

Health and Environmental Problems in Philippines

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Abstract

This paper reviewed available information/data compiled by various agencies, institutions, and experts, including the academe. The review concentrated on five of the most pressing problems such as air pollution, water pollution, land pollution related to the problem of solid wastes, toxic and hazardous chemical wastes and deforestation. Most of the data presented focused on Metro Manila. Past air monitoring data showed significant exceedances of national air quality guideline values especially for particulates and lead. Many of the country's rivers and lakes have deteriorated, some were declared biologically dead. The acute solid waste problem and the proliferation of toxic and hazardous chemicals have led to the enactment of legislation. Uncontrolled deforestation has taken its toll on the environment and people. Various actions were undertaken by the national administration with the cooperation of other sectors to address environmental problems. However, constraints to the enforcement of environmental laws and programs must be minimized to attain the desired level of environmental protection and management.

Introduction

The Philippines, as a developing country, has contributed its share to the number and complexity of environmental problems in Asia. Population explosion occurring at a rate of 3% in the 70's and 80's was accompanied by a rapid growth of urban communities, industries and other sectors. Accelerated human activities to spur economic development were undertaken with inadequate/ineffective mechanisms for environmental protection and management. Additionally, the impact of environmental problems on health did not merit the desired attention it deserved. National morbidity and mortality statistics regularly reported in past years did not show the influence of e.g. environmental pollution on home types of diseases that were recorded:

The estimated population of the Philippines is 79,503,675 distributed in 16 regions. The various regions, the National Capital Region (NCR) or Metro Manila is the main center of trade, commerce, industry, education, financial services, communications and the nation's administration. It is composed of 13 cities and 4 municipalities occupying a total land area

of 636 km² with a high population density of 15,617 persons km². Seven out of the 17 communities in Metro Manila, are among the 10 most populous cities in the country.

This paper reviews available information/data about the prevailing health and environmental problems in the country. Emphasis will be on the well-documented Metro Manila area or NCR. Some of the more recent developments will also be cited in connection with solving the most pressing problems.

Environmental Problems: Air Pollution

Air quality in Metro Manila has deteriorated over the years based on monitoring data collected from the mid-70's to the 90's. Although there are gaps in air quality data compiled, it is clear that at least 70% of the air pollution problem is attributed to mobile sources i.e. motor vehicles followed by industry.

The number of registered motor vehicles as of 2001 was 3,865,862. About 35% of these are in Metro Manila and the rest are in the other regions. However, the air pollution problem is not confined to operation of registered vehicles. There are quite a number of unregistered often poorly maintained vehicles plying the Metro Manila streets. Traffic density is understandably high leading to increased emissions of air pollutants. The types of motor vehicles within the country include: cars, utility vehicles (e.g. jeepneys), trucks, buses, motorcycles/tricycles and trailers. In the Metro Manila area, the jeepney considered the "king of the road" is the most common means of transport for commuters. Jeepneys and other utility vehicles represent about 37% of all registered vehicles nationwide; 42% for Metro Manila. Fuel used are either gasoline or diesel. Leaded gasoline was phased out in December 2002.

Noteworthy are the findings of air monitoring between 1990 and 1992 carried out by 2 projects. One project measured levels of total suspended particulates (TSP), sulfur dioxide (SO₂), carbon monoxide (CO) and lead (Pb). The results showed that the TSP levels exceeded the WHO guidelines by a large margin while Pb and CO concentrations exceeded both national ambient standards and WHO guidelines for 24-hour exposure. The other project which was associated with the vehicle emission plan for Metro Manila involved five monitoring stations. Monitoring data showed that TSP levels exceeded the national guidelines by a factor of more than two while PM₁₀ exceeded the national guideline by a factor of more than three and the proposed 24-hour maximum by a factor of two, Pb results exceeded guidelines most of the time. In the case of CO and NO₂, exceedances were obtained occasionally during the monitoring period. National air quality guidelines have been updated in 1993 (Table 1).

Table 1. National Ambient Air Quality Guidelines for Criteria Pollutants

Pollutant	Averaging Time	Standard
TSP	24 hours avg.	230 $\mu\text{g}/\text{m}^3$
	1 year	90 $\mu\text{g}/\text{m}^3$
PM ₁₀	24 hours avg.	150 $\mu\text{g}/\text{m}^3$
	1 year	60 $\mu\text{g}/\text{m}^3$
Sulfur dioxide	24 hours avg.	180 $\mu\text{g}/\text{m}^3$
	1 year	80 $\mu\text{g}/\text{m}^3$
Nitrogen dioxide	24 hours avg.	150 $\mu\text{g}/\text{m}^3$
Photochemical Oxidants (e.g. ozone)	1 hour	140 $\mu\text{g}/\text{m}^3$
	8 hours	60 $\mu\text{g}/\text{m}^3$
Carbon Monoxide	1 hour	35 $\mu\text{g}/\text{m}^3$
	8 hour	10 $\mu\text{g}/\text{m}^3$
Lead	3 months	1.5 $\mu\text{g}/\text{m}^3$
	1 year	1.0 $\mu\text{g}/\text{m}^3$

Source: DAO No. 14, series of 1993, DENR-EMB

So far data collected on air quality concentrated on criteria pollutants. However, between 1994 and 1996, a research project on indoor/outdoor air quality investigated for the first time, levels of selected volatile organic compounds (VOCs) in Metro Manila. Portable outdoor air samplers attached to tubes with carbopack B and carbosieve were utilized. Samples were analyzed by thermal desorption capillary gas chromatography (GC) with flame ionization detector (FID) in the U.K. Levels recorded for benzene and toluene were: nd- 47.5 $\mu\text{g}/\text{m}^3$ and 9.4-807 $\mu\text{g}/\text{m}^3$, respectively. A separate set of charcoal tube (NIOSH-type) samples were analyzed by GC-FID in Manila. The results obtained were: 0.1-792 $\mu\text{g}/\text{m}^3$ for benzene and 0.1-2178 $\mu\text{g}/\text{m}^3$. Other VOCs measured were; hexane, heptane, ethyl benzene, m,p.xylene, o-xylene, 1,3,5 methyl benzene. These levels were quite high in comparison with European standards.

Environmental Problems: Water Pollution

In the early 70's, domestic sources were mainly responsible for 70% of water pollution in Metro Manila. Industry contributed 30%. Wastes generated by the general public were discharged into the various river systems. The existing sewerage system served a small proportion (13%) of households while the rest avail of septic tanks.

Waste water from industries were discharged untreated or partially treated into the same river systems as the domestic wastes. Eventually, four major river systems that included the historic Pasig River were declared "biologically dead". All five rivers flow into Manila Bay with low dissolved oxygen (DO) - i.e. below the national criteria for class C rivers. The biochemical oxygen demand (BOD) was high making them useful only for navigation. The

rivers were also found to be contaminated with heavy metals and pesticides. Oils wastes from petrol stations, oil depots, barges, tankers and boats added to the pollution load. Other several river systems in other parts of the country have likewise started deteriorating. Associated with the deterioration of water quality is the problem of siltation. Pollutants identified which affected water quality of the country's waters consisted of the following materials: Pesticides, heavy metals, toxic chemicals, sewage as well as sediments. An example of an extensive water pollution situation is the case of the 90,000 hectare lake - the Laguna de Bay. Nearly 1000 factories have been discharging effluents into the lake.

Environmental Problems: Solid Waste; Toxic Chemicals and Hazardous Wastes

For the year 2000, the country produced approximately 10 million tons of municipal solid wastes. Of this volume, Metro Manila generated 2.5 million tons (25% of total), the biggest quantity from among the 16 regions. The amount generated is about 6 tons per day: As a highly urbanized region, people in Metro Manila or NCR tend to have high rates of solid waste generation. About 50% of the solid wastes are organic and biodegradable especially those churned out by households consisting of kitchen and yard/garden wastes. The rest are recyclable such as materials made of paper, plastic, metal, glass. Sources of other solid wastes come from commercial, industrial, construction, municipal or community services as well as agricultural activities generating a variety material types.

Aside from the voluminous municipal solid waste generated, the problem of collection and disposal of these wastes has become a very serious environmental issue especially within the Metro Manila area. Local government officials and their constituents are encountering difficulties in selecting appropriate sites without incurring the ire or opposition of neighboring communities.

The collection of solid wastes in Metro Manila is accomplished to the extent of about 70%. This is accounted for by the limited number of available dump trucks together with other modes of collection. The remaining 30% are dumped along streets/side walks, drainage canals and in open spaces or vacant lots. Uncollected wastes are scattered by animals, scavengers or by moving motor vehicles along streets, as well as by irresponsible people or blown by the wind.

The subject of toxic and hazardous wastes a special category, may be generated in solid, liquid or gaseous forms. Inventories have shown that there are thousands of toxic/hazardous chemicals used and disposed of in the country. These include locally produced and imported chemicals. Approximately 60% of such wastes are found in two regions: NCR and Region 4. As solid wastes, these have often been mixed with the usual municipal solid waste and dumped together in the same site. In view of their known chemical reactivities and toxicities; there are many potential health problems that may develop among exposed populations. They could contribute to land, air, and water pollution.

Industry and agriculture are significant sources of such toxic and hazardous wastes. Classes of hazardous wastes identified are mainly putrescible organic wastes, acid and alkali wastes, inorganic chemical wastes, oil. The case of infectious wastes generated by 18,500 hospitals in the country presents another problem for disposal, since the quantity generated has been estimated to be about 6,750 tons per year. Almost 50% of the total quantity is produced by Metro Manila hospitals and that incinerators are known to be operated by these institutions for disposal of such medical wastes.

Environmental Problem: Deforestation

Degradation of natural sources e.g. deforestation is also one of the most pressing problems the country is faced with. It is acknowledged that the forestry sector is a source of food, medicine, fuel, and wood-based products. Various rare species of flora and fauna are found in forests. Substantial revenues have been derived from the forestry sector due to exports of its products.

Forests are vital in the conservation of soil and water. Unfortunately, the extent of denudation or destruction of the country's forest resources has occurred at an alarming rate i.e. 80,000 hectares per year up to 1978 which had reportedly increased to 130,000 hectares between 1989 and 1995. The initial inventory done in 1969 showed that there were 16 million hectares of forested land in the country.

Legal as well as illegal logging, forest fires, "Kaingin", biological agents such as pests and diseases have led to the denudation of the nation's forests. In turn, these have caused problems of soil erosion, siltation, deterioration of water-holding capacity of soil, floods, landslides., reduction in the population of some endangered plants and animals, displacement of people including economic losses.

Some regions, with extensive deforestation have experienced loss of lives, and property that accompanied calamities (excessive rains, landslides) in the last few years.

Health Problems

Health concerns affecting the general public can be gleaned from morbidity and mortality statistics. Generally, they are presented in terms of "the ten leading causes of morbidity" and "ten leading causes of mortality" (Table 2 and 3). Other morbidity and mortality statistics for vulnerable sectors of the population, e.g. infants are also available. These statistics guide policy makers, health service administrators in setting priorities for intervention programs for the general public.

Table 2. Ten Leading Causes of Morbidity Number and Rate per 100,000 Population Philippines 1999

	Cause	Number	Rate
1.	Diarrheas	908,454	1189.9
2.	Bronchitis/Bronchiolitis	717,214	939.4
3.	Pneumonias	693,334	908.1
4.	Influenza	514,198	673.5
5.	Hypertension	208,248	272.8
6.	T.B. Respiratory	144,932	189.8
7.	Malaria	68,155	89.3
8.	Diseases of the Heart	63,167	82.7
9.	Chickenpox	35,699	46.8
10.	Typhoid and Paratyphoid Fever	17,675	23.1

Source: FHIS Annual Report 1999

Table 3. Ten Leading Causes of Mortality Number and Rate per 100,000 Population Philippines, 1997

	Cause	Number	Rate
1.	Diseases of the Heart	49,962	69.8
2.	Diseases of the Vascular System	38,693	54.1
3.	Pneumonia	30,811	43.1
4.	Accidents	28,563	39.9
5.	Malignant Neoplasms	26,842	37.5
6.	Tuberculosis, All Forms	23,056	32.2
7.	Chronic Obstructive Pulmonary Diseases and Allied Condition	11,807	16.5
8.	Other Diseases of the Respiratory System	6,961	9.1
9.	Diabetes Mellitus	6,749	9.4
10.	Nephritis, Nephrotic Syndrome and Nephrosis	6,704	9.4

Source: Philippine Health Statistics 1997

As far as the impact of environmental problems on health is concerned, there are some studies which have been undertaken and disseminated to sectors concerned. They are as follows:

- A research project investigated exposure of motor vehicle drivers and commuters to air pollutants. Respiratory symptoms such as chronic cough, chronic phlegm, wheezing and shortness of breath were noted. Responses of jeepney drivers were most significant among all the subjects tested. The prevalence of chronic obstructive pulmonary disease (COPD) among the subjects were; 32.5% (jeepney drivers), 16.4% (air-conditioned drivers) and 13.8% (commuters). The development of pulmonary tuberculosis among

jeepney drivers was also highest (17.5%) compared to commuters (9%).

- In a related study, the subjects were school children and child vendors. The prevalence of pulmonary symptoms were scored and the results were: 4.8-27.5% for school children and 15.8-40.6% for child vendors. Results of pulmonary function tests on Metro Manila schoolchildren were compared with those done on rural schoolchildren. The comparison showed that the rural children's lungs were "healthier" than their urban counterparts.
- Estimates of human cost of environmental pollution in the Philippines. These were expressed as "million days of healthy life lost" for only three conditions, namely, bronchitis due to dust (294), heart disease due to dust (47) and lead exposure. The estimate for the latter was an "average of five points of I.Q." loss among all children. When premature mortality from pollution was considered: 184,000 years of healthy life lost were indicated for bronchitis, diarrhea and heart disease. When expressed as % risk attributable to pollution, the estimates the three diseases were: 8-55; 19-30; 4-24, respectively.
- A study specifically designed to investigate mercury exposure of 163 school children in selected gold-mining communities was carried out. Results revealed that all the subjects were found to manifest five predominant abnormalities: under-weight, under-height, gingival discoloration, adenopathy and dermatologic abnormalities. Elevated total mercury blood levels were found in 10 children, one with both high total and methylmercury levels in hair samples. Previous investigations on cases of mercury poisoning in the gold-mining sites in the country have also been documented to some extent; others have been discussed in local assemblies.
- The health of scavengers in one dumpsite was also studied. Since the study group lived within the area, they were subjected to exposures to the potentially harmful wastes, unsanitary conditions; therefore, compromising their health. In one much-publicized accident in another dumpsite more than a hundred persons lost their lives when mounds of garbage piled high loosened and struck people and their dwellings.
- Industrial worksites are also a good source of information on the adverse health affects of air pollutants similar to those that may be found in the ambient (outdoor) environment. One survey covering 13,656 workers in some 3400 industries (except agriculture) were interviewed for illnesses or symptoms. Responses were linked to their daily exposure to dusts and other forms of chemicals. Industrial establishments are required to submit annual illness/injury reports to the corresponding regulatory agency.

There are also concerns about health effects of toxic chemical e.g. pesticides improperly applied and disposed of in various places in the country. Some cases of abnormalities seen in children have been associated to such chemicals. Additionally, chronic exposure of male workers in pineapple plantations involving one type of pesticide has resulted in sterility to hundreds of them. Exposures to pesticide aerial sprays, as well as contact with soils

contaminated with various toxic chemicals have also been frequently cited in many fora.

Contamination of water supplies with both harmful chemicals and biological agents has been known to cause illnesses e.g. diarrhea among vulnerable and disadvantaged population groups. For example, infants and children especially from impoverished families/communities have been known to suffer not only from inadequate food intake but also from consumption of contaminated water. The health consequences in such a situation lead to abnormalities/deficiencies under-development, illnesses, including mortalities.

Data on the impact of PM₁₀ pollution on health, were also gathered in four urban areas in the country. From the summary the number of cases for each of the seven types of health impacts expressed as "respiratory symptom days" had the most number of cases followed by "restricted activity days". The health impact with the lowest number of cases was "respiratory hospital admissions". The other types of health impacts documented were: "chronic bronchitis", "emergency room visits", "bronchitis in children", "asthma", and "respiratory symptoms days".

Actions taken to address environmental problems

On the part of the national administration, numerous programs were instituted including enactment of legislation for the protection and management of the environment. Specific activities undertaken include drafting of standards, rules and regulations, guidelines with the help of expert professionals/organizations/agencies including the academe both local and international; educational campaigns, creation of specialized offices tasked to assist the government in solving problems of the government. Many non-governmental agencies (NGO) or cause-oriented groups have also been instrumental in resolving issues concerning the environment.

Examples of projects or activities launched in the past and some being sustained to the present time are: the anti-smoke belching campaign, vehicle volume reduction project, massive reforestation, revival or rehabilitation of polluted rivers and lakes, educational programs at various levels. The general public is usually enjoined to actively participate in such activities.

Some of the regulatory policies that were urgently formulated during the last decade include: Toxic Substances and Hazardous and Nuclear Wastes Control Act (RA 6969), 1990; Philippine Clean Air Act (RA 8479), 1999 and the most recent is the Ecological Solid Waste Management Act (RA 9003), 2000. The Clean Air Act bans incineration, sets specification and standards for all types of fuels, additives, substances and pollutants. For example, aromatic content of unleaded gasoline will be reduced from 50% by volume to 35% (2003); benzene content will be reduced from 5% to 2% (2003). Other agencies of the government have likewise formulated or revised regulations, pertaining to the environment based to their mandates.

Reviews and updating of regulatory standards on air quality, motor vehicle emissions, water quality and other regulations/guidelines to make them more realistic, as well as enforceable

were accomplished in collaboration with sectors concerned. However, implementation of rules and regulations focused on the environment has been a big problem. Constraints such as: inadequate or lack of trained people assigned to implement standards, limited financial allocations for environmental projects, lack of equipment for field monitoring, laboratory supplies, inadequate equipment maintenance program for the purpose of e.g. air pollution work. These constraints have caused disruptions/cancellations in environmental services and programs. Changes in local and national administration have also led to changes in priorities for action.

Conclusion

The prevailing environmental problems in the country include air pollution, land pollution arising from improper solid waste management, water pollution and toxic and hazardous waste. Other concerns involve degradation of natural resources e.g. deforestation.

- Air pollution in Metro Manila has worsened over the years brought about by emissions of an increasing number of motor vehicles followed by industrial activities.
- Water pollution has rendered many rivers and lakes unusable or biologically dead. Efforts at reviving them have been undertaken for a few areas.
- The mounting problem of solid waste management, like air pollution, has elicited so much concern among all sectors of society prompting local government officials to plan for immediate as well as long term solutions.
- Massive reforestation efforts are being pursued in answer to the denudation of forests which have caused adverse effects on the environment and people.
- Toxic and hazardous wastes constitute a new challenge to environmental management. Considering that there are presently, thousands of such harmful substances that have proliferated in the Philippine environment.
- The adverse effects of the problems cited including their impacts on health are now recognized and appreciated.
- Actions have been taken to address the most pressing environmental and health problems. However constraints on the implementation of programs, regulations standards and other planned activities must be minimized if not prevented to attain the desired level of environmental protection and management.

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