

For the past three decades, economic growth in the Philippines has been fueled by rapid industrialization, urbanization, and intensified agricultural production. In the absence of effective environmental management, these growth engines have also resulted in air-, water-, and soil pollution. As urban centers have grown, there have been significant negative impacts on quality of life, especially for the poorest residents. Owing to its size and importance in the national economy, Metro Manila has the most pressing air, water, and solid waste pollution.

Community-based and private sector initiatives are on the rise in almost all areas. While these initiatives have succeeded in raising awareness, and assist communities in assuming responsibility for environmental improvement, the Government still has a critical role to play in the provision of environmental public goods.

This section outlines trends in solid waste management, and air- and water pollution. It also covers the main legislative and institutional changes needed to better address waste management and pollution.

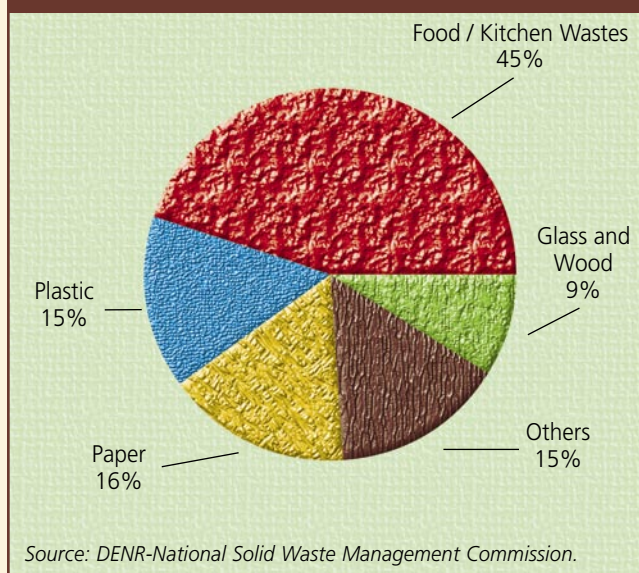
SOLID WASTE MANAGEMENT¹⁶

Mismanagement of waste has serious environmental consequences: ground and surface water contamination, local flooding, air pollution, exposure to toxins, and spread of disease. Many of the disposal sites contain infectious material, thus threatening sanitation workers and waste-pickers.

Organic waste decomposition releases greenhouse gases, and burning of waste releases toxic gases. Odors from non-sanitary landfills can be so bad that people living in the surrounding areas are taken ill.

¹⁶ This section builds on the Philippines Environment Monitor on Solid Waste 2001b.

Figure 5. Household Waste Composition in Five LGUs of Metro Manila, 2003



Even to the casual observer, the environmental, human health, and aesthetic impacts of solid waste in Philippines’ urban areas are substantial. While the former have been studied at length, there are few reliable cost estimates of either human health or environmental impacts of solid waste mismanagement in the Philippines.

Solid waste generation. Solid waste generation in the Philippines is comparable to that in other low-middle income countries. An average Filipino generates 0.3 and 0.5 kilograms (kg) of garbage daily in rural and urban areas respectively.¹⁷ The National Capital Region and Southern Tagalog Regions respectively account for 23 percent and 13 percent of the total garbage generated annually. A recent ADB study showed that 6,700 MT of waste is generated daily in Metro Manila alone with composition shown in Figure 5.¹⁸ Annual waste generation is expected to grow 40 percent by 2010. Improvements in recycling,

¹⁷ Report from the National Solid Waste Management Commission. Makati City, the richest LGU, has a per capita waste generation rate of 0.71 kg.

¹⁸ Asian Development Bank, 2004.

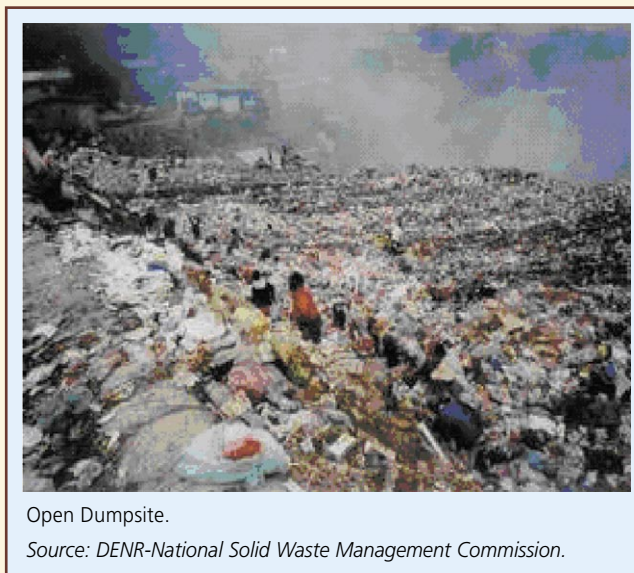


collection, and disposal will become even more critical as garbage production continues to increase with population growth and economic development.

Collection. It has been estimated that over PhP3.54 billion is spent annually on collection and disposal of Metro Manila's solid waste. In 2001, anywhere from five to 24 percent of the total expenditures of Metro Manila's local governments went to solid waste management. Most of this money was spent on private hauling contracts. Despite this high percentage of spending, the system requires significant improvement.

The 1998 National Demographic and Health Survey reported that 30 percent of households had access to solid waste collection at varying frequencies, ranging from twice a week to once every two weeks. More recent estimates by the National Solid Waste Management Commission have put collection efficiency at 70 and 40 percent in urban and rural areas, respectively. In areas where residents lack access to solid waste collection, garbage continues to be thrown indiscriminately or burned. In Metro Manila, burning of waste by individuals and at illegal dumpsites also contributes to a significant percentage of the city's particulate pollution.¹⁹

Disposal. Solid waste disposal continues to be a growing crisis in urban centers in the Philippines. In Metro Manila, two landfills—Carmona in Cavite Province, and San Mateo in Rizal Province—both operated by the Metro Manila Development Authority (MMDA)—were closed in 1998 and 2000 respectively. Together, these two landfills had accepted between 40 and 50 percent of Metro Manila's daily garbage. Although they had been designed as sanitary landfills, they were not operated as such, and were closed due to environmental and social concerns, including



Open Dumpsite.

Source: DENR-National Solid Waste Management Commission.

contamination of ground and surface water, and foul odors. As a result of the closure of these landfills, garbage is now disposed in six open or controlled dumps in Metro Manila (Figure 6). However, these sites have the capacity to accept waste for only two more years. According to a 2004 ADB study, the Rodriguez and Payatas waste sites generate an estimated 26 kilograms of lead and 76 kilograms of arsenic annually. These contaminants are released into the water bodies surrounding Metro Manila.



Controlled Dumpsite in San Fernando, La Union.

Source: DENR-National Solid Waste Management Commission, Briefing Report, 2004.

¹⁹ DENR-Environment Management Bureau, 2002.



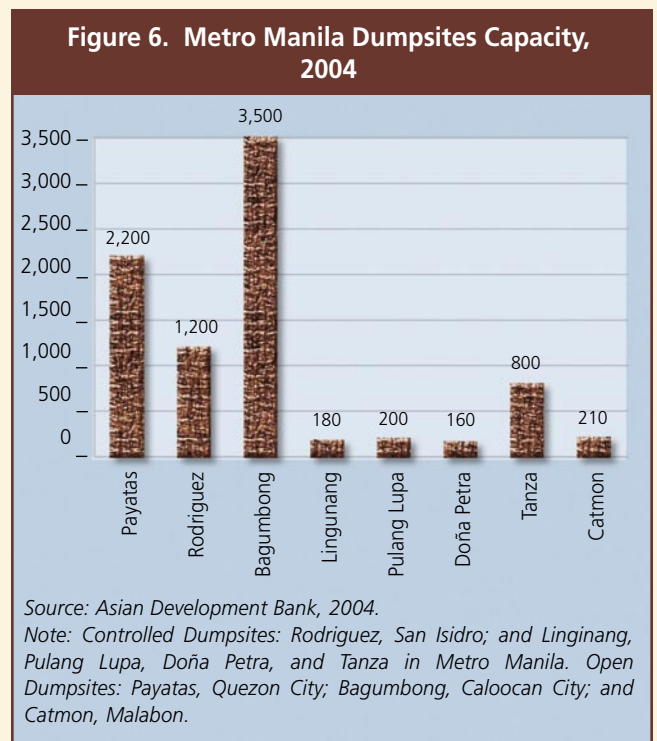
A sanitary landfill is being developed within the Rodriguez controlled dumpsite to serve the needs of Metro Manila. Construction of this landfill is expected to begin in the first quarter of 2005. Sites are also being surveyed by DENR and MMDA for two possible final disposal sites in Quezon province.

While the Ecological Solid Waste Management Act (ESWMA) had set February 2004 as the deadline for shifting from open to controlled dumping, waste continues to be disposed in 866 open dumpsites outside Metro Manila. There are only 125 operating controlled-dumpsites nationwide. The law also mandates the shift to sanitary landfills by February 2006. Yet, there are only two operating sanitary landfills,²⁰ with two others under construction (at Puerto Princesa City, Palawan and Bais City, Negros Oriental). Another 109 sanitary landfill site-proposals are under various stages of development.

Recycling. There is no reliable data on the extent of recycling and composting in the country, as recycling remains largely an informal-sector activity. Data from some sectors indicate that recycling is on the rise. Yet, only a small percentage of the total waste generated



²⁰ Two sanitary landfills serve the Clark EcoZone and the province of Tarlac in Luzon, and Cebu City in the Visayas.



in the Philippines is recycled or composted. In 1997, six percent of solid waste was recycled in Metro Manila. By 2000, this had grown to 13 percent, primarily due to efforts made by the MMDA and NGOs to promote segregation at source, composting, and recycling. An MMDA Ordinance passed in 1999 mandated source segregation. With the passage of the ESWMA, a growing number of LGUs are implementing integrated waste management, which encourages reduction, recycling, composting, and reuse of material. As of mid-2004, 397 LGUs (24 percent) are known to practice ecological waste management. A total of 976 materials recovery facilities serve either one or a cluster of barangays, or an entire LGU. Of these facilities, 126 are in Metro Manila. From 1998 to 2003, the volume of waste traded by the Federation of Multipurpose Cooperatives in Metro Manila (an association of junk dealers) has tripled from 69,400 MT to 209,770 MT, and its value has increased from PhP95 million to PhP268 million. Data from the operator of the Rodriguez controlled-dumpsite shows a recovery rate



of 25–30 percent on incoming waste through secondary sorting prior to final disposal.

Hazardous and infectious waste. Approximately 2.3 million MT of hazardous waste is generated by industries every year. By 2004, 3,015 hazardous waste generators had been registered with the Environmental Management Bureau (EMB).²¹ Oil, immobilized waste, containers, and plating waste make up more than half (55 percent) of recorded hazardous waste nationwide. Hospitals generate an additional 6,750 tons of infectious waste annually. The national capital region contributes 34 percent of hazardous and 47 percent of infectious waste.

About half the waste generated by registered industries is treated off-site, and 2.5 percent of this waste is recycled. A quarter of the total hazardous waste generated is also recycled. As of July 31, 2004, DENR-EMB had recognized 92 treaters/recyclers and 308 transporters of hazardous waste. More than half the recycled hazardous wastes are oils (51 percent) and 49 percent are inorganic chemicals.

Community-based waste management. A number of successful community-based ecological waste management projects can now serve as model initiatives (Box 5). Several LGUs and NGOs have initiated community-based campaigns to reduce and recycle waste. To encourage communities to undertake such projects, DENR, the Department of Interior and Local Government, and NGO and business partners recently launched a Nationwide Search for Model Barangays for Ecowaste Management. More than 500 barangays participated; and the top winner received PhP1 million from the Office of the President.

While such campaigns do have positive local impacts, waste management is still perceived by many as the responsibility of governments. Public participation

²¹ This is a large increase from the 721 generators that were registered in 2001-DENR-EMB, 2004.

Box 5. Payatas, Rising From Tragedy

Payatas dumpsite, has been Quezon City's solid waste disposal site for almost three decades—serving its 2.3 million people who generate about 1,500 tons of waste daily. In July 2000, a landslide of garbage that killed more than 200 waste pickers prompted the enactment of the Ecological Solid Waste Management Act. As required by the Law, Payatas was immediately converted to a controlled dump facility, and some danger zones completely closed.

Today, Payatas has been transformed into a waste disposal facility with organic waste composting, recyclable wastes recovery, and landfill gas extraction. A one-megawatt Payatas Methane Gas to Power Generation Project (the first in the country), which will supply electricity to 2,000 households in the area over the next 10 years, was commissioned in July 2004. Other initiatives to make Payatas a self-sustaining community include providing security of housing tenure under the government's Community Mortgage Program, improved access to basic services, especially clean water, scholarship grants to students, construction of access roads, credit cooperatives, and livelihood programs.

Source: Asian Development Bank, 2004.

in waste management, especially in segregation at source, remains limited. More extensive awareness-raising activities and training on ecological waste management are needed, together with stricter enforcement.

Private sector initiatives in waste management. (Box 6). In addition to ensuring that their operations comply with environmental laws, more manufacturers are actively implementing schemes to recover waste and to recycle products. The Philippine Business for the Environment, in cooperation with companies and NGOs, holds the Annual Recyclables Collection Event where anyone can recycle materials such as paper products, recyclable plastic bottles, aluminum cans, polystyrene packaging waste, and old or broken electronic equipment. This event has been so successful in Metro Manila, Laguna, and Quezon City, that it has now become a regular feature of the celebration of Earth Day in the Philippines, and



Box 6. Private sector activities in ecological solid waste management

- Polystyrene Packaging Council of the Philippines is a group of 21 foam polystyrene producers who have set up a recycling plant. The Council advocates for localized recycling of packaging waste, and recovered 8000 cubic meters in 2003.
- Coca Cola Bottlers Philippines Inc. manages a major campaign to promote the recovery of non-returnable but recyclable soft drinks containers. Cans are processed into aluminum sheets and tubes, which are then turned in various consumer products, including mobility aids for people with disabilities. In 2002, Coca Cola also begun recycling plastic (polyethylene teraphthalate–PET) bottles. This recycling program has recovered 4.1 million aluminum cans, and three million PET containers.
- Pulp and Paper Manufacturers Association is collaborating with various sectors to improve the recovery of wastepaper. Many government agencies have an ongoing wastepaper recycling program with Recyclean Foundation. The foundation collects the wastepaper based on a pre-agreed schedule and returns paper products needed by the concerned offices.
- The Philippine Recyclers Inc., an NGO, Bantay Kalikasan, and DENR have together launched an advocacy campaign to improve the recovery and recycling of used lead-acid batteries. About 30 percent of the 200,000 lead-acid batteries sold in the country are not properly recycled. The project continues to grow; collecting 204 tons in 2003 and 340 tons in the first three quarters of 2004. This is equivalent to 73,759 liters of sulfuric acid and 590 tons of lead prevented from polluting the environment. More than 50 companies are now actively supporting the campaign.
- San Miguel Corporation is establishing three PET recycling plants, and working closely with Coca Cola bottlers. It has also entered into an agreement with the DENR and the Department of Education to institutionalize recovery of PET bottles from public schools in the Metro Manila region.

Source: Authors.

has been expanded to Baguio, Cebu, and Davao. Economic value gained from the event totaled PhP285, 000 in 2004.

LEGISLATION AND INSTITUTIONS

The Ecological Solid Waste Management Act calls for the institutionalization of a national program that will manage the transfer, transport, processing, and disposal of solid waste in the country. The National Solid Waste Management Commission (NSWMC) is the major agency responsible for providing guidance and overseeing the implementation of this Act. According to the Act, different levels of local government are responsible for various aspects of waste management. The barangays are responsible for ensuring segregation at source, collection of the bio-degradable and recyclable components, and setting up materials-recovery facilities. The city or municipality takes care of collecting the residual non-biodegradable and hazardous waste, and its final disposal, except in Metro Manila where disposal is within the mandate of the Metro Manila Development Authority.

The performance of cities and municipalities in solid waste management continues to be poor. Insufficient numbers or inappropriate collection vehicles, their inability to reach households or collection stations, and shortage of transfer points are the main infrastructure problems. Metro Manila and 11 other cities and municipalities have contracted garbage collection to the private sector to improve coverage. Although many local governments spend a high percentage of their budget on solid waste management, they are not able to recover significant portions of these expenses through fees assessed on either households or businesses. Local businesses pay for solid waste management through their annual business permits. However, these charges are unrealistically low, are seldom revised to reflect higher costs, and do not accurately reflect the actual cost of collection and disposal. Only a few of the wealthier barangays have implemented household fees, and some studies suggest that the willingness to pay for services is still very low.

Multi-sectoral solid waste management Boards at the province, city, and municipal levels have been created



in almost all LGUs to develop and implement ten-year solid waste management plans. Some of these boards are receiving assistance from UNDP; however, most are not actually functional. In fact, of 117 cities and 1500 municipalities, only nine cities and 46 municipalities have prepared and submitted their ten-year plans to the National Solid Waste Management Commission for review. The actual implementation of these plans may, however, be constrained by the current level of government appropriation, inadequate technical capacity to operationalize these plans, and the lack of political will among local and national leaders to enforce the law.

AIR QUALITY²²

Air pollution. Urban smog, smoke-belching buses, and industrial smoke stacks are visible reminders of air pollution. However, air pollution is not just an aesthetic problem; it also causes acute- and long-term health problems (Figure 7). Thus, the costs of air pollution are felt not only at the individual, but also at the national level. Diesel emissions from buses, jeepneys, utility vehicles, and trucks are estimated to be the largest contributor to urban air pollution, and are also recognized carcinogens. Fine particulate matter (PM10) penetrates the upper defenses of the respiratory tract and deposits deep in the lungs, and affects human health.

Environmental Champion — AYALA FOUNDATION



The **Ayala Foundation** is the social-responsibility wing of the Ayala Corporation, a leading business conglomerate in the Philippines. In 1996, Ayala with assistance from the Metropolitan Environmental Improvement Program, began implementing ecological waste management in four buildings it owned. Residents were encouraged to segregate their waste at source. The building administrators provided a system for the recovery of biodegradable and non-biodegradable components of the waste. Relationships with buyers of the recyclables were formalized. Working with environmental NGOs, Ayala Foundation provided orientation and training to the building occupants. Soon, all tenants of the Ayala Commercial Center were also required to segregate their waste and implement ecological waste management, even before a law requiring the same was passed.

By 2001, the campaign was expanded to other buildings and firms in the central business district of Makati City. Cooperators included the Management Association of the Philippines, the Makati Commercial Estate Association, and the Ayala Center Association. The target was to reduce non-recyclable by 25 percent in two years. This has been exceeded with waste decreasing from 80 tons to 24 tons per day. As of July 2002, 160 buildings were implementing waste segregation with six buildings doing their own composting. An average of 34,600

kg of recyclables is produced every month. In addition, a Materials Recovery Facility (MRF) has been set up within the commercial center (a first in the country) where anyone can bring waste materials for composting or recycling.

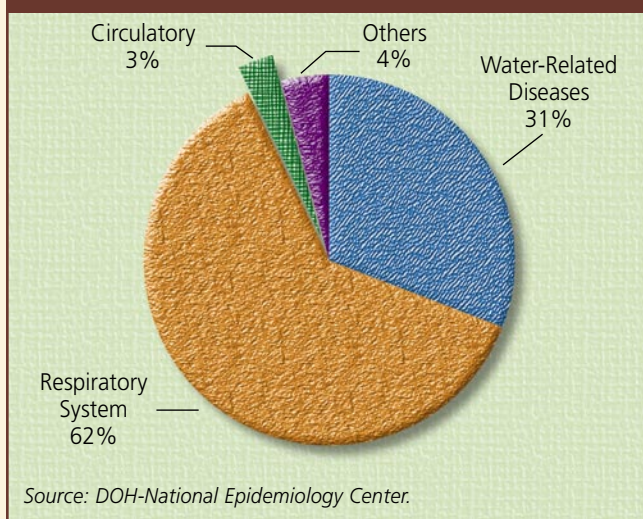
The Ayala Town Center in Muntinlupa City, Ayala Center in Cebu City, and the Cebu Business Park have adopted similar waste management practices. The Foundation and Ayala Land Inc. in Cebu are also involved in reforesting Kotkot Lusaran and Mananga watersheds. A nursery area has been established to house about 100,000 seedlings every year. About 40,000 seedlings are now being grown, together with 5,000 saplings of indigenous species. The group aims to cover the 70 hectare Ayala Property within the area with gabions and check dams for water conservation.

Source: Authors.

²² This section builds on the 2002 Philippines Environment Monitor on Air Quality, 2002.



Figure 7. Type of Illness 1992-2000



Numerous international studies have computed the numbers of pollution-related excess-deaths and incidence of disease, and associated costs.²³ Based on established methods, the health costs of PM10 pollution in four cities (Metro Manila, Davao, Cebu, and Baguio) for the year 2001 have been estimated to be more than US\$400 million. These costs account for 2.5 to 6.1 percent of per capita income in these cities, equivalent to 0.6 percent of the country's GDP. The population of the four cities represents 28.4 percent of the total urban population. If the rest of the country's population is assumed to be exposed to pollutant levels similar to those in these four cities, a high annual estimate for urban health cost for the country is over US\$1.5 billion.

In addition, recent studies in the Metro Manila airshed have found that the levels of outdoor and indoor PM10 have a strong positive correlation at statistically significant levels; and that exposure to high levels of indoor air pollution is a major health problem.²⁴ However, the extent of indoor air pollution in the country is yet to be quantified.

²³ Clean Air Initiative for Asian Cities website: <http://www.cleanairnet.org/caiasia>.

²⁴ Department of Health, 2004.

Sources. Air pollution is generated by point sources such as vehicles, industries, and power plants, and area sources such as road dust, construction, waste burning, and open cooking in urban and rural areas. There are over 100 identified air pollutants that can be categorized as particulates of various sizes (TSP—or total suspended particulates, is used as proxy measure for all particulates), oxides of sulfur and nitrogen, volatile organic compounds, and ozone. Noise and odor are under the jurisdiction of local governments and are considered a nuisance. Indoor air pollution is equally a concern, as the levels of contaminants are higher inside confined spaces where people may spend most of their time. Common sources of indoor pollution are cigarette smoking, and burning of kerosene, liquid petroleum gas, and biomass fuel (e.g. wood and charcoal) for cooking and lighting.

The transport sector continues to be a significant contributor to air pollution. In 2003, there were 4.3 million registered vehicles in the country (Figure 8)—a threefold increase within the past two decades. This trend is expected to continue as vehicle ownership usually rises with increases in income.

Of all vehicles, 70 percent are gasoline-powered and the rest use diesel. However, most of the high-mileage

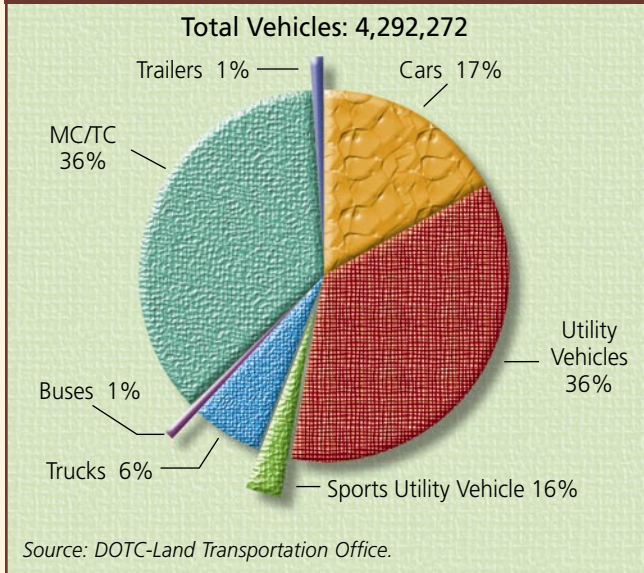


Waste Segregation.

Source: DENR-Public Affairs Office.



Figure 8. Nationwide Motor Vehicle Registration, 2003



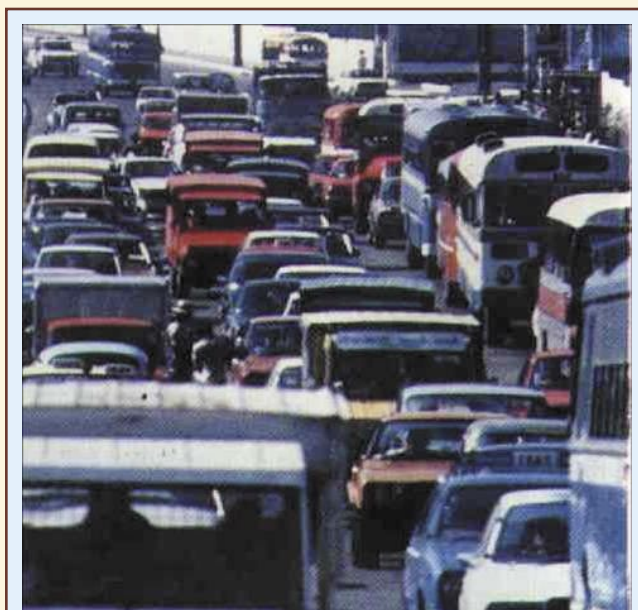
public utility vehicles are diesel-powered. Diesel-powered vehicles emit a significant amount of fine particles. Nationally, utility vehicles outnumber personal cars by a ratio of 2:1. Despite advances in pollution-control technology, a large increase in utility vehicles combined with low turnover contribute significantly to air pollution.

On the positive side, sales of four-stroke engines for motorcycles increased dramatically in the first nine months of 2004—accounting for 91.5 percent of the total motorcycle market. Four-stroke engines account for 75 percent of motorcycles sold for use in three-wheelers within the same period, up from only 25 percent in 2001. If this growth is sustained, the Philippines will be able to catch up with other countries in the region that have completed the transition to four-stroke engines in motorcycles, thereby reducing the pollution from particulate matter, hydrocarbons, and carbon dioxide, and also reducing noise.

Industrial emissions are also significant polluters. A 1998 DENR survey of 737 industrial establishments revealed that nearly two-thirds did not have the

necessary air-pollution-control facilities.²⁵ The air-pollution control devices installed in the remaining third were not operational because companies believed that these were very expensive to operate. However, a total of 8,024 pollution permits were issued by the EMB regional offices in 2003. Of these, 63 percent were for air-polluting industries. By June 2004, another 7,104 permits had been issued. The majority of industrial sources are located in the Metro Manila airshed.²⁶ Since the number of air pollution permits granted since 1998 has risen steeply, it would be interesting to see how many industries that applied for permits actually installed air-pollution-control devices, what percentage of these devices is operational, and whether these devices have contributed to improvements in air quality.

Power generation is a major source of sulfur-dioxide. The lowering of the sulfur content of industrial diesel to 0.3 percent in January, 2001, and the planned shift



Traffic congestion leads to increased pollution.

Source: DENR-Public Affairs Office.

²⁵ DENR, 1998.

²⁶ As required by the Clean air Act, EMB has designated the National Capital Region, and the area between Batangas to the South and Bataan to the North, as the Metro Manila Airshed.



to natural gas under the Philippine Energy Plan, will reduce sulfur dioxide emissions from the power generation sector. The share of natural gas is to increase to 7.9 percent of the primary energy mix by 2007.²⁷

Area sources of pollution are widespread, difficult to estimate, and generally overlooked even though controlling these sources is a cost-efficient way to improve air quality. Unpaved roads and pavements, unturfed center islands, building and road construction, and traffic are the main contributors to re-suspended dust. The contribution of refuse-burning to local air pollution has not yet been well-quantified, although it is known to be a major source of air pollution.

With stronger enforcement of the requirement for submission of quarterly self-monitoring reports, major industries, particularly power and cement plants, now regularly prepare reports that monitor compliance to emission standards. Additionally, as of 2003, in compliance with Department Administrative Order (DAO) 2000-81, Continuous Emission Monitoring Systems (CEMS) for particulates, and

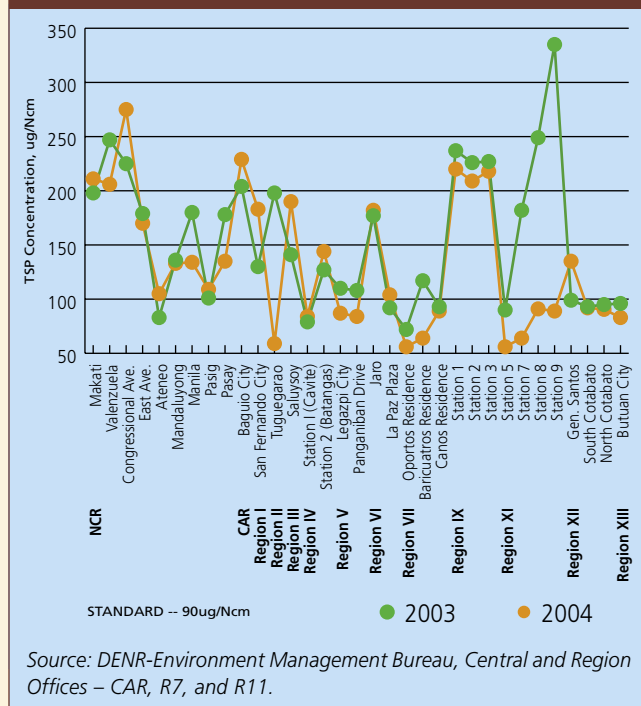


Emission Testing.

Source: DENR-Public Affairs Office.

²⁷ Department of Energy, 2003.

Figure 9. Annual Total Suspended Particulate (TSP) Concentration, 2003-2004



Source: DENR-Environment Management Bureau, Central and Region Offices – CAR, R7, and R11.

sulfur and nitrogen oxide emissions have been installed in 12 industrial plants.²⁸

Air pollution trends. Manual samplers are used by DENR to monitor TSP at over 40 stations nationwide (Figure 9). Data in 2003 and 2004 show that majority of the stations exceed the standards although there is a slight improvement. Thirty-one percent (31%) were within the standards in 2004 up from 23% in 2003. Highest record was in Station 9, Davao (2003) and Bocaue, Bulacan (2004).

In Manila there is a decline in the incidence of daily average TSP levels exceeding guidelines. As of 2003, TSP annual mean concentrations of ambient air in most monitoring stations in Metro Manila decreased by an estimated 14 percent compared with those recorded in 2000.²⁹ This improvement can be partly

²⁸ This includes eight power plants, two cement plants and two refineries. DENR-EMB, 2002.

²⁹ DENR, 2003.



attributed to repeated anti-smoke belching campaigns carried out by local governments, MMDA, Land Transport Offices of the Department of Transport and Communication, and NGOs, and to the lowering of the sulfur content of diesel. Ambient concentrations of ozone and nitrogen oxides, while still within the standards, are on the rise, mostly due to a rapid increase in the number of motor vehicles.

LEGISLATION AND INSTITUTIONS

The Clean Air Act (1999) aims to provide a comprehensive air pollution control policy for the country. However, implementation difficulties point

to the complexities associated with solving a problem involving many agencies. Inter-agency collaboration remains a challenge despite many multi-sectoral working committees and memoranda of agreement. Lack of provincial and local government capacities for air quality management will be further exposed as these entities are under-prepared to carry out the functions devolved to them by the Clean Air Act (CAA).

Preliminary estimates for implementing parts of the Act indicate that the country will need to spend at least PhP25 billion between 2000 and 2010. Notwithstanding limited funding, progress in the

Environmental Champion — PUERTO PRINCESA CITY, PALAWAN PROVINCE



Puerto Princesa has consistently won the award of being the Cleanest and Greenest City in the Philippines. The city has not only been at the forefront of environmental protection but has also paved the way for others. Mayor Hagedorn, its dynamic leader, recognized the urgent need to save the last frontier of the Philippine forests when he first took office. During his first term, he began a major offensive against illegal logging. The Mayor recognized that upland settlers needed alternative sources of livelihood that would reduce their dependence on forests. With limited funding, the city leaders declared the forests of Puerto Princesa a “natural calamity.” This allowed them to tap into the calamity fund, which is set aside for unforeseen natural disasters. This was considered a very bold and creative move, since at the time only

the President had the authority to declare a “calamity”. Mayor Hagedorn’s political opponents criticized him and challenged him in the courts. But, he persisted and eventually won the court case, thus opening the door for other local chief executives to follow suit.

At the same time, a massive reforestation program was also launched. The effort involved thousands of stakeholders, especially school children. Thus began the annual celebration of the “Pista y Kagueban” (Feast of the Forest) during the Environment month celebrations in June. Since 1990, more than 1.5 million trees have been planted and the city’s watershed has been fully replanted. Reforestation efforts have since moved to another forest area within the city. Survival rate has also substantially improved from only a little over 40 percent to 87 percent.

Puerto Princesa also has the very first local government to make a serious effort to stop smoking in public places. All residents have been deputized to apprehend violators. So effective is this campaign that passengers of all inbound flights are told to strictly follow this policy or risk being apprehended. In fact, a school child welcoming a senator to the city once apprehended his esteemed visitor when he threw a cigarette butt on the ground. The senator was made to pay the penalty based on this citizen’s arrest.

The City has also put an odd-even scheme for tricycles into place. Working in partnership with the tricycle drivers and operators associations, tricycles are banned from the road on certain days depending on the last number of their license plate. This policy has decongested the city, and reduced traffic emissions. With the support of the Motorcycle Manufacturers Association, free technical training is being provided on the proper maintenance and operations of tricycles.

Source: Authors.



implementation of the CAA has been achieved in the following areas:

- Rise in the number of designated airsheds from six in 2003 to 14 by August 2004;
- Intensified anti-smoke-belching drives in urban areas;
- Further reduction of aromatics in unleaded gasoline, from 45 percent in 2000 to 35 percent in 2003, and the lowering of benzene content, from four to two percent;
- A 75 percent reduction in the sulfur content of automotive diesel by January 2004;
- Nationwide implementation of emissions-testing requirement prior to registration;
- Ban on incineration;
- Setting-up of 12 networked electronic stations;
- Improvement in automotive technology;
- Promotion of coco-methyl ester and bio-diesel;
- Expansion of the mass-transit system within Metro Manila, and improvement and extension of the North and South Rails; and,
- Switch to natural gas use in power plants and industries, as well as for public buses.

In an attempt to reduce noise pollution, in May 2004 the government issued an order imposing a fine on the use of vehicle-horns while traveling on major highways around Metro Manila.

Public awareness and participation. Active non-governmental initiatives have raised public awareness; and provide examples of possible actions on a small scale (Box 7). However, a Knowledge, Awareness and Practice Survey, conducted by the Public Information Agency for DENR in 2001 (Figure 2), noted that although more than 72 percent of Manila's residents were alarmed by air pollution, only 28 percent said they were aware of government actions to control this pollution. The results of this survey highlighted the need for more targeted information, education, and communication campaigns using mass media and interpersonal communications. The Partnership for Clean Air and DENR are using the results of the survey to guide them in preparing a public awareness action plan under the Metro Air Program.³⁰ To judge the

Environmental Champion — SISTER AIDA VELASQUEZ



Sister **Aida Velasquez** of the Missionary Benedictine Sisters Order was trained as a chemical engineer. In 1976 she helped organize the people in San Juan, Batangas province, to oppose a proposed copper smelter project. The suspension of the project is considered a milestone in Philippine environmental protection advocacy. Her missionary work in Leyte, Bataan and Marinduque often involved local environmental risks. Through information campaigns on the hazards of nuclear power, and popular mobilization she opposed the commissioning of the Bataan Nuclear Power Plant. Sister Aida also worked with communities in protesting against Marcopper's polluting operations, especially the dumping of highly toxic mine tailings into Calancan Bay.

Sister Aida now serves as Coordinator of "Lingkod Tao Kalikasan" (In the Service of Human-Earth Community), an NGO that was formed in 1985. Its main focus is ecological education in rural areas. Sister Aida kept vigil for the cause of Raul Zapatos, a DENR forest guard who was unjustly imprisoned, providing a voice for Raul, calling for justice until the Supreme Court finally acquitted him.

Sister Aida frequently represents the country in international conferences such as the Earth Summit and the World Summit for Sustainable Development. She was instrumental in drafting the Philippine Agenda 21. In 1997, UNDP honored her as one of 25 Women Leaders in Action.

Source: Authors.

³⁰ Metro Manila Air Quality Improvement Sector Development Program.



Box 7. Miriam College and the Ateneo de Manila University—Leading by Example

Miriam College, a private school in Metro Manila, has taken a leadership role in educating people on the importance of clean air. The School took a lead role in organizing a loose coalition of twelve schools in Metro Manila that regularly hold education seminars and street campaigns to raise public awareness about the issue. Clean Air Camps are organized to deepen student and faculty understanding of air pollution problems. The college also engages students in advocacy through its series of Dialogues with Legislators. In addition, Miriam College practices what it preaches. From 1992 to 2002, all vehicles that required a sticker to park at the school were subject to emissions testing. A minimal fee was charged for the testing, which was conducted with the support of the DENR-EMB, MMDA and private groups. Approximately 5,860 student and faculty vehicles, and 140 school buses were tested annually. In 2001, bus owners were also trained on preventive maintenance. Realizing that many highly-polluting three-wheelers (tricycles) also enter their campus, Miriam College also developed and implemented a program for emissions testing and preventive maintenance for these tricycles. Free emissions testing of almost 300 tricycles was undertaken in partnership with the MMDA.

The Ateneo de Manila University also adopted a similar program starting in 2000. The school tapped its Environmental Science students and made emissions testing part of their school practicum. An average of 12,600 vehicles were tested each year. Revenue from the emissions testing was used to purchase the school's own emissions testing equipment. In addition, the University's Manila Observatory has been monitoring PM10 since July 2000. PM10 level within the campus average 70 ug/Ncm, or is moderate with no cautionary indicators. Both these emissions testing programs were stopped after the Land Transportation Office implemented mandatory emissions testing of all vehicles in January 2003.

Miriam College also organized the Usapang Trike project. This included a series of meetings, and preventive maintenance training to reduce hydrocarbon and carbon monoxide (CO) emissions. The project was conducted in partnership with the Motorcycle Development Participants Program Association, the National Federation of Tricycle Owners and Drivers, and the Academy of Educational Development. One of the key findings of the Usapang Trike project was that the use of high quality 2T oil for two-stroke engines leads to a dramatic decrease in both CO and hydrocarbon emissions (45 percent and 42 percent respectively). The CO levels achieved were half of those emitted by four-stroke engines. The drivers also reported that the use of high quality oil improved the performance of their motorcycles and lowered their daily fuel consumption by 1.5 liters. These lessons were shared in a forum in Tuguegarao City. Finally, a national conference was held as the culminating event to share significant lessons learned, present successful initiatives, and agree on resolutions to improve tricycle emissions.

Source: Authors.

effectiveness of these information, education, and communication campaigns and to identify other perceived areas of concern, another Knowledge, Awareness, and Practice Survey is expected to be undertaken in 2005.

WATER QUALITY³¹

Data on surface and groundwater quality and availability indicate that access to clean water is becoming an acute seasonal problem in many urban and coastal areas. Poor water quality has large economic and quality-of-life costs in terms of health impacts, potable water costs, foregone tourism

revenues, lost fisheries production etc. Sanitation and sewerage remain problematic, as only a small percentage of the population is connected to sewerage systems. In urban areas, discharge of domestic waste water is a major source of water pollution. This section briefly examines the current state of water supply and sanitation in the country, and gives an overview of recent legislative and institutional innovations to improve access to clean water and related services.

Surface and ground water resources. Overall, the Philippines is endowed with rich water resources. Rivers and lakes cover 1,830 km² or 0.61 percent of the total area. The Philippines has 421 river basins in 119 proclaimed watersheds. However, within South Asia, it ranks among the lowest in terms of annual

³¹ This section builds on the Philippines Environment Monitor on Water Quality, 2003.



freshwater availability per capita. At 1,907 m³, per capita availability is lower than Asian and world averages (Table 2).³² Country water demand is expected to increase from 1,303 m³ in 1995 to 3,955 m³ in 2025. Water resources are unevenly distributed throughout the country, often resulting in water shortages in highly populated areas, especially during the dry season. Several river basins (Pampanga, Agno, Pasig-Laguna, and on the island of Cebu) are also experiencing generalized water scarcity (Table 3).

Access to an improved water source. As of 2003, 86 percent of the total population has access to an improved water source; with 79 percent and 91 percent access in rural and urban areas, respectively.³³ In Manila, the Metropolitan Waterworks and Sewerage System (MWSS) serves approximately 65 percent of Metro Manila's water demand. However, 26 percent of Manila residents (3 out of 12 million)

Table 2. Annual Renewable Water Resources

Country	Total Resources (km ³)	2000 (m ³ /person)
World	42,655.0	7,045
Asia	13,508.0	3,668
United States of America	2,460.0	8,838
Japan	460.0	3,393
Lao People's Dem Rep	190.4	35,049
Malaysia	580.0	26,074
Myanmar	880.6	19,306
Indonesia	2,838.0	13,380
Cambodia	120.6	10,795
Vietnam	366.5	4,591
Philippines	146.0 ¹	1,907 ¹
Thailand	110.0 ²	1,854 ²

Source: World Resources Institute, 2000-2001.

1. JICA Master Plan on Water Resources Management in the Philippines, 1998.
2. World Bank Thailand Environment Monitor, 2001.

Table 3. Water Demand and Availability of Major Cities in the Philippines in million cubic meter (mcm) / year

	Year	Total	Metro Manila	Metro Cebu	Davao	Baguio	Angeles	Bacolod	Iloilo	Cagayan de Oro	Zamboanga
Demand	1995	1,303	1,068	59	50	12	11	37	9	29	28
Demand	2025	3,955	2,883	342	153	87	31	111	47	98	203
Groundwater Availability		759	191	60	84	15	137	103	80	34	54
Surplus / Deficit	1995		-877	1	34	3	126	66	71	5	26
Surplus / Deficit	2025		-2,692	-282	-69	-73	106	-8	33	-64	-149

Source: JICA Master Plan on Water Resources Management in the Philippines, 1998.

are still not connected to piped water. In Cebu, 55 percent of residents are serviced by water utilities, and about 600,000 people use other water sources, including private sellers. The projected water demand for Cebu for the year 2025 is estimated at 342 mcm,

with a demand to supply ratio of 0.18, indicating an acute shortage in the future.

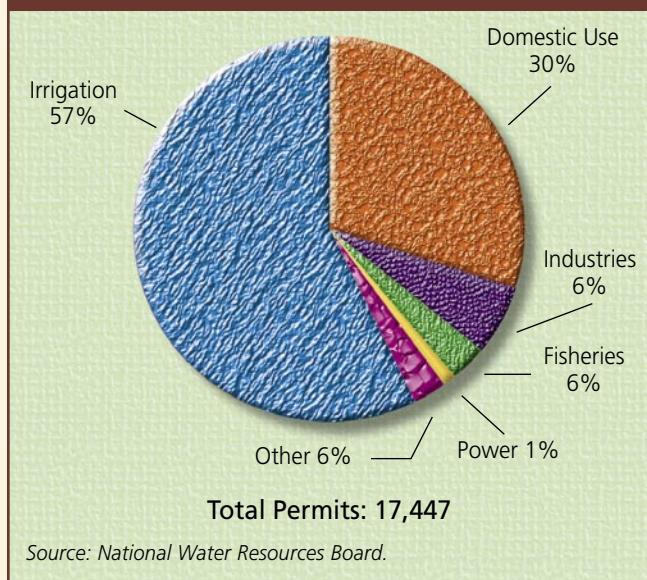
As of December 2003, 17,447 water permits had been granted to water users for use of surface water (53 percent), groundwater (37.5 percent), and spring water (9.5 percent). Slightly more than half the water permits are used for irrigation. At approximately 83

³² Water Resources Institute, 2000-2001.

³³ World Bank, 2004b.



Figure 10. Water Permits Granted By Use, 2003



percent of total volume of water used, irrigation is the dominant water user (Figure 10). Water users are charged per connection at either a flat rate, based on the size and population of residence or business, or a metered rate, based on the volume of water used.

Groundwater use. Groundwater contributes 14 percent of the total water resources potential of the Philippines; groundwater recharge or extraction potential is estimated at 20,200 mcm per year. Northern Mindanao has the lowest potential source of ground water compared to its surface water potential; while Ilocos and Central Visayas have the highest potential. About half the population uses groundwater for drinking purposes.

According to 2003 data, 63 percent of groundwater is consumed by the domestic sector, and the remaining is shared by agriculture (17 percent), industry (13 percent), and other sectors (7 percent). In terms of sectoral demand, agriculture has the highest demand, 85 percent, while industry and domestic sectors have a combined demand of only 15 percent.

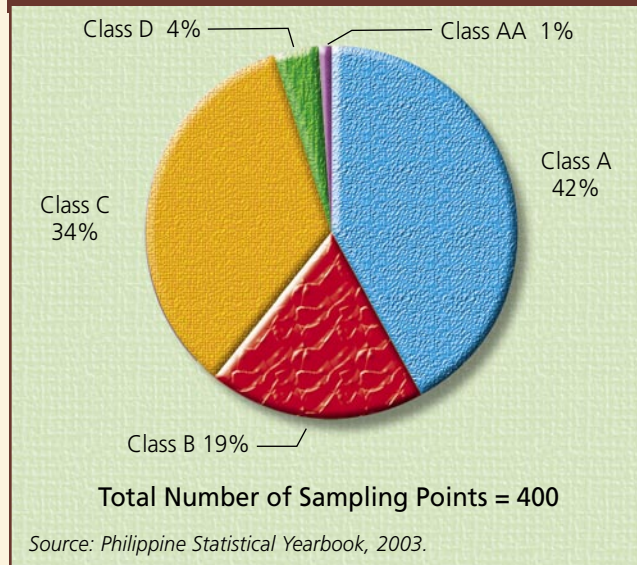
About 60 percent of groundwater extraction is without water-right permits, resulting in indiscriminate withdrawal. Some 86 percent of piped-water supply systems use groundwater as a source.

Over-abstraction from 6,441 registered wells has led to the lowering of aquifers, resulting in saline water intrusion and ground subsidence in some areas.

Water quality. Surface-water quality can be assessed by using Dissolved Oxygen (DO) and Biochemical Oxygen Demand (BOD) as parameters.³⁴ The National Capital Region (Metro Manila), Central Luzon, Southern Tagalog, and Central Visayas are the four critical urban regions in terms of water quality and quantity. Government monitoring data indicate the following:

- Approximately 42 percent of the country’s river systems are classified as sources of public water supply (Figure 11).
- Up to 58 percent of groundwater sampled is contaminated with coliform bacteria, and needs treatment.
- Just under a third, or 31 percent, of illnesses monitored for a five-year period were caused by water-borne pathogens.

Figure 11. River Water Classification, 2002



³⁴ National standards for DO vary from 2 to 5 mg/l and for BOD from 1 to 15 mg/l based on beneficial water usage and classification (Table 4).



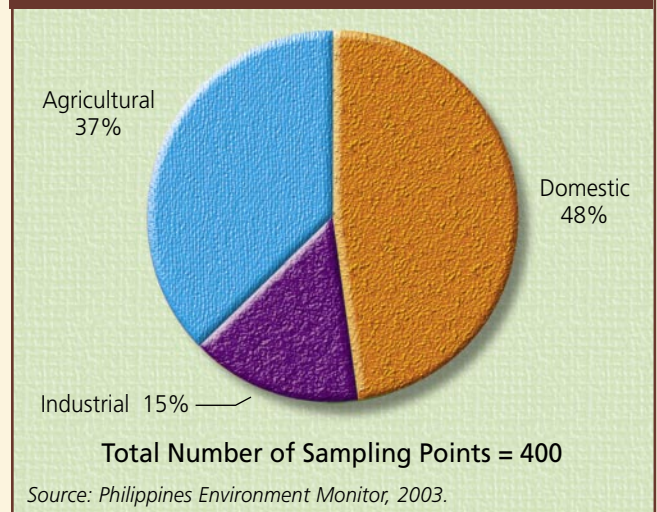
- 15 rivers nationwide have dissolved-oxygen at or below zero, indicating that they are “dead” during the dry months.

Water quality monitoring has not been carried out on a regular basis for all major rivers and bays in the country. Sampling of 51 rivers in 2002 showed that 69 percent of all samples were within the criterion for BOD, with 30 rivers (59 percent) having a passing rate of 100 percent.³⁵ Sampling for DO shows a similar result, with 68 percent of samples within the criterion. However, only 22 (43 percent) of the 51 rivers passed all the time. Monitoring for BOD in 2003 shows a slight improvement, with 76 percent of samples within the criterion.³⁶

Pollution sources. There are three main sources of water pollution—domestic (municipal), industrial, and agricultural. More than 2.2 million MT of organic pollution are produced annually by domestic (48 percent), agricultural (37 percent), and industrial (15 percent) sectors (Figure 12). In the four water-critical Regions, water pollution comes mainly from domestic and industrial sources. Estimates of total pollution do not include pollution from solid waste discharge and leachate. Solid waste disposed either at the dumpsite or directly into water bodies, generates high rates of organic and inorganic pollution. Leachate contaminates groundwater or seeps into rivers, lakes, and coastal waters. Despite the passage of the ESWMA, open dumpsites still operate throughout the Philippines (see section on solid waste), and solid waste remains a major water pollutant.

Industrial wastewater may contain organic and/or inorganic pollutants. Industries produce vastly

Figure 12. Estimated Share of Domestic, Industrial, and Agricultural BOD at the National Level, 1999-2000



different amounts of wastewater depending on the product and process used, and the scale of production. They receive permits from the EMB to discharge wastewater into a receiving water body. To receive and maintain a permit, the industry must comply with the provisions of the Pollution Control Law of 1976 (PD 984), and not discharge into either Class AA or Class SA water. Of the total permits issued in 2003, 23 percent were permits to discharge wastewater. Most of the water pollution-intensive industries are in National Capital Region, Calabarzon, and Region III. Food manufacturing, piggeries, and slaughterhouses are the main sources of organic pollution.

Exposure to such chemicals may result in a range of health effects including headache, nausea, blurring of vision, poisoning, male sterility, and immune system impairment.

The major trends in water quality recorded for the four critical regions are briefly discussed below.

National Capital Region. Domestic sources, industries, and solid waste contribute 65 percent, 30 percent and five percent, respectively, of the BOD loading of the Pasig River system. Between 1996–2001, EMB monitored 141 rivers, five of which are in

³⁵ A passing rate of 100 percent means that all samples taken during the year met the standards.

³⁶ Water classification is based on the following: Classes AA and SA generally have the most stringent requirements as these cover water for the public water supply and coastal and marine waters that may have fisheries, national parks, or coral reefs and other reserves; Classes D and SD have the least stringent requirements.



Metro Manila (Paranaque, San Juan, Marikina, Pasig, and Navotas-Malabon-Tullahan-Tenejeros). The San Juan river had the highest average BOD and lowest DO, and did not meet criteria for Class C water. The Marikina river had the lowest average BOD and met standards set for beneficial uses (Table 4). At some point during the monitoring, all four rivers exhibited a zero reading for DO, indicating that they were “biologically dead” during those periods. There had been a noticeable improvement in Pasig river water quality from 1992 to 2002, owing to the government’s rehabilitation effort. However, monitoring in 2003 showed that water quality had worsened between 2002 and 2003, with DO values lower than the minimum values in six of the eight stations, with the annual DO average decreasing by 30 percent. The same is true for BOD, with two stations exceeding the guideline values compared to only one station in 2002, and the BOD annual average increasing by 65 percent. The reduction in rainfall in 2003 could partly be the reason (Figures 13 and 14).

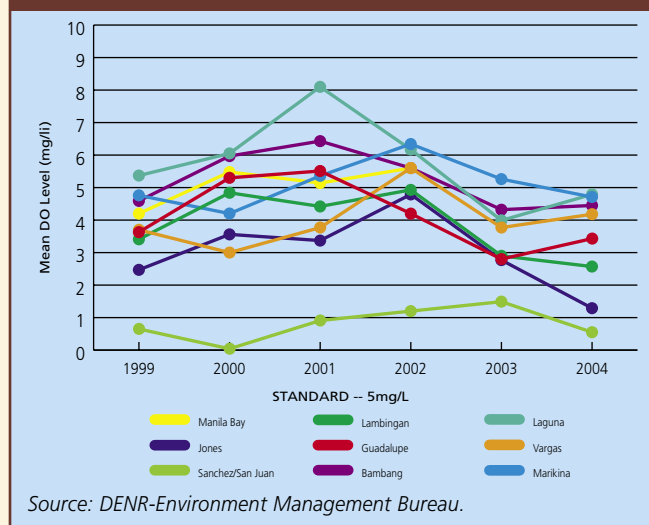
Total coliform and fecal coliform count of bathing beaches in Manila Bay, on the other hand, remain high (Figures 15 and 16). The refined risk assessment

Table 4. Water Classification by Beneficial Use

Classification	Beneficial Use
For Fresh Surface Waters (rivers, lakes, reservoirs, etc.)	
Class AA: Public Water Supply	Waters that require disinfection to meet the National Standards for Drinking Water (NSDW)
Class A: Public Water Supply	Waters that require complete treatment to meet the NSDW
Class B: Recreational Water	Waters for primary contact recreation (e.g. bathing, swimming, skin diving, etc.)
Class C:	<ul style="list-style-type: none"> Water for the fishery production Recreational Water Class II (boating, etc.) Industrial Water Supply Class I
Class D:	<ul style="list-style-type: none"> For agriculture, irrigation, livestock watering Industrial Water Supply Class II Other inland waters
For Coastal and Marine Waters (as amended by DAO 97-23)	
Class SA	<ul style="list-style-type: none"> Waters suitable for the fishery production National marine parks and marine reserves Coral reefs parks and reserves
Class SB	<ul style="list-style-type: none"> Tourist zones and marine reserves Recreational Water Class 1 Fishery Water Class 1 for milk fish
Class SC	<ul style="list-style-type: none"> Recreational Water Class II (e.g. boating) Fishery Water Class II (commercial) Marshy and/or mangrove areas declared as fish and wildlife sanctuaries
Class SD	<ul style="list-style-type: none"> Industrial Water Supply Class II (e.g. cooling) Other coastal and marine waters

Sources: DENR Administrative Order No. 34, series of 1990 and DENR Administrative Order No. 97-23.

Figure 13. DO Levels in the Pasig River system, 1999-2004



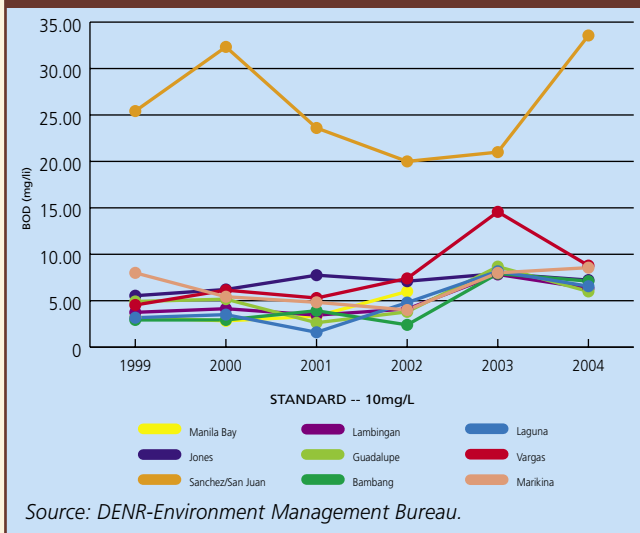
of Manila Bay,³⁷ which evaluates the impacts of pollutants on human and ecological targets, shows that the following contaminants need to be addressed immediately: (a) fecal coliform (due to sewage discharged directly into the bay, or into the river systems entering the bay); (b) lead and mercury; and (c) pesticides.

Routine monitoring from 1990 to 2003, at five stations within the Laguna de Bay, shows that it meets class C water quality criterion, except for a spike in one station in 1991. Although BOD in the lake is not

³⁷ PEMSEA and MBEMPTWG-RRA 2004.



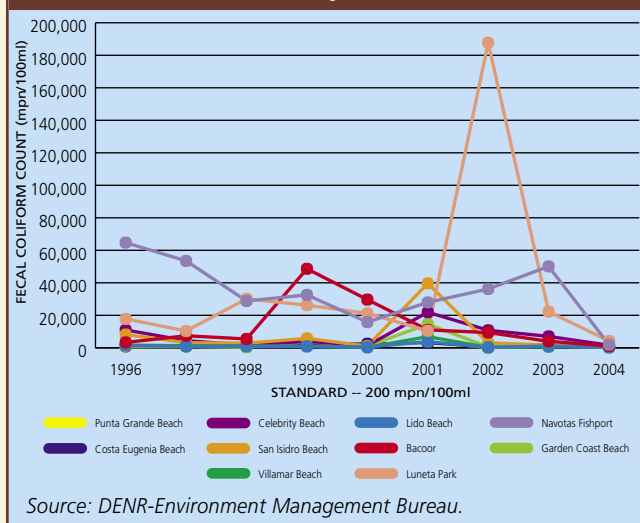
Figure 14. BOD Levels in Pasig River system, 1999-2004



currently a problem, siltation continues to be an issue. Of greater concern are the increasing levels of heavy metal. The Laguna de Bay Institutional Strengthening and Community Participation Project (LISCOP) is expected to improve environmental quality in the lake and its watershed, and will strengthen the institutions that are responsible for its management.

Region III-Central Luzon. Although it has a small land area, this region ranks third in the number of

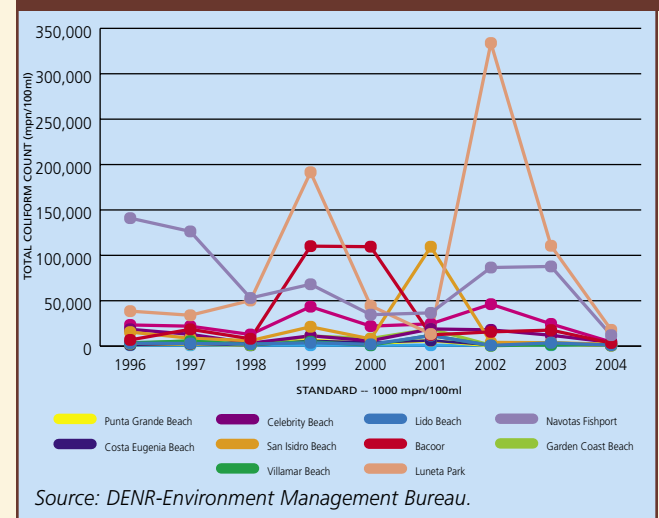
Figure 15. Fecal Coliform Count of Bathing Beaches in Manila Bay, 1996-2004



households and manufacturing establishments. It is also the third highest contributor to national income. In Central Luzon, 51 percent of BOD loading is generated by domestic sources, 14 percent by industrial, and 35 percent by the agricultural sector.

Based on EMB monitoring, 60 percent of the rivers in this region fall under class C waters. In the Bataan coastal area, four monitoring stations (Matell, Villa Carmen, Villa Leonora, and Barangay Wawa) show total coliform count above the water quality criterion of 5000 most probable number (MPN)/100 ml (Class

Figure 16. Total Coliform Count of Bathing Beaches in Manila Bay, 1996-2004



SC). Thus, in 2003, these beaches were not suitable for recreational use.

Region IV—Southern Tagalog. Region IV A & B are comprised of 11 provinces: six on mainland Luzon, and five island provinces that are coastal tourist attractions. Rivers were not monitored for BOD and DO from 1996 to 2001. Instead, four bays were monitored in this period: Cajimos, Calancan, Puerto Galera, and Pagbilao. All of the bays passed the 5mg/l criterion for Class SA, SB, and SC for DO measurements.

Region VII—Central Visayas. Three bays were sampled in the region from 1996 to 2001. Only DO



levels were checked, and these indicated that all of the bays passed the Class SC criterion.

Pollution costs. The total annual economic loss caused by water pollution is estimated at PhP67 billion (US\$1.3 billion). This figure includes, PhP3 billion for health costs, PhP17 billion for lost fisheries production and PhP47 for lost tourism revenues. Losses due to environmental damage, in terms of compensation and claims, are also on the rise in the Philippines.

Chronic or preventable diseases impose large economic and social costs stemming from worker days lost, and excess morbidity and mortality. Contaminated drinking water is one of the most prevalent causes of illness in the Philippines. Thirty-one percent of illnesses between 1994 and 2000 were traced to water-related diseases.³⁸ Known diseases caused by polluted water include gastro-enteritis, diarrhea, typhoid, cholera, dysentery, and hepatitis. According to the Department of Health, in 2000, more than 500,000 morbidity and 4,200 mortality cases were attributed to water-related disease. Avoidable annual health costs due to losses in direct income and medical expenses are estimated at PhP3.3 billion.

The Philippines has beautiful beaches, which are its main tourist attraction. In addition to recreational use of beaches, coral reef diving, and whale watching also draw tourists. In 1997, the pristine waters of Boracay Island, an international tourist destination in Region VI, experienced a 60 percent decline in occupancy rate at area hotels because of the news of high levels of coliform bacteria. What happened in Boracay could easily happen on other equally-fragile islands of the country unless something is immediately done to address the pollution problem.

The recently launched Beach Ecowatch (Box 8) project of the DENR-EMB aims to use public disclosure to put pressure on local governments, resort owners, and communities to protect the water quality at their beaches and ensure sustainable tourism development. In addition, losses to family income due to the demand for safe bottled water are not insignificant.

The widespread use of bottled water may also be considered an indirect cost of water pollution. According to the Water Quality Association of the Philippines, almost 45 percent of Metro Manila residents (4.8 million people) are willing to buy bottled water. At PhP50 for five gallons (or PhP2,642 per m³), bottled water is 100 times more expensive than tap water, which would cost PhP10–19, per cubic meter of water (Box 9). The poor, who rely on vended water as their main source, devote nine percent of their household expenditure to buying water (Figure 17).

Box 8. Beach EcoWatch in the Philippines

The Beach EcoWatch Program is an environmental improvement and monitoring program to improve public awareness of water quality at Philippines beaches, and improve compliance by hotel and resort owners, and LGUs. Information provided by the Beach EcoWatch Program allows the public to persuasively promote the improvement of beach water quality. The ultimate goals of the program are tourism promotion, ensuring the safety of swimmers, and supporting an informed use of beach resources.

Source: Authors.

Sewerage and sanitation. Indiscriminate disposal of domestic wastewater is one of the main reasons for degradation of water quality in urban areas. Unlike the agricultural and industrial sectors, where the cost of controlling water pollution can be passed on to the polluters themselves, off-site domestic wastewater collection, treatment, and disposal are considered basic public services.

³⁸ DOH-National Epidemiology Center.



Box 9. The Cost of Water to the Poor

Poor households in the Philippines spend a greater proportion of their income per month on water than do rich households. Although half of all poor and rural households consume less than 41.6 l/person/day, the expenditure shares for water are considerable. Self-provisioning and vended water account for the greatest portion of the cost.

Only 25 percent of the poor access the full waterworks systems that have individual household connections. Thirteen percent of poor households access piped systems with community faucets, and 31 percent are provided water from springs or protected wells. The remaining water supply is provided to households in self-provision and vended water—29 percent and 2 percent respectively. An average poor household, reliant on vended water as the main water source, spends 80 percent more on vended water than an average rich household.

Source: Asian Development Bank, 2004.

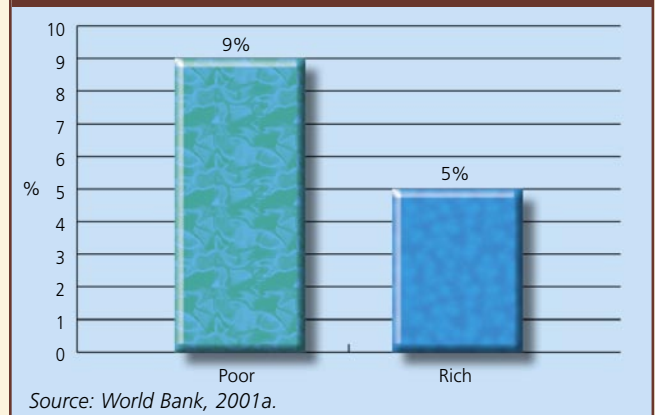
Only one percent of the country's total population is connected to sewer systems (Table 5). The National Urban Sewerage Strategy of 1994 holds LGUs responsible for the provision of sewerage and sanitation improvements.³⁹ However, water supply and sanitation systems outside Metro Manila, which were turned over to LGUs in poor condition, have not been effectively managed or improved. Local governments lack the capacity, technical knowledge, and funds needed for proper management and maintenance of these systems. While LGUs were given the option to form semi-autonomous water districts to manage their urban water supply and sewerage systems, with support from the specially-created Local Water Utilities Administration, the provision of sanitation services have not been assigned a high priority.⁴⁰ Sewerage services outside Metro Manila are almost non-existent, leaving most urban poor excluded from sewerage services.

In the capital city, the Metropolitan Waterworks and Sewerage System (MWSS) is responsible for providing

³⁹ ADB, 1999.

⁴⁰ Robinson, 2003.

Figure 17. Share of vended water as percentage of total household expenditure



urban water supply and sanitation services. The Manila Water Company, Inc., a concessionaire of the MWSS for the east zone, is in the process of setting up 29 decentralized sewerage treatment plants and three septage treatment plants. The World Bank continues to assist the Government in expanding sanitation coverage through the Metro Manila Second Sewerage Project (1996–2003), LGU Urban Water Supply and Sanitation Project (1997–2010), and the Water District Development Project (2001–2006). On the whole, sanitation and sewerage investments are a small fraction of the total investment in the “Water Supply and Sanitation Sector” (Table 6), and there is considerable under-investment in sanitation and sewerage. It is estimated that over a ten-year period, the country will need to invest PhP250 billion (nearly US\$5 billion) in physical infrastructure (Figure 18).

Table 5. Sanitation Services in the Philippines

	Population (millions)	Access to sanitation services		
		sewerage	on-site	none
Metro Manila (MWSS)	13.3	4%	41%	55%
Other urban and rural	63	0%	88%	12%
National	76.3	1%	74%	25%

Source: Robinson, 2003.



LEGISLATION AND INSTITUTIONS

The Clean Water Act was passed in 2004. Rules and regulations for this Act are currently being drafted and debated. The Act seeks to designate specific water quality management areas. These will be managed by a governing board composed of political leaders, representatives of government agencies, registered NGOs, water utilities, and the private sector. The Board will be responsible for formulating strategies that will effectively implement the Act's provisions. In areas where water pollution has already exceeded limits, further polluting sources will not be allowed. The Act also establishes a National Sewerage and Septage Management Program that will allot funds for construction and rehabilitation of infrastructure for wastewater management. A five-year time horizon has been provided to connect existing sewage lines in business centers and households with the available sewage system in Metro Manila and other urbanized areas. A Water Quality Fund will be created to partly meet the requirements of the Act. The Act also supports the implementation of a wastewater charge system in all management areas including the Laguna Lake Region.



Although the National Water Resources Board (NWRB) is the primary agency tasked with enforcing the Water Code of the Philippines (PD 1067), there are approximately 30 government agencies currently involved in water resource management. In addition to operating under unclear and overlapping mandates, many of these agencies also lack sufficient budgets. In 2002, NWRB was reorganized, with major activities decentralized to three water operations offices in Luzon, Visayas, and Mindanao, so as to provide increased local autonomy in decision-making. Government-public initiatives are making the water management approach more comprehensive in scope and reach.

Inadequate technical staff and resources, and insufficient data on polluters point to the need for more targeted inspections. The processes of the Pollution Adjudication Board could be more streamlined and decentralized, to make enforcement actions more effective. Long-term environmental monitoring programs for major waterways are not regularly undertaken for such basic indicators as BOD and DO, making it difficult to establish trends and understand changes.

Table 6. Investment in Sanitation and Sewerage

Coverage Area	Population (in million)		Service Coverage (in million)		Investment Requirement (in PhP B)	
	2005	2015	2005	2015	2005	2015
Urban	48.85 (58%)	55.58 (60%)	9.77 (20%)	27.79 (50%)	55.69	158.40
Rural	35.37 (42%)	37.06 (40%)	17.69 (50%)	18.53 (50%)	50.42	52.81
Sub- Total	84.22 (100%)	92.64 (100%)	27.46 (33%)	46.32 (50%)	106.11	211.21
Program Support						
Operating Costs Urban					3.91	11.12
Operating Costs Rural					6.28	6.58
Support Activities					13.79	27.46
TOTAL					130.09	256.37

Source: ADB, 2001.

Notes: Investment requirement was computed based on constant 2002 rates. Support activities were estimated at 13% of the Capital Cost.





Dirty water is a health threat.
Source: DENR-Public Affairs Office.

Small but positive steps: Given the financial constraints LGUs face in implementing sanitation and sewerage projects, a way forward is to take small steps such as scaling-up pilot projects and low-cost initiatives. Examples of such initiatives include the following:

- Drainage project of Cabanatuan City, which has integrated dry weather flow interceptors;
- Sewage interceptor systems and treatment in Boracay and Dumaguete City;
- Communal septage collection, treatment, and disposal in communities (Barangay Environmental Sanitation Project's sub-project initiatives) in several barangays in Palawan and Panabo City); and
- Low-cost technology options for ecological sanitation that are being piloted in San Fernando City, and low-cost treatment initiatives with private participation in LISCOP and Local Initiatives for Affordable Wastewater sub-project sites.

MINING-RELATED POLLUTION

Recognizing its significant potential for fueling sustained economic growth, the government has moved from a policy of tolerance to that of active promotion of environmentally- and socially responsible mining.

Environmental impacts. The greatest risk arising from a medium- or large-scale mining operation is a major tailings spill, such as the Marcopper mine accident (Box 10). Environmental effects of artisanal mining are mostly related to mercury pollution, soil erosion, sedimentation of water bodies, and a total lack of land-reclamation after closure. Of these impacts, the most dangerous and irreversible for human health is mercury contamination. Several studies have looked into mercury pollution, based mainly on the experience in Diwalwal, Compostela Valley—the largest and most controversial small-scale mining site in the country. These provide evidence of worsening mercury pollution due to mining activities in the area. In the past years, water samples at the mining site in Diwalwal showed higher concentrations of mercury than those in other gold rush areas in the world.⁴¹ Results of a recent survey conducted in two other important small-scale mining sites further highlight the extent of mercury pollution in the country. The majority of ball-mill operators practicing amalgamation do not wear protective gloves while handling mercury and other chemicals used in processing. Some blowtorch the amalgam indoors, seldom using retorts that could prevent mercury from escaping into the air. While some sites had tailings ponds, upon inspection, these were found to be inadequate to handle the volume of wastes produced.

The Mining Act of 1995 requires mining companies to prepare Environmental Work Programs. Such plans are meant to detail a company's plans to achieve its environmental objectives and commitments, including the protection and rehabilitation of the disturbed environment. Plans are expected to include the budget (at least 10 percent of exploration expenditures) to ensure that sufficient funds are available to meet

⁴¹ With Diwalwal under direct state utilization, and more effort exerted to address the pollution problem, monitoring of the Naboc river shows mercury levels are well within the standards.



Box 10. The Marcopper Mine Accident

The Government estimated that the accident caused the loss of marine and fresh water life, estimated at PhP1.8 million. In addition, the 27-km long Boac River was declared dead after the incident. Following the accident, cases were filed against Marcopper and DENR officials. The Government halted mining operations, and measures were taken to contain the continuing leakage.

A subsequent United Nations report defined the tailing spill as an 'environmental disaster', and estimated clean up costs around \$100 million, to be paid by Placer Dome, the Canadian company that owned Marcopper. While Placer Dome sold its stake in the Philippine mine soon after the accident, it continues to pay the cost of the cleanup.

A comprehensive assessment of the impacts of the spill conducted by experts led by the US Geological Survey has been commissioned by the Government. The study will look at the technical/mining, environmental, and health impacts of the spill aims to determine the best options for a comprehensive rehabilitation of the area. Results of the study are expected to be released soon and agreements made for both short term and long term actions. In the meantime, damages amounting to PhP61 million for families affected by the spill have been paid with additional claims for PhP27million for Boac and PhP21 million for Mogpoc under process. The United States Geological Survey team's monitoring of the Boac river in 2004 showed that the river water is not toxic (using the Sea Urchin Toxicity Test), and that it meets US Environmental Protection Agency criteria for cadmium, zinc, copper, lead, and nickel.

Source: <http://www.twinside.org.sg/title/toxic-ch.htm>, and DENR/MGB reports.

commitments. In addition, mining companies are also required to prepare a comprehensive environmental management plan for the life of the mining project or an Environmental Protection and Enhancement Program. An environmental guarantee fund mechanism is being implemented to ensure just and timely compensation for damages and progressive and sustained rehabilitation. Monitoring and enforcement need to be substantially strengthened. To improve compliance with existing laws, and to increase the efficiency of monitoring inspections, DENR's Mines and Geosciences Bureau (MGB) and EMB have recently decided to form joint inspection teams for each mining site. While it is still too early to assess the impacts of this measure, the deployment of joint teams is expected to ease the inspection burden on DENR and the private sector.

Abandoned Mines. During the last two decades, low economic viability, labor disputes, environmental impacts, and intense public scrutiny have contributed to the closure of a number of large and medium-scale mines. Aware of this situation, the government is attempting to address the issue of abandoned mines. Twenty abandoned/inactive mines and quarry sites

have been surveyed for rehabilitation. The enhancement and revegetation of the 120-hectare tailing dam No. 3 of Maricalum Mining Corporation in Sipalay, Negros Occidental, has been completed. Three major strategies are being pursued—the prevention of further abandonment through the strict implementation of the Environmental Protection and Enhancement Program and the Final Mine Rehabilitation and Decommissioning Plan; the rehabilitation and remediation of inactive mines; and planning for the future through the formulation of new guidelines. If properly implemented, these plans will go a long way in restoring trust in the government, especially among anti-mining groups.

Geohazard mapping. Landslides, such as those that occurred in Panaon Island, Southern Leyte, in Surigao City in December 2003, and in Aurora and Quezon in November 2004, have been occurring more frequently all over the country. These disasters have highlighted another important aspect of the work of the mining sector in the country—that of geohazard assessment and the preparation of geohazard maps. Geohazard assessment (which involves the analysis of several thematic maps,





Artisanal mining.

Source: DENR-Public Affairs Office.

such as topography, vegetation, soil characteristics, geology, fault line, rainfall, and population centers) identifies the geohazards within an area, and what type of development can be allowed to prevent or at least minimize the impact of a particular geohazard. Such mapping should serve as the basis for the comprehensive land-use and development plan of any locality. While DENR-MGB has been undertaking this activity, it has only covered a small portion of the country due to limited funds.

LEGISLATION AND INSTITUTIONS

The 1995 Mining Act is the main legislative provision regulating the mining sector. At the same time, RA No. 7076 regulates small-scale mining activities. An earlier law, PD 1899, passed in 1984, was the first legislation to legalize small-scale mining. It provided for a licensing system which includes issuing permits for small-scale mining within existing mining claims, subject to the consent of the claim holder. Small-scale mining, as defined in this law, refers to any single unit of the mining operation having an annual production of not more than 50,000 MT of ore, involving work that is artisanal (either open-cast or shallow underground mining without the use of sophisticated mining equipment), with minimal investments in

infrastructure and processing, and relying heavily on manual labor. Small-scale mining safety rules and regulations were also promulgated in 1997, making the Philippines the only country to have such a separate and distinct safety rule for small scale mining. In spite of these rules, small scale mining in the country has largely been illegal and uncontrolled. The DENR-MGB is tasked to regulate, supervise, and support the minerals industry in the country. It was only in 2004 that a small-scale Mining Unit has recently been established within the Bureau to handle the specific concerns of that subsector.

The Fraser Institute, in its 2004 Annual Survey of Mining Companies, indicated that the Philippines ranks high in terms of mineral potential but low in terms of policy regime. Regulatory uncertainties and strong social activism against current mining practices are believed to have played a significant role in slowing-down foreign and local investments in mining. In addition, there are emerging concerns about the government lacking the financial, technical and institutional resources to execute the National Minerals Action Plan.

Indigenous peoples, civil society groups, and the Catholic Church have challenged some provisions of the Mining Act of 1995, specifically the constitutionality of the Financial and Technical Application Agreement (FTAA), which allows up to 100 percent foreign ownership of mining projects. These groups also contest that there is potential conflict between the Mining Act of 1995 and the Indigenous Peoples Reform Act. After over four years of uncertainty, in January 2004, the Supreme Court ruled that indeed the FTAA is unconstitutional, and that exploration and mineral processing permits may not be granted to foreign-owned corporations. The motion for reconsideration filed by Western Mining, the Chamber of Mines of the Philippines and DENR was recently decided in their favor with the Supreme Court reversing its original decision.

