume or a contaminated area, the duration of exposure may be short, with a quick return to a cleaner environment. Benthos, on the other hand, cannot easily avoid adverse conditions and occupy the sediments, which is a sink for a wide variety of persistent pollutants. Reef fish are dependent on the survival of corals for their survival.

Reef fish and benthic biota, in particular, may be of greater concern for susceptibility to urban and industrial wastewater discharges than pelagic species, because the former are unable to easily avoid adverse water quality conditions and are more likely to be exposed to high levels of persistent pollutants.

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CHAPTER F.3. MAJOR ISSUES AND CONCERNS

Overview

Pollution problems in the Philippines related to urban and industrial development is one of the major issues detrimental to economic development. The problem is aggravated by: (a) uncoordinated planning within the various agencies and bureaus at the national level; (b) use of the EIS System as a permit rather than as a planning tool; and (c) weaknesses in the monitoring capabilities due to lack of trained personnel, equipment limitations, and access to analytical laboratories.

Other concerns related to pollution include its effect on the sustainability of benthic (especially reef) fisheries resources, tourism, and public health.

Priority industrial sectors and environmental trouble spots need to be identified to enable the public and private sectors to assist the government through pollution abatement, monitoring, public education, and planning. Industries targeted for concern are based on:

- o potential toxicity and persistence of pollutants from industries such as smelters, petroleum refineries, and petrochemicals among others, and
- o high volume of BOD in discharges from sugar milling, distilleries and coconut and vegetable oil processing plants among others.

Environmental trouble spots are identified based on:

- o density and type of industry;
- o what is known about the effluents, and
- o reported water quality problems.

Progress on these can be measured through a few key environmental indicators such as the reduction in mass loading of certain pollutants and improvement in industry compliance with water quality standards.

Impediments to Economic Growth

Urban and industrial pollution is a major impediment to economic growth in the Philippines. Tourists and foreign investors arriving in the country for the first time are struck by the poor air and water quality in Manila and Cebu and the large quantities of litter in the streets. In particular, large volumes of putrid solid waste in Manila's business and residential districts alike raises questions for newly-arrived foreign investors as to the ability of the government to provide the basic infrastructure and public services necessary for them to carry on business.

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As North American and European governments tighten and enforce regulations regarding the disposal of hazardous wastes and require expensive cleanup and remediation of contaminated sites, multi-national corporations that care about long-term investments and profit returns and good-neighbor policies recognize the desirability of a predictable regulatory environment and adequate hazardous waste treatment and disposal facilities. These become an important criterion for selecting future investments.

The growth of tourism is predicated on the existence of healthy coral reefs and swimmable waters. As resort developments increase in density around desirable waterfront locations, inadequate sewage treatment and solid waste management facilities become more and more critical in destroying the very recreational values that make the destination desirable.

Institutional Capabilities

An overview of the institutional capabilities for effective management of urban and industrial pollution in the coastal zone highlights three major concerns: uncoordinated planning, use of the EIS System in permitting but not planning; and weaknesses in monitoring capabilities. Furthermore, the government's decision-making process, particularly at the national level, is not readily open to public participation or oversight.

Planning

Planning functions occur within the various line agencies and bureaus at the national level. Development planning oversight at the national level is the responsibility of the National Economic and Development Authority (NEDA), and the most current national plan (the Philippine Medium-Term Development Plan, 1987-1992) affirms the nation's environmental policies. The national government, through DENR, is also working on drafting a Philippine Strategy for Sustainable Development which will stress the need to link economic growth and environmental protection.

Executive Order 192 of 1988 reorganized and mandated the Department of Environment and Natural Resources (DENR) to be the primary government agency responsible for environment and natural resources. However, the Department of Agriculture retains responsibility for management of agriculture, aquaculture, and fisheries management. At least 15 agencies have designated responsibility for some aspect of environmental management (1). At the national level, the distribution of responsibilities for various aspects of environmental protection among disparate agencies is exacerbated by the lack of coordinated planning among these agencies. Although there is some attempt to coordinate development planning at the national level through NEDA, startling examples of lack of coordination still occur. For example, the Department of Public Works and Highways, with Japanese assistance, and the Department of Agriculture, with Singaporean assistance, simultaneously developed feasibility studies and master plans for a fishing port for the same site in General Santos City, South Cotabato Province.

Management of urban and industrial pollution in the coastal zone involves a wide range of

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national, regional, and local interests. But there is no mechanism to integrate cross-sectoral planning and management activities. Consultations between agencies and bureaus have evolved to a large extent on an informal one-on-one basis. Although these tend to be desirable from the socio-cultural viewpoint, they are also highly susceptible to being ineffective because their informal, ad hoc basis means that certain public interests may be easily overlooked or ignored.

Effective management of the coastal zone and its resources requires extensive participation by the public and all regulatory agencies in setting goals and objectives and developing and carrying out a cross-sectoral plan to meet these objectives. In effect, coastal zone management requires a partnership between local citizens, businesses and industries, non-governmental organizations, and governmental agencies. This process of developing a plan and implementing it, however, can only work if the plan is developed ("owned") at the local level, yet remains consistent with broad national goals and policies.

A major need is to develop a mechanism for local development and implementation of coastal zone management plans, and national recognition of their existence and authority. Under existing governmental organization, this role may be most effectively initiated by DENR at the regional or provincial level. An effective mechanism may be one comparable to that found in the US, in which a federal agency develops a broad program of policies and guidelines and provides grant funding to state and local governments for implementing a local coastal zone plan. The national oversight is needed to ensure that the locally generated plan is consistent with broad national goals and policies.

Impact Assessment

The way the EIS System is presently organized and implemented, the EIS is used as a permitting tool, rather than as a planning tool. Although the enabling legislation calls for its use as a planning tool, it is unable to effectively operate in this manner. There is a need for both functions in making rational decisions about the control of urban and industrial pollution and management of coastal resources.

An EIS System can be a very effective mechanism in opening up government decision-making to public input and oversight. It also can be a very effective forum for bringing together various responsible agencies during the decision-making process.

DENR's effort to decentralize its regulatory and monitoring functions is laudable and should be encouraged. At the moment, however, review and approval of EISs remain with the Environmental Management Bureau in Quezon City. Decisions regarding use of resources and the relative costs and benefits of certain activities can be made more effectively at the local level. This approach, however, is predicated on several key assumptions:

- o the necessary technical skills are present at the regional and local level;
- o regional and local staff are aware of and committed to broad national goals and

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- o policies regarding habitat protection and environmental management;
- o a mechanism exists at the regional or local level to effectively coordinate input from both the public and all interested governmental agencies; and
- o the necessary authority and budgetary support is allocated at the regional or local level.

The complex interactions in the coastal zone between a wide variety of economic sectors and natural resources often can only be comprehended at the local level, and even then only at a preliminary level. The potential conflict between the interests of fishermen, the tourism industry, and the industrial sector, for example, can best be mediated at the local level. Although an effective coastal zone management plan that has wide acceptance in the community can alleviate some of these conflicts, an environmental impact process that is open and accessible to all interested parties is a valuable coastal zone management tool. Environmental issues and projects that are more inter-regional or national in scope, however, may continue to be best evaluated at the national level.

The Government of the Philippines should be encouraged to modify its use of the EIS System to an approach more consistent with the intent of the enabling legislation and to open the decision-making process to public input. The government should be encouraged to use the EIS System early in the project development stage, before major investments and commitments are made by project proponents, to coordinate agency comments and address agency and public concerns on decisions regarding the proposed project and its implications for resource management and allocation.

DENR should be encouraged to delegate authority for review of EISs and issuance of Environmental Compliance Certificates to the regional or local level once mechanisms have been established at the local or regional level for more open public participation in the EIS process.

Monitoring

EMB is responsible for establishing environmental quality standards and formulating rules and regulations for proper disposal of wastes. Water quality monitoring programs are usually one of three types: funded and carried out as part of donor agency grant or loan programs, funded and carried out by EMB, and funded and carried out by the regional DENR offices.

Given its limited resources, EMB reportedly surveyed in 1990 about 50% of the industries in the country (1). Approximately 77% of the industries that are classified as potential water-polluting industries (approximately 11% of those surveyed) included water pollution control devices, but less than 30% of these met water effluent standards set by the government.

Dames & Moore (8) contacted DENR Regional Offices for information on monitoring programs as part of its study of mine tailings disposal practices and policies in the Philippines. Of the five

regional offices which responded, all indicated the presence of a tailings monitoring program. Regions 1, 6, and 11 reported that data were collected on concentration of pollutants in tailings, and Regions 1, 3, 6, and 10 reported that data were collected on volume of tailings discharged. Regions 1 and 6, therefore, have data which can be used to characterize both the potential toxic effects of discharges from tailings and accumulation of tailings in the environment. Regions 10 and 11 have collected data on mercury contamination in streams, rivers, and the nearshore environment of bays receiving river flows from gold rush areas. Although Region 4 did not respond to inquiries regarding tailings monitoring programs, it is known that extensive monitoring of the discharge to Calancan Bay on Marinduque has been undertaken (38).

Discussions with regional DENR personnel (8) in various regions revealed that the primary impediments to routine monitoring programs were perceived as:

- o shortage of manpower and trained personnel;
- o equipment limitations; and
- o difficulty in having water samples chemically analyzed.

Of these, inadequate analytical laboratory facilities appears to be the greatest problem to effective monitoring and enforcement. Lack of adequate analytical facilities is perhaps indicated in that data on conventional water quality parameters (e.g., pH, suspended solids, temperature, dissolved oxygen) are frequently reported by the regions, whereas parameters requiring more sophisticated equipment (e.g., heavy metals) generally are not reported unless the mining company provided the analysis.

Outside of Metro Manila, sufficiently equipped analytical laboratories are found only in a small number of academic institutions and as part of large-scale mining operations or large-scale agricultural production and processing businesses (usually multi-nationals). In reviewing DENR programs in monitoring mine tailings disposal, Dames & Moore (8) observed that regional DENR offices often relied on mining companies to analyze the water quality samples collected while monitoring the companies' discharges from tailings impoundments. Although government-private sector partnerships may be desirable, this type can lead to an awkward situation when enforcement is required.

In cases where regional DENR offices sent water quality samples to Manila for analysis, considerable time appeared to pass before the data were provided to the regional offices. These time lapses also make enforcement actions difficult.

Implementation of water quality monitoring programs and management of information obtained during monitoring has not yet caught up with the DENR efforts to decentralize monitoring and enforcement responsibilities. Records and files appear to be inconsistently stored at either EMB or the regional offices. Although EMB appears to have a computerized data management system, few data from mine tailings disposal monitoring are actually stored in the computerized

data base (8). Finally, collection of monitoring data in itself is not adequate; the data must be promptly interpreted and used to make decisions regarding enforcement.

The World Bank is working towards strengthening EMB capabilities to carry out environmental monitoring as part of a project loan in the energy sector. This will strengthen EMB capabilities, but the focus is likely to be on Luzon Island, where the bulk of power generation (and population) is located.

There is a need for better access to analytical laboratories. Ideally these would be located in the regions with adequately trained personnel and well-maintained equipment. One potential method is to provide incentives for industries in a particular urban or industrialized area to collectively contribute to such a facility and manage and make use of it in partnership with DENR. The Southern California Coastal Water Resources Project may be a model for industries' ability to collectively work with regulatory agencies in developing effective self-monitoring programs that no one discharger or agency could afford alone.

Sustainable Resource Use

Fisheries

One of the contributing factors to the decline of fishery stocks, aside from overfishing in the Philippines, is the pollution of coastal waters. This is brought about primarily by sewage and industrial effluents from urban areas, tailings from mining activities, oil from shipping and refinery operations, and agricultural run-off.

An example of adverse impacts from sewage is Manila Bay which receives untreated sewage from Metro Manila thus drastically increasing coliform bacteria. This has rendered Manila Bay water unfit for shellfish culture (52).

Chlorinated hydrocarbons such as aldrin, dieldrin, and endrin which are found in pesticides have reportedly been detected in inland and marine fishes (52).

Heavy metals have also been detected in shellfish in areas affected by heavy mine tailings in shallow water environments such as in Calancan Bay and the shoreline of Tanon Strait.

The destruction of coral reefs due to various types of pollution such as sedimentation due to dumping of mine tailings and offshore oil drilling muds has indirectly affected coastal reef and demersal fishery (53).

Benthic communities, in particular, may be of greater concern for susceptibility to urban and industrial wastewater discharges than pelagic communities, because the former are unable to easily avoid adverse water quality conditions and are more likely to be exposed to high levels of persistent pollutants.

Tourism and Coastal Recreation

Tourism and coastal recreation are not compatible with industrial or urban pollution of the coastal zone. Tourists in the coastal zone usually come for clear beaches, swimmable water, and healthy coral reefs with lots of beautiful tropical fish. In the absence of industries and urban areas, tourism developments, particularly in higher densities, potentially become their own sources of pollution in the form of sewage and solid wastes. Sustainable tourism and coastal recreation require effective wastewater treatment and solid waste management systems. It is unlikely that tourism developments will become major earners of foreign exchange unless healthy coral reefs and reef fish populations are also present.

In recreational areas, silts and sediments and viruses and pathogens are major contributors to adverse effects on resources that are valued by recreationists.

Public Health and Welfare

The incidence of parasitism and debilitating intestinal diseases, especially among young children, can be directly related in many cases to the availability of clean potable water and adequate sewage treatment. Cabelli (54,55) has developed predictive relationships between the concentrations of certain pathogens near recreational beaches and the incidence of gastrointestinal disease and related ailments.

As of 1986, the shoreline waters of Manila Bay, including areas with recreational development, were unfit for swimming (5) and did not meet the standards for commercial shellfish growing areas. Widespread discharge of sewage to Manila Bay has resulted in nearly a 10-fold increase in total and fecal coliform bacteria in the past 5 years (1). In Metro Manila, less than 2% of the resident households are served by sewerage facilities (1). The draft Philippine Strategy for Sustainable Development report states that about 70% of the water pollution load (BOD) in the Philippines is due to domestic sources (sewage and solid waste), and 30% comes from industrial sources.

From the standpoint of protection of public health, particularly with respect to recreation and tourism values, the high priorities would include ceasing discharge of untreated sewage in coastal recreation areas.

Methyl mercury is rapidly absorbed by living tissues, perhaps at a rate as high as 90% in the human intestine. Once in the body, methyl mercury compounds tend to be stored for long periods of time in tissues, and therefore often build up over time in long-lived organisms that are exposed to mercury-contaminated environments. When present in the human body in high concentrations, methyl mercury compounds produce irreversible damage to the brain and nervous tissues. Damage to the structure of the brain occurs long before signs of toxicity begin to appear. Minamata disease (mercury poisoning) was discovered and diagnosed 20 years after 220 tons of mercury were discharged to Minamata Bay (Japan) over a 4-year period. Thus, methyl mercury poisoning of nervous tissue is particularly deadly because the victims have

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suffered irreparable harm long before the symptoms may begin to appear. Furthermore, the symptoms may appear long after exposure has ended.

Similarly, strong linkages between PCBs and chlorinated hydrocarbons and cancers have been detected in industrialized countries.

From the standpoint of risk assessment and known hazard to human health, mercury, PCBs, and chlorinated hydrocarbons are clearly candidate priority pollutants.

Priority Industrial Sectors and Environmental Trouble Spots

Environmental Trouble Spots

Monitoring and environmental planning studies carried out by foreign assistance and donor programs have generally focused on the environmental problems of Metro Manila and Manila Bay (5,6). These various reports have documented severe pollution of Metro Manila's rivers, significant water quality degradation in Laguna de Bay, and unacceptable contamination of Manila Bay by fecal coliform bacteria and heavy metals. Several programs are now underway with non-US donor funding to clean up Metro Manila's rivers. Although Manila Bay is clearly a major environmental trouble spot, the scale of interventions necessary to make a difference is so great, and the capabilities of other donors now addressing Metro Manila's environmental problems and the comparative strengths of USAID are such, that USAID will be most effective in addressing problems outside of Metro Manila.

Because DENR is making an effort to decentralize monitoring and enforcement functions at the regional level, the regional administrative unit may be a very effective mechanism for strengthening institutional capabilities and carrying out demonstration projects in various problem areas. Most of the industries classified by the Philippine regulations as potential water-polluting industries are located outside of the Metro Manila area (1). DENR reports that the regions with industries with the poorest record of compliance include Metro Manila, the Cordillera Autonomous Region, and Regions 4, 6, and 11 (1). Regions 12, 2, 1, 3, and 9 have the best record of industrial compliance.

Based on:

- o density and type of industry,
- o what is known about the typical effluent from these industries, and
- o reported water quality problems,

potential environmental trouble spots outside of Manila Bay include: Iligan Bay, Ormoc, the Cebu waterfront, Lingayen Gulf, Calancan Bay, and Tanon Strait. Calancan Bay and Tanon Strait are impacted primarily by large-scale tailings disposal and are being addressed as part of a USAID-



funded study on mine tailings disposal policies that soon will be completed (8). Lingayen Gulf has suffered greatly from sedimentation by historic and inappropriate mining and tailings disposal practices. However, the severe erosion problems dating from the July 1990 earthquake and typhoon will probably overwhelm any industrial or urban pollution inputs to the Lingayen Gulf for several years to come.

The Leyte Industrial Development Estate near Ormoc, Leyte is a very high priority trouble spot because of the potential discharges of high volumes of acids and heavy metals. The refinery areas of Batangas Bay, as well as those along the east coast of the Bataan Peninsula, are also of concern because of risk of oil spills and potential effluent discharge containing dissolved hydrocarbons which are known to be highly toxic.

Policy interventions at the national level regarding urban and industrial pollution control should be augmented with institutional strengthening and pilot projects in selected geographic areas. Candidate sites, based on known or suspected problems and potential opportunities for successful interventions, include: the Cebu metropolitan area and Regions 4, 6, and 11.

Priority Industrial Sectors and Pollutants

Conditions will vary from industrial facility to industrial facility as to its priority. Factors that are important include the volume of discharge, the hazard of pollutants, and the biological and oceanographic conditions in the receiving environment. In general, however, Table F.3 lists priority industries, of which Categories A and D are particularly targets for concern. Based on the potential toxicity and persistence of pollutants, the following industrial types are high priority:

Table F.3 Classification of Philippine Industries

Industry	Industry Code Number
A. Highly Pollutive; Extremely Hazardous	
Basic industrial chemicals except fertilizer	3511
Chemical products nes	3529
Petroleum refineries	3530
Miscellaneous products of petroleum and coal	3540
B. Highly Pollutive; Hazardous	
Sugar milling and refining	3118
Distilling, rectifying and blending spirits	3131
Wine industries	3132
Malt liquor and malt	3133
Spinning, weaving and finishing textiles	3211
Tanneries and leather finishing	3231
Leather products except footwear	3233
Pulp, paperboard and paper	3411
Pulp, paperboard and paper, nes	3419
Soaps, cleansing prepns, toiletries	3523
Cement, lime and plaster	3692
Iron and steel	3710
Non-ferrous basic metals	3720
C. Highly Pollutive; Non-Hazardous	
Meat Slaughter, preparation	3111
Dairy products	3112
Fruit, vegetable preparation	3113
Fish, crustacean preparation	3114
Vegetable, animal oils and fats	3115
D. Pollutive; Extremely Hazardous	
Fertilizer and pesticides	3512
Synthetic resins, plastic materials	3513
Paints, varnishes & lacquers	3521
Tires and tubes	3551
Rubber products, nes	3559

Source: Environmental Impact Assessment Handbook, 1983 National Environmental Protection Council

Smelters
Petroleum refineries
Petrochemicals
Pesticides/wood preservatives
Gold amalgam processors
Industrial chemicals
Fertilizers.

With respect to volume of discharge, the following industrial types may be of high priority under certain conditions:

Coconut and vegetable oil
Sugar milling
Distilleries
Textiles
Iron and steel
Mining
Cement.

In all cases, discharge of PCBs, DDT and other pesticides, mercury, and other heavy metals when associated with low pH conditions are potential high risk for coastal resources.

Environmental audits and oil spill contingency planning are high priority needs that can be easily provided by US sources.

From the standpoint of persistence in and the assimilative capacity of the environment, chlorinated hydrocarbons (including pesticides and PCBs), mercury, and to a lesser extent other heavy metals may be candidate priority pollutants of particular concern.

In shallow water environments and poorly flushed water bodies, BOD, sulfides, ammonia, and sediments may also be of priority concern for their effects on fisheries.

Roles of Public and Private Sectors

Pollution Abatement

Pollution abatement is the primary responsibility of the polluter. In a few cases, ability to pay may become a critical factor, and various forms of private/public sector partnerships may be required. Non-governmental organizations, with proper training, may be able to effectively work with small-scale industries in identifying methods of waste reduction and promoting environmental awareness.

Monitoring

Monitoring should constitute a combined effort of public and private sector efforts. One potential method is to provide incentives for industries in a particular urban or industrialized area to jointly carry out environmental monitoring programs. The Southern California Coastal Water Resources Project (SCCWRP) is one model that has been successfully developed by major sewage treatment districts in Southern California. SCCWRP has generated large volumes of useful data on the effects of sewage discharge at a scale that could not have been generated by individual sanitation districts without unbearable expense. In geographic areas with limited access to adequate analytical laboratory facilities, industries could be provided incentives to collectively contribute to such a facility and manage and make use of it in partnership with DENR.

Education

Public education is a role that non-governmental organizations (NGOs) can effectively play. As in the case of potential assistance with pollution abatement, participating NGOs themselves may require training before commissioned to carry out a public education program. Public education is likely to be one of the most effective resource management tools in the Philippines.

Planning

Although developing effective plans is the primary responsibility of the public sector, plan formulation and approval requires input from the general public and private sector from the very earliest stages. Failure to take into account these inputs is likely to doom the plan to failure because of difficulties in soliciting public and private sector support for its implementation.

Selection of Environmental Indicators

Several factors can be used to measure progress in control of urban and industrial pollution. The most useful indicators include:

- Reductions in mass loading of persistent pollutants.
- Improvement in industry compliance rate with water quality and air quality standards.
- Improvements in fecal coliform counts and other measures of pathogens in coastal waters.
- Reduction in body burdens of heavy metals and toxic chemicals in benthic biota near urban and industrial areas with these types of pollutants in the discharges.

CHAPTER 4. RESEARCH, INFORMATION, AND TECHNICAL ASSISTANCE NEEDS

Overview

Considerable investigation of Metro Manila's problems with urban and industrial pollution has been and continues to be carried out. Little activity, however, has occurred outside of Metro Manila. As a result, there is poor understanding as to what kinds of industries are causing the most serious pollution problems in the provinces and regions outside of Manila. Furthermore, adequate inventories of critical and sensitive coastal resources are now likely to be out of date, although it is also likely that the necessary recent information exists in highly dispersed form.

Technical assistance needs are particularly acute in the regions, where the monitoring and enforcement authority has been recently established, and in the private sector, which can be and should be a major component in self-regulation and monitoring. Training needs include improvement of lines of communication within the new decentralization system as well as training of NGOs, educators, and journalists.

On-Going Research

The World Bank has recently requested proposals from consultants to help prepare an Industrial Efficiency and Pollution Control Program in the Philippines. The main objectives of the assignment are:

- o to propose a set of measures to address abatement of industrial wastes and effective management of toxic residues in Metro Manila;
- o prepare an action plan in sufficient detail for appraisal by potential donors; and
- o prepare a broad pollution control strategy for Metro Manila.

To the extent that Metro Manila is the major city on the coastline, this program may help address industrial pollution problems in Manila Bay. This program, however, is like several other programs described elsewhere in this report that address well-known pollution problems in the Metro Manila area. The focus of some of these efforts is on rehabilitating the biologically dead rivers now flowing through the Metro Manila region.

Apart from these activities, the only other significant project involving industrial pollution effects in the coastal zone of the Philippines is the major effort undertaken by the government and Marcopper on mine tailings discharge to Calancan Bay. The effort is focused on monitoring the impacts, and researching and developing habitat rehabilitation on the causeway built by the discharge of mine tailings in Calancan Bay.

Critical Information Needs

There is little information on effects of pollutants on water quality and coastal resources in the Philippines, with the exception of Manila Bay and marine discharges of mine tailings at Marcopper and Atlas mines. Nevertheless, acceptable information for making decisions about candidate priority sites can be obtained at very low cost. The primary need is to identify the various industries in certain geographic areas and use existing information from the literature to: a) characterize the likely composition of the waste stream, and b) the likely risk to nearby coastal resources. This approach will provide a useful preliminary sorting of potential priority sites and industrial sectors.

In designing the Urban and Industrial Environmental Management Project, answers to the following questions will be very useful in identifying opportunities for USAID/P action.

What industries are the sources of the reported low compliance rates in Regions 4, 6, and 11?

Lorenzo et. al. (1) report that Regions 4, 6, and 11 have the lowest rate of industry compliance with water quality regulations. At a preliminary screening level, these three regions seem likely candidates for implementing interventions at the local, provincial, or regional level. In making this decision, however, information is critically needed to determine the basis for this reported low compliance. Questions that need to be addressed include:

- o What are the industries that are least compliant?
- o Where are the industries located and what are the opportunities for waste reduction or waste treatment?
- o What are the comparative strengths and weaknesses of the DENR regional office with respect to obtaining improved rates of compliance?
- o What are the pollutants that are of greatest concern, either because of volume of discharge or from the ecological impacts?

Where are the high value coastal resources in the regions for:

- o tourism?
- o fisheries?

Most of the coastal resources inventories of the Philippines are now outdated, especially with respect to tourism. Rapid degradation in the past decade of fish stocks through over-fishing, coral reefs through destructive fishing techniques, and mangrove habitats through conversion to shrimp ponds appears to be accelerating, but the knowledge of habitat losses is scattered.

What are the most important problems, using a risk assessment approach?

Unfortunately, very little data on impacts of pollution on biota comes from the Philippines. At first glance, the large volume of literature on pollution effects from other urbanized and industrialized coastal places can be bewildering to resource managers. In an environment of limited or shrinking agency budgets, how does one sort through the information and establish priorities?

Factors that should be considered in establishing priorities include:

- o public perceptions and resource uses;
- o existence of sensitive or critical habitats and species;
- o fate of pollutants;
- o toxic hazard, persistence, and natural detoxification mechanisms; and
- o exposure.

In the decision-making process, a matrix approach may be useful in establishing priorities. In other words, a situation in which three or four different factors of those listed above rate high in degree of concern may be classified as higher priority than a situation in which only one or two of the factors listed above rate high.

The occurrence of sensitive or critical habitats and species will vary from situation to situation. In the Philippines, however, a few general principles apply. Mangroves and coral reefs are already well recognized in regulations as sensitive and critical habitats. Both protect shorelines from erosion and are important spawning and nursery areas for coastal fish and shellfish species. The tropical coral reef is the analog in the marine environment to the tropical rain forest in the terrestrial environment, in that both are habitats supporting the highest abundances and diversity of species on the planet. When corals die, the wide variety of reef fish and other animals on which reef fish feed also die. The overall cumulative effect is a great reduction in the productivity of marine fisheries in the coastal zone, and a potentially significant loss to the planet's biodiversity.

Technical Assistance Needs

Training

Several programs are now underway or are planned for institutional strengthening at EMB. However, in spite of the focus of the agency on decentralization, little effort has been directed to strengthening capabilities in the regions. Particular needs include:

Training for DENR Regional Officers in:

- EIS evaluation.
- environmental monitoring.

Training for private sector environmental officers in:

- EIS System.
- water quality standards.

Equipment and Facilities

Discussions with regional DENR personnel (8) in various regions revealed that the primary impediments to routine environmental monitoring programs were perceived as:

- o shortage of manpower and trained personnel;
- o equipment limitations; and
- o difficulty in having water samples chemically analyzed.

Of these, inadequate analytical laboratory facilities appears to be the greatest problem to effective monitoring and enforcement. Lack of adequate analytical facilities is perhaps indicated in that data on conventional water quality parameters (e.g., pH, suspended solids, temperature, dissolved oxygen) are frequently reported by the regions, whereas parameters requiring more sophisticated equipment (e.g., heavy metals) generally are not reported unless the mining company provided the analysis.

Outside of Metro Manila, sufficiently equipped analytical laboratories are found only in a small number of academic institutions and as part of large-scale mining operations or large-scale agricultural production and processing businesses (usually multi-nationals). In reviewing DENR programs in monitoring mine tailings disposal, Dames & Moore (8) observed that regional DENR offices often relied on mining companies to analyze the water quality samples collected while monitoring the companies' discharges from tailings impoundments. Although government-private sector partnerships may be desirable, this type can lead to an awkward situation when enforcement is required.

Lines of Communication

Discussions with DENR personnel in Manila as well as the regions resulted in the discovery that there are very poor lines of communication between the staff of various bureaus and even within bureaus! A surprising number of people did not clearly understand the responsibilities of their counterparts in the agency. More important, it was widely acknowledged that field inspectors would often report violations to their superiors, but obtain no feedback on the ultimate resolution of the notice of violation. It also quickly became clear that it was universally recognized that the policing authority and the technical expertise to address issues were also separated in different

office functions. Clearly lack of adequate communication significantly hampers enforcement capability.

Changing Public Perceptions

It is the general public who in the end wields the power to safeguard or protect their environment. But only an informed public can be effective in protecting the environment. As such, some activities can help bring about a change in public perception about the environment.

Training for NGOs

There is at present an increasing number of NGOs with particular interest in the environment (1). However, although these groups may have monetary capability, their ability to effectively carry out citizen's monitoring is hampered by limited understanding of scientific issues. Training is thus deemed necessary to increase their capability in assisting the government in enforcing pollution regulations and monitoring compliance with them. Training a bigger sector of the public can also be undertaken by NGOs in the regional level.

Educational System

Subjects with emphasis on ecology and the environment should be incorporated in the curriculum of all educational levels. Beforehand, teachers and instructors should have intensive training to be able to handle the subject well.

Use of the Mass Media

Massive campaign for the environment can be attained through the use of television, the newspaper and the radio. The latter can be very effective in the provinces where less people own televisions thus less viewership. But again this approach calls for intensive training and education on the part of journalists.

CHAPTER F.5. CONCLUSIONS AND RECOMMENDATIONS

Impediments to Economic Growth

Urban and industrial pollution is a major impediment to economic growth in the Philippines. Tourists and foreign investors arriving in the country for the first time are struck by the poor air and water quality in Manila and Cebu and the large quantities of litter in the streets. In particular, large volumes of putrid solid waste in Manila's business and residential districts alike raises questions for newly-arrived foreign investors as to the ability of the government to provide the basic infrastructure and public services necessary for them to carry on business.

As North American and European governments tighten and enforce regulations regarding the disposal of hazardous wastes and require expensive cleanup and remediation of contaminated sites, multi-national corporations that care about long-term investments and profit returns and good-neighbor policies recognize the desirability of a predictable regulatory environment and adequate hazardous waste treatment and disposal facilities. These become an important criterion for selecting future investments.

The growth of tourism is predicated on the existence of healthy coral reefs and swimmable waters. As resort developments increase in density around desirable waterfront locations, inadequate sewage treatment and solid waste management facilities become more and more critical in destroying the very recreational values that make the destination desirable.

Institutional Capabilities

Planning

A major need is to develop a mechanism for local development and implementation of coastal zone management plans, and national recognition of their existence and authority. National oversight is needed to ensure that the locally generated plans are consistent with broad national goals and policies.

Impact Assessment

The Government of the Philippines should be encouraged to modify its use of the EIS System to an approach more consistent with the intent of the enabling legislation and to open the decision-making process to public input. The government should be encouraged to use the EIS System early in the project development stage, before major investments and commitments are made by project proponents, to coordinate agency comments and address agency and public concerns on decisions regarding the proposed project and its implications for resource management and allocation.

DENR should be encouraged to delegate authority for review of EISs and issuance of Environmental Compliance Certificates to the regional or local level once mechanisms have been established at the local or regional level for more open public participation in the EIS process.

Monitoring

There is a need for better access to analytical laboratories. Ideally these would be located in the regions with adequately trained personnel and well-maintained equipment.

Public Health and Welfare

From the standpoint of protection of public health, particularly with respect to recreation and tourism values, the high priorities would include ceasing discharge of untreated sewage in coastal recreation areas.

From the standpoint of risk assessment and known hazard to human health, mercury, PCBs, and chlorinated hydrocarbons are clearly candidate priority pollutants.

Priority Industrial Sectors and Environmental Trouble Spots

Although Manila Bay is clearly a major environmental trouble spot, the scale of interventions necessary to make a difference is so great, and the capabilities of other donors now addressing Metropolitan Manila's environmental problems and the comparative strengths of USAID are such, that USAID will be most effective in addressing problems outside of Metropolitan Manila.

Policy interventions at the national level regarding urban and industrial pollution control should be augmented with institutional strengthening and pilot projects in selected geographic areas. Because DENR is making an effort to decentralize monitoring and enforcement functions at the regional level, the regional administrative unit may be a very effective mechanism for strengthening institutional capabilities and carrying out demonstration projects in various problem areas. Candidate sites, based on known or suspected problems and potential opportunities for successful interventions, include: the Cebu metropolitan area and Regions 4, 6, and 11.

A preliminary analysis suggests that urban and industrial pollution that occurs in the vicinity of coral reefs and mangroves represents candidate priority sites for pollution abatement and waste management.

A preliminary analysis suggests that urban and industrial pollution that occurs in poorly flushed water bodies, e.g., bays and estuaries, and shallow water environments are potential candidate priority sites for pollution abatement and waste management.

Priority Industrial Sectors and Pollutants

Environmental audits and oil spill contingency planning are high priority needs that can be easily provided by US sources.

From the standpoint of persistence in and the assimilative capacity of the environment, chlorinated hydrocarbons (including pesticides and PCBs), mercury, and to a lesser extent other

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heavy metals may be candidate priority pollutants of particular concern.

In shallow water environments and poorly flushed water bodies, BOD, sulfides, ammonia, and sediments may also be of priority concern for their effects on fisheries.

In recreational areas, silts and sediments and viruses and pathogens are major contributors to adverse effects on resources that are valued by recreationists.

Roles of Public and Private Sectors

Pollution Abatement

Pollution abatement is the primary responsibility of the polluter. In a few cases, ability to pay may become a critical factor, and various forms of private/public sector partnerships may be required. Non-governmental organizations, with proper training, may be able to effectively work with small-scale industries in identifying methods of waste reduction and promoting environmental awareness.

Monitoring

Monitoring should constitute a combined effort of public and private sector efforts. In geographic areas with limited access to adequate analytical laboratory facilities, industries could be provided incentives to collectively contribute to such a facility and manage and make use of it in partnership with DENR.

Education

Public education is a role that non-governmental organizations (NGOs) can effectively play. As in the case of potential assistance with pollution abatement, participating NGOs themselves may require training before commissioned to carry out a public education program. Public education is likely to be one of the most effective resource management tools.

Planning

Although developing effective plans is the primary responsibility of the public sector, plan formulation and approval requires input from the general public and private sector from the very earliest stages. Failure to take into account these inputs is likely to doom the plan to failure because of difficulties in soliciting public and private sector support for its implementation.

Selection of Environmental Indicators

Several factors can be used to measure progress in control of urban and industrial pollution. The most useful indicators include:

- o Reductions in mass loading of persistent pollutants.
- o Improvement in industry compliance rate with water quality and air quality standards.
- o Improvements in fecal coliform counts and other measures of pathogens in coastal waters.
- o Decrease in levels of toxic chemicals or persistent pollutants in benthic organisms or the sediments.

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