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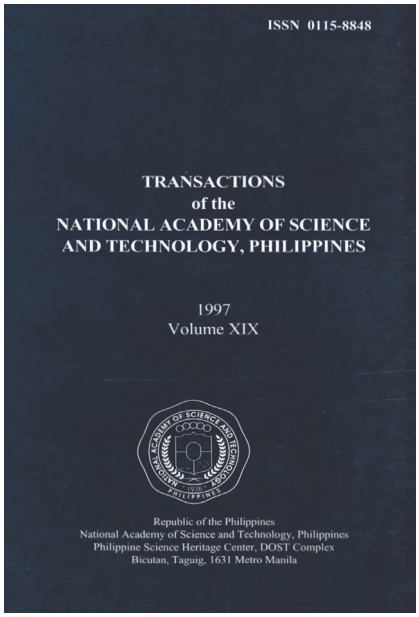

Environmental Health: Past, Present, and Future

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PLENARY SESSION II

ENVIRONMENTAL HEALTH: PAST, PRESENT AND FUTURE

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INTRODUCTION

As the 20th century draws to a close, a consensus is emerging that we must make better decisions to protect the quality of our environment and public health. These decisions cut across our economic development directions, environmental policies and our perspectives of a quality life. Obviously there are interactions between development activities, consumption of natural resources and human health which are significantly influenced by demographic, social, cultural and political factors. In order that these decisions be made better, it's just fitting that we look back to what happened in the past and draw some lessons to enable us provide a sustainable development to the future generation.

This paper presents a treatise of development, environment, health in the country. Increasingly in recent years, it has been recognized that health depends largely on our ability to understand and manage the interaction between human activities and our physical environment. On the other hand, development means addressing people's needs at the same time attaining ecological sustainability so that natural resources are not depleted, damaged or degraded. This report covers the socio-political influences of the prewar era as well as the postwar trends in our economic development, environmental management and human health. The paper also tries to present the challenges and opportunities in integrating health and environment in our development efforts towards a newly industrializing nation by the turn of the century and in making better decisions for sustainable development in the next millennium.

Historical Background

The Philippines is endowed with vast natural resources such as mountain ranges and forests, river systems, coastline and volcanoes. According to the book *History of the Filipino People*, the longest continuous mountain range in the country is the Sierra Madre while the largest river system is the Rio Grande de Mindanao. Philippine forests cover some 40,000 square miles while the coastline extends to about 11,000 statute miles.

There are at least ten active volcanoes, of which the Mayon volcano is the most active considering that it has erupted more than thirty times since 1615. Volcanic eruptions have been for centuries a natural cause of injuries, death and destruction of property. Because of the country's geographic location and topography it is also prone to natural hazards such as earthquakes, and floods. During the pre-colonial period, the economic life of the Filipinos was mainly dominated by agriculture and as such an abundance of rice, coconuts, sugar cane, cotton, hemp, bananas and oranges, and other crops existed. Kaingin system and tillage were the basic methods of land cultivation during those times. The rice terraces of the Mountain Province is a living proof of the irrigation technology used during the period. Other industries did exist such as poultry, fishing, mining, lumbering, shipbuilding and weaving. As chronicled, fishing was mostly done with the use of fish nets, bow and arrow, spear, wicker baskets, corals and fish poison. Mining, on the other hand was developed before the Spaniards came particularly in gold mining. This was evidenced by the goldchains, bracelets and earrings worn by the rich natives as reported by Legazpi in 1569. The reported gold mining technology used then as washing and placer mining. Shipbuilding technology then present was shown by the vintas and bancas used for travel and commerce.

Under the Spanish regime, during the nineteenth century, telecommunications, infrastructures and public utilities were developed. The railway line, 120 miles long extending from Manila to Dagupan was constructed by Filipinos before the Philippine revolution in 1896. Among the forms of street transportation were horse-drawn carriages, animal-pulled tramcar, tranvia de vapor, calesa and carretela. The Quezon bridge was the first suspension bridge in the Far East built during the period. The telephone system in Manila began working in 1890 servicing initially only 170 persons. Telegraph lines between Manila and Corregidor started in 1872 and the first interisland submarine cable linking Manila with the Visayas done in 1897. The lighting of Manila and suburbs using coconut oil started as early as mid 1800s and gradually changed to kerosene in the 1880s. The walled city was lighted by electricity in 1893.

Several economic development took place during the American occupation. The country developed with the establishment of industries such as textile, tobacco, sawmills coconut oil mills, cordage factories, alcohol distilleries sugar centrals, fishing and fish-canning industries to mention a few. All these industries were based on agricultural resources of the country. On the other hand, mining became the

backbone of the Philippine economy. The mining industry depended as well on the extraction of natural resources of the country. The country's then growing economic development, however, was affected by the world-wide economic depression of the 1930s.

Paralleling the economic development were progress in the transportation and communication sectors. Road and bridges were constructed, and the means of transportation also improved from the ancient bull carts and calesas to a railway network. Interisland shipping also developed which promoted domestic trade and industry by opening several ports to domestic shipping. In telecommunications, telephone lines, radio-telephone services and postal services were also opened.

Significant progress in education was achieved during the American occupation which enormously contributed to the increase of Filipino literacy. Enrollment of children became compulsory as well as the learning of the English language. Filipino students excelling in specific areas of learning were sent to the US as *pencionados.* The UP was established in 1908 to provide higher education. Other private educational institutions, like the University of Santo Tomas also formed part of the educational system of the country.

The progress in literacy had been attributed to the establishment of schools, colleges and universities between 1900 and 1935 as well as the adult education program introduced by American missionaries in non-Christian areas and the pioneering venture of the UP in launching literacy campaign in the rural areas.

Considered as an important contribution of the Americans to the country was the introduction of a scientific program of public health and welfare. Communicable diseases such as cholera, smallpox, tuberculosis and malaria ravaged the country before 1900. The Americans introduced new methods of preventing and treating these deadly diseases and educating the people on basic principles of hygiene and sanitation. The net results of the preventing programs were the decrease in mortality, improvement in standard of living and nutritional status of the Filipinos. The net results of the preventive programs were the decrease in mortality, improvement in standard of living and nutritional status of the Filipinos. However, the major limitation in the program was the ignorance and superstitious nature of the Filipinos.

The Japanese occupation of the country resulted to a massive destruction of the economy, as well as the loss of the social and moral balance of the Filipinos. Industry and trade suffered a major setback during the occupation since production virtually stopped. Filipinos then engaged on the "buy and sell" business which resulted to astronomical prices of basic commodities. The high inflation and the manufacture of "Mickey Mouse" money to encouraged buy and sell businesses resulted to high prices and scarcity of food. With the economic dislocation and food scarcity, many Filipinos died from malaria, malnutrition, tuberculosis and other communicable diseases.

Trends in Development, Environment and Health (1945 to 1997)

The destruction brought about by the war on the national economy was incalculable. Poverty was prominent due to widespread destruction of property, the reduction in income and other means of livelihood and losses in industrial productivity. Consequently, social services, health and welfare suffered tremendously. However, the rebuilding of the country started with the reorganization of the government, the American financial aid for rehabilitation and reconstruction. Several changes occurred in our health development through the years, mainly influenced by demographic and social factors, economic development, trends in science and technology, management of our environmental resources and by the institutional and policy framework wherein our goals of total development are embodied.

Demographic Trends

The 1990 population of the Philippines, according to census, stood at 60, 703, 206. This population figure more than doubled from 1960 to 1990 considering the average annual growth rate of 3.5 percent between 1960 and 1970, 3.1 percent between 1970 and 1980, and 2.6 percent between 1980 and 1990. These rates are definitely higher than in the neighboring countries of Indonesia and Malaysia. The 60.7 million population in 1990 is occupying a land base of 300,000 square kilometers making the country one of the most densely populated countries in the world. Although the population growth declined to 2.4 percent by the end of 1995, such rapid growth is putting great pressure to the country's economy to generate employment. During the 1970s, migration patterns of population were towards the cities where employment opportunities abound. However, these patterns considerably changed when the country experienced economic crisis between 1980-1985 provoked by domestic economic policy and excessive bank lending. The reduction of job opportunities in Metro Manila and the collapse of the sugar, rice and corn industry, the declining family income for the population and the incentive for commercial logging contributed to upland migration that by 1985, some 30 percent of the population have migrated to the upland areas.

In 1990, the migration pattern was back towards urban and industrial centers of the country basically for employment. However, work opportunities were not always available thus the sprouting of urban slums where basic services such as water and sanitation and other social services were grossly inadequate. Poverty had stricken many regions of the country that in 1991 severely affected areas were the Bicol region, Central and Eastern Visayas as reported by the National Statistics Office (NSO).

Undernutrition of Filipino children, although decreasing in proportion in proportion was still high compared with our neighboring countries of almost similar development trends. Food expenditures were reported to share more than 50% of the

family income. A 1991 survey by the NSO indicated that food expenditures share more than 56% of the total income in the political regions of Eastern Visayas, Western and Northern Mindanao and the ARMM. This indicates that with the declining economic opportunities and consequently the family income, access to food had become more difficult and thus satisfying the nutritional requirement of the population was grossly neglected. Surveys of the FNRI in 1982 and 1990 indicated that 17% and 12% of 1-6 year old and 7-10 year old children respectively were underweight in 1982. These decreased to 14% and 5.5 percent in 1990. Stunting, an indication of chronic malnutrition was seen among 22% of 7-10 year old children in 1985 and reduced to 14.2% in 1990. This nutrition profile made our children vulnerable to several diseases and premature death. The prevailing demographic patterns required additional resources for basic health and social services and would strain our environmental resources which are rapidly deteriorating because of population pressures.

Urbanization

Together with the significant population increase is the unprecedented rate of urbanization which poses multi-faceted problems including unemployment and underemployment, lack of infrastructure and basic social services as well as environmental degradation. In 1961 urban poor population was 28% of the total urban population and the proportion doubled thirty years later.

The level of urbanization in the country was 30% in 1960, 31.8% in 1970, 38% in 1980 and increased to 49% in 1990. The growth of urban population increased from 3.7% per year in 1960s, 4.4% in 1970s, and 5% in the 1980s. Unfortunately, the level of urbanization had not been matched by a correspondingly high per capita income and employment opportunities. The acceleration of urbanization in the 1980s occurred when the overall economic performance of the country was mediocre compared with our Southeast Asian neighbors.

Economic development policies in the 1960s were bias in favor of urban areas particularly in Metro Manila, the main urban center in the 1950s. This induced the concentration of manufacturing establishments, infrastructure and social services in the area. Gradually in the 1970s and 1980s this trend continued on to Central Luzon and the Southern Tagalog regions. Cebu in the Visayas and Cagayan de Oro and Davao in Mindanao emerged as the urban and industrial centers in those regions. With these developmental activities concentrated in urban centers, rural development was impeded due to lack of infrastructures and social services in the rural areas.

The macroeconomic environment in the country changed significantly in the 1980s and early 1990s towards a more open and market-oriented economy. However, the country's foreign debt and the ailing economy during this period severely limited the government's ability to provide the growing demand for infrastructure development and social services. Major problem spawned by urbanization was poverty as characterized by lack of employment opportunities, poor access to food, housing, health and education.

Given this socio-economic and political climate in the country during the mid-1980s to mid 1990s, efforts had been focused on development programs and projects designed to enhance food production, to improve delivery of social services and the establishment of infrastructure industries and utilities which aimed at generating greater productivity and promoting the social and economic growth of the country. Among the development projects implemented by the government agencies and private sector investments were infrastructure development covering transport, water resources, power and communications and social infrastructure including health, nutrition, population, education, manpower development, housing, community development and environmental management.

Trends in Science and Technology

Postwar developments in science and technology were mainly focused on rehabilitating our economic and educational facilities and industrial productivity. This meant having new laboratory equipment and facilities, and training of Filipino scientists abroad in the fields of agriculture, industry and medicine. The US government supported most of these rehabilitation activities through aids and grants. In agriculture, research and capacity-building were in the fields of horticulture, agronomy, pest control, farm mechanization, the Masagana system of rice culture, animal husbandry, livestock and fish culture – all aimed at increasing the yield of our natural resources. Research projects also concentrated on industrialization of local products including coconut by-products, leather tanning, plywood, pulp and paper, ceramics and medicinal plants among others.

Development of science in the country after the war was attributed to several factors such as 1) the increasing number of scientists in the fields of agriculture, medicine, engineering and other specialist in allied technological fields sent abroad for training, 2) the educational trend wherein colleges and universities offered science and technology courses geared towards meeting the needs of our economic development and 3) the revitalization of activities and membership in professional scientific organizations. In 1968, a special science fund sourced from tax imposed on motor private vehicles and science stamps on legal travel documents sustained the science and technological research program of the country which aimed at developing our science resources and the application of such resources in accelerating our social and economic development. However, the science and technology sector suffered a setback in human resource development in the so-called "brain-drain" phenomenon in the 1970s. This problem was countered by the government with the Balik-Scientist program during the martial law period and the "development diplomacy" on transfer of technology invoked in 1986.

Henceforth, several government efforts were directed towards the formulation of a comprehensive plan for science and technology, the establishment of S and T council, science communities and the scientific career system, and the integration of regional activities to enhance the promotion of science and technology in the

countryside. The Science and Technology Master Plan focuses on directing efforts towards making the nation a newly industrializing country through the development of 15 "leading edges" in priority sectors aimed at yielding substantial contributions to our GDP. The 15 production and services sectors are: agriculture, aquaculture, forestry, metals, textile industry, mining, process industry, food and feed industry, energy, transportation, construction, information technology, electronics, instrumentation and control, pharmaceuticals and emerging technologies. As such, strategies formulated to realize development goals include the development of high quality S & T manpower in growth areas, expansion of S&T education and training, development of S&T institutions, expansion of private sector participation, and development of an S&T culture.

Economic Development Trends

After the war, agricultural production was the focus of the government to increase people's productivity and improve standard of living. From 1946 to 1956, crop production almost doubled to some 7 million metric tons. This increased production resulted from expansion of land area for cultivation and the application of improved methods of production to increase yield per hectare such as the use of irrigation systems, better types of seeds, chemical fertilizers and pesticides to destroy plant pests and diseases. Philippine exports also tremendously increased from 300,000 metric tons in 1946 to 2.77 million metric tons in 1956. Copra and sugar were then the leading exports of the country. Recovery in the fisheries and livestock production was partial and thus resulting to reduced importation from 1946 to 1956. Increased activity in the lumber and timber industries was inevitable as demanded by the post war reconstruction. The timber and lumber production soared to 2.5 billion board feet in 1964 as an outcome of domestic and foreign demands.

Even with the rehabilitation efforts, the national economy remained weak, so that in 1950 a US economic mission headed by Daniel Bell initiated an assessment of the economic situation of the country as well as to identify measures to improve production and living standards in the country. Among the major findings were inefficient production and low income, and excessive volume of imports. The recommendations listed in the mission report to address these difficulties included efforts to improve agricultural production through modern and efficient methods, expand the services of agricultural extension stations, and the establishment of rural banks; to diversify the economy by encouraging new industries, developing power and transportation facilities, coordinating activities of government corporations and abolishing ineffective ones, and giving financial assistance to productive enterprises; and to improve social and welfare services through an adequate program of public health and education, to provide better facilities for urban housing, to pass laws for the protection of workers and to establish a minimum wage for urban and agricultural workers; and the provision of foreign financial assistance through grants and loans for carrying out a program of economic development and technical assistance.

It was in 1955, during the term of President Magsaysay when the country started to avail a US $10 million loan from the International Monetary Fund for economic stabilization and increased to US $ 18 million in 1957. President Garcia's economic program anchored on austerity and Filipino-first policy to complete Philippine economic independence. Other aims of his program was to achieve a balanced economy by providing equal impetus to agriculture and industry and to minimize or possibly eliminate graft and corruption. In spite of his nationalistic policies, the economy of the country continued to deteriorate and graft and corruption continued to perpetuate.

During the term of President Macapagal in 1961, the stabilization loan of the country amounted to US $330 million and the Philippine peso devalued from 50 US cents to 25 US cents. Among the major goals of his presidency were to solve the problem of unemployment, self-sufficiency in staple food and the establishment of practices that will strengthen the moral fiber and reintroduce those values which invigorates our democracy. To radically change the economic and social conditions of the farmers, the Macapagal administration saw the need to prepare the agricultural land reform code. This code was passed by Congress and signed by Macapagal into law in 1963. The code intended to establish the economic family-size farm as the basis of Philippine agriculture and divert landlord capital in agriculture to industrial development. Consequently, a viable social and economic structure in agriculture will be achieved.

During the inauguration of President Marcos in 1966, he promised that he will implement the land reform code. Among the objectives of the Marcos administration then were self-sufficiency in rice production and diversification of crops, implementation of the land reform program, and intensification of community development program in order to strengthen further "our social, economic and political base". In the early years of his administration the country's foreign loan amounted to US $500 million and reached to some US $ 19.5 to 215 billion in 1983.

In 1972 when martial law was declared, a reform program to restructure the Philippine society through rationalization of development planning and decision-making was deemed necessary by the administration. The creation of NEDA in 1973 provided the necessary institutional framework for development planning and policy-making in the country. NEDA estimated that the GNP of the country increased from P40 billion in 1974 to P43 billion in 1975. Agricultural growth was documented and attributed to the liberal credit policy of the government and to good climatic conditions in 1974 to 1975.

Industrialization

Serious efforts at industrialization started in the mid 50s as a result of attempts to rehabilitate and recover from the ravages of war. The pace accelerated in the 1970s and moved to high gear in the early 1980s. The Philippine industrialization strategy then was based on accelerated implementation of 11 major industrial projects namely:

aluminum smelter, copper smelter, integrated steel mills, phosphate fertilizer, diesel engine manufacture, heavy engineering industries, cement industry, coconut industry, petrochemicals, pulp and paper and alcogas.

To realize industrialization goals and accelerate the country's development, export processing zones (EPZs) were established in the early 1970s. Three export processing zones were established between 1972 and 1979: 1) the Bataan export processing zone established in 1972 with a total proclaimed area of 1,600 hectares, 2) the Baguio City export processing zone established in 1979 covering a proclaimed area of some 114,000 hectares, and 3) the Mactan export processing zone in Cebu made operational in 1979 with a total land area of about 120,000 hectares. In 1980, the Cavite export processing zone established but became operational only in 1986.

Nine special export processing zones were also developed to cater the major industrial projects of the country. Among these special EPZs are the Leyte industrial estate for copper smelting and fertilizer manufacture, the Tabangao special EPZ in Batangas for LPG production, industrial estates in Cavite, and Tarlac, industrial and business parks in Cavite and Laguna. In 1986 these regular and special EPZs housed only 51 companies. This figure doubled in 1989 and increased to 178 in 1991. The export earnings of the three regular EPZs in 1980 amounted only to US $ 71 million which increased to US $ 236 million in 1981. The exports in 1986 only valued some US $ 277 million. Five years later, exports increased by 250%. With industrial development, employment improved as demonstrated by the increase of employment of some 24,000 in 1986 to 43,000 in 1991. The net trade balance of these zones in 1986 was US $ 129.6 million which slumped to million US $M 6.3 in 1987 due to the then weak political stability of the government. However, this was able to recover in 1988 to about US $ 100 million and in 1991 soared to US $ 245 million.

Agriculture

As the agricultural technology in the 70s called for intensive use of chemical fertilizers and pesticides to increase crop yield, 1974 census data indicated that 30% (10,117,000 hectares) of the total land area of the country was devoted to food and commercial crop production. The Masagana 99 rice production program was introduced in 1973 with the aim of increasing and attaining self-sufficiency in rice.

To realize this end, dissemination of high-yielding variety, expansion of irrigated areas planted to rice and the scientific application of fertilizer and pesticides were called for. In 1973 a total consumption of some 677,000 metric tons which peaked in 1974 to 740,000 metric tons of fertilizers were recorded. However, in 1976, this value decreased to 650,000 metric tons. The local production of fertilizers could only supply 50% of the requirement. By 1977 the Masagana 99 areas planted total some 64,000 hectares and the total fertilizer allocation for the vegetable, rice, corn programs was estimated at 268,000 metric tons. Pesticides were also extensively used to maximize crop production. Over 80 kinds of pesticides were used then including DDT and

endrin which were banned for use in vegetable production. In 1976, 32 firms engaged in pesticide industry and the annual importation for the year.

Mining

Mining of mineral continued to contribute to economic development of the country. Mineral production included gold, silver, iron, copper, chrome, manganese, coal and other minerals and non-metals. The application of modern methods for exploration and mining coupled with increasing world demand for metals and industrial minerals led to the unusual mining industry in the 1970s. This was demonstrated by the country being the biggest producer of copper in Asia and its consistent production of significant quantities of gold, silver, nickel and cement.

In 1977, total mineral production was 1.15 million metric tons consisting of nickel, refractory chromite and copper concentrates. A major portion of production went to mineral export and valued at 2.322 billion pesos while mineral product imports totalled P108.5 million. In 1987, the total ore reserves were 6 billion metric tons (BMT) for metallic ores and 25 BMT for nonmetallic ore. Due to increasing exploration activities, known ore reserves were estimated to have increased. In 1994, the estimated ore reserve was 6.8 BMT for metallic and 51.6 BMT for nonmetallic ores. The metallic ore was dominated by copper while limestone dominated the non-metallic reserve. The economic dependence of the country on the mining industry led to increased volume of mineral production resulting in increased exploitation of mineral resources which are nonrenewable and the consequent depletion of mineral reserves.

Energy

Parallel to the industrial development is the increasing demand for energy to fuel agro-industrial and other economic activities. The Philippines has always been dependent on foreign supplies of commercial energy. Ninety four percent of the country's energy needs in the 1970s were supplied by foreign countries through oil imports with the rest supplied by hydropower and coal. The global fuel crisis in 1973 which severely affected the country's fuel supply forced the country's decision-makers to develop and utilize indigenous sources of energy and reduce dependence on costly imported petroleum.

The mid 1970s witnessed the acceleration of energy resource exploration and development activities in the Philippines. The first oil discovery in Palawan recorded in 1976 prompted the government to broaden its energy perspectives by launching a more comprehensive energy resource development program which will explore other indigenous resources such as coal, geothermal and nuclear fuels and strengthen research and development activities on other less conventional forms of recoverable energy such as solar, wind and biomass.

In 1977, coal production recorded at about 250,000 metric tons, the highest production figure so far in the country. The coal regions were identified in 1977 as the

Cagayan basin, Southern Mindoro, Semirara, Cebu, Davao, Malangas, Eastern Negros Catanduanes, Surigao, Polilio, Bataan and Lanao-Misamis.

The Philippines remains the second largest producer, next to the US, of geothermal power in the world. Potential reserves are estimated at more than 5000 megawatts (MW). In 1977-1978, a total of 28 development wells were drilled for geothermal exploration and development. Of these, three became operational in the late 1970s namely the geothermal plants in Tiwi, Albay, in Makiling-Banahaw in Laguna, and in Tongonan, Leyte. In the 1980s an additional geothermal plant in Palinpinon in Southern Negros was added to the list. In 1995, there were five geothermal fields with the addition of Bacon-Manito in Albay, generating a total geothermal power of 1,153 MW representing only 20% of geothermal reserves.

The energy program was able to reduce the country's dependence on imported oil down to 65% in 1983. Domestic oil and coal production contributed only about 5% and 3% of the country's energy needs respectively. A couple of years later, there was a decreasing trend in the use of imported coal and oil. However, the trend reversed when imported energy fuel use increased from 55.6% in 1986 to 65.7% in 1990, and 71% in 1994. Records have shown that the total energy consumption of the country from 1980 to 1995 was at its lowest during the period 1984 to 1986 and started to show an upward trend in 1987 to 1995. This profile maybe attributed to the level of economic activities, population growth and the political climate of the country. The crippling power crisis in the early 1990s led to the redefinition of the institutional framework of the energy sector.

Historically, energy affairs were in the hands of the Petroleum Board in 1972. This was changed to consider other energy sources with the creation of the Energy Development Board in 1976. The Ministry of Energy was created in 1977 and with the change in the political leadership in 1986, the BOE was placed under the Office of the President. The power crisis in early 1990s led to the creation of the Department of Energy to rationalize the organization and functions of government agencies related to energy. The energy sector has spurred the economic development of the country through the years and have generated beneficial and detrimental environmental consequences which may have affected as well the quality of life of the general population.

Environmental Resources

With the increasing pace of industrialization and urbanization occurring in the 1960s, the Government and Congress were indicatively concerned with the deterioration of our environmental resources and thus has created the National Pollution Control Commission in June 1964 under RA 3931. The Commission was mainly tasked to prevent, abate and control environmental pollution for the more effective use of the country's natural resources. Reports of environmental quality monitoring and surveillance were then available, however, organized information as to how the physical environment has been affected by the economic development activities was

virtually insufficient. The reports on overall status of the quality of our environment started in 1977 with the creation of the National Environmental Protection Council composed of 13 member agencies. President Marcos then chaired the Council. It was tasked to undertake a comprehensive and nationwide study of the overall status of the Philippine environment and thus had to coordinate with other government agencies and non-governmental organizations involved in the country's development. It continued to produce environmental status report until 1985 when the task was charged to the Environmental Management Bureau with the structural reorganization of environmental management affairs. The EMB henceforth produces situationers which chronical developments in the country's ecosystems and identify importants issues and concerns in the environmental management efforts of the country.

Land Resources

The country's land resources have undergone marked changes since the 1960s. From 1960 to 1990, there was a steady increase of alienable and disposal lands from 39.6% to 47% in 1990. Of these lands, about 64% were allotted for agricultural use in 1960 and increased rapidly to 92.7% in 1990. However, a 1991 nationwide study indicated that the conversion of agricultural lands to human settlements and industrial purposes have been going on rapidly at a rate of 2,267 hectares per annum. From 1987 to 1991, a total of 11,337 hectares had been converted which meant that some 3 to 5 times that area of rainfed and rolling uplands have to be cultivated in order to replace the loss in food production due to conversion. From 1982-88, conversion of agricultural lands to residential areas was evident in large cities of Metro Manila, Cebu, Iloilo and Davao, 42% of this conversion occurred in Region 4. A 1993 study identified 15 provinces covered by the study as critically affected by this conversion namely the CALABARZON provinces; Pampanga, Nueva Ecija and Bulacan in Region 3; Cebu, Aklan and Negros Occidental in the Visayas and South Cotabato and Lanao del Norte in Mindanao.

Other problems confronting our land resources which indirectly affect health development are erosion, siltation and misuse and overuse of chemical fertilizers and pesticides. A study undertaken in 1993 estimated that approximately 5.2 million hectares of land are severely eroded, 46% of which are in Mindanao. Overuse of agricultural chemicals and siltation also resulted to soil acidification, nutrient loss and deterioration of drainage conditions. The implementation of Masagana 99 and the green revolution program of the government also introduced high yielding varieties of rice and other crops which required extensive use of chemicals and the consequent manifestation of pest resistance. Misuse of pesticides also resulted to residues in the soil, groundwater and food exceeding the standard limits as reported in the monitoring in 1986-87 by the National Crop Protection Center and succeeding monitoring by concerned agencies.

Air Quality

Air quality monitoring has been limited to Metro Manila where motor vehicles and industries have been concentrated. In the 1970s, vehicular emissions contributed approximately 75% of the total daily air pollution load. It remained as the dominant source of air pollutants through the 1980s and 1990s. In 1994, the total number of vehicles in Metro Manila exceeded 959,000. In four years (1990-1994) consumption of gasoline increased by more than 30% and diesel by more than 60%. Information available provides a basis for the estimation of total motor vehicle emissions for Metro Manila in 1990: about 497,100 metric tons of carbon monoxide, 80,900 metric tons of hydrocarbons, 65,200 metric tons of oxides of nitrogen, 1,750 metric tons of sulfur dioxide, 650 tons of lead, and 11,100 tons of suspended particulate. These emission levels increased by approximately 50% over the following four years.

Although industries are second chief source of air pollutants, they contributed more sulfur dioxide (99% in 1970s, 88% in 1990s) and nitrogen dioxides than motor vehicles. More than half of the country's manufacturing and industrial firms are in Metro Manila. Power plants remain responsible for a high proportion of the pollution load from stationary sources. The emissions from power plants in Metro Manila are low compared to motor vehicle emissions. The emissions of carbon dioxide from power plants are only 0.1% of motor vehicles; oxides of nitrogen are 13% of motor vehicles; and total suspended particulate is 40% of motor vehicles. On the other hand, power plants are the largest sources of sulfur dioxide, generating 35 times more than motor vehicles.

Water Resources

The Philippine inland waters comprise primarily of 421 rivers, 58 natural lakes and more than 100,000 hectares of freshwater swamps. With an annual average rainfall of about 2,200 mm and annual run-off of some 257,000 million cubic meters (MCM), theoretically, the country has enough water resources to supply the water demand for domestic, industrial and agricultural needs. However, the rapid population growth and increasing industrialization and economic activities, have threatened the availability of these resources and their optimum utilization.

By 1978 only a quarter of the 421 rivers have been classified as to their best usage and monitored as to its quality. As of end of 1994, the number almost doubled to 207. Records show that in 1977 the rivers in Metro Manila were severely affected by pollution from domestic discharges (55% of the organic load) and from 313 industrial firms along the Pasig-San Juan-Marikina river systems while 140,000 tons of tailings daily from 24 active mining firms in the country were discharged into the rivers and streams outside Metro Manila. About nine rivers in Luzon, three in the Visayas, one each in Palawan and Marinduque have been polluted by mine tailings and consequently have damaged 128,000 hectares of irrigable lands. Other than mining operations, sugar mills and alcohol distilleries polluted 19 river systems in Bulacan, Capiz, Negros Occidental and Oriental.

Pollution of inland waters by domestic and industrial discharges continued to progress through the years. In 1989, it was reported that all the four major river systems in Metro Manila have become biologically dead. The rivers were contaminated by organic matter from sewage and solid wastes, heavy metals from industries, pesticides, and oil spills from gasoline stations, oil depot and barges and tanks. From 1990 to 1995, Pasig river quality has slightly improved but still did not meet the quality criteria for its classification of optimum usage (Class C) as for fishery and recreational purposes. The Marikina river which was classified as source of public water supply that required complete treatment (Class A) in 1975 has deteriorated through the 1990s; it is now found to meet only Class C water quality requirements. The other two river systems, the Paranaque-Zapote and the Navotas-Malabon-Tullahan-Tinajeros river systems which were classified as Class C rivers still do not meet the quality criteria and could satisfy only class D quality, that is, for agricultural irrigation and livestock watering.

Similar pollution trends were noted outside Metro Manila where the river systems have been continuously damaged by mine tailings, organic discharges from sugar mills and distilleries. In the 1970s through the 1980s, among the heavy metals monitored were copper, lead, cadmium in Luzon and mercury in Mindanao, concentration levels of which exceeded the quality standards set by the government. In 1990-1995, only 75 out of the 207 classified rivers were monitored. Reports indicated that only about 55% have met their classification criteria and 13% are considered dead. The rest are in their different stages of pollution. Of the dead rivers, two are in La Union, three in Pangasinan, five in Bulacan, one in Quezon.

Laguna Lake, Southeast Asia's biggest lake has been polluted by excessive organic discharges from domestic, agricultural and industrial sources that fish kills due to algal blooms in the early 1970s have occurred. A survey done in 1976 indicated that an estimated 25 million kilos of fertilizers and 100 tons of pesticides were used in irrigated and rainfed agricultural lands around Laguna lake. In 1978 the lake was reported to be in semi-eutrophic condition and siltation has resulted to a shallower lake from a depth of 7 meters to 2.8 meters. In the 1980s, the lake was considered hyper-eutrophic wherein algal populations abound. With the deteriorating lake water quality, occurrences and increases of fish diseases as *kitong* or *korikong* in the late 1980s have been attributed to the polluted condition of the lake.

Development pressures have continuously affected the quality of Laguna de Bay through the years. From 1978 to 1994, it was reported that nitrogen and phosphorus loads have increased by 10.8% and 24% respectively making the lake eutrophic. In the 1990s although almost 47% of the 1,500 industries around the lake have wastewater treatment facilities, they still significantly contribute to the total waste load of the lake together with domestic (about 4.8 M people or 60% of the population in the region discharge liquid and solid waste directly into the lake) and agricultural sources. Among the pollution problems threatening the lake quality are thermal pollution due to discharges of industrial cooling waters, toxic and hazardous wastes, and oil spills from barging and oil transport operations.

The importance of the coastal zone in the economic development of the country could be gleaned from the fact that 82% of the provinces are located in the zone. In 1981; fish production totalled 1.77 million metric tons, and increased up to 2.05 million metric tons in 1985 and to 2.4 million metric tons in 1989. Through the 1990s, fish production from all sectors almost doubled at 2.5 million metric tons in 1990 and gradually increased to 2.7 million metric tons in 1994. However, a serious problem experienced by the sector is overfishing. Commercial fishing vessels have intruded waters reserved for municipal fishing. Fishery experts signified that the limits of sustainability of marine fisheries have already been reached or exceeded since the estimated actual marine catch of 1.3 million tons per year is nearing the potential catch which is 1.45 to 1.85 million tons per year.

Mangroves serve as nursery grounds for aquaculture, and thus vital to our coastal fisheries. The mangrove resources of the country as recorded in 1918 were about 500,000 hectares. In 1970 or 52 years later, the mangrove forests reduced to 288,000 hectares and again to 242,000 hectares in 1980. A decade later, mangove area further decreased to 132,000 hectares which gradually decreased at an annual average rate of 2.4% to 120,500 hectares by 1994. The reduction of mangrove cover has been attributed to conversion to fishponds, harvesting of mangroves for fuel wood production and expansion of coastal human settlements.

As early as 1977, the country's coral reefs have been observed as progressively degenerating. The first comprehensive assessment of the coral reef areas of the country was conducted in 1976-1981. The study results established that 32% of the Philippine reefs were already considered in poor condition and less than 6% were considered excellent. The destruction has been attribute to siltation, natural calamities, destructive fishing practices, harvesting of corals for handicraft, ornamentals and construction purposes and the pollution of the marine environment.

The coastal waters of the country have rapidly deteriorated over the past decades primarily due to domestic wastewater and industrial effluents from urban areas, mine tailings from mining operations, agricultural run-off and oil from shipping operations. Monitoring of Manila Bay indicated that many beaches in its eastern part arc already unfit for bathing wile nearshore waters are also unfit for fisheries and shellfish growing.

The red tide phenomenon in our coastal waters has also consequently affected the fishery sector and has resulted to paralytic shellfish poisoning (PSP) of persons consuming the red-tide contaminated shellfish. The first episode of PSP was reported in 1983 when red tide phenomenon occurred in Samar, Capiz, Masbate, Sorsogon, Camarines Norte, Angeles City and Mati in Davao. A total of 279 PSP cases and 23 deaths were reported then. The next episode was reported in 1987 this time affecting Zambales and Samar again. In 1988, 307 cases of PSP were reported in red tide occurrences in Manila Bay, Samar, Negros Occidental and Carigara Bay. Henceforth, yearly occurrences of red tide and PSP cases were reported and each time more areas are affected. Since 1983 a total of 1871 PSP cases with 113 deaths have been reported up to mid 1997.

Health Trends

The factors that determine the health status of populations can be classified as: the socioeconomic/psychosocial environment, environmental pollution, individual practices and behavior, health care services, and genetic endowment. The socioeconomic/psychosocial environment includes factors related to income, education, occupation, and impact of childhood experiences, social support and influence of political system in buffering stress. Environmental pollution includes all aspects of the physical environment which affect health. Individual practices and behavior includes smoking, drinking, personal hygiene, food choices, and other health risk factors which are thought to be based on individual's choice. Health care services include all aspects of human institutions designed to protect and promote health and cure diseases.

There is an overlap of the above factors as determinants of health and thus boundary lines between these factors are vague. For example, in the relationship between the socioeconomic environment and individual health practices, the ability to eat healthy food depends upon its availability and affordability. In a country where healthy food is readily available and affordable to the population, dietary patterns become an "individual's choice". In the Philippines, the availability and affordability factors will be most important, and individual health practices and behaviors are best construed as responses to socioeconomic conditions. In other words, choosing health food is as much as socioeconomic factor as it is an individual health practice.

The quality, availability and affordability of health care services will also be largely determined by socioeconomic conditions. In 1990, the country spent approximately 2% of GDP on health care which places it in the lower end of the 2-7 % by countries in its income bracket as reported in a 1993 World Bank report. In the same report, it was stated that the public share of total expenditure is a low 30% whereas the mean for its income bracket is approximately 45%. Spending on environmental and public health services is affected by these patterns and may be inadequate to protect the public from the effects of environmental pollution.

The country's gain in life expectancy has been modest considering that from 1960 to 1990, the life expectancy of the Filipinos rose only by 5 years (from 59 to 64 years) compared with an average of 17 years in the demographically developing world and 12 years in the world as a whole. Definitely, there is a positive correlation between GDP and life expectancy. However, the average level of income per person in a country is only one among many social, economic, cultural and political factors that influence people's health. In general, the Philippines is "average" as far as health status among developing countries is concerned. According to the 1991 UNDP *Human Development Report,* of the 127 developing countries in the world, we ranked number 61 in life expectancy at birth at 64.2 years in 1990, number 51 in real GDP per capita for 1985-88 and ranked number 51 in terms of human development index (HDI) in 1991. The HDI is a composite indicator incorporating life expectancy, educational attainment (adult literacy and mean years of schooling) and real GDP per capita.

Definitely, we then lagged behind our Asian neighbors like Malaysia and Thailand which ranked number 20 and 33 in HDI, respectively.

The country has outstandingly achieved a very low illiteracy rate among adult females – among the lowest in its income bracket. Several of our health studies indicate the significance of adult female literacy in providing better and more effective care of children from the stand point of nutrition, sanitation and stimulation. However, the proportion of low birth weight of newborns and the rate of malnutrition among our young children are still unacceptably high. This makes interpretation of environmental health data more complicated. Malnutrition may be both a risk factor for environmental disease and a result of it. As reported in many health studies, malnourished children often have poor immune systems and compromised intestinal function which increase the severity of pollution-related infections.

The health profile of the Filipinos has been improving in terms of control of communicable diseases mainly because of public health interventions such as immunization, improved water and sanitation services, and health education programs. Although there is a downward trend among communicable diseases which are related to the quality of our physical environment, they still are the leading causes of morbidity such as acute respiratory infections, cholera, typhoid, diarrhea, hepatitis A, malaria, schistosomiasis and filariasis. Philippine statistics from mid-1940s to 1991 indicate that a changing disease pattern is emerging, that is, the increasing trend in non-communicable diseases particularly malignant neoplasm and diseases of the heart which ranked number 5 and 1, respectively as the leading causes of mortality in 1991.

The health profile of the working population is also a major concern since it drives the economy of the country. Studies have shown that occupational health problems relate mainly to agriculture, mining, manufacturing, transportation and construction. Contractual workers are identified as high risk population in terms of health considering that they do not enjoy the same working conditions and social benefits that regular employees do. The emergence of the informal sector particularly in the urban areas is also another health concern. The informal sectors in major urban areas made up of street vendors, jeepney and tricycle drivers, professionals sex workers, and people engaged in diverse cottage industries. These workers exist close to poverty in some of the poorest living conditions in the country.

The employment of child labor is very alarming as reported by a survey done by the NSO in 1995. Results showed that of the 13.7 million children aged 10-17 years in the Philippines in 1995, 15% or 2.1 million have worked in 1995, two-thirds of whom were working in the rural areas predominantly in agriculture including fishery and forestry. Other child labor consumers are the services (20%) and manufacturing (7%) sectors. Definitely, child labor has specific detrimental impact to the physical, mental and social development of children. Lack of educational opportunities, hazardous working conditions, separation from family members as in the case of domestic helpers are just few of the problems which threaten the development of a child as a total human being.

Specific occupational health hazards identified among our working population are work-related injuries and illnesses, pesticide and chemical exposure and poisonings, communicable diseases including malaria, schistosomiasis, dengue and tuberculosis. Reports from establishments employing 10 or more workers in 1993 indicate that the agriculture sector had the highest in number and severity of injuries (20 per 500 full time workers and some 5,000 lost work days per 500 full-time workers) during the year, followed by the manufacturing, transportation and construction sector. There are very limited available epidemiological data as to occurrences of occupational diseases, however, the Government has released a list of few occupational diseases which are compensable under the compensation law.

Air Pollution and Health

The average annual measurements of concentrations of total suspended particulate and sulfur dioxide from the routine air quality monitoring of DENR in 1988-1992 showed that particulate dust is found at levels which could affect human health. Epidemiological studies done by the UP College of Public Health in 1990 and 1992 defined exposures to dust by specific populations. These populations were jeepney drivers, air-conditioned bus drivers, commuters, school children and street child vendors. One major finding of these studies is that being a jeepney driver in Metro Manila increases the risk of chronic obstructive pulmonary disease by more than doubled.

Blood lead levels of children in Metro Manila were also determined. Data from these studies indicate the tendency to higher blood lead levels among children in the inner city areas of Metro Manila, where traffic flows are greatest. With the exception of Muntinlupa, all areas have mean blood levels among the school children that are or above those of lead smelter towns in most developed societies (Hertzman 1991). Among child vendors, the distribution of their blood lead levels are higher, one-third of them have levels above 20 micrograms per deciliter. The range of lead exposures found among children in Metro Manila is public health significance, because lead's toxic effects on brain development affect behavior and learning in ways which can interfere with success in school, and have potential for lifelong impact.

Water Pollution and Health

The health issues surrounding water supply begin with the quality of surface waters used by the population. The widespread pollution of surface water used for recreation and bathing with coliforms as reported by the DENR and the water quality issues facing Laguna de Bay, as a drinking water source are some environmental problems which may be related to health. By 1990, about 42% of the population were supplied with Level III, 31% by Level II and 25% by Level I systems as reported by the NSO. Sanitary toilet coverage was very limited at 67% with the rural communities suffering most considering that only half of the population has access to sanitary facilities. What could be the impact of these to health? An evaluation of the Water

Decade in 1992 by the DOH showed that using a public or neighbors water supply increased the risk of diarrheal disease by 25% compared with using a household source. Similarly, living in a household without a toilet increases risk by 42% compared to a household with a toilet. The use of inaccessible water supply increased the risk of skin disease by 74% compared with a household source while the lack of a toilet increased risk by 28%. For both diarrhea and skin disease, the worst combination is a household without either a toilet or with an accessible water supply since the risk is increased by 76% compared with households that have both.

Pesticide Use and Health

A major opportunity for pesticides to adversely affect human health when farmers come in contact with them. Another opportunity comes as a result of pollution of the environment where they are used. A study conducted in 1993 compared the prevalence of various health impairments for 57 exposed farmers and 39 controls. Results showed that pesticide users had higher prevalence of eye, skin, respiratory, heart, digestive, and blood related conditions than controls. The modal number of conditions among the users is four, whereas for the controls is one. Moreover, the risk of developing pesticide-related symptoms increases with frequency of pesticide use; doing two to three applications per season increases the risk for conditions in each of five body-organ systems. Since more than 8.5 million Filipinos are employed in agriculture, this would suggest that there are actually millions of pesticide poisoning episodes per year in the Philippines. In 1993, only 100 pesticide poisonings were reported to the National Poison Control Center, indicating that most pesticide poisonings are not recorded.

As reported in 1992 and 1994, surveys conducted in Nueva Ecija and Laguna showed that well water in irrigated areas not only yielded the pesticides that were in current use, but also pesticides which were not reported as being used as well. These observations raise a number of questions about the persistence of pesticides and the accuracy of reporting of pesticides currently in use and also about the knowledge of users of pesticides used.

Pollution and Food

It has been reported that fish has been concentrating heavy metals point and non-point sources, bacteria multiply under market conditions to reach unacceptable levels, and a wide range of pesticide residues persist. The public health effects of daily exposure to food contaminated with metals, microbes and pesticides are uncertain and has not been systematically studied in the Philippines. Several outbreaks of foodborne diseases have been reported by the DOH in 1989-1994, all of which are related to microbiological contamination of food.

Solid Waste and Health

Waste generation of Metro Manila in 1992 is estimated to range by 2,600-3,300 tons per day, 7% of which is burned, goes into waterways and seers or is left lying around. Close 71% is handled by the municipal collection system, and is subject to landfilling and scavenging. In the past, most of the public health attention was focused on the Smokey Mountain because of the presence of squatter communities and scavengers on other dumpsites in the country. The health profile of child scavengers in Smokey Mountain was worse than those of schoolchildren and child vendors as reported in 1991. One out of three child scavengers had bronchitis or ashtma. More than half of the children have pulmonary function below normal, and mean blood lead level was three time higher than the schoolchildren and 73% of child scavengers have blood lead levels above the 20μg per liter deciliter compared with 10% for school children and 33% for child vendors.

How much of the diseases prevailing in our country are attributable to environmental pollution which is major impact of development activities for the past 50 years or so? Epidemiological data are so limited and the multi-dimensional nature of health makes the quantification of health impact almost impossible. Due to these constraints, recent studies on the assessment of environment health status of the country utilized the burden of disease morbidity and mortality in terms of days of life lost due to premature death, due to conditions that cause death, losses due to chronic disability that do not cause death, and losses due to acute phases of disease.

The estimates are in two major groups: those for which there is direct evidence regarding the impact of pollution, and those for which only informed estimates are available. These estimates are expressed as "days of healthy life lost" (DHLL). The days lost relate to current losses due mostly to morbidity episodes and losses in future years due mainly to premature death arising from such morbidity. From this assessment study, conservative estimates have been made of the share of the burden of morbidity and premature mortality in 1990 attributable to pollution namely:

- 294 million DHLL for bronchitis due to dust
- 47 DHLL for heart disease due to dust
- 54 million DHLL for diarrhea due to poor water supply and no excreta disposal facility
- average 5 points of IQ loss among all children due to lead exposure
- 184,000 years of life lost due to premature mortality from bronchitis, diarrhea and heart disease.

The study also estimated that the present value of the loss of discounted future earnings due to premature death in 1990, of people participating in the work force, amounted to 2 to 4% of Gross Domestic Product.

Institutional and Policy Framework on Health, Environment and Development

The Rio declaration of 1992 proclaimed the first principle of Agenda 21: *"Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony of nature".*

The Philippine Medium-term Development Plan for 1993-1998 (MTPDP) explicitly focuses on sustainable development and people empowerment towards achieving the vision of Philippines 2000. This is evidenced by the incorporation of strategies on environmental protection and public health promotion in development plans and by clearly defining the duties of local communities. A UNDP/WHO study in 1993 on the integration of health and environment issues in development plans has identified certain institutional and policy deficiencies in operationalizing the plans.

At present, there are two institutional bodies legally created to oversee the environment and health concerns of development: the Philippine Council for Sustainable Development (PCSD) and the Interagency Committee on Environmental Health (IACEH). The PCSD oversees the fulfillment of the Philippine commitments to sustainable development principles made at the 1992 United Nations Conference on Environment and Development (UNCED), particularly those related to conservation and management of resources for development. The Council is chaired by NEDA and co-chaired by DENR. There are 14 other government member agencies and seven representatives from the non-governmental organizations.

The PCSD has facilitated the integration of sustainable development principles in the MTPDP through its subcommittees, by adopting a resolution that endorses local NGOs and people's organizations as lead entities in the implementation of development programmes, and by the inclusion of sustainable development activities in the 1994 Philippine Government budget. However, a major finding of the UNDP/WHO study identified in the execution of its mandate is that the PCSD will only function as effectively as the extent of its commitment and adherence of its members to sustainable development principles. The report further stated that the PCSD subcommittees are also faced with a certain dilemma that an agency is a member in three or more subcommittees resulting in poor representation in subcommittee meetings and in limited participatory consultations.

In 1995, President Ramos directed the PCSD to formulate the Philippine Agenda 21. The documented was drafted which embodied the consensus of sustainable development by the different sectors of the Philippine society. Regional cluster consultations and by NGOs, business, youth, health, labor, urban poor and other sectors were conducted to generate the needed information for the document. The document was finalized with the formulation of the Principles of Unity which represent the common ground among the key actors in the sustainable development process - government, business and civil society. The Philippine Agenda 21 "envisions a better quality of life for all Filipinos through the development of a just, moral, creative, spiritual, economically vibrant, caring, diverse yet cohesive society charac-

terized by appropriate productivity, participatory and democratic processes, and living in harmony and within the limits of the carrying capacity of nature and the integrity of creation."'

The implementation of the Philippine Agenda 21 is seen to be done by participatory action and shared responsibilities. Strategies of implementation identified are: 1) strengthening the role of major stakeholders, 2) information, education and communication plan for sustainable development, 3) financing means and strategies such as market-based instruments and command-and-control measures by the LGUs, the National Government, and the Economic Sectors, and 4) through the formulation of a local action agenda for sustainable development.

The Interagency Committee on Environmental Health (IACEH) was formed prior to the PCSD with 11 major government member agencies. The committee is chaired by the Department of Health and vice-chaired by the Department of Environment and Natural Resources. The IACEH focuses on environmental health issues and support the Department of Health mechanisms for streamlining national health policy implementation in response to the devolution of power to local government units. As reported in the UNDP/WHO study in 1993, the IACEH has never been involved in the development of the national MTPDP and its role had been limited to reactive responses to health issues of development projects. Similarly with the PCSD , it was faced then with administrative problems and an uncertain commitment of its member agencies. In the more recent years, the IACEH has taken a proactive stance through the development of action plans and research projects that address health issues related to environmental pollution. The IACEH also supported information drives of local government units in preventing communicable diseases such as dengue, typhoid, cholera and diarrhea.

The PSCD, IACEH and regional and local development councils complement the official mandate of government departments such as DENR and the DOH to integrate health and environment issues into the development and implementation of plans for sustainable development. The regional and local development councils are channels by which development projects maybe made acceptable to local populations through a process of consultation.

The policy instrument that gives legal force to the integration of environment and health concerns in development projects is the Environmental Impact Statement (EIS) system, which has been in operation for more than a decade. It remains a useful tool for pursuing environmental and development policies and enhancing sustainable use of natural resources. It also promotes consultations, dialogues and public hearings for evaluating the technical feasibility and social acceptability of projects, while facilitating understanding and formal agreement among project participants. In 1996, the DOH through the IACEH endorsed the inclusion of Health Impact Assessment in the existing EIS system implemented by the DENR.

Challenges of the Future

The challenges facing us today are undoubtedly daunting but in making rcasonable choices about safeguarding environmental health, the choices must blend and balance scientific facts, societal values and economic realities which are the building blocks of environmental decision. Howevcr, much of the information and understanding necded to resolve our environmental health problems is still incomplete. At the same time varied social, economic, political, scientific, technological and legal issues color our decision making processes must build strong bridges between scicntists and decision makers; improved mechanisms for using science to devise, implement, and evaluate environmental health policies and strengthen the scientific underpinnings that support environmental decisions.

Development and Environmental Policies

Devclopment policies designed to improve the economic conditions and living standards of communities often have unintended effects on health. While these effects can be positive, many policies created additional health risks for vulnerable groups, thereby compromising the welfare objectives of development policies. These policies can also create or exacerbate the diseases of poverty as well as health problems of industrialization. Our country is now confronted with this double health burden and places additional pressure on the limited national resources available for health services provision and public health intervention. A review of our macroeconomic policies as well as the agricultural, energy, industrial, and housing policies must be objectively done since these may positively or adversely impact on health.

Our environmental policies and programs need to be reviewed as well and assess if these have taken a holistic approach to preventing and reducing pollution, based on the best scientific methods with appropriate characterization and communication of the associated scientific uncertainties, that these have been made with the participation of stakeholders, and that these recognize shared responsibility among Government, businesses, and communities. The implementation of the Philippine Agenda 21 deserves objective monitoring and evaluation and to derive specific learnings in reforming existing environmental regulations.

Research in Science and Technology

The dearth of scientific information as to the health risks associated with industrialization and development activities and the health burden brought about by environmental pollution must be timely addressed to enable stakeholders at all levels make better decisions and for regulatory purposes. Epidemiological studies as to the health effects of certain hazards are urgently called for. Risk assessment studies which incorporate community values must be conducted to provide better solutions for risk management. Research in scientific methods and product technology that

appropriately addresses prevention, reduction and control of environmental pollution must be conducted.

Public Participation and Education

This should strengthen communication and involve more interest groups, professionals, politicians at the national and local levels, to heighten environmental and health awareness and create demand for helpful change. Mass and targeted communication with the assistance of NGOs are some helpful change. Mass and targeted communication with the assistance of NGOs are some helpful mechanisms in this process. The formal education system could be used further to involve students and academics and encourage self-help and behavioral change.

Human Resource Development and Capacity Building

Strengthening the capabilities of implementing agencies in terms of staff training and adequate facilities to implement and monitor their programs are urgentl, needed. Health professionals need to be trained to enhance the identification of environmental and occupational hazards as causes of disease and to provide feedback to relevant agencies. A network of trained health workers at local level can form a basis for an improved system of problem identification and monitoring. To this end, it will also be necessary to create analytical laboratory capability and capacity.

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