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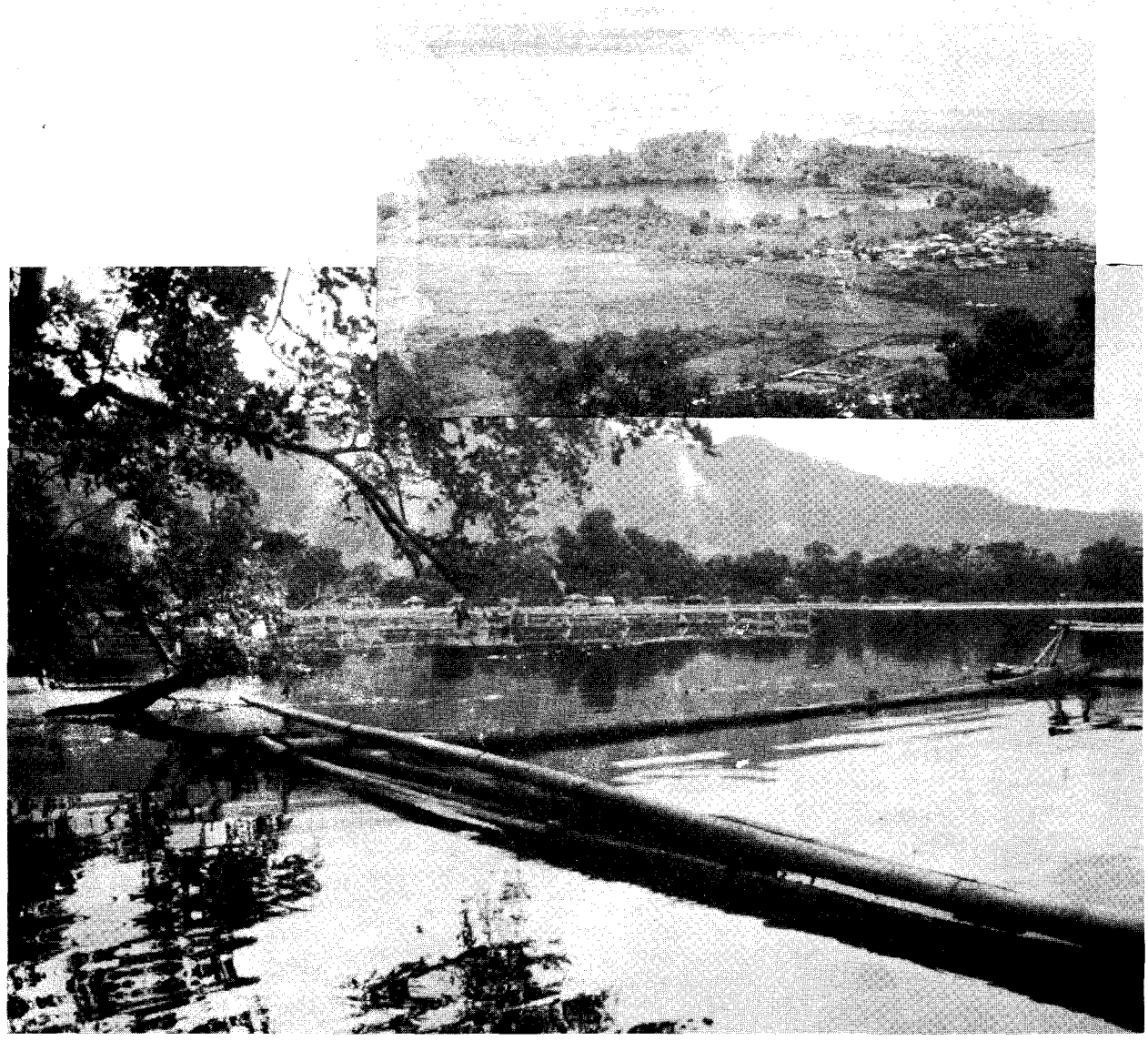

ECOLOGY

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THE COVER

Alligator Lake, Los Baños, Laguna

The picturesque scenery offered by this lake is an ideal backdrop for a variety of recreational and livelihood activities. However, this ideal setting may soon be altered by human incursions that threaten to upset its fragile ecosystem, such as quarrying and deforestation activities continuously going on in its periphery (Cover photos by Honorio T. Palarca.)

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NUCLEAR ENERGY AND THIRD WORLD REALITIES: THE BATAAN NUCLEAR PLANT AS A CASE STUDY

DOLORES A. ENDRIGA

INTRODUCTION

Because of the recognition that fossil fuel, which is a basic source of energy, is non-renewable and, without proper controls in its use, would be depleted by the ever-increasing need for energy by members of society, the search for alternatives has intensified. One alternative which has long been recognized to hold promise is nuclear energy. For a while, in addition to the nations which were already utilizing it, other nations, including third world countries like the Philippines, were giving serious consideration to its use. The accident at the nuclear plant at Three-Mile Island, however, started a series of discussions, examinations and rethinking about the desirability or acceptability of nuclear energy. With the more recent incident at Chernobyl, the issue became even more involved. In the Philippines, where a nuclear plant has already been constructed, a continuing debate rages as to whether the plant should be allowed to operate or not. Such protracted debate has proved to be expensive because of the interest in foreign loans amounting to $1.5M that the Philippine Government has to pay for each day that the issue is not settled.

This paper is an attempt to assess the desirability of the use of nuclear plants to generate electricity in third world countries, taking the Bataan Nuclear Plant (BNP) as a case in point. In so doing, it also hopes to clarify and place in perspective all the issues raised with respect to the Bataan Nuclear Plant.

The BNP Within the Framework of Policy

The ten-year Energy Program (1979-1988) provides the policy framework for the BNP. The framework[1] recognizes the interrelationships of energy, economic development, and the environment: energy plays a very significant role in economic development, but various sources of energy which are part of the environment and potentially available in different amounts and at varying costs, could have harmful effects on the environment itself. In the effort to supply energy for economic development, care must therefore be taken to maintain environmental quality. In recognition of this, the policy had for its objectives the following:[2]

a) Supply Objective: To provide timely, adequate and secure energy supplies at publicly affordable price levels, in such forms and at such locations, as should be most useful to the markets;
b) Usage Objective: To minimize inefficient and wasteful consumption of energy fuels within the context of given socio-cultural institutions and constraints; and
c) Environmental Objective: To ensure that both objectives above are met in an environmentally acceptable fashion.

In order to realize these objectives, strategies were formulated. Of note are the following:

a) The diversification of the origins of petroleum supply for increased reliability and security: Recalling that in 1973 when the oil crisis erupted, the country was

[1]This framework is discussed at length in Gerald Garvey, *Energy, Ecology, Economy* (New York: W.W. Norton & Co., 1972) Chapter 3.

[2]Republic of the Philippines Ministry of Energy, *The Ten Year Energy Program* (1979-1988), p. 10.

caught in a 95% dependence on petroleum for commercial energy requirements, this strategy sought to intensify domestic oil and gas explorations to place the source within the country's boundaries.

b) The accelerated diversification from depletables to alternative sources of energy with emphasis on indigenously abundant and regenerative forms. Conceding that the supply of cheap oil was likely to tighten because of declining reserves and competing uses, and deriving optimism from the assessment of energy potentials that the country offered in terms of hydro, geothermal and diffused energy from the sun, the Energy Program sought to pursue the development of substitute energy resources.

c) The use of fiscal measures for reflecting the real economic and social costs of energy. This strategy was prompted by the externalities which are usually imposed on the community, not only in terms of direct pollution, but also in terms of physical or spatial congestion.

Based on the above objectives, targets were set, aimed primarily at decreasing dependence on oil, as shown in Table 1 as follows:

Table 1—NATIONAL ENERGY SOURCE MIX (IN MILLION BARRELS-OF-OIL EQUIVALENT, MMB)

	1979		*1983*		*1988*	
	Volume	*%*	*Volume*	*%*	*Volume*	*%*
Power						
Hydro	5.558	5.96	11.285	8.75	22.317	11.62
Geothermal	0.975	1.05	5.778	4.48	9.723	5.06
Nuclear					6.518	3.39
Coal	0.257	0.28	3.053	2.37	13.535	7.05
Oil	21.195	22.74	26.864	20.83	23.659	12.31
Non-conventional			0.015	0.01	0.170	0.09
Subtotal	27.985	30.03	46.995	36.44	75.922	39.52
Nonpower						
Oil	63.669	68.32	75.488	58.53	107.134	55.76
Coal	1.538	1.65	5.569	4.32	6.340	3.30
Nonconventional	0.006		0.913	0.71	2.721	1.42
Subtotal	65.213	69.97	81.970	63.56	116.195	60.48
Total Commercial Energy	93.198	100.00	128.965	100.00	192.117	100.00
Oil Share (%)		91.06		79.36		68.07
Per Capita Consumption	2.0bbls		2.5 bbls		3.4bbls	
Non-commercial*	9.365		10.541		12.219	
Non-energy Consumption**	3.235		8.278		13.577	
Memo Total***	105.798		147.784		217.913	

Source: Ministry of Energy. Ten Year Energy Program (1979-1988), p. 11

*Includes agro-industrial wastes and charcoal only.

**Non-energy consumption refer to petroleum only.

***Memo total is the sum of total commercial energy, non-commercial energy and non-energy consumption.

The table shows that the share of oil in the total energy supply was projected to drop to 91% by the end of 1979, from an import-dependent level of 95% experienced until 1978. Conversely, increased production and utilization of other energy sources were also targeted to increase to 30% of total commercial energy by 1988. Of these non-oil sources, hydro-electric energy was to contribute the largest share, 12% of total energy supply; coal, 10%, and geothermal, 5%. As the table indicates, nuclear energy was targeted to provide only 3% of total energy required by 1988. In the projected efforts to decrease dependence on oil and increase the utilization of alternative energy sources, the program gave serious consideration to their effects on the environment. The section on *Environmental Policy Aspects* warned that:

> *While an energy crash program is embarked on with a keen sense of immediacy, caution must be taken to guard against blind zeal and unregulated excesses in implementation that could lead to serious disturbances in the ecology. . .*
>
> *For instance, a hydro project has to settle with the problems of tectonic or earthquake anomalies and potential victims are usually those who live some distance away from the infrastructure site. The utilization of fossil fuels of course are continually restrained by problems of carbon monoxide discharge, particulates, sulfur content and other externalities. Fuel mineral exploitation has generated social disapproval in terms not only of working conditions and mining hazards for miners, but of sight pollution from abandoned open pits. Geothermal exploitation has suffered from problems of ground subsidence in certain countries. Nuclear options also have to grapple with the difficult issues of spent fuel storage, weapons proliferation and the risks of fatal explosives to radioactivity. . .* (underscoring supplied)[3]

[3] *Ibid,* p. 14.

It is within this policy framework that the desirability of nuclear energy will be assessed.

HISTORY

The history of nuclear energy in the Philippines actually dates back to July 1955, when the government entered into an agreement with the United States government for cooperation and exchange of information in the civil uses of atomic energy. To implement the agreement, then President Magsaysay established an inter-agency committee on atomic energy. Then, in 1958, the government established the Philippine Atomic Energy Commission (PAEC), charged with the responsibility of the promotion of peaceful research, development and use of atomic energy, and notified the International Atomic Energy Agency (IAEA) of the creation of such institution. Later in the same year, the then National Science Development Board (NSDB) created an Interagency Committee – composed of representatives from the National Economic Council (NEC), PAEC, National Power Corporation (NPC), Public Service Commission, MERALCO, Philippine Chamber of Industry, Bureau of Mines, Electric Administration, Philippine Investments Administration (PIA) and the Philippine Electric Plant Owner's Association (PEPOA) – to advice PAEC on nuclear power policy. In 1960, the Philippine government requested the IAEA to undertake a survey of the prospects for nuclear power in the Philippines, particularly the "economic and technical aspects" of a nuclear power plant. The IAEA sent a mission to the Philippines which conducted the study jointly with the Interagency Committee. The study was finished in 1961, with the conclusion that "there appears to be ample justifications for giving serious thought to the installation of a nuclear power plant in the Luzon Grid".[4]

As a result, the Philippine government, through the NEC and NSDB, requested assist-

[4] Information on the background as well as the details of the study itself were taken from IAEA, *Pre-Investment Study on Power.* General Report, 1966.

ance from the UN Special Fund for a technical and economic feasibility study of a nuclear power plant in Luzon. The request was granted in 1963 and the study was conducted in 1964 jointly by IAEA and several government agencies. Among those which collaborated in this study, special mention was made of the Bureau of Mines, NPC, MERALCO, the Nuclear Power Study Committee and its member organizations (PSC, PEPOA, PCI). PAEC acted as coordinating agency within the country while the former Director of System Planning of the Public Service Electricity and Gas Co., Newark, N.J. acted as Project Manager for Phase I on behalf of NEA.

The main purpose of the study was to develop an optimum expansion program for the Luzon Grid for the period 1965-75. The project was divided into two phases: Phase A, which dealt with the estimation of projected power demand for Luzon for the period 1965-75 and an evaluation of indigenous energy sources to meet this demand; and Phase B, which envisaged two possible cases: if the evaluation of indigenous energy resources indicated that these were sufficient to meet projected demand, Case II would be followed, and an optimum program would be developed on the basis of conventional plants only; if resource evaluation proved that these were inadequate to meet demand and the country would have to depend on imported fuel, Case I would be followed and consideration would be given to nuclear plants in the development of an optimum expansion program.

Phase A was conducted from January 1964 to March 1965. The contract for conducting a Power Market Survey was awarded to Gilbert Associates, Inc. of Reading, Pennsylvania.

Work on Phase B started in March 1965 and the contract for making detailed cost analysis of conventional and nuclear plants for Luzon was awarded to Burns and Roe, Inc. of New York. A special contract was given to Electricite' de France for making system planning studies for the Luzon Grid. The Management and Investment Development Association, Inc. of Manila. H. Jones Zinder International of Seattle, and the USAID were also involved.

The whole study was finished in 1966 with the following findings:

Phase A

a) The demand for electric power in the Luzon Grid was likely to increase at an average rate of 12.7% per annum during 1965-75. The Grid would require an installed capacity of about 2700 MW by 1975 and local energy resources would then be inadequate and able to meet only a small part of the requirements.

b) Out of the total 2000 MW needed between December 1965 and December 1975, only 318 MW (218 MW Angat and 100 MW Tabu, both hydro) could be economically supplied by indigenous resources. The remaining capacity of approximately 1700 MW in thermal plants would have to be based on importation of fuel, whether fossil or nuclear.

c) Commitments and advance planning at the end of 1965 provided for increasing the oil-fired plant capacity by 690 MW (725 MW new minus 35 MW retired) by 1970. This would leave about 1000 MW of thermal capacity required between 1971-75 for which a solution would have to be found.

Phase B

d) The integrated Luzon Grid would be able to absorb relatively large thermal plants (300-400 MW) during the 1971-75 period, at a high capacity factor and with satisfactory service reliability.

e) Cost estimates and economic analysis indicated that nuclear plants in the 300-MW range would be economical for the Luzon Grid in the early 1970s.

f) The recommended programme of expanding the Grid involved the installation of three nuclear plants as shown in Table 2.

g) The Luzon Grid expansion would require annual expenditures of about $70 million

(roughly 30% in pesos and 70% in dollars) during 1965-75 and $80-85 million equivalent annually during 1975-80.

h) The estimated total cumulative capital expenditure incurred for three nuclear plants (two of 300 MW each and one of 400 MW) between 1967-73 would be about $182.4 versus $147 million for an alternative program of four oil-fired plants of 250 MW each.

i) The annual savings to be generated by a 300 MW plant as compared to a conventional plant using fuel oil at current prices would range from $3.7 million; for a 400 MW plant the range would be $4.9 to $6.2 million.

j) It was estimated that the extra initial investment required for the proposed nuclear plants as compared to conventional plants would be fully recovered by 1978-79 as a result of annual fuel-cost savings in nuclear plants. Afterwards the nuclear plants could generate net operating savings of around $14 million per year.

k) Nuclear technology would require the training of staff as shown in Table 3.

Table 2—RECOMMENDED PROGRAM UNDER MOST LIKELY ECONOMIC CONDITIONS

	First Plant	*Second Plant*	*Third Plant*
Size of unit	300-MW Nuclear	300-MW Nuclear	400-MW Nuclear
Date of Operation	Sept. 1971	Sept. 1972	Oct. 1973
Can supply thermal load peak up to	Sept. 1972	Oct. 1973	Sept. 1975
Total installed capacity of system	1900 MW	2200 MW	2600 MW
System maximum demand	1540 MW	1775 MW	2170 MW
Total installed capacity reserve	360 MW	400 MW	490 MW

Table 3—TRAINING FELLOWSHIPS

Year	*Duration Months*	*Number*	*Main Field of Study*	*Country*
1963	3 each	2	Load Survey	USA
1964	12	1	Reactor Technology	USA
	12	1	Health Safety and Environmental Protection	UK
	12	1	Power Reactor Operation	USA
	12	1	Power Reactor Design	UK
	12	1	Reactor Technology	UK
1965	4 each	4	Power System Planning	France
1966	10	1	Nuclear Engineering	USA
	12	1	Nuclear Engineering	USA
	12	1	Nuclear Engineering	
	12	1	Economics of Nuclear Power	
	12	1	Reactor Technology	
	12	1	Nuclear Engineering	

Recommendations Made

The details of the report showed that the expansion would involve capital expenditures totalling P449,730,000 until 1972. Total financial requirements amounted to P748,880,000 after addition of debt service needs. These would be met by internally generated funds totalling P369,290,000 from 1966 to 1972 and from external sources including loans.

A problem was presented by the statutory ceiling on foreign currency borrowings. In addition, debt capital was also expected to exceed equity capital by 1967. To solve the problem, the report recommended fiscal reforms and legislative action. Among the recommendations were for the government to take steps to facilitate introduction of nuclear plants, such as:

a. adopting suitable atomic energy legislation at an early date.
b. deciding not to tax nuclear fuel for a period of grace,
c. limiting the liability of nuclear power plant operators with respect to indemnity, and
d. establishing clear-cut procedures for licensing and regulation of nuclear facilities.

Following the study, the Atomic Regulatory and Liability Act of 1968 was enacted, and in the same year the Philippine government entered into a new international agreement with the US government which included the construction of two nuclear power plants and the long term supply of enriched uranium.

In 1973, a Feasibility Study conducted by IAEA was completed. Instead of 300 MW units, the specifications now called for 600 MW because the plant manufacturers found it to be the minimum economical level for them. All in all, the feasibility study was favorable and the decision to install a nuclear reactor was made.

In February 1976, with the completion of the EBASCO study favoring Napot Point as the site, the NPC entered into a contract with Westinghouse Electric Corporation for the purchase and construction of a Nuclear Power Plant and the fabrication of the initial fuel for the plant. The US Ex-Im Bank authorized $644 M in loans and loan guarantee in support of the plant. Construction work began.

PRESSURE GROUPS

The BNP was not without opposition. During the mid 1970s, the dangers posed by nuclear plants had already become a major international concern and organized groups were waging campaigns against further construction of nuclear plants. In West Germany, France and Italy, anti-nuclear demonstrations were continually being held. In the U.S. some 2,500 scientists in 1975 gave then U.S. President Ford a declaration urging a drastic reduction in new nuclear plant construction and a halt to the export of nuclear plants to other countries. The following year the Federation of American scientists published results of their study showing that 62% of respondents chose to proclaim a moratorium and to phase out the plants. In the same year, the State of California enacted what amounted to a moratorium on new reactors. It was during the same year that Westinghouse applied to the U.S. Nuclear Regulatory Commission (U.S. NRC) for license to export nuclear steam to the Philippines.

In the Philippines, organized opposition[5] to the nuclear plant started as soon as construction began. The people of Morong banded themselves for organized action. They held meetings, conducted study groups, and sought not only to gather more information, but also, to inform others about various aspects related to the nuclear plant. In 1978, they sent an appeal[6] to

[5]"Appeal for Support" by the Residents of Morong and Other Towns of Bataan, n.d., "A Statement of Concern" by the Kilusan ng Siyentipikong Pilipino, n.d.

[6]Kilusan ng mga Nagmamalasakit na Mamamayan ng Bataan, "Appeal to the President", June 19, 1978.

the President for the suspension of the construction of the nuclear plant. The Association of Major Religious Superiors of Men and Women subsequently also sent a letter[7] in support of the appeal of the people of Bataan. The Kilusan ng mga Siyentipikong Pilipino published information materials[8] explaining the mechanics behind the nuclear plant, possible dangers arising from its operation, and the expected consequences. Existing anti-bases and human rights groups later joined the cause of the BNP oppositionists. Letters were written, statements of concern were issued, public appeals were made and a general campaign for the suspension of the construction was conducted. In 1981, a grassroots coalition of individuals and over forty concerned groups formally organized themselves into the Nuclear-Free Philippines Coalition (NFPC).

The BNP oppositionists in the Philippines quickly gained support from the USA. In 1978, Daniel Ford, Executive Director of the Union of Concerned Scientists, after his mission to investigate nuclear power projects in Asia, sent his preliminary findings to then President Marcos. In general, the finding was that the plant was unsafe.

Meanwhile, hearings were held by the U.S. NRC in connection with the application of Westinghouse to export nuclear materials. Among those who registered their opposition was Clarence Long, Chairman of the House Appropriations Subcommittee on Foreign Operations. Long challenged not only the granting of the license but also the granting of the loan by the Ex-Im Bank. He maintained that the twin questions of safety and conflict of interest were more than enough to disapprove the loan.[9] Aside from Long, a group that called itself the Friends of the Filipino People also filed a motion to intervene and submitted a brief to the U.S. NRC outlining its objections to the granting of the license.

The Three-Mile Island Nuclear Plant accident in March 1979 apparently served to strengthen the cause of the oppositionists because in June of the same year, President Marcos issued Executive Order 539 creating a Presidential Commission to conduct an inquiry on the safety of the BNP.

In November, the Report of the Commission[10] came out. It ruled that: a) the BNP as designed was not safe; b) the design needed fundamental changes; c) safety devices were needed; d) the crucial problem of nuclear waste disposal had not been solved; and e) there was reasonable assurance that the plant could withstand the effects of earthquakes, volcanic eruptions and tsunamis that could occur at the plant site.

Soon after the ruling came out, oppositionists then sent a letter to the President, with more than 600 signatories, asking him to stop the construction of the BNP. In the same month, LOI 959 was issued, suspending construction of the BNP and directing the Ministries of Justice, Finance and Energy and the Solicitor General to take immediate and appropriate steps, including termination or renegotiation of the Plant contract to safeguard the interest of the Government.

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[7] Letter of the Association of Major Religious Superiors of Men and Women to the President, June 30, 1978.

[8] Kilusan ng mga Siyentipikong Pilipino, "Primer on Nuclear Energy and the Philippine Nuclear Power Plant", n.d.

[9] "Nuclear Plant Loan Challenged", *Washington Post*, February 8, 1978.

[10] "Report of the Commission in the Inquiry on the Safety to the Public of the Bataan Nuclear Plant", Manila, November 13, 1979.

LOCATION AND LAYOUT[11]

The BNP is located at Napot Point in the southern portion of the Municipality of Morong in Bataan. The site was decided upon on the basis of elimination of other possible sites through studies. The "Pre-Investment Study on Power in Luzon" (1965) enumerated possible sites for the Plant. These possible sites were narrowed down with the "Feasibility Study for Nuclear Power Plant in Luzon – Survey of Possible Sites," (1972). The IAEA siting mission further narrowed the choice to two: San Juan, Batangas and Morong, Bataan. With the subsequent feasibility study conducted by NPC with the expert services of Ebasco Overseas, Ltd. Morong finally became the site.

Under Philippine set-up, the NPC is responsible for plant construction and eventual operation but the PAEC exercises licensing and regulatory authority over the plant. As per RA 5207, the PAEC shall grant permits for the construction and later operation of the nuclear plant if it finds that "on the basis of the technical information and data so far made available to it, there is reasonable assurance that the proposed installation can be constructed and operated at the proposed location without undue risk to the health and safety of the public". [11 a]

Accordingly, the NPC applied for site approval, submitting the Preliminary Site Investigation Report (PSIR) for Napot Point, the Preliminary Safety Analysis Report (PSAR), and the Environmental Report (ER). The documents were reviewed by PAEC and a pool of Consultants from among local scientists and technologists. IAEA assistance was also requested for expert services in the review of the reports and nuclear safety assessment of the plant design and construction. An expert was assigned to PAEC for this purpose.

The IAEA and the US Nuclear Regulatory Commission (NRC) were also furnished copies of the documents to provide assistance to PAEC in the review of the plant safety. In addition, PAEC made its own evaluation of the suitability and adequacy of the area as a nuclear power plant site.

On December 20, 1976 PAEC issued a Provisional Permit to allow NPC to perform all necessary site preparation. In June 1977, NPC applied for construction permit and submitted documents. PAEC then published hearing notices and conducted a series of technical meetings, attended by representatives of NPC, WIPCO, and Ebasco for the applicant and the PAEC regulatory staff, IAEA experts and local consultants on the side of the regulatory body.

On October 3, 1976, the PAEC issued a Limited Work Authorization (LWA) to allow NPC to construct a number of buildings in the complex, pending resolution of some safety issues. With the resolution of the safety issues, a second LWA was issued on October 3, 1977 for the erection of other buildings and structures of the BNP not covered in the first authorization.

The documents, studies, and technical discussions centered on the plant design in relation to the natural terrain and geological characteristics of the site, population distribution, and the plant's effect on the environment. Prime consideration was given to safety. The US NRC Regulatory Guides were used to determine the necessary safety measures.

As designed,[12] the BNP was described as defense in depth, where a margin of safety was given for both normal operations and in cases of accidents. There were three levels of the defense in depth: the first level addressed prevention of accidents through the design of the plant so that the plant would operate reliably;

[11] Much of the factual information in this section is taken from Librado D. Ibe, "Pubic Safety and PAEC Licensing of PNPP-1", ATOMEDIA, Vol. III, 1977, pp. 7-15.

[11a] *Ibid*

[12] Information on safety is taken from NPC-EBASCO, *Feasibility Study for Nuclear Power Plant in Luzon*, January 1972.

in case of failure or operating error, a second level of protection by means of devices and systems was provided; the third level of safety incorporated the occurrence of extremely unlikely circumstances in the design.

The BNP was also designed with multiple barriers to prevent the release of radioactive materials to the environment. Each barrier formed a successive back-up system to guard against any release of radioactive fission products. Beyond these barriers a site boundary distance was also observed as further protection.

The BNP encompasses a total of 357 has. of land in Morong and Bagac, which are both predominantly agricultural. Under its charter, the NPC has the authority to acquire and use surrounding land areas as necessary for the purpose of plant construction and operation. The NPC has defined an exclusion area immediately surrounding the plant itself, within which all activities are under the control of the utility or government agency. Residences are not permitted within this area.

Since Napot Point is located at the coast, the South China Sea formed part of the exclusion area. Bouys which indicate the exclusion area boundary as it traverses the sea were put in place, and will remain in place throughout the life of the plant. The exclusion area will not be traversed by any public waterways, railroad or vehicular access.

ISSUES AGAINST THE BNP

The issues[13] raised against the BNP may be classified under two headings: those that are applicable to BNP in particular and those that are applicable to Third World countries in general. These are as follows:

A. The Issues Particular to BNP

1. People were not properly/adequately informed about the project. The oppositionists cited cases to illustrate the lack of adequate information about the BNP. For instance, it was reported[14] that around February 1976 a census was conducted in Morong and it was only then that people were informed that the nuclear plant would be put up in their town. Activities for the preparation of the plant site had already started then. Another illustration[15] involved a group of parishioners who wanted to conduct an information dissemination campaign on the benefits and risks of nuclear power. The campaign, however, could not be conducted because local authorities refused to issue a permit for a large barrio meeting. The group, thus, resorted to whispering campaigns and the handing out of leaflets. Oppositionists also claimed that although the NPC held meetings to inform people of the project, the information was at best partial. They were told, for instance, that the plant was "absolutely safe", and that the government would not build

[13] Summarized from the following sources: Urmeneta, CARDP, "Power For Whom? ", Development Issues Series, No. 2, ORC, ISWCD, U.P., Q.C.; Kilusan ng Siyentipikong Pilipino, "Position Paper on the Nuclear Power Plant; " KSP, "Primer on Nuclear Energy and the Philippine Nuclear Power Plant, n.d. and Sr. Ma. Aida Velasquez, OSB. "How Safe is the Bataan Power Plant? " (Philippine Federation of Environmental Concern, n.d.).

[14] *Bulletin Today,* August 13, 1976, p. 9.

[15] *Bulletin Today,* August 31, 1977, p. 8.

it in Morong if it were dangerous. People were also discouraged from asking questions about its danger.

2. There was very limited access to information. Again, there were reports that a member of the Morong Study group, had gone to the NPC office in Manila on August 17, 1976 but could not get much information, particularly on the safety of the plant; and that PAEC could not give a definite answer when asked in September 1976 about the extent of the exclusion area and if there would be relocation of residents.

3. Families were dislocated. Oppositionists reported that a number of farmers and their families lost the land they were tilling to the plant site. The same fate befell some families in a nearby fishing village who were driven out of their residences because of the proximity of their place to the nuclear power plant site. The widening of the road, likewise, encroached on a number of ricefields and residential lots. The losses to the farmers further included cattle and grazing land.

4. Studies conducted were inadequate. The Ebasco siting report, on which the decision to locate the plant was based, was criticized both in the Philippines and abroad. Dr. John Kellehu, a seismology consultant hired by the U.S. NRC, in a classified 1979 review, identified inadequacies and fundamental shortcomings in the report. Andres Hizon, head of the National Society of Seismologists and Earthquake Engineers of the Philippines, also found the work "inaccurate, unreliable and biased". David Leeds, a consulting engineering seismologist, documented "flagrant examples of the understatement of Bataan seismicity".

5. The location is not suitable for a Nuclear Plant. The Ebasco Report declared that no tremors could occur at the site that could endanger the nuclear plant but others disagreed because of the following reasons:

   a) The Philippines is situated along the Circum Pacific Ring of Fire where 80% of all earthquakes in the country originate. Bataan itself had been categorized by the former Manila Weather Bureau as having the highest frequency of earthquakes in the country;
   b) The Philippines is surrounded by a system of deep ocean trenches where tectonic plates grind together. Frequent earthquakes also result from this;
   c) The Philippines is criscrossed by faults and the BNP site itself is surrounded by such faults. According to Leeds, the Ebasco report had dismissed a 400-km. fault only 25 kms. east of the site and capable of a severe magnitude 8 earthquake; and
   d) The BNP is located at the southwestern flank of Natib volcano. Within 142 kms. of the plant site are three other volcanoes: Banahaw, San Cristobal and Taal.

In 1978, the International Atomic Energy Agency (IAEA) submitted a report to the Marcos government stating that the BNP site was "unique to the nuclear industry in so far as the risk associated with nearby volcanoes" was concerned, and that "the eruption of Mt. Natib (was) a credible event" during the lifetime of the nuclear reactor. Others were equally alarmed by the threat of volcanic eruption. Christopher Newhall, a PhD Candidate at Dartmounth College specializing in Philippine Volcanology, and Commissioner Gregorio Andal of the Philippine Commission on Volcanology, both asserted that ". . .(e)ruption from any of the volcanic complexes is possible not only from the presently observed craters and vents, but virtually from any point in the (Bataan) peninsula."

By 1979, even the Philippine Atomic Energy Commission became finally convinced of the threat of volcanic eruption and recommended the installation of a volcano

surveillance system to warn of an impending eruption and a special procedure to remove the nuclear fuel. However, in a confidential memorandum, the U.S. Nuclear Regulatory Commission (NPC) stated in 1979 that "It should be noted that the prediction of volcanic eruptions is still a somewhat uncertain discipline and not practiced on a wide-scale basis." The eruption could also cause large rock fragments to rain down on the BNP, destroy the plant's heavy machinery and cause the release of nuclear radiation.

6. The plant design is faulty. In February 1978, Daniel Ford, Executive Director of Concerned Scientists, sent his preliminary findings to President Marcos stating among other things, that "It is our considered opinion that the Bataan Plant now under construction is plagued by poor design or hasty engineering. We believe that there may be as many as 200 unresolved technical problems that would prevent the plant from operating satisfactorily".

   This was confirmed in 1979 by the Commission on Inquiry created by President Marcos which determined that the BNP design was unsafe and lacked, among other things, an adequate emergency core cooling system — the most critical emergency system in a nuclear plant.

7. The BNP will not benefit the poor. Proponents of nuclear power argued that the benefits will ultimately outweigh the social cost and the risk of danger. Oppositionists, on the other hand, posed the question of whether the BNP was really intended to benefit the majority of the Filipino people. They cited statistics showing that (a) 84% of Filipinos lived on or below the poverty line; (b) 78% of preschool children suffered from malnutrition; (c) From 1971 to 1975, the richest 5% of families increased their share of the national wealth from 24% to 32% while the poorest 40% of families decreased their share from 11.7% to 11.2%; and (d) in the rural areas, 76% of families fell below the United Nations Poverty Threshold; only one out of 15 rural families had electricity and only 30% had drinkable water.

They said that these needy people would not reap the benefits of the BNP and that the plant would be providing power not for rural electrification, but primarily for three major consumers in the area: the Bataan Export Processing Zone, and the two huge U.S. military bases in Clark and in Subic.

B. Issues Applicable to Third World Countries in General

1. The availability and cost of uranium fuel are uncertain. Oppositionists claimed that uranium reserves expected to be mined in the country were insufficient to support the operation over the technical lifetime of the nuclear power plant.

   The BNP would require 400 metric tons of uranium (U308) initially at the start of operation. From then on it would require 150 tons of uranium (U306) annually. The reserves at Larap, Camarines Norte would, therefore, not be enough even to supply the fuel requirement of the nuclear power plant for the first year. A foreign supply of uranium fuel and enrichment services must therefore be assured. For this purpose, the Philippines had already signed an agreement with Australia for the supply of unprocessed uranium needed for the BNP.

   Oppositionists claimed, however, that the availability of nuclear fuel is being controlled by the uranium producer countries and the international market prices for the material are rapidly rising. In the late 1960s, General Electric projected the future uranium prices over the long term to be around $4 to $4.50 a pound, but by early 1976, uranium for immediate delivery had reached $37 a pound.

As a consequence, no reactor vendor now seems willing to supply the lifetime fuel re-

quirements of the reactor it sells. It is expected that procurement of uranium from abroad in the proper quantity and at a reasonable price will become extremely difficult. A shift to nuclear energy will therefore not change the dependence on other countries for fuel.

2. The BNP is expensive. Nuclear energy is derived principally from the fissioning of uranium. Fissioning a pound of U-235 (less than 1% of whole uranium) produces energy equivalent to a level produced by 1.4 thousand tons of coal or six thousand barrels of oil. Therein lies one of the more significant arguments in favor of nuclear energy: it is cheap. Oppositionists, however, think otherwise and point to the following to support their position:

   a) The original cost of the plant was estimated at $1.1 Billion. This included transmission line costs, escalation, and interest provisions during construction. When the project was later suspended and additional safety features were required by the Puno Commission, the cost estimates were increased to $1.9 Billion. Because of further delays in completing the project, its costs were estimated at $2.3 Billion.

      Uranium, which is used to fuel the plant, could either be mined in the Philippines or imported from other countires. Either way would be very expensive. In addition, the financial cost involved in running a nuclear power plant safely and in the management of radioactive wastes and their safe disposal will both entail a significant amount and will involve foreign exchange.

   b) Since the NPC has no experience in the operation of a nuclear power plant, it plans to hire at least 19 foreign experts during the first two years of operation. The money involved, which will all be in dollars, will be significant. Already, NPC had asked for, and had been granted, an additional loan of $22 million, part of which is meant to pay for these foreign consultants.

   c) The cost of mothballing or decommissioning the BNP after its useful lifespan may be as equally prohibitive as the cost of building it. Though mothballing is the initially cheaper alternative, the perpetual care and security required makes it unfeasible.

3. The BNP poses environmental hazards.

   a) Heat. At full power, the BNP will take in some 881 million gallons of ocean water per day, and will discharge the water at a temperature hotter than at the intake. A difference of only 2 degrees can already change the ecology of the surrounding areas. The fishing grounds therefore stand to be affected, notably Agbalayong, a barrio 4 kms. away from the site, which is the spawning ground of sabalo and the supplier of bangus fingerlings to the whole of Bataan.

   b) Radioactive discharge. Radioactivity is released even during the course of normal operation of a nuclear power plant, although this is meant to be carefully monitored so that the release is below the allowable limit. When accidents occur, leaks can release significant amounts of radioactivity and significantly increases the risks of cancer, gene-mutation and stillbirths.

      Even if kept within specified limits the discharge can still affect aquatic life. Studies of the Columbia River on which the Hanford nuclear facilities in Washington State are situated were cited, which revealed that although radioactivity in the river was insignificant, the radioactivity in the river plankton was 2,000 times greater and the radioactivity in fish feeding on the plankton was 15,000 times greater. As

early as 1958, oysters at the mouth of the Columbia River were found to have over 300 times the radioactivity of the water. This phenomenon occurs due to the process of bio-accumulation whereby radioactive elements are re-concentrated in the aquatic food chain from plankton to fish, oysters, crabs, mussels, etc., and eventually to humans, as was found in studies of people living along the Columbia River. The population surrounding BNP collect oysters for local consumption and supply Bataan Province with fish, some of which are marketed in Manila. In view of the above, the long-term effects resulting from daily emissions of low-level radioactivity and its subsequent bio- accumulation by edible marine species remain a big question.

c) Plutonium. A common radioactive chemical in spent reactor fuel is Plutonium 239 which takes as long as 8,100 years to decay to half its original radioactivity. This substance is highly toxic when inhaled even in an infinitesimal amount, can almost certainly cause cancer. Plutonium is also the main ingredient in A-bombs, the technology of which is not difficult to acquire. Easy access to plutonium because of the BNP is therefore a grave political concern. The BNP will produce, on the average, 20 tons of spent fuel annually.

d) Radioactive waste disposal and safety. The Philippines will have to send the spent fuel for reprocessing to the US or Japan and take care of the radioactive waste that will be separated. Radioactive wastes remain deadly for 250,000 years, during which time they must be kept isolated from the atmosphere and safe from accidents, natural disasters, and sabotage. According to the 1976 Fox Report of Australia, at present there is no generally accepted means by which high-level waste can be permanently isolated from the environment.

4. The safety of BNP is questionable. Westinghouse has claimed that "nuclear power plants have a perfect safety record and that no member of the public has ever been injured as a result of the operation of a commercial nuclear reactor during the last 20 years that nuclear reactors have been generating electricity in the U.S. and elsewhere." PAEC has also cited the Rasmussen Report, a study sponsored by the US Atomic Energy Commission to estimate public risks in potential nuclear plant accidents, which estimated that the possibility of a major accident that would cause one hundred or more fatalities is only one chance in a million.

Those who oppose the plant, however, aver that accidents can and do happen notwithstanding all safety precautions. They also pointed out that 2 out of 17 Apolo missions failed due to human error—an example of the occurrence of exceedingly improbable events resulting from the failure of a supposedly fail-safe technology.

UNSUITABILITY OF NUCLEAR ENERGY FOR THIRD WORLD COUNTRIES

The major issues raised against the BNP touch on the very rationale for the policy in favor of nuclear energy. The first among these pertains to the supply of energy at affordable cost.

The issue of cost involves at least two questions: (1) Is nuclear energy, in fact, cheaper than other sources, e.g. fossil fuels?, and (2) Is the generation of nuclear energy affordable, particularly for Third World countries like the Philippines? Regarding the first question, as early as 1977 the economics of nuclear power had already become a big issue in the United States and the controversy touched all aspects of the economic perform-

ance of a nuclear power plant, particularly in relation to coal. With respect to this issue, perhaps the testimony of the Public Service Commission of Wisconsin in 1978 is *apropos,* particularly its conclusion that there is a wide range of views concerning the relative economics of nuclear and coal-fired generation. These views range from nuclear power's being much less costly than coal to coal's being much less costly than nuclear, and include the view that it is impossible to tell.[16]

This was echoed a few months later by the staff of another state public service commission. In reviewing this controversy, an author concluded that there is no credible bottom line and that it is plausible to assert that atomic energy is or is not competitive *by a choice of assumptions that suits one's interest.*[17] (underscoring supplied)

The second question primarily involves the technical and financial capability of Third World countries to install and operate nuclear power plants. As the Philippine experience shows, foreign consultants were required all the way from the conduct of preliminary studies to the design and actual construction of the plant. In addition, its operation would have required the training of Filipinos abroad, the importing of nuclear fuel, the exporting of spent fuel, and the decommissioning of the plant. All of these would require huge outlays involving foreign exchange and would add further to the already huge foreign debts of the country. To pay for the loans, the cost of power would therefore be much more, not less. Also, the payment of interests alone would already eat up a significant portion of the budget, which could otherwise be used for basic services or development projects.

The second major issue involves the effects of the nuclear plant on the environment. This includes the plant's effects during normal operations and the probable effects in case of an accident. The effects during normal operation are slow, imperceptible, and long term, but nonetheless significant. The effects of an accident have already been demonstrated particularly by the Chernobyl incident. The damage was widespread and encompassed all forms of life. It also involved immediate as well as long-term effects.

Accidents are a function primarily of safety measures taken in the design of the nuclear plant, but the issue has remained unresolved: how safe is safe?[18] Apart from the design factor, there is the question of the management and administration of the plant. This requires strict recruitment of personnel based on qualifications, an efficient organization that can respond to emergencies, and discipline in strictly maintaining safety standards and procedures. Even with the best of plant designs, accidents can happen through human error, negligence, or laxity in the enforcement of safety measures. Within the context of the Philippines, and generally of Third World countries, where professionalism in the service can be severely hindered by political patronage and other informal types of relationships and where obedience to rules is not necessarily observed nor enforced, such high standards for safety may not be met.

Considering such cultural factors and the magnitude of the problems that will be generated in case of an accident, Third World countries may have to wait until an alternative to nuclear fission shall have been found or the probability of meltdown reduced to almost zero before they can start to consider the use of nuclear energy.

ALTERNATIVE MEASURES

Notwithstanding the arguments for or against the BNP, the fact is, it was expected to contribute only 3% of all power needs by 1988.

[16] *Op. cit.*

[17] Stobaugh and Yergin (eds.) *Energy Future* (N.Y.: Bullantine, 1979), pp. 145 ff.

[18] *Ibid.*

Although its contribution to power is likely to increase in succeeding years, its contribution, with 3% as a base, could not be so much more as to warrant all the expenses and the risks involved in putting up a plant. Even in the USA, nuclear power constitutes less than 10% of total energy generated.

As events turned out, even without the BNP, the country had been able to meet its energy requirements. The energy policy has not changed and continues to be one of attaining self-reliance. Thus, energy development efforts are geared not only towards meeting the energy needs but also reducing dependence on imported energy.

Based on the energy consumption for the first quarter of 1988, the following is the energy source mix for that period, as compared to 1979:

Table 4—COMPARISON OF ENERGY SOURCE MIX[19] FOR 1979 AND 1988 (FIRST QUARTER)

Source	% of Total 1979	1988
Oil	91.06	57.6
Hydro	5.96	9.1
Geothermal	1.05	7.4
Coal	1.93	7.3
Agri-Industrial wastes	—	17.8
Non-Conventional	—	.8
	100.00	100.00

The table reflects decreasing dependence on oil and a corresponding increase in the utilization of other energy sources. With reference to the table, it should be noted that actually in 1979 there was already use of industrial wastes for energy but its use was non-commercial. That is why it is not reflected in the table above. In 1988, industries were already using bagasse and industrial wastes for energy.

The fact gains more significance when one considers that the economy turned from a negative (from 1983-1985) to a very positive growth (5.6%) in 1987. It should also be noted that because of the rural electrification program, more areas are now being served with electricity. (As of December 1987, 93% of potential areas identified for electrification had already been served.)

Thus, even with the increased demand for electricity generated by economic upturn and a widened area of servicing, the country had been able to meet its energy needs without having to depend on the nuclear plant, and without having to increase its dependence on imported sources for its additional needs. On the contrary, its dependence even decreased. This was done through the development of indigenous energy sources and through conservation. Perhaps spurred by the big controversy over the BNP, there seems to have been a determined effort to utilize indigenous fuel sources, to diversify fuel used for power generation, and to conserve energy. Indigenous sourcing involved oil exploration and the development of hydro and geothermal plants. Diversification of fuel involved the exploration of other sources, such as the use of solar energy and industrial wastes, for power generation. While the technology for solar energy has to be developed further to make it cost-effective, the use of agro-industrial wastes such as bagasse, coconut husks, and rice hull seems to hold promise, especially in areas where these are abundant. In 1984, the Energy Research and Development Center successfully tested a mixture of diesel and cochin oil to run 80 bus units of the Metro Manila Transit Corporation.[20] Ground work was also completed in a fishing village so that it could generate its own electricity and produce ice from an ice plant using agricultural wastes for fuel. Utilization of these waste products will not only help solve the energy problem, it will also reduce pollution. In addition, it is not very expensive and does not require foreign exchange.

[19]Office of Energy Affairs, *Quarterly Review*, Vol. XI, No. 1, March 1988, p. 5.

[20]PNOC Annual Report, 1984, p. 12.

What is required is the encouragement of research and development in less expensive alternative sources of energy, particularly on a small scale, using appropriate technology. An example is the production of methane gas from chicken manure. Incentives should be provided to encourage research and development along this line as well as dissemination of successful cases for adoption by more and more households or communities.

Side by side with this search for indigenous sources of energy should be a program on conservation. It has been estimated that if the U.S. were to make a serious commitment to conservation, it will consume 30 to 40% less energy than it now does, and still enjoy the same or even a higher standard of living.[21] This shows that much less energy than is now being consumed can be used to achieve the same end. In this sense, conservation is actually a key energy source. If the same were true in the Philippines and other Third World countries — and there is no reason why it cannot be true, — then conservation and alternative sources of energy can help considerably in the effort for self-reliance in energy.

Conservation, however, has not been given the attention required to make it work. Studies on energy consumption of households and industries are required so that measures may be taken to reduce wasteful consumption to its barest minimum. Studies on building materials and design may even be required to reduce, if not eliminate dependence on power for lighting and cooling. Changes will have to be made in both the micro and macro levels to arrive at more efficient use of energy, including a change in people's attitudes and behavior.

Both these measures require political will in formulating the necessary policies, in providing both incentives and sanctions, and in bringing about the necessary changes, so that energy may be made available, the environment preserved, foreign debt contained, and national development served.

[21] Stobaugh and Yergin, *op. cit.*

RECENT PHILIPPINE NATURAL RESOURCE AND ENVIRONMENTAL POLICY: A "FAILURE OF NERVE"? *

AMADOR A. REMIGIO

INTRODUCTION

The resurgence of environmentalism in the 1960s and 1970s, especially in the developed countries, dovetailed with the increasing perception that resource and environmental problems (e.g., industrial pollution and resource shortages in the North) are the concomitant costs of pursuing unbridled economic growth. Initially, the developing countries balked at the widespread adoption of environmental policies by the industrialized North in the aftermath of the 1972 UN Conference on the Human Environment at Stockholm. Such policies were viewed as manifestly running against the grain of the pro-economic growth and development-oriented strategies of many Third World nations and would, it was believed, have considerably throttled their quest to provide their populations with rising standards of living.

But the growing incidence of environmental perturbations (such as deforestation, etc.) in the developing world has led to the realization, too, that the protection and maintenance of environmental quality has become a legitimate policy concern as well, which can hardly be ignored.. Moreover, several factors have to be borne in mind in ascertaining the seriousness of environmental disruption in the Third World (Kapp, 1972). While developing countries are as yet in relatively early stages of economic growth and development, their belated entry into the race to improve their economic prospects should be viewed as occurring under less favorable conditions compared to those which obtained more than two hundred years ago in today's industrialized economies. Some factors and conditions that should then be considered in attempting to understand the context of resource and environmental problems in many Third World countries are:

1. their peculiar geographic location in tropical and subtropical regions (which accounts for their particular vulnerability to soil erosion and depletion);
2. the relatively high population growth rates (spilling over in many instances to rapidly swelling urban agglomerations and large villages);
3. the poor infrastructure relating to sanitary conditions coupled with the inadequate delivery of needed health services in urban and rural areas (compounded by the already precarious health conditions of a low-income, undernourished population experiencing either chronic unemployment and/or underemployment);
4. the prevalent structural inequalities characterizing the economy, polity and society of many developing countries; and
5. the greater complexity, relative mobility and the potentially broader (and sometimes more lethal) 'scale' effects of modern technologies.

In the Philippines, the emergence of resource and environmental problems (e.g., pollution in the urban areas and resource degradation in the rural areas) in the course of economic growth was addressed in the late seventies by an institutional response from the state to explicitly incorporate resource and environmental policies

*This paper is based on the author's masteral thesis bearing the same title, which he submitted to Wye College, University of London in August 1988.

into the framework of development planning, programming and project implementation.

Most of the existing resource and environmental policies of the Philippines had already been legislated by the late 1970s. It would be but appropriate to assess how the implementation of such policies has fared in recent times.

Objectives

1. The study aims to assess the implementation of certain resource and environmental policies from the standpoint of evaluative criteria (e.g., the conjunction/disjunction between policy objectives and implementation experience, equity, etc.);
2. to determine areas of natural resource and environmental policy failure and success as well as the probable factors underlying these; and
3. based on this policy review, to draw policy insights that can be translated into specific policy recommendations usable in the context of environmental policy formulation and implementation.

Scope and Limitations

Specific resource and environmental policies of the previous Marcos regime in the Philippines were reviewed and assessed with the use of certain evaluative criteria. The study focuses on the experience of government agencies primarily engaged in the operationalization of such policies. As such, it has been confined mainly to the following government agencies:

1. the Department of Environment and Natural Resources (formerly the Ministry of Natural Resources during the Marcos regime) and its associated bureaus (such as the Bureau of Forest Development).
2. the National Environmental Protection Council (a Cabinet-level coordinating body constituted by Ministers of government agencies with environment-related functions); and
3. the National Pollution Control Commission (under the Ministry of Human Settlements during the Marcos regime).

While there are twenty-two environment-related agencies in the Philippine government, this study concentrates only on these three agencies (and their policy mandates) for the sake of manageability. Accordingly, this policy review does not attempt to survey and evaluate all resource and environmental policies that fall within the ambit of these agencies' policy mandates. Rather, it has been limited to major policy sectors, e.g., renewable resources (forests) and environmental quality management (involving policy instruments such as pollution control and environmental impact assessment).

Review of Relevant Literature

From the literature surveyed, three approaches for analyzing and assessing resource and environmental policy are available: the political economy approach, the neoclassical economic framework and an eclectic perspective oscillating between these two approaches.

Redclift (1984; 1987) and Blaikie (1985) typify the political economy approach in their emphasis on the structural factors underlying the phenomenon of environmental degradation. Because it underscores the inseparability of the economic, social and political aspects of development and environmental policy, as contrasted with the neoclassical economic framework which views the economic as discrete from the social and political, the political economy approach can be argued as illuminating wider patches of the social reality which impinges on resource and environmental processes.

While there currently exists a substantial body of literature devoted to the assessment and evaluation of the efficacy, efficiency and equity of resource and environmental policies in industrialized countries (O'Riordan, 1976; Pearce, 1976; Sandbach, 1980; O'Riordan and Turner, 1983; Park, 1986; Schnaiberg, Watts and Zimmermann, 1986; Turner, 1988), the equivalent literature in developing countries is comparatively more recent (Redclift, 1984; Blaikie, 1985; Bartelmus, 1986; Redclift, 1987; WCED, 1987) and rather sporadic in character (as in Park, 1986 and Turner, 1988).

Pearce (in Turner, 1988), insofar as he exemplifies the application of the neoclassical economic framework to environmental problems, would rather underline its technical-economic problem-solving potential (over relatively short periods of time) in contrast to the social change writ large (which may take longer) recognized by Marxist political economy in addressing societal problems (Ellis, 1988). Implicit, too, in the neoclassical paradigm is the prominence of the objectives of growth and efficiency relative to equity. Expectedly, the equity and distributional aspects of policies are paramount from the Marxist standpoint while growth and efficiency are given short shrift.

Both the WCED and World Resources Institute's position can be characterized as having adopted an eclectic perspective. But it is evident, too, that its assertion that market forces have an appropriate role to play in sustainable development will be vulnerable to the Marxist contention that such forces will only tend to accentuate the contradictions unleashed in the process of capitalist development.

As for the political economy and eclectic approaches' policy prescriptions deemed as applicable for resolving developmental and environmental problems at the national and international levels, these can be assailed on the following grounds:

1. the myopic, short-term decisional horizons of bureaucrats, politicians and decision-makers in both national and international institutions;
2. the difficulty in marshalling political will at both the national and international levels, as borne out by the dismal catalogue of previously unsuccessful international efforts (e.g., the attempt to implement the Brandt Commission and the U.N. Commission on the Law of the Sea recommendations) 'foundering on the shoals' of multifarious national interests; and
3. formidable obstacles in undertaking radical, structural reform (e.g., due to the entrenched interests of capital working through entities such as TNCs).

As for related studies in the Philippines on environmental policy, there have been studies by Cabrido (1983; 1986) and Lee (1983). Cabrido's initial study focused on strategies for environmental administration in the Philippines as undertaken by the environmental agencies then. His second study attempts to assess environmental administration by relying on a primary data set of 'forty-four pre-selected environmental administrators' as respondents in administered interview questionnaires. Based on these, the structure and mechanism of environmental administration as well as the appropriateness of environmental programs in the Philippines were gleaned and assessed. The following findings were highlighted:

1. the decision-making structure of environmental agencies/institutions is usually dominated by the agency head;
2. the coordination mechanism is weak and ineffective in carrying out inter-agency environmental programs and projects;
3. the environmental administration system is often crippled by the absence or lack of management information, monitoring, research application, and evaluation components;
4. environmental laws are adequate but poorly enforced while programs are extensive but insufficiently implemented;
5. environmental programs are accorded low priority;
6. there is lack of public support to environmental programs and related activities; and
7. there is a dearth of competent environmental administrators and staff.

Without directly taking issue with these findings enunciated by this study (which are purportedly reflective of the perceptions of the respondent environmental administrators that were the main source of the findings), its value lies in yielding 'first hand' information on notions, impressions and opinions of those involved in environmental policy formulation, administration and implementation. However, the extent to which these impressionistic observations correspond to the 'true' picture of environmental administration in the Philippines could have been addressed in the study itself by

an attempt to compare whether such perceptions (and findings) are consistent with the perceptions of others (e.g., technical staff in the environmental agencies or the 'clientele base' which these agencies are mandated to serve). These could have minimized the danger of personal bias distorting the responses (such as the suppression of information perceived as running counter to the respondent's self-interest or posing a threat to the agency's interest and concerns or otherwise projecting the negative and the worst in order to advance latent political objectives, e.g., in order for budgetary support levels to be increased).

Consequently, this 'rarified' view of environmental administration lends a somewhat introspective quality to the study which fails to take into account the wider social, economic and political factors and processes influencing environmental policy. Another major constraint which hampered the study was the relative inaccessibility and/or unavailability of data and information on politically sensitive issues (bearing in mind that the studies were conducted in 1985 – the twilight year of the Marcos regime when the climate of political repression was very pronounced).

In the case of Lee (1982), he identified the main problem of Philippine environmental administration as the poor implementation of well-designed programs and, because of the narrow public administration perspective used, attributes this to the following:

1. the lack of administrative skills in environmental affairs;
2. the complexity of the contemporary social system; and
3. the underdeveloped state of administrative theory and practice in environmental administration then.

METHODOLOGY

In general, this study follows the methodological procedure outlined below:

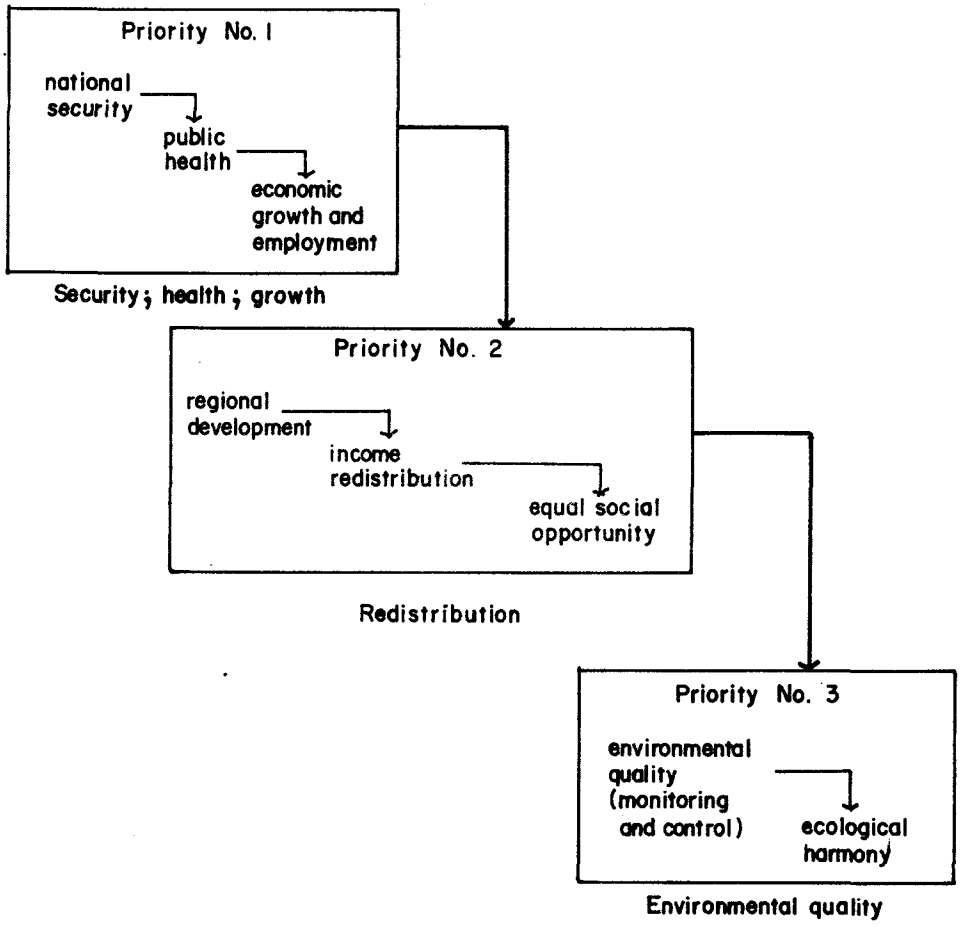
1. Natural resource and environmental policies, viewed against the backdrop of pertinent historical and institutional factors, will be surveyed as these relate to natural resource and environmental problems and issues.
2. Such policies will then be assessed using the following evaluation criteria:
   a. relevance to issues and problems;
   b. conjunction/disjunction between policy objectives and implementation experience;
   c. equity/distributional aspects and implications.
3. From this completed policy assessment, policy opportunities and constraints will be determined and associated policy insights will be derived and developed into specific natural resource and environmental policy recommendations.

The Historical and Institutional Context of Philippine Natural Resource Management and Environmental Protection Policies

Before the watershed year of 1972 (when the first UN conference on the Human Environment was held in Stockholm), many developing countries ascribed little or no emphasis on the problems of natural resource deterioration and the degradation of air, water, and land quality. The mix and relative weights of national policy objectives (such as economic growth and development, equitable distribution of income, regional and rural development, national self-sufficiency, environmental quality, and maintenance of the productivity of natural systems are instructive in this respect (Hufschmidt, James, Meister, Bauer and Dixon, 1983). O'Riordan (1976) depicts this point in graphical terms (see Fig. 1) that illustrates a hierarchy of goals articulating national policy priorities or objectives.

While considerable progress has been attained since the early 1970s in elevating environmental quality problems as a concern in the national goal hierarchy, the greatest emphasis today, in most developing countries, is still assigned to the policy objectives of economic development, the promotion of exports, the reduction of poverty and fulfillment of basic human needs, including food and shelter (Hufschmidt, et al. 1983).

FIGURE 1. THE HIERARCHY OF NATIONAL GOALS



In the Philippines, the policy of import substitution industrialization in the late 1950s and early 1960s began to reap the unwanted impact of external diseconomies (readily visible as pollution in the urban areas like Manila). Thus, one of the earliest environmental pressure groups, the Philippine Society of Sanitary Engineering, lobbied for the enactment of legislation on pollution control then pending before the Philippine Congress. On 18 June 1964, Republic Act No. 3931 (the enabling law which created the National Water and Air Pollution Control Commission) was passed. It was not until 1966, however, that the law was finally implemented with the Commission receiving only token funding. Also, the said law was largely ineffective because it never vested any penal powers and sanctions which the Commission could employ in regulating the activities of pollutive establishments. In retrospect, the passage of relatively weak environmental legislation during this period could be possibly attributed to the success of the strong and dominant legislative representation of industrial interests and capital in diluting the demands of environmental lobbying then.

In the sixties, it can be recalled that environmentalism in the U.S. received a powerful impetus from the wide spectrum of public support largely owing to the crusading efforts

of its intellectual high priests (e.g., Rachel Carson, Rene Dubois, Barry Commoner). Such American-inspired environmentalism was to eventually migrate across the Pacific to Philippine shores (Roque in N.E.P.C., 1986). This was aptly symbolized in the early 1970s by the trip of Charles Lindbergh to the Philipines in order to champion the cause of endangered species such as the tamaraw and the Philippine eagle. By July 1976, an interagency committee for environmental protection was created by Presidential Letter of Instruction No. 422 and was placed under the coordinative direction of the Department of Natural Resources (previously organized in 1974). By August 1976, the almost ineffectual National Water and Air Pollution Control Commission was strengthened when its enabling law (R.A. 3931) was amended by Presidential Decree No. 984 (which clothed it with strong regulatory powers).

On 18 April 1977, the interagency committee on environmental protection was reconstituted into the National Environmental Protection Council (the Cabinet-level coordinating body on environmental protection chaired by President Marcos) through Presidential Decree No. 1121. Landmark environmental legislations were subsequently enacted on 5 June 1977. These were the Philippine environmental policy laws (as embodied in Presidential Decree No. 1151) and the Philippine Environment Code (Presidential Decree No. 1152) which codified separate environmental legislation into a single law. Close examination of these laws, especially P.D. No. 1151 on Philippine environmental policy, leaves no doubt whatsoever as to its unabashedly American-inspired character. For instance, Section 4 of P.D. No. 1151 required all agencies and instrumentalities of the national government as well as private corporations 'to prepare, file and include in every action, project or undertaking which significantly affects the quality of the environment, a detailed statement on:

1. the environmental impact of the proposed action;
2. any adverse environmental effects which cannot be avoided should the proposal be implemented;
3. alternatives to the proposed action;
4. the relationship between local short-term uses of man's environment and the maintenance of long-term productivity; and
5. any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

It is evident, then, that this requirement of a detailed environmental impact statement (particularly its content) is merely a replication of Section 102 (2), para. (c) of the 1969 U.S. National Environmental Policy Act. Even the design of the initial environmental impact assessment system was accomplished with American assistance (particularly consultancy services provided by the U.S. Agency For International Development).

Perhaps, it was more than just symbolic that this rather uncritical cuddling of American environmentalism by the previous political leadership came to be epitomized in the chairing by Imelda Marcos, a prime proponent of what was then 'fashionably trendy' in developed countries (e.g., environmentalism'), of the National Environmental Protection Council by the late 1970s. This Cabinet-level council met only once (in 1979) and was never convened again. It was finally supplanted by the creation of the Department of Environment and Natural Resources in 1987 under the Aquino government.

Admittedly, the period between 1976 and 1981 (when the last environmental policy guideline of consequence was promulgated by presidential fiat) has been unusually productive in terms of environmental policy formulation (albeit undertaken via unorthodox and undemocratic means). Most of the extant environmental policies that were legislated into being by the late 1970s through presidential fiat had their origins in the multi-agency task force (known as the Inter-Agency Committee on Environmental Protection) convened and coordinated by the Department of Natural Resources. It was primarily a legal-technocratic exercise in policy formulation that scarcely considered any inputs from other segments of the body politic.

Its recommendations were translated into presidential issuances which when promulgated under the martial law powers of the President had the full force of law. The then Secretary of Natural Resources endorsed these proposed presidential issuances to Malacañang Palace where these were given the final scrutiny by presidential staff before the President signed these into law. In the latter part of martial law rule, the Cabinet standing Committee (later known as the Cabinet Executive Committee) began to increasingly assume this task of sifting and recommending to the President preferred policy directions. Not surprisingly, the Cabinet (and its members) became the arena of struggle among the various dominant class segments battling for control of the national policy apparatus. At this juncture, it will then be appropriate to assess and examine the what and how of natural resource and environmental protection policy formulation and implementation in the Philippines, during the Marcos regime.

Philippine Natural Resource and Environmental Policies: An Assessment

As mentioned in Part IB of this study, the assessment of Philippine natural resource and environmental policies in this section will be confined to the peculiar problem contexts associated with the major policy sectors of renewable resources (e.g. forests) and environmental quality management (particularly involving the policy instruments of pollution control and environmental impact assessment).

Renewable forest resources

1. Policy objective

In Presidential Decree No. 389, the Forestry Code of the Philippines, the government shall endeavor to administer forest resources under a system of careful and prudent management designed to promote its wise utilization, development and conservation. The following major programs were undertaken in pursuit of this end:

a. the program for forestry ecosystem management (I and II).

   — the reforestation of open, denuded, degraded and other identified land areas (with a social forestry component in order 'to maximize land productivity, enhance ecological stability and improve the socio-economic conditions of forest occupants and communities through their active participation in food production and rehabilitation of forest lands').

b. watershed development

   — the management and rehabilitation of critical watershed reservations (e.g., those supporting hydroelectric and irrigation activities) through means such as the introduction of anti-erosion measures in severely eroded portions of these reservations.

c. forest resource protection

   — the conduct of forest protection activities (such as patrols, fire detection and control as well as the enforcement of forestry laws, rules and regulations).

2. Implementation experience

Notwithstanding the implementation of such renewable forest policy and programs during the Marcos martial law regime, it will be shown that the gap between policy objective and actual implementation experience has been rather sizeable.

The Philippines has a total land area of 30 million hectares, 51.6 per cent or 15.5 million hectares of which were considered uplands with the remaining 48.4 per cent or 14.5 million hectares treated as alienable and disposable land, as of 1984. (See Table 1). Areas in the uplands are rainfed, have undulating topography with an elevation of 300 meters (or more) and a slope gradient of 18 per cent and above. It should be noted that about five million hectares of uplands (or around one-third) of total upland area are denuded and vulnerable to erosion (NEPC, 1982).

Table 1. – LAND USE STATUS OF THE PHILIPPINES (in Hectares)

Category	*Total*	*Philippines Uplands*	*Alienable or Disposable*
Total	30,000,000	15,484,607	14,515,393
I. Forest	11,555,596	10,765,279	790,317
1.1 Productive	9,286,509	8,527,109	750,400
1.1.1. Dipterocarp	8,865,767	8,136,792	728,975
1.1.1.1 Rep-brush	2,747,020	2,058,144	688,876
1.1.1.2 Young-growth	3,880,644	3,848,329	32,315
1.1.1.3 Old-growth	2,238,103	2,230,319	7,784
1.1.2. Mangrove	232,065	204,253	27,812
1.1.2.1 Rep-brush	113,083	93,527	19,556
1.1.2.2. Young-growth	109,083	101,673	7,410
1.1.2.3. Old-growth	9,899	9,053	846
1.1.3 Pine	188,677	186,064	2,613
1.2 Unproductive	2,269,087	2,238,170	30,917
1.2.1. Diptercarp	1,421,812	1,397,883	23,929
1.2.2. Mossy	329,285	328,089	1,196
1.2.3. Bamboo	7,924	2,132	5,792
1.2.4. Forest Plantations	510,066	510,066	–
II. Non-Forest	18,444,404	4,719,328	13,725,075
2.1 Openland	805,135	314,493	490,642
2.2 Managed Pasture	660,629	563,678	96,951
2.3 Marsh & Small Water	106,328	76,992	29,336
2.4 Plantation	7,540,971	1,721,581	5,819,390
2.5 Cultivated Cropland	8,240,865	1,810,996	6,429,869
2.6 Urban & Others	1,090,476	231,588	858,888

Source: Bureau of Forest Development (1984)

Of the 1984 total upland area of 15.5 million hectares, 10.8 million have been classified for forest use while some 4.7 million hectares have been categorized for non-forest use. Also, of the 10.8 million hectares of forest use lands, 8.5 million hectares are designated productive with virgin forests occupying an estimated 2.2 million hectares.

A more cautious estimate by Revilla in 1984 calculates the remaining forests in forest use lands from a low figure of 7.7 million hectares to a high figure of 8.2 million hectares (Pulhin, 1984). Of these, the remaining old growth or virgin forests may vary from 1.9 to 2.4 million hectares, according to Revilla.

Bureau of Forest Development Statistics (Table 2) indicate that from 1972 to 1981, the annual rate of conversion of forest use lands to non-forest uses averaged 341,800 hectares. Thus, forest use lands in the country were reduced from 15.6 million hectares in 1972 to 12.2 million hectares in 1981. In ten years, the aggregate total reduction amounted to 3.418 million hectares. Comparatively, the annual average reforestation rate from 1975 to 1985 was only 57,000 hectares (Ministry of Natural Resources, 1986). By 1987, however, the estimated rate of deforestation had decelerated somewhat to 220,000 hectares per annum (Department of Environment and Natural Resources, 1987).

More than just the immediate perturbations which deforestation causes on the tropical forest ecosystem, it also radiates environmental impacts to human communities in the uplands and has exerted off-site effects on places far removed from where deforestation has occurred. In a public statement of the Minister of Natural Resources, he identified deforestation as a principal factor in the immiserization of around 500,000 families (or roughly three million Filipinos) living in the uplands (Malaya newspaper, 13 March 1986).

It has also been implicated as having resulted in the forced migration of some upland people to lowland areas as the productivity of upland areas affected by deforestation was reduced (Sajise, 1976).

Likewise, the removal of vegetative and plant cover from tropical forest areas has also caused the loss of topsoil sediments which has increased surface runoff, given the relatively high rainfall intensities and steep slopes. Increased sediment loading of the water-courses through which the runoff passes usually translates downstreams into greater siltation of riverine and irrigation systems and the consequent decrease in productivity of affected agricultural farmlands (as in the case of towns in the province of La Union and Pangasinan sourcing their irrigation water needs from the Bued and Amburayan rivers, whose waters have high sediment loads due to watershed deforestation and the dumping of mine wastes upstream). Other infrastructure projects like dams were also affected in terms of decreased lifespan — as in the case of Ambuklao dam in Benguet province and Pantabangan dam in Central Luzon (Bello, et al., 1983).

The drastic alteration of the hydrological regime upstream due to deforestation has also disrupted the regulated discharge of rainwater (specially during times of heavy precipitation) and has increased the probability of downstream flooding and damage. For example, in 1972, after a hurricane (code-named 'Yoling') swept through the Central Luzon plains, vast areas went under floodwater because most of the watersheds surrounding the plains have been severely deforested.

Deforestation, coupled with past government policy to ostensibly save foreign exchange by replacing existing oil-fired boilers/furnaces with wood-fired devices, has further aggravated the already critical fuelwood supply situation in the country (Department of Environment and Natural Resources, 1987).

Rabor (1981) also blames extensive deforestation as a major factor in the depletion of Philippine wildlife and the endangering of many species.

Insofar as social equity is concerned, the much touted social forestry program under the Marcos regime had distributed some 400,000 hectares to around 116,000 families. In contrast, about 5,000,000 hectares were leased to just 114 individuals — with one person being awarded a forest lease covering 100,000 hectares (Roque, in NEPC, 1986). In another clear example of the inequitable access to natural resources, Cellophil (a giant private logging venture integrated with pulp and paper manufactures owned by Marcos' crony, Herminio Disini) was awarded a logging concession (and the associated right) in 1976 to exploit 200,000 hectares of virgin pine forests in the provinces of Ilocos Sur, Ilocos Norte, Kalinga-Apayao, Mountain Province and Abra that were part of the lands of four tribal groups — the Isneg, Bontoc, Kalinga and Tingguian (Bello, et al., 1987, May and Nemenzo, eds., 1985).

The commercial pressure to exploit Philip-

Table 2—LAND USE TREND (1972-1981)
(In Million Hectares)

Category	*1981*	*1980*	*1979*	*1978*	*1977*	*1976*	*1975*	*1974*	*1973*	*1972*
1. Forest	12,253	12,457	12,661	12,864	13,068	13,272	13,476	13,690	13,894	15,671
A. Productive	10,493	10,697	10,901	11,105	11,309	11,513	11,717	11,931	12,135	13,887
1. Dipterocarp	10,062	10,262	10,461	10,661	10,861	11,061	11,261	11,471	11,671	13,389
a. Rep-brush	3,474	3,542	3,608	3,677	3,813	3,813	3,880	3,958	4,036	5,280
b. Young growth	3,794	3,728	3,662	3,396	3,530	3,464	3,398	3,332	3,266	3,455
c. Old growth	2,794	2,992	3,191	3,388	3,856	3,784	3,982	4,181	4,379	4,655
2. Mangrove	,239	,241	,245	,247	,249	,251	,254	,256	,258	,284
a. Rep-brush	,120	,120	,123	,124	,125	,127	,128	,130	,132	,151
b. Young growth	,109	,110	,110	,111	,112	,112	,113	,113	,114	,119
c. Old growth	,010	,011	,012	,012	,012	,012	,013	,013	,013	,014
3. Pine	,192	,194	,195	,197	,198	,200	,202	,203	,205	,212
B. Unproductive	1,759	1,759	1,760	1,759	1,759	1,759	1,759	1,754	1,759	1,784
1. Dipterocarp	1,422	1,422	1,422	1,422	1,422	1,422	1,422	1,422	1,422	1,439
2. Mossy	,329	,329	,329	,329	,329	,329	,329	,329	,329	,330
3. Bamboo	,008	,008	,007	,008	,008	,008	,008	,008	,008	,015
II. Non-Forest	17,747	17,534	17,339	17,136	16,932	16,728	16,524	16,310	16,106	14,329
A. Openland	1,095	,794	,876	,959	1,039	1,136	1,349	1,453	1,549	2,566
B. Managed Pasture	,612	,997	,994	,991	,990	,974	,842	,862	,846	,829
C. Marsh and Small Water	,115	,115	,118	,123	,126	,129	,132	,134	,137	,212
D. Plantation, Cultivated Cropland, Urban and Others,	15,925	15,638	15,351	15,064	14,776	14,389	14,201	13,861	13,574	10,721

Source: Bureau of Forest Development (1984)

pine forest resources has also affected different tribal groups in other parts of the Philippines.

In South Cotabato province, the T'boli tribe, having already lost agricultural land and lake foreshore areas to immigrant settlers, had to contend with two competing logging firms (the Habaluyas Enterprises Inc. and Sarmiento Logging) operating on tribal forest land (as documented in May and Nemenzo, eds., 1985).

In the province of Davao del Norte in Mindanao, the Dibabawon tribe has protested unsuccessfully against logging operations and commercial tree planting on their traditional tribal lands by the Aguinaldo Development Corporation (May in May and Nemenzo, eds. 1985).

In Misamis Oriental province, the Higa 'onon tribe has complained of the landgrabbing and logging activities by the Anakan Lumber Company on its tribal lands. (May in May and Nemenzo, eds., 1985).

It should come as no surprise therefore that these marginalized tribal communities have increasingly been drawn into and associated with armed leftist groups (such as the Communist Party of the Philippines' New People's Army) operating in the upland countryside (Bello, et al., 1982; May in May and Nemenzo, eds., 1985).

Investigations in the Ministry of Natural Resources after the Marcos regime was toppled also show the extent of Philippine log smuggling engaged in by political figures and businessmen close to Marcos. For example, log import records from Japan and South Korea disclose that these two countries bought 6,084,239 cubic meters of logs from the Philippines from 1979 to the first six months of 1980. However, Philippine log export records merely register an 'authorized' shipment of 3,580,000 cubic meters for the same period. In a 1986 public statement, the then Minister of Natural Resources revealed that the magnitude of loss (in terms of money that should have gone to the public coffers) due to log smuggling to Japan, South Korea and Taiwan amounted to more than twelve billion pesos (or around 1.72 billion US dollars at the prevailing peso to dollar exchange rate then) in just the five year period from 1978 to 1982.

In the Upland Resource Development Policy Workshop held in Quezon City (Philippines) on March 18, 1986, Minister Maceda of Natural Resources described the modus operandi used by loggers in rather vivid terms:

> ". . . in the past, they were able to give two, three, ten, fifteen million pesos (as a bribe to the Marcos' political machine) to get a (logging) concession. . . In that connection, I also said that there are cases where these wood processors owe the Development Bank of the Philippines (DBP) or the Philippine National Bank (PNB) so much. Some of them owe 150 million pesos, some of them 52 million pesos, some of them owe 80 million pesos. This was part of the modus vivendi — when you were close to deposed President Marcos, you could get a concession; you could bleed the DBP and PNB dry; you get 100 milllion pesos; you get illegal logs; you make all your profits."

Furthermore, he added:

> "It is my intention to try to encourage the PWPA (Philippine Wood Products Association) to discharge its proper role. (As it is), 50 per cent of their members are engaged in log smuggling and I would say one third of their members are engaged in illegal logging."

Even military elements during Marcos' regime were engaged in log smuggling (Malaya newspaper, 4 November, 1985). In an article entitled "Military hit for Romblon deforestation" in the aforecited newspaper, Mr. Prajedo Sarañas, a Bureau of Forest Development official, exposed the smuggling of "hot" lumber from Romblon province by military officials since 1982. He was quoted as saying that:

> "Provincial, local officials and even the Bureau of Forest Development men are helpless to face the situation because these men are armed with (M-16) Armalite and .45 caliber guns. Confronted with a gun, the Forestry Code of the Philippines has to step backward with the guiding doctrine of self-preservation" [sic].

While illegal logging by powerful political, commercial and military interests during the Marcos regime was a main factor behind widespread deforestation in the Philippines, the indiscriminate practice of slash-and-burn, swidden agriculture by many poor upland families has also been contributory. A recent census by the Bureau of Forest Development (1983) reported that 193,506 families (with 686,969 dependents) occupied about 547,436 hectares of public forest lands and were engaged in this practice.

This rather dismal track record in the management and conservation of renewable forest resources has not escaped the notice of Philippine development planners. In the medium-term Philippine development plan (1987-1992) prepared by the National Economic and Development Authority (the state economic planning agency), it noted that the 'rehabilitation of watersheds and the preservation and maintenance of national parks and rangelands were given low priority' and that 'the overall country performance in the management and conservation of natural resources was unsatisfactory'.

To recapitulate, the pathetic reforestation efforts relative to deforestation rates and denuded areas, the ineffectual enforcement of forest policy and programs (in the face of contradictory government policy, powerful political, commercial and military interests operating on the basis of their political connections with the regime as well as the recourse of the poor to exploit upland resources in order to survive) and the generally inequitable system of allocating the use of renewable forest resources amply illustrate the massive policy failure in this specific natural resource sector.

3. The appraisal of forest resource policy and its implementation

Bruton (1984) asserts that 'the test of the performance of policies is whether they shape decisions and actions which change the real world in line with their objectives'.

A perusal of the policy objectives and concomitant programs for Philippine forestry resources furnishes the qualitative impression that it was based on a reasonable assessment of the threat posed by deforestation and the consequent need to manage these forest resources in order to promote their wise utilization, development and conservation. Thus, it can be justifiably claimed that the policy objectives and programs were properly oriented relative to the major policy problem and issue of deforestation.

However, it would also be useful to comb for possible and probable explanations accounting for the policy failure implicit in the considerable disjunction between the objectives of forest resource policy and its implementation experience.

Interestingly, the Natural Resources Management Center (a staff agency of the Ministry of Natural Resources engaged in resource mapping and information activities) attributed the major policy problem of deforestation to ineffective forest management and administration (1981). Various circumstances were then identified as detrimental to effective forest management, such as:

1. the slow pace of land classification, allied with the lack of a comprehensive land use policy;
2. organizational and institutional constraints; and
3. inadequate technical information due to the paucity of forestry-related research.

Pearce (in Turner, 1988) advances several proximate causes of natural resource degradation in developing countries, such as:

1. forest clearance for agricultural land use;
2. non-sustainable woodfuels harvesting;
3. over-intensive rates of animal stocking;
4. farm practice;
5. exogenous climatic impacts;
6. population pressure;
7. market 'failure' (i.e., the failure of market to develop properly as in the "tragedy of the commons' arising from common land ownership) in forms like:
   a. the lack of property rights in 'open-access' resources (to be distinguished from 'common property resources')

and in lands occupied without title; and

b. the 'optimal' extinction or 'rundown' of resources assuming high resource prices, high discount rates and the non-dependence of harvesting costs on remaining stock size; and

8. government 'failure' (including intervention in markets, marketing controls, land use controls, inappropriate tax policy and the general failure of bureaucracies to formulate and implement rational resource policies such as proper resource pricing).

His main argument is that economic distortions arising primarily from government 'failure' (and which leads to inefficient use rates causing harvest levels to exceed 'sustainable yield') are what generate resource depletion and the generally wasteful use of natural resources.

Given the paramount role of the government as the most important agent in Philippine political economy during the Marcos regime (insofar as it involved the inordinate concentration of governmental authority and power in the executive branch), it will be noteworthy to determine whether the nature of government policy 'failure' corresponds to that propounded by Pearce.

In the area of government taxation of resource proceeds, it is quite obvious, as Pearce maintains, that the failure to tax such proceeds will result in loss of the economic rent (i.e., the difference between the value of the resource output and the costs of extraction and harvesting) accruing to governments and more of it being made available to the 'rent-seekers'. In the Philippines, the forest charge (or tax) system has its major weakness in the ludicrous, low value it imputes to timber resources – only 1 to 2 per cent of the wood market value in log form (Department of Environment and Natural Resources or DENR, 1987). Thus, Repetto (1985) reports that the Philippine Government took only 10-14 per cent of rents from all timber sales. Between 1979 and 1982, for example, the government collected only about US$ 140 million of a potential US$ 1.5 billion in timber royalties; it left the remainder to favored logging concession holders (World Bank, 1988). The results have been disastrous. Such a misguided policy has been a cardinal factor then in the reduction of productive virgin forests in the Philippines by nearly 90 per cent. What it also implies is that this gross undervaluation of forest resources where the prices assigned to such resources do not even start to approximate their true market value (much less their true social value which should include their adverse environmental effects) has led to the earning of excessive rents by those firms that have gained rights to exploit these resources. These rents represent returns over and above that which is actually needed to attract firms in the Philippine wood-based industry (DENR, 1987). The freezing of rents at such ridiculously low levels has therefore led to the over-exploitation of forest resources as certain class segments in the dominant political coalition behind the Marcos regime scrambled to partake of the 'profit' windfall opportunity, as documented elsewhere in this study.

Also, the manifest undervaluation of forest resources has encouraged inefficiency in both logging and processing operations. It has been estimated that only from 20 to 30 per cent of the total timber drain (or outflow from the harvest) is transformed into primary wood products, with the greater portion of the drain being wasted in the logging and processing operations (DENR, 1987).

More ominously, such undervaluation also guarantees that the avowed policy objective of forest conservation will be negated if only because the improper deployment of forest taxation as a policy instrument ensures that it will be at cross-purposes with the policy objective.

This institutionalization of excessive economic surpluses or rents amongst those that have been politically favored has almost certainly exacerbated prevailing 'structural' inequalities regnant in Philippine rural society as small-time forest resources users such as tribes are increasingly displaced and marginalized by the big-time, politically and economically powerful interests.

Pearce's line of reasoning then, anchored on the proposition that economic distortions arising from 'government failure' can be causative of natural resource degradation, could be argued as finding some validation in the Philippine example. It must be noted, however, that it does not preclude the view that natural resource degradation is also the natural outcome of the unequal relations of socio-economic and political power so prevalent in the Philippines.

Pollution control

1. Policy Objective

In Presidential Decree Nos. 600, 984, 1152 and 1181, the government policy on pollution control is oriented towards the control of pollution in the major environmental media (i.e., air, water and land). The policy encompasses objectives such as:

a. to maintain air quality at levels that will protect public health and prevent (to the greatest extent practicable) injury and/or damage to plants, animals and property;
b. to maintain water quality through the enforcement of environmental standards that will regulate the dumping of untreated wastewater, mine tailings and other substances that may pollute any water body; and
c. to ensure the proper collection, disposal, treatment and recovery of waste, using safe, sanitary and efficient means.

In Presidential Decree No. 1151, Section 1 declares that it is a 'policy of the State to attain and maintain a rational and orderly balance between socio-economic growth and environmental protection' while Sec. 2 provides the establishment of an 'environmental impact statement system' for operationalizing this policy.

For air, water and land pollution control, the following program thrusts were initiated:

a. regulation of mobile and stationary sources of air, water and solid waste pollution; and
b. the penalization of those found guilty of violating pollution control laws.

2. Implementation experience

A fair indication of the relative success or failure of pollution control policies and programs is whether these have been effectively enforced. In the area of mobile air pollution, for example, 53,819 vehicles (mostly diesel-fed) were reported as possible violators between 1976 and 1984. However, only an insignificant percentage (around five per day) were grounded (or not allowed to operate) by the Bureau of Land Transportation for fear of paralyzing the public transport system heavily dependent on diesel-fed public utility vehicles such as buses. Moreover, operations of the National Pollution Control Commission vis-a-vis mobile air pollution were severely hampered by the non-release of needed (and already budgeted) public funds amounting to fifteen million pesos for maintaining existing air pollution control equipment, buying new ones and hiring necessary personnel. This can be inferred indirectly, for example, by looking at Table 3 which portrays the number of exceedances in hourly suspended particulate levels in four monitoring stations in Metro Manila, covering the period from 1975 to 1983 (and noting the number of incorrect and incomplete data values due to analyzer malfunctions).

The malfunction of monitoring equipment and other pollution control equipment and devices used by the Commission has been oftentimes blamed by the Commission's engineers and technicians as arising from their not being properly calibrated because of the lack of funds for their maintenance.

Table 4 also shows the substantial number of non-compliance of industries with air pollution control requirements. Around 497 firms out of 3,217 air pollutive firms had no air pollution control devices.

Even those firms with air pollution control devices cannot be presumed as operating and maintaining these on a round-the-clock basis because of the alleged difficulty of complying with unrealistic environmental quality standards and the admission by many corporations

Table 3 – NUMBER OF EXCEEDANCES IN HOURLY SUSPENDED PARTICULATE LEVELS IN FOUR STATIONS IN METRO MANILA. 1975-1983

Year	*Cubao*	*Ermita*	*Pasay*	*Quiapo*
1975	14	90	89	16
1976	56	73	41	28
1977	184	98	176	69
1978	167	56	197	107
1979	118	16*	271	9*
1980	52*	21*	111	74
1981	76*	112	13*	47*
1982	209	78	38	138
1983	18*	116	26*	5**

Standard: 250 ug/m^3 hourly average concentration
*Incomplete data due to analyzers' malfunction
Source: NPCC Annual Reports (1975-1983)

Table 4 – COMPLIANCE OF INDUSTRIES WITH AIR POLLUTION CONTROL REQUIREMENTS AS OF 1983.

	Metro Manila Area	*Outside Metro Manile area*	*Whole Country*
Total Number of Firms surveyed and Inspected	2145	3439	5584
Total Number of Air Pollutive Firms	1164	2053	3217
Total Number of Firms with Air Pollution Control Devices	931	1718	2649
Total Number of Firms without Air Pollution Control Devices	197	300	497
Total Number of Firms with Pollution Control Devices under Construction	36	35	71

Source: NPCC Annual Report (1983)

that pollution control ranks last in their totem pole of corporate priorities. (Pollution Control Association of the Philippines in NEPC, 1986). Philippine air pollution control standards, for example, require that air pollution control facilities (such as electrostatic precipitators) remove ninety eight per cent (98%) of particulate emissions in the flue gases generated by industrial equipment used in installations such as electricity generating plants or oil refineries. In the economics of pollution control, requiring the flue gas to be cleaned of up to ninety-eight per cent of the particulate load means almost doubling the size of the electrostatic precipitator usually employed in clearing eighty two to ninety five per cent (82% to 95%) of the particulate emission. In this case, the incremental increase in the size or scale of the equipment required by the environmental quality standard necessarily implies a correspondingly greater increase in acquisition as well as operating costs of such pollution control equipment. In other words, the marginal benefit to be derived from the additional removal efficiency of the bigger equipment would appear to be extremely disproportionate to the marginal cost to be incurred by the firms (Pearce, 1976). Thus, firms have found it difficult to justify complying with such standards. And even if firms risk not complying with such environmental standards, the probability that they will be subjected to penal sanctions is rather nil anyway considering the lackluster enforcement of such regulations.

As for water pollution, many Philippine effluent standards also seem to be extraordinarily stringent when compared to the standards in other Asian countries, as shown in Table 5.

It is interesting to note that, in general, many of the Philippine effluent standards for unprotected inland waters are even more stringent than that of Japan, which is by any measure much more industrialized than the Philippines.

As for water pollution in rural areas due to agricultural wastes such as fertilizers, pesticides as well as animal slurry, water quality monitoring results by the National Pollution Control Commission on major river systems throughout the Philippines already show that toxic chemical compounds from pesticides such as Alpha BHC, Gamma BHC, Heptachlor, Heptachlor Epoxide, Aldrin and Dieldrin have been already found as present in significant concentrations in some rivers (See Table 6). And yet, no program addressing agricultural (and soil) pollution in the rural areas has been undertaken by either the National Pollution Control Commission or line agencies such as the Ministry of Agriculture and the Bureau of Soils.

Firms associated with the political and economic interests of the Marcos family and/or their associates also violated environmental regulations with impunity. For example, Marcopper Corporation has dumped since 1975 113 million metric tons of mine wastes and tailings into Calancan Bay, a rich fishing ground in Marinduque Island. These have caused massive damage to aquatic life (such as coral reefs) and fisheries. Thus, the livelihood of some 9,000 fishermen were also threatened. It was not publicly known until the Marcos regime was toppled that the Marcos-owned Performance Investment Corporation also controlled 48 per cent of Marcopper's stockholdings (Ganapin in NEPC, 1986). It became palpably clear then that it was the corporate tie-up with Marcos which enabled the firm to refuse to heed the outcry from the public and successfully thwart the regulatory efforts of environmental agencies.

In another instance, the Philippine Associated Smelting And Refining Corporation copper smelting project was also successful in evading the requirement of an environmental impact assessment when it secured a presidential directive exempting it from submitting an environmental impact assessment (EIA) study through the direct intercession of politically powerful figures. In the 1980s, other prestige projects of the Marcos regime (such as the Manila Bay reclamation, the Metro Manila Light Rail Transit system and the Calaca coal-fired power plant in Batangas province) were all undertaken in spite of the fact that these projects have never been issued environmental compliance certificates by the National

Table 5 – POLLUTION CONTROL ASSOCIATION OF THE PHILIPPINES, INC. (PCAPI)
Compiled by Dr. A.R. Ouano
Comparison of Philippine Effluent Standards for Unprotected Inland Water with Effluent Standards from Other Asian Countries
(1986)
(in parts per million)

	China	*Thailand*	*India*	*Japan*	*Phils.*	*Phil. Rank in terms of Stringency*
pH	5-9	5-9	5.5-9.0	5.8-8.6	6-8.5	1
BOD	150	90	100	160	80	1
SS	400	150	850	220	75	1
Oil	–	15	10	35	10	1
phenols	01	.05	1	5	.1	3
Copper	–	2	3.0	3	1	1
Zinc	–	2	10	5	5	2
Soluble Iron	–	5	–	10	10	2
Soluble Manganese	–	–	–	10	1	1
Hexavalent Cr	.5	–	.1	.5	.1	1
Arsenic	–	.1	.2	.5	.1	1
Fluoride	–	–	10	15	6	1
Cadmium	.5	–	2.0	.1	.05	1
Cyanides	.1	1	.2	1	.14	2
Phosphorus	–	–	–	1	–	–
Lead	1.0	–	1	1	.5	2
Mercury	–	–	.010	.005	.002	1
PCB	–	–	–	.003	–	–
Nickel	–	–	3.0	–	.5	1
Selenium	–	–	–	–	.2	–
Silver	–	–	–	–	.5	–
Boron	–	–	–	–	.2	–
Berryllium	–	–	–	–	.5	–
Summary						1-12
						2-4
						3-1

Environmental Protection Council because these have not complied with the statutory requirements on environmental impact assessment.

Presumably, a major factor which vitiated and undermined the Philippine environmental impact assessment system was the blatantly political act of key government ministers to ensure the deliberate inclusion of an administrative loophole in the system designed to safeguard the interests of some influential sectors.

In Philippine Cabinet meetings in 1981 where the proposed administrative and procedural guidelines for the EIA system were discussed, the author observed the ministerial propensity to delete from the proposed list of projects to be required an EIA those projects where it can only be presumed that they had their respective vested interests. Pollutive project categories such as textile mills, cement plants and industrial tree plantations (in the case of the Minister of Trade and Industry whose National Develop-

Table 6 – RANGES OF PESTICIDE LEVELS IN SELECTED BODIES OF WATER, 1983.

River	*PESTICIDES CONCENTRATION, MG/L*						
	No. of Samples Analyzed	*Alpha BHC*	*Gamma BHC*	*Heptachlor*	*Heptachlor Epoxide*	*Aldrin*	*Dieldrin*
Pasig-Marikina	98	0-.024	nil-.020	nil-0.012	nil-0.001	0-0.009	0-0.012
San Juan	66	0-.020	0-0.020	0-0.009	0-0.009	0-0.009	0-0.006
Tullahan-Tinajeros	37	0-.019	0-0.012	0-0.009	–	–	–
Parañaque-Zapote	56	0-.032	0-0.021	nil-0,009	–	0-0.020	0-0.001
Balagtas (Bulacan)	4	0.011.013	.011-0.012	0.006-0.007	–	–	–
San Simon (Pampanga)	10	0-.002	0-0.017	0-0.008	–	–	–
Iloilo (Iloilo)	20	0.011-.017	.010-0.013	0-0.008	trace	–	–
Jala-ur (Iloilo)	27	0.010-.017	.010-0.015	–	–	trace-.007	all traces
Jaro (Iloilo)	14	0.013-.017	.013-0.015	.006-0.008	–	–	all traces
Sawaga (Cagayan)	3	0.010-.016	.010-0.016	–	–	nil-.007	–
Wawa (Cagayan de Oro City)	4	0.014-.018	.017-0.019	–	–	all traces	–
Gibong (Cagayan)	4	0.010-.014	.012-0.016	all traces	–	all traces	–
Simulao (Cagayan)	4	0.012-.016	.014-0.016	0.006-0.007	–	all traces	–
Tuganay (Davao)	10	0.018-.020	.017-0.020	–	–	–	ni.-0.002
Tarlac (Tarlac)	4	–	.006-0.012	nil-0.009	–	all traces	–
Moriones (Tarlac)	4	0.006-011	–	nil-0.009	–	–	–
Camiling (Tarlac)	8	nil-.011	nil-0.011	nil-0.006	–	–	–
O'Donnel (Tarlac)	3	–	nil-0.014	nil-0.002	–	trace-.009	–
Porac (Pampanga)	8	nil-.020	nil-0.020	nil-0.009	nil-.010	nil-.010	–
Laganay (Camarines Sur)	9	0.001-.019	nil-0.019	–	–	–	nil-.001
Quinale (Albay)	9	0.011	–	0.003-0.008	–	.003.009	–
Gumaus (Camarines Norte)	6	0.012-,016	nil-0.013	–	–	–	–
Mulaquit (Camarines Norte)	6	0.010-.014	–	–	–	nil-.009	–
Dumaca (Quezon)	9	nil-.016	.010-0.018	nil-0.009	nil-0.006	–	–
Iyam (Quezon)	9	nil-.018	nil-0.013	–	nil-0.006	–	–
Malaking Ilog (Quezon)	9	–	.007-0.013	nil-0.009	–	all traces	–

Table 6 – RANGES OF PESTICIDE LEVELS IN SELECTED BODIES OF WATER, 1983.

River	*No. of Samples Analyzed*	*PESTICIDES CONCENTRATION, MG/L*					
		Alpha BHC	*Gamma BHC*	*Heptachlor*	*Heptachlor Epoxide*	*Aldrin*	*Dieldrin*
Ganano (Isabela)	6	0.010-.013	.010-0.015	all traces	–	all traces	–
Andalan (Isabela)	4	trace-.015	trace-.013	–	–	–	–
Diadi (Isabela)	4	0.010-.012	0.010-.013	–	–	all traces	–
Tao-Tao (Isabela)	4	–	0.010-.015	–	–	all traces	–
Mallig (Isabela)	4	0.010-.014	–	–	–	–	–
Magat (Isabela)	10	trace-.013	–	–	–	–	–
Cagayan (Isabela Province)	18	0.009-.019	0.010-.017	.005-.009	–	trace-.009	–
Malatgao (Palawan)	4	0.013-.016	–	0.011-.014	–	trace-.009	–
Teritial (Palawan)	4	0.010-.016	–	0.011-.015	–	trace-.009	–
Katabusan (Palawan)	4	0.009-.014	–	0.010-.016	–	–	–
Tuguegarao (Cagayan)	6	trace-.015	–	trace-.012	–	trace-.008	–
Dunaun (Cagayan)	4	0.010-.016	–	0.008-017	–	trace-.005	–
Parred (Cagayan)	4	–	–	0.009-014	–	0.007-.009	–
Tinurgdungar (Cagayan)	4	0.010-.019	–	0.010-.017	–	0.007-.009	–
Abulug (Cagayan)	6	0.010-.017	–	0.008-.019	–	–	–
Lanao (Cagayan)	6	–	–	–	–	trace-.009	–
NPCC standard (max. level)		0.20	–	0.020	0.010	0.010	0.005

Source: NPCC Annual Report 1983 Manila, 50 pp.

ment Company was then engaged in several export-oriented agricultural plantation projects) were all excised unceremoniously from the proposed body of administrative regulations for environmental impact assessment. Not quite satisfied with the range of projects that have been deleted already, the Minister of Energy and the Minister for Trade and Industry also insisted on the inclusion in the proposed regulations of a ministerial prerogative to recommend to the National Environmental Protection Council (the government agency implementing the EIA system) other projects that may be exempted from the statutory requirement of preparing an environmental impact assessment (Roque in NEPC, 1986).

Compounding this already patchy record of implementation was the fatal institutional failure to effect the necessary coordination required for rationalizing the oftentimes disparate environmental programs and/or environment-related activities of around twenty-two government agencies whose functions have some bearing or impact on the environment. The National Environmental Protection Council, expressly created to serve as the overall Cabinet-level coordinating body for environmental protection, met for the first (and last) time in November 1979. Several attempts to reconvene the Council in the eighties were all unsuccessful as the political, social and economic climate surrounding the Marcos regime became more turbulent. At the level of sectoral policies, bureaucratic skirmishing became more and more patent as contradictions arose in intersectoral relationships. Agencies such as the National Pollution Control Commission and the Ministry of Trade and Industry were at policy loggerheads as the Commission protested that its campaign against smoke-belching by motor vehicles ran aground because the Ministry refused to reverse its policy of importing reconditioned diesel vehicles from Japan-which were among the main agents of urban air pollution – in order to meet domestic transport needs. Even the thrust towards export-oriented agriculture began to be questioned as to the negative socio-economic resource and environmental impacts it exerted, e.g., the increasing scale of agribusiness plantation operations at the expense of the marginalization and dispossesion of the lands of rural smallholers, and the increased incidence of poisoning from the aerial spraying of pesticides (Hawes, 1987; Bello, et al., 1982).

As the Marcos regime struggled to remain in power, it became more and more obvious that its increasing preoccupation with more urgent national policy concerns (such as the growing insurgency, the massive capital flight, the contracting economy generating more poverty, unemployment and underemployment, etc.) all but overshadowed natural resource and environmental policy (except in those instances where the regime saw it fit to defend its interests). Environmental protection was passé, ready to be consigned to the dustbin of causes that the political leadership could just afford to pay 'lip service' to. And it was this unheralded waning of political commitment to environmental protection that was to be emblematic of the 'failure of nerve' of natural resource and environmental policy during the Marcos regime.

3. The appraisal of pollution control policy and its implementation

The lackluster performance of the National Pollution Control Commission in enforcing what are arguably well-intentioned pollution control policies and laws (aimed at protecting human health and mitigating negative environmental impacts on urban and rural ecosystems) cannot just then be merely ascribed to its own institutional inadequacies and constraints (such as the meager budgetary support, lack of equipment, poor personnel complement, etc.). Notwithstanding its reorganization in 1976 to make it a stronger agency, the political leadership failed to provide the necessary resources to enable it to improve its institutional capability in implementing pollution control policies. The perceived gap then between the agency's mandates and functions and its inability to carry these out resulted in a gradual erosion of its credibility. What made this very apparent indeed was the fact that the agency had formulated and adopted strict (or among the more stringent in Asia) environmental quality stand-

ards which were unevenly enforced. Aggravating this situation, too, was the political powerlessness which characterized the agency when faced with the problem of the circumvention of pollution control laws by powerful political and economic interests determined to frustrate environmental regulation, if and when these ran contrary to their primary interests and concerns. The situation became even more unfortunate as it became known that major government instrumentalities themselves (e.g., the Ministry of Energy in the case of the Calaca coal-fired power plant and the Ministry of Transportation and Communication in the Light Rail Transit project) were among the flagrant violators of environmental regulations. As far as the private sector was concerned, this setting of a 'bad' example by government agencies flouting environmental regulations was concrete proof that the government had failed to police even its own ranks. The serious impairment of the credibility of the government's environmental agencies contributed in no small measure to the undercutting of the government's environmental program.

The uneven implementation of pollution control policy has also determined the distribution of the 'social' costs of pollution. As noted elsewhere, the disturbing lack of a program for addressing agriculture-based pollution has meant that the rural populace (accounting for 70 per cent of total Philippine population) has had to bear the brunt of this policy failure.

RECOMMENDATIONS

A. Renewable forest resources

The failure of the Philippine Government to properly implement renewable resource policy during the Marcos regime then underlines the pivotal role of political, social and economic factors accounting for forest resource degradation. Viewed from the neoclassical economic perspective, it is possible to pinpoint policy deficiencies such as resource undervaluation and poor institutional capability as partly responsible for the widespread destruction and depletion of Philippine forest resources. From the standpoint of political economy, however, forest resource exploitation by powerful political and economic interests allied with the regime (as realized through the abuse of the state prerogative to allocate the right to exploit natural resources) has been amply shown to have played an instrumental role in deforestation. The general poverty and inequality of economic opportunity in the uplands (as can be gauged from the 'immiserization' of many upland families and diminishing fuelwood supplies) has then been merely reinforced by the inequitable system of access to forest resources.

These policy insights and observations, therefore, would be indicative of the character and direction of the broad policy recommendations that can be suggested. In the short, medium and long term, the failures of government policy in this sector can be realistically approached by pursuing the following modes of thought and action:

1. there must be a reorientation of government towards equity of access and the fair sharing of benefits from the use and exploitation of forest (and natural) resources;
2. the planning and use of forest (and other natural) resources must be grounded on a broad-based consensus that is democratically representative of a well-informed public (rather than an adumbration of the interests of the political and economic elite controlling the apparatus of state power). In this connection, indigenous or collaborative environmental management that utilizes the considerable fund of rural people's experience and knowledge of sustainable resource practice should be resorted to (Redclift, 1987);
3. statutory laws as well as administrative procedure governing the access to forest (and natural) resources must be reexamined with the goal of changing those which favor the rich and educated (e.g., laws which require a rather complex grasp and detailed knowledge of legal and administrative systems) while discriminating against the poor and the unschooled. Thus, the objective is to democratize resource access;

4. sufficient public pressure must also be brought to bear upon forest (and natural) resource policy formulation and implementation agencies to ensure that formulated and implemented policies are aligned with the public good and welfare (and not distorted to suit the narrow, socially undeserving interests of the elite);
5. the government must develop and institutionalize a system for the proper valuation of forest (and natural resources) and adapt the appropriate policy instruments (e.g., price and fiscal tools as suggested by Pearce in Turner, 1988) that will ensure its effective implementation of the goals of resource sustainability, efficiency and equity;
6. a strategic reappraisal of the government policy that still encourages the export of primary commodities (such as timber) must be performed in the face of dwindling fuelwood supplies, increasing domestic timber prices (a probable indicator of scarcity) and the environmental and social costs of deforestation; and
7. the institutional capability of forest resource policy and implementation agencies must be improved and enhanced for the conduct of environmental monitoring and the enforcement of forest resource regulations.

B. Pollution control

The fiasco in this policy sector stemmed primarily from the shortcomings of the political leadership not being able to provide the necessary institutional support for the implementation of pollution control policy. To complicate these further, powerful political and economic interests managed to circumvent environmental regulations and even government instrumentalities figured among those who flouted environmental policy. The sizeable gap then between policy and implementation was reflected in poor enforcement and the curious absence of a program addressing agriculture-based pollution.

But even the marked decline of political commitment to the cause of pollution control and environmental protection by the national leadership was further aggravated by the general public apathy concerning environmental protection. The poor awareness of environmental problems by the public, the marginalizing effects of widespread poverty and unemployment, as well as the repressive political climate were all contributory in ensuring that pollution remained largely a peripheral social concern which the few environmental pressure groups barely managed to sustain before the public. Juxtaposed against the fact that pollution was exerting negative environmental impacts on increasing numbers of people in both urban and rural society (particularly the urban and rural poor), it is remarkable indeed that pollution issues and problems hardly became political flashpoints for the Marcos regime. Perhaps, these can be attributed to the conspicuous lack of political and economic clout on the part of those affected relative to the regime.

The 1986 change in government has presented various opportunities then for rectifying these failures in this policy sector. Based on the previous understanding and insights afforded by the appraisal of pollution control policy and its implementation, several policy recommendations can be set forth, as follows:

1. sustained political commitment by the national leadership to pollution control and environmental protection as a basic national policy goal must be a *sine qua non* in environmental policy formulation and its implementation. This has to be concretely expressed by the state in such actions as the provision of the requisite institutional and organizational support to environmental agencies and/or the decentralization of regulatory environmental control to local government units that can more effectively administer these;
2. The mobilization and deployment of public opinion and pressure in the political legitimization of environmental policy goals and actions must be encouraged by both concerned government as well as non-government organizations (e.g., environmental pressure groups); and

3. The consideration of what appropriate policy instruments to employ (e.g., economic incentives, direct regulation, persuasion/information and collective or community action) in achieving pollution control (and other environmental) policy objectives must take into account not just economic efficiency but other equally valid criteria as well, such as distributional equity, political feasibility and acceptability and effectiveness (Rees in Turner, 1988).

Invariably, these proposed policy recommendations pertaining to both the natural resources and environmental protection sectors call for a fundamental rethinking of the philosophy, values and ideology that have underlain the formulation and implementation of natural resource and environmental policies during the Marcos regime. Moreover, it also presupposes that while the 'enlightened technocentrist as environmental manager' has a proper role to discharge in tackling environmental-cum-developmental problems (O'Riordan and Turner, 1983), the peculiar social, economic and political conditions that are often at cross-purposes with natural resource and environmental policy must also be the object of needed structural changes that could be effected under the current government.

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ECOLOGICAL PROFILES: A NEW APPROACH TO INCORPORATE ENVIRONMENTAL CONSIDERATIONS IN LOCAL DEVELOPMENT PLANNING AND DECISION-MAKING*

REYNALDO P. ALCANSES

INTRODUCTION

Environment and Development

Man obtains a wide variety of resources and amenities from the environment. Although finite in nature, these resources are under continuous pressure to satisfy the growing needs of human population. The greater these needs are, the greater the degree to which the resource demands must be coordinated and regulated in order for the environment to function effectively and sustainably. This dictates the necessity for including environmental considerations in development planning.

Ecological assessments and environmental studies are therefore regarded as unavoidable starting points which planning and policy-making bodies use as bases for the formulation of land management programs, land use policies, pollution control measures, resources conservation, urban and regional planning and other development activities. An objective environmental study generally enables planners to anticipate the type of development controls necessary in the planning of an area. In this context, development planning refers to the "control and regulation of reciprocal influences, actions and exchanges between the environment and human societies at the different levels of social concerns; from villages to cities through the level of the biosphere".[1]

There are at least three major reasons for incorporating environmental considerations in development planning, namely: the unity of ecosystems functioning in the development of natural resources; the suitability and unsuitability of natural resources to certain forms of development and to certain types of development practices; and the protection of unique, sensitive and important ecosystems.

The use of ecological (or ecosystems) approach in development planning constitutes the essential tool in reconciling the demands of development and the need to protect the environment. The use of ecological principles in planning enhances the goal of development by evaluating compatible use options while anticipating the effects of incompatible ones. This enables planners to present to decision-makers the possible trade-offs between short-term benefits and the use of natural resources for sustained productivity.

The decision to use natural resources for development must be guided by an interplay of two very important factors, namely: the identification of natural constraints which might endanger a particular type of development, and the discovery of environmental opportunities where conditions are usually favorable for particular kinds of development activities. A third factor which is beyond the scope

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[1] Oliver Goddard, "Environment and Development Planning: Methodological and Institutional Aspects". *Regional Seminar on Alternative Patterns of Develop- in Asia and the Pacific Region* (Bangkok: ESCAP-UNEP, August 1979), pp. 3-11.

of this paper is the prediction of environmental impacts or the likely consequences of a proposed action.

Constraints are the limitations of the environment or certain conditions that pose limits to proposed actions. Environmental opportunities (viewed in relation to the area where the proposed action will take place) include the discovery of the many different ways an area can be used including the intensity of its uses. A distinguishing characteristic of the environmental opportunities approach is its capability to discover the present and potential value of an environmental condition for one or more uses.

Environment and the Present Philippine Development Policies

Incorporating ecological and environmental considerations in Philippine development planning is not a new experience. Most development-oriented agencies, especially those devoted to natural resources development, have considered environment in their approaches to development. Although in many cases, the approaches seem to be fragmented, sectorally oriented and less comprehensive, these attempts have somehow improved the national concern and perspective on the environment.

In general, the Philippine Development Plan (1983-1987) has outlined a two-pronged strategy for natural resources and development.[2]

> "The attainment of a balanced economy emphasizing increased agricultural production, trade diversification and rationalization, the transformation of existing energy structures, and the proper management of natural resources and the environment. The equitable access to social development opportunities through the enhancement and integration of human resources in nation building."

The major economic and political development for the past three years has somehow made the country's development planners at the national policy making levels reassess their proposed development goals. These development redirections have found expression in the revised Philippine Development Plan which was drafted in 1985. In this document, the emphasis is on the integration of symbiotic activities in agriculture, industry and services.

At the regional level, the major objective of the region's development strategy has been set at the "full exploitation of the region's development potential through the allocation of investments, the provision of income and social amenities in the lagging regions, and the strengthening of the capacity to utilize natural resources more effectively."[3]

The incorporation of environmental concerns in the country's national and regional development strategies is expressed in the statement of development goals using the resource and conservation principles. This is focused on three areas: land management and disposition, agricultural development and reforestation, and forest conservation.

Local Responses to the Need to Incorporate Environmental Considerations in Local Development Planning and Decision-Making

Traditional development planning may be defined "as an organized and continuous process of supporting the formulation and implementation of a development policy".[4] In most developing countries, this has been carried out notwithstanding the duplication of functions at the sectoral level and the cross-duplication of functions at the local level by a number of national government agencies. In the Philippines, development planning is spearheaded by at least three large national government agencies: The National Economic Development Authority (NEDA), the National Council on Integrated Area Development (NACIAD), and

[2] *The Philippine Environment Report 1982.* The National Environmental Protection Council (Quezon City), pp. 54-56.

[3] National Economic Development Authority (NEDA) *Five Year Development Plan, 1983-1987* (Makati, October 1982), p. 23.

[4] Ing. Jan de Vos, "New Developments in Land Use Planning", Integrated Resources Survey and Management, (December 1980).

the Ministry of Human Settlements, particularly the Human Settlements Regulatory Commission (HSRC).

Planning has to do with the guiding and control of growth of a community of whatever size. At present, there is a need to incorporate environmental considerations in land use planning in order to provide decision-makers with sufficient information on the impacts of certain types of development and land uses on environmental quality. The basis of this shall be a comprehensive evaluation of the potentials for and constraints of a planning area to certain types of land use activities or certain development decisions.

Duplication of functions does not become apparent until planning decisions trickle down at the local level where policies implemented cross with one another. While at the national level, the government may be promoting goals and policies applicable to the nation but this may not always suit local aspirations. In a number of cases, government policies applied to local level may appear to intrude upon local aspirations. This is true in cases where natural resources are at stake for development uses. The economic importance to local livelihood of natural resources somehow points to the necessity for relating development uses to its overall impacts. Uncontrolled resource use will become a concern only when the impacts have already been felt. For example, a certain town may not be aware of the adverse impacts of river bed quarrying on a bridge nearby until the latter collapses as a result of eroding foundations.

Because of this, remedies to environmental problems created by resource use are in most cases "mitigative" or remedial rather than anticipatory. From an ecological standpoint, however, environmental impacts such as these only show that the environmental problems have reached a critical stage and that the lack of knowledge on environmental impacts of prospective development projects has resulted in expensive and wasteful mitigation.

If it is assumed that the issue of integration of environment in the development process should initially come at the municipal level, then the land use planning goals and objectives of the Human Settlements Regulatory Commission appear to sufficiently focus on environment. It explicitly provides as a development goal that of encouraging the "full awareness and understanding of environmental effects of implementation of our actions on land to the present and future generations".[5] The specific objectives for land use planning include the "conservation of productive agricultural lands, forests, mineral lands, through good management and protection from damage from conflicting uses".[6] The specific environmental objectives for land use planning include the following: protection of water quality; maintenance of the integrity of wildlife in lakes, recreation areas and rivers against over-use; balanced recreational opportunities through the allocation and best use of natural areas; protection of existing fish and wildlife habitats to ensure their preservation and integrity as an essential part of the environment; provision of the opportunity for enjoyment and maximum best use of wildlife resources; and the protection of sites with exceptional topography, scenery, ecological and historical features. In the frontispiece of any typical town plan, it is explicitly stated that as a policy, "environmental impacts of any proposal in this plan" (The Land Use Plan Document) shall be assessed. Among the fundamental proposals for environmental protection and quality is the orderly utilization of land resources in terms of their compatibility and suitability matrices.[7]

Environment and natural resources in any typical town plan are essentially depicted in thematic maps of slope, geology, surface water (coastal areas, lakes and rivers) groundwater, (in unique cases, natural risk areas) forests and agricultural lands. The environmental quality of these resources is usually not considered although certain planning standards are included in the document. The allocation of spe-

[5] Human Settlements Regulatory Commission, "Town Planning Guidelines" (Makati, Metro Manila: May 1982).

[6] Ibid, p. 16.

[7] Municipality of San Nicolas, Town Plan, 1985-1994. The Municipal Planning Team, (January 1985) pp. 6-11.

cific land uses in the plan itself essentially lacks the rationale as it relates to the overall prospective land uses of the entire municipality.

Although the proposed land use plan provides the comprehensive spatial integration of specific land uses, (i.e. the built-up areas, forests and watershed reservations and agricultural lands), it does not provide the rationale for relating the proposed standards with the spatial allocations of the plan. In spite of the fact that the plan is at the municipal level, specificity is usually lacking, particularly in terms of recommendations concrete enough to tackle identified environmental problems (especially ecological problems).

The Human Settlements Regulatory Commission has produced volumes upon volumes of maps of the physical and socio-economic characteristics of each of the provinces in the Philippines.[8] In a much smaller scale are the regional maps, although limited in major characteristics, like growth centers, prime agricultural lands, and road networks. These materials are to a certain extent useful for planning purposes and project development at the provincial level.

Statement of the Problem

Upon an examination of policies which government agencies have so far tried to implement, it can be seen that basic gap exists in the policy pronouncements, planning and planning recommendations with regard to the necessity to integrate environmental considerations in planning and decision-making. This conclusion is borne out of the following observations.

1. The fragmentation of sectoral functions of national government agencies concerned with the environment tends to diversify planning approaches and miss an essential integrating element.

2. Because of the diversity of approaches and methodologies, there is a vast divergence in data collection, methodologies and formats for presentation and evaluation.

3. The country's present methodology for land use planning especially at the local (provincial and municipal) level, although explicit in promulgating environmental quality standards for major development activities, lack an integrating rationale for relating these standards in terms of the spatial allocation of the plan.

4. The fourth problem is related to the above. Because of the lack of an adequate spatially-based instrument for evaluating environmental quality, for identifying potentials and constraints of major land use activities and for identifying environmental impacts, there is an equal lack of basis for making decisions with regard to the improvement of environmental quality.

In response to the problems cited above, this study shall evaluate the possibilities of a new and innovative approach namely the Ecological Profile Methodology to serve as an integrating mechanism to incorporate environmental considerations in planning and decision-making.

Scope and Objectives

The objective of the study is to develop a methodology for incorporating environmental considerations in local development planning and decision-making. More specifically, the study seeks to:

1. Introduce and evaluate the results of the case study for Ecological Profile of Cavite Province as an illustrative example of evaluating environmental quality translated to decision maps that can be used to prescribe environmentally acceptable planning recommendations;

2. Apply the results of the ecological and environmental quality evaluations of Cavite Province to specific development issues confronting the province's development in an integrative manner;

3. Evaluate the usefulness of the methodology as applied to Cavite using the following criteria: adaptability to local planning and decision-making, cost-effectivenes, flexibility, simplicity of presentation and data requirements and usefulness to local planning activities; and

[8] See for example HSRC's Provincial Atlases for each of the Province in the Philippines.

4. Formulate an alternative model using the Ecological Profile Methodology as a tool for incorporating environmental considerations in local development planning and decision-making.

The most important contribution of this study in the field of regional development planning is the presentation of a rational, comprehensive and spatially-based methodology to evaluate and examine environmental quality, using the concept of *sustainability* (the management of resources aimed at ensuring maximum sustainable benefit for the present and future generations)[9] as a rationale for the use of natural resources.

The ecological profile methodology was developed by a team of environmental specialists from the NEPC as an answer to the problem of how ecological considerations can be integrated in development planning and decision-making. Development planning within the context of this study involves the Integrated Area Development Project Areas managed by NACIAD while decision-making involves the provincial governor who implements selected projects prioritized by the IAD Framework Plan.

The general features of the methodology are described in detail providing a step-by-step procedure on how to apply the methodology for a specific planning sector from the evaluation of the data base including the provision of planning recommendations based on the results. The Cavite Ecological Profile was summarized per sector illustrating the basis for decision-making, given three real development issues confronting Cavite Province: the Cavite Friar Lands Irrigation Project, the Coastal Zone and Tourism Management, and the Watershed Preservation. The ecological profile was used to highlight the interplay of ecological factors in order to arrive at a better decision regarding the issue.

Finally, an institutional framework is proposed using the existing government structures for planning and decision-making as basis so that the methodology can be applied at the different planning levels and sub-systems, more specifically at town planning level.

Ecoprofile versus Thematic Mapping

Thematic Mapping is broadly similar to Ecological Profiling in that both approaches present geographic-based information (in the form of maps) as the final output. Thematic maps, however, are used to describe only a single characteristic or theme, such as rainfall patterns, soil types, or geology on map forms. Ecological Profiles, on the other hand, represent the spatial characteristic of environmental quality which integrate the necessary data bases as components (including, if necessary, thematic maps) into a single spatially-based decision-making instrument, the "eco-profile". In short, thematic maps are simply geographic-based translations of data bases of single parameters, while several parameters are needed to compose the ecoprofile for a given sector.

General Components of the Ecological Profile Methodology

As an independent approach, the ecological profile methodology has the following general components:

Inventory — defined as a systematic baseline assessment of the natural conditions, present land uses, and trends of growth and expansion including their intensity and direction.

Qualitative Evaluation — assessment of key or important environmental sectors that play crucial roles in the regional and sub-regional development. In many cases, the major environmental sectors are those natural resources that play important roles or are related to important economic activities such as coastal water quality for fisheries, and soil or land quality for agriculture.

Mapping — the translation of spatial characteristics into maps as key instruments. They represent degrees of quality, availability, significance, constraints or potentials, severity or

[9]Richard A. Carpenter, "Using Ecological Knowledge for Development Planning", East-West Center Environment and Policy Institute. (Honolulu, Hawaii, USA, 1979).

intensity of use or fitness or appropriateness for certain uses.

Planning Recommendations – Prioritized recommendations are provided after each ecological sector has been comprehensively evaluated which take the form of terms of reference for planning decisions, project implementation or action projects, regulatory measures, protection and conservation and others. The rationale for integrating is also considered and included.

The more important applications of Ecological Profiling include the provision of guidelines for environmentally sound development programs, decision-making and for project implementation. These include recommendations or specific action projects, the need for the preservation of natural resources and the enhancement of environmental quality.

To address the integration problem, the methodology is *planning-oriented,* i.e., the evaluation of natural resources is inputted to planning decisions. It is also *pragmatic and flexible* in the sense that if hard (field collected) monitored data is not available, suitable factors and indicators can be used in the evaluation. The pre-evaluated maps are the main outputs. These maps may be refined and detailed as more field or primary data and information become available.

Procedural Features of the Methodology

The basic procedural features of the methodology are the following: (Please refer to Figure 1: Ecological Profile Methodology)

Defining Environmental Quality

The initial phase of the methodology involves a suitable description of the "environment" of a province in its regional context, its external influences, intrinsic environmental quality as related to its natural features (soils, climate, topography, geology, hydrology, etc.) the influences of the present trends of development on existing environmental conditions, and the projection of the future environment in relation to the present development trends.

In particular, the following constituents help define environmental quality: scientific knowledge of environment and ecology, specific environmental conditions of the province and the Philippine Environmental Impact Assessment System,[10] particularly the definition of environmentally critical projects and areas. Based on these, socio-economic problems and their relationships to environmental quality become evident. In Cavite Province for example, the available resources such as water and lands are intensively used resulting in adverse environmental impacts. The ecological issues relevant to Cavite's landforms as described (Figure 2 – Major Environmental Issues in Cavite Province) include those related to urban development, agriculture, settlement and resettlement, tourism, industrialization and natural hazard risk areas. Here, the focus is on the multi-dimensional human activities and the resulting changes in environmental quality.

Operationalization by Breaking Down Environmental Sectors into Sub-Sectors, Components and Indicators

Operationalization and data gathering are closely related. Operationalization of each sector means its breaking down into subsectors, main components, main factors and indicators based on existing data and information. Factors are sub-units or elements that would describe the intrinsic quality of a given sector, while indicators are parameter sets to define given sectors. Factors are sometimes values or standards such as biophysical standards, while indicators are sets of parameters taken together to describe an *index.*

An example of the basic subdivision into sub-sectors and main components is that of the water sector which is further subdivided into fresh and coastal marine waters. On the other hand, the main component of the sub-sector

[10] Alcances, R.P., Anderson, M.B. and Supetran A.D., *Environmental Impact Assessment Handbook,* Quezon City, National Environmental Protection Council, November 1985.

FIGURE 1. ECOLOGICAL PROFILE METHODOLOGY

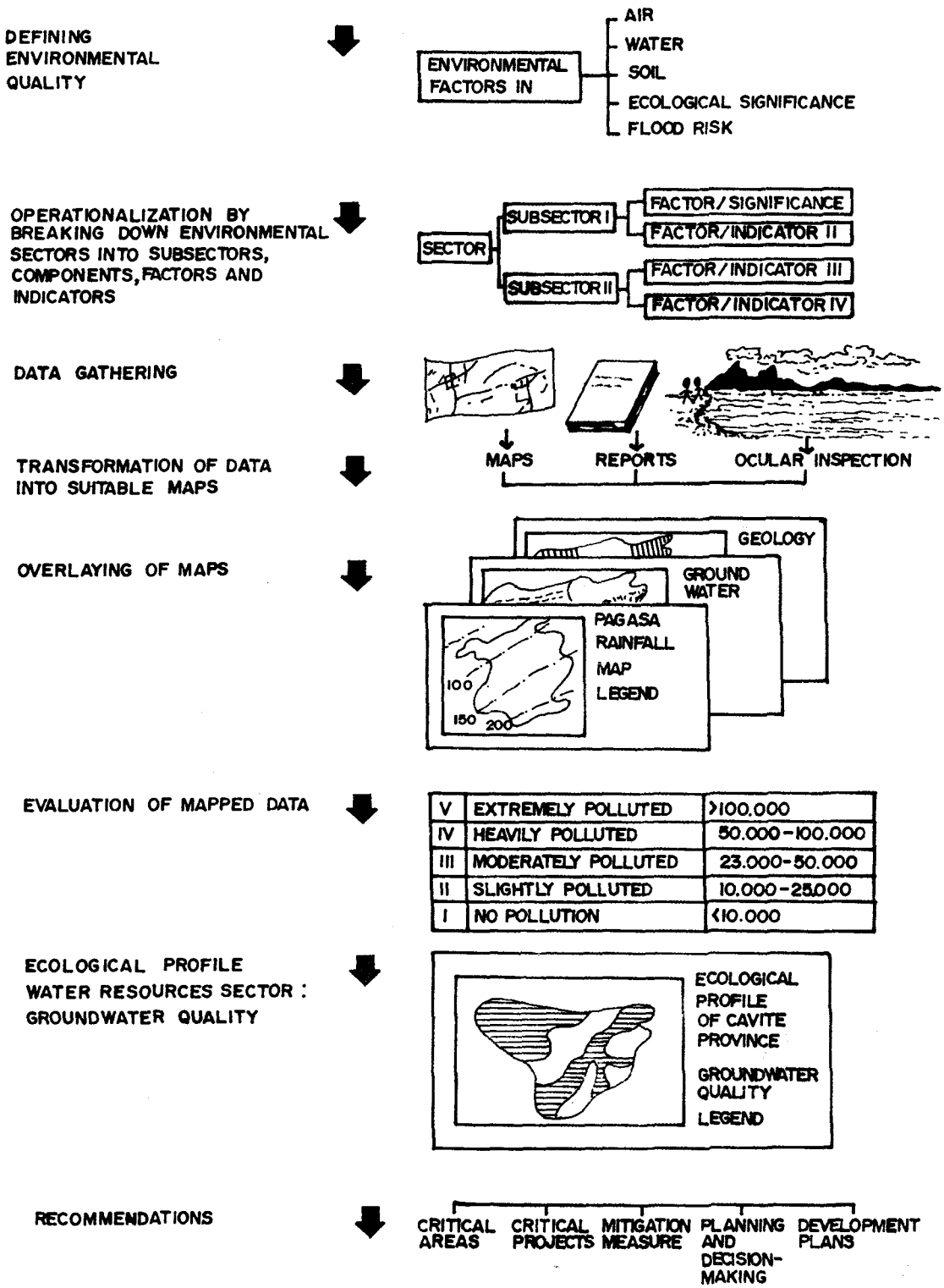
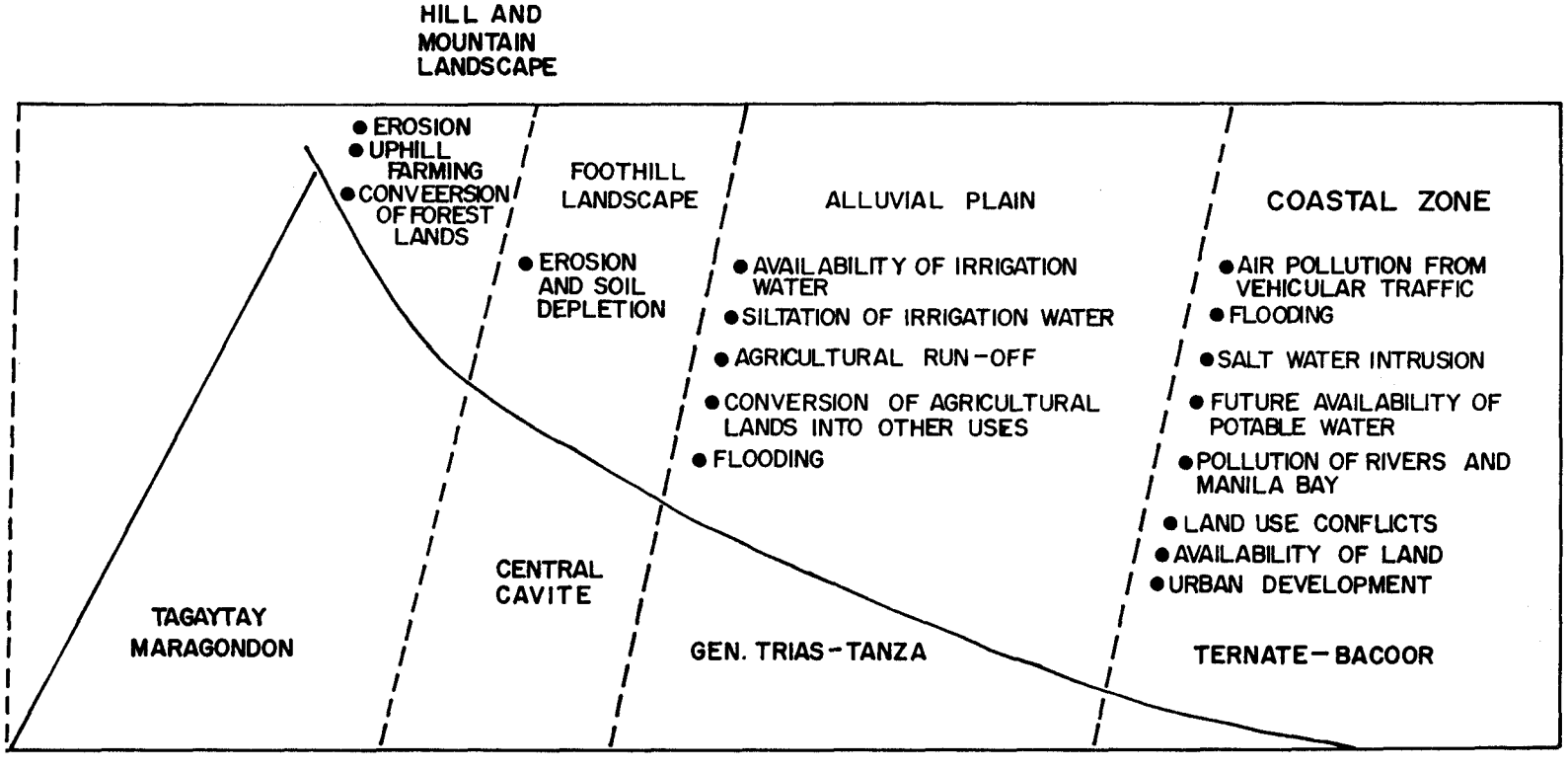


FIGURE 2. MAJOR ENVIRONMENTAL ISSUES IN CAVITE PROVINCE



Source: Adopted from Table 2.1 Major Environmental Issues in Cavite Province.

groundwater are quality, quantity, availability and susceptibility to the intrusion of pollutants.

The sector on Natural Hazard Risks area is further subdivided into geologic hazards and flood (inundation related) hazards. These are, in turn, subdivided into components namely earthquakes and volcano eruptions for geological hazards and coastal or tidal storm surge and river-runoff for flood hazards. (See Figure 3 – Operationalization of Sectors into Factors and Indicators).

The more elaborate subdivisions for factors, sectors and indicators is illustrated by the Ecological Significance Areas. The areas are further subdivided into terrestrial (land based ecosystems) and aquatic (marine ecosystems) which is further classified into coral reefs areas, marine algae communities and fisheries.

Once these subdivisions have been completed, a selection is made with regard to the sub-sectors and components relevant to the study area. For example, with regard to geologic hazards, volcanism is more relevant than earthquakes while for the sub-sector marine ecosystems, the coral reef component is more relevant than either marine algae or fisheries. (See Figure 3 – Operationalization of Sectors into Factors and Indicators).

Data Gathering

The identification of relevant data as well as its usefulness depends largely on the operationalization of the identified sector. When the identified sector is subdivided into factors, some important aspects of the data are considered at once. These are the relevance and availability of the identified data needed and the usefulness of the form or format of the available data.

The transformation of data into suitable indicators allows the practical use of all available data and information at all levels of availability. The "environment" of a given sector is defined based on important indicators that comprehensively describe its quality and relevance to planning decisions. To illustrate this, the evaluation of the different environmental sectors uses a variety of indicators from environmental quality standards to the variety of arbitrary standards set by government agencies based on certain characteristics of the environment. For example, the evaluation of water quality for major rivers may be based on a comparison of land use (the degree of inflow of organic and inorganic pollutants) or the self-purification capacity of the rivers expressed as dissolved oxygen used for oxidizing water pollutants (about 5 mg/liter available oxygen) and the River Classification Standards for Water Quality by the NPCC. (See Table 1 – Surface Water Quality Classification and Specifications).

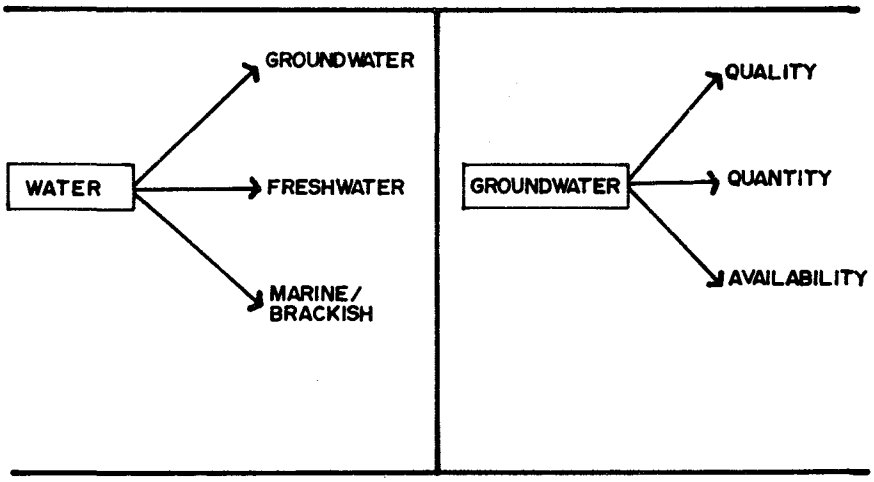
The agricultural sector, to cite another example, utilizes a less restrictive indicator set. *Physiographic indicators* essentially provide an idea of land quality based on the prevailing topography and certain natural potentials and constraints as indicated by soil types, general terrain and existing vegetation.

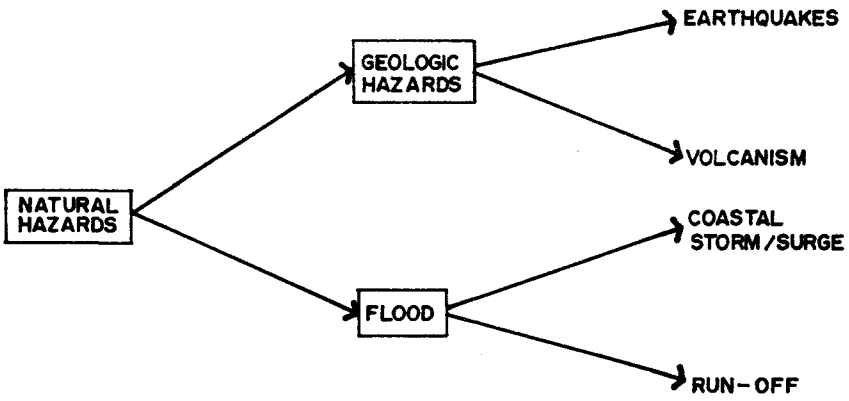
As a final example, selecting the appropriate indicators, particularly for site potentials for high density human settlements development may be based on the evaluation of the availability of amenities and services, proximity to existing or proposed pollutive or highly pollutive industries, and extremes of natural constraints (availability of groundwater), development impetus (proposed for planned development) and functions. Suitability is then based on the ranking of the areas in relation to these given indicators (See Figure 4 – Framework for Selecting Areas Appropriate for Human Settlements Development).

Mapping of Data

Before the decision to map relevant data is considered, a base map using an appropriate scale is necessary. The most appropriate scale for base mapping at the provincial level and according to acceptable standards for map scale is 1:100,000. (See Table 2 – Principal Types of Surveys and Their Components). For municipal mapping, a map scale three to five times larger is appropriate. All the other maps used in the overlays are either enlarged or reduced to this scale. The base map is then used as a benchmark guide where overlaying with transparent copies of the thematic maps could

FIGURE 3. OPERATIONALIZATION OF SECTOR INTO FACTORS AND INDICATORS





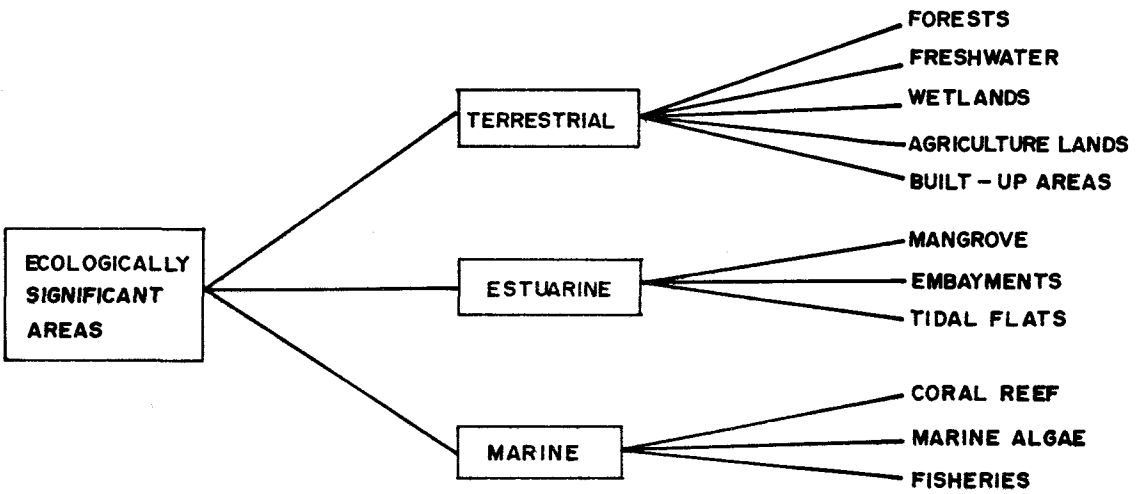


TABLE I SURFACE WATER QUALITY CLASSIFICATION AND SPECIFICATIONS

Surface Water Quality	Classification	NPCC Classification	SPECIFICATION			
			Biological Status	Industrial/ Domestic Pollution	Agricultural Pollution	Use Function
V	Extremely Polluted	E	Biologically "Dead" Waters of Aerobic Type	Extreme		-Navigation -Direct contact must be avoided -Health Risk
IV	Highly Polluted	D	Severely disturbed freshwater of aerobic type	High		-Navigation -Industrial use with limited water quality requirements
III	Moderately Polluted	C	Slightly	Moderate	Moderate	-Potable water supply with purification -Recreation -Aquaculture -Livestock -Irrigation
II	Slightly Polluted	AB	Undisturbed ecosystem with rich aquatic life	Slight	Slight	-Portable water supply with purification -Aquaculture -Livestock
I	Not Polluted	AA	Undisturbed ecosystem with rich aquatic life	None	None	-Potable water supply -Recreation -Aquaculture -Livestock -Irrigation

Source: Integrating the Surface Water Quality Evaluation Matrix and Tables Ecological Profile of Cavite Province NEPC-NACIAD May 1985

FIGURE 4. FRAMEWORK FOR SELECTING AREAS APPROPRIATE FOR HUMAN SETTLEMENTS DEVELOPMENT

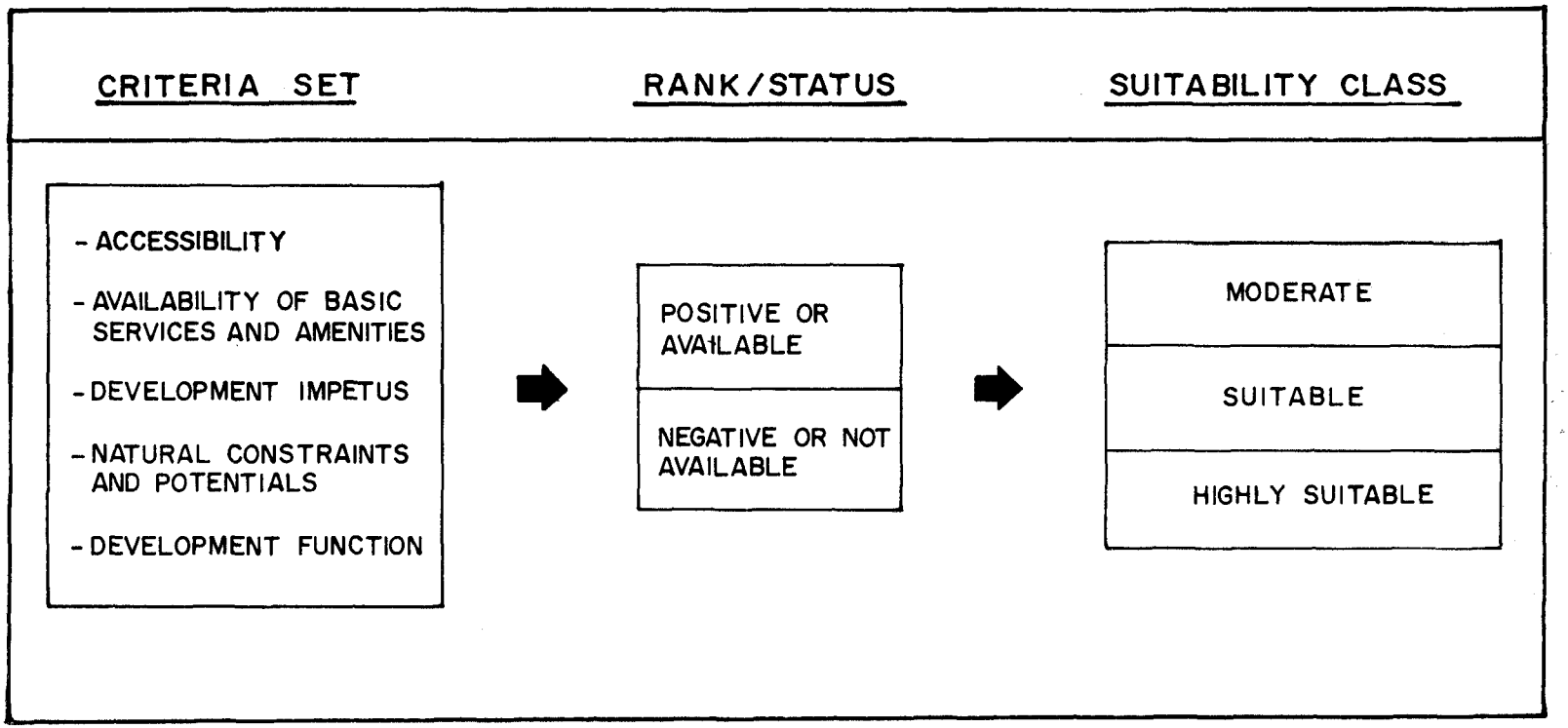


TABLE 2 PRINCIPAL TYPES OF SURVEYS AND THEIR MAJOR COMPONENTS

Hierarchy of Subsystems	Survey Type & level of land suit. classific.	Objective	Map Scale & Remote Sensing Techniques	Agro/ Ecological Zones	Land Units	Land Use	Markets	Infra-structure	Population	Economic
World example: Asian region ESCAP region	Broad exploratory	Broad inventory Qualitative land evaluation	:: 1,000,000 – 1:10,000,000 Meteo-Sat Landsat Sea-Sat	Agro/ecol. zones "	Major landscape units Geological information Soil map of world	Major kind of land use	World location demand/supply	Communication Transportation	Ethnic groups Density Distribution	World Economy Analysis for prospective sector "planning"
National example: Philippines Indonesia Malaysia	Exploratory Order	National inventory of Human & natural resources Qualitative land evaluation General economics	1: 100,000 – 1: 5,000,000 Meteo-Sat Landsat Side Looking Radar (SLAR)	Agro/ecol. zones and climatic hazards	Major landscape units Soil and other natural resources information	Major kind of land use	National location demand/supply	Communication Transportation Service centres Schools, etc.	Ethnic groups Tribes Density Distribution Employment in sector	Analysis for prospective and mid term national and sector planning
Regional example: large islands provinces	Reconnaissance Suitability class	Regional inventory Qualitative land evaluation General economics	1: 100,000 – 1: 500,000 Earth Resources Sat. Small Scale A.P. SLAR	Agro/ecol. zones and environmental factors limiting production	Major landscape units and major land forms "	Major kind of land use	Regional location demand/supply Nature of merchandise	Communication Transportation Service centres Schools, etc.	Tribes Density Distribution Employment in sectors	Regional Economic and/or sector analysis Market prospects Rural planning
District Island	Reconnaissance Semi-detailed Suitability subclass	Quantitative land evaluation and economic appraisal Feasibility studies	1: 25,000 – 1: 100,000 Medium Scale A.P. Small Scale A.P. SLAR	Climatic hazards (risks) "	Detailed land forms and soil map	Land utilization type	District location demand/supply Nature of merchandise Local prices	Communication Transportation Service centres Schools, etc.	Tribes Density Distribution Employment	District Economic Multi sector analysis Rural and settlement planning Market prospects Cost benefit Analysis of development projects
Sub-district Island	Semi-detailed Detailed Suitability subclass	Quantitative land evaluation and economic appraisal Feasibility studies	1: 25,000 – 1: 100,000 Medium Scale A.P.	Climatic hazards (risks) "	Detailed land forms and soil map	Land utilization type	Location Commodities Nature of merchandise Local prices	"	Density Distribution Groups of farmers	Land use and settlement planning Employment
Village	Detailed Suitability unit	Quantitative land evaluation and economic appraisal Feasibility studies	1: 5,000 – 1: 25,000 Medium and large scale A.P.	Climatic hazards (risks) "	Land form elements "	Land utilization type	Location Commodities Nature of merchandise Local prices	"	Groups of farmers	Farm and village planning Employment
Farm	Very detailed Suitability unit		1: 1,000 – 1: 5,000 Large Scale A.P.	Climatic hazards (risks) "	Land form elements "	Land utilization type	Location Commodities Nature of merchandise Local prices	"	Farmers	Farm planning Family labour

Source : Jan De Vos, "New Developments in Land Use Planning Integrated Surveys and Management. Proceedings, Manila. December, 1980.

be done. The results of the overlay are redrawn on the base map and later enhanced based on the other available data and the results of the planning evaluations.

Overlaying of Maps

This refers to the combination of different data sets and information on maps in order to gain a comprehensive insight of the given area. The degree of accuracy for the overlaid information depends on the availability of information on maps using the same scale. If the maps with different scales are to be overlaid, prior transformation to similar scales is necessary.

For the agricultural sector, a variety of maps are available to determine the actual and potential suitability for cropland. Three sets of overlays are possible. (Figure 5 – Agricultural Resources Overlay Method). By overlaying land capability with land suitability maps for cropland, a generalized land suitability feature map for crops use may be derived. The result is the land resources potential composite map. If the land resources potential composite map is further overlaid with the existing land use map, the result of the overlay will provide a picture of the land resources potential vis-a-vis the prevailing or actual land use. The third set of overlay includes all the other environmental constraints ranked according to their suitability or unsuitability for cropland use.

Evaluation of Mapped Data

All evaluated data and results are transformed into a uniform scale whose characteristics have been defined and described in terms of their planning relevance. Very high planning relevance ratings are given to sectors whose resource quality is significant both within and outside the region. Evaluation and mapping are limited to the pre-evaluated environmental factors and mainly consider the following: (See Table 3 – Guidelines for Evaluation).

Planning Relevance – the importance of the results to sub-regional, regional and municipal planning activities.

Resources Quality – the characterization and evaluation based on environmental quality.

Pollution Level – the level of degradation of the resources especially those brought about or related to uncontrolled human activities. The evaluation is based on existing environmental quality standards.

Each environmental sector is evaluated and rated on a five point scale. The characteristics of the scale are defined where the highest include those having extreme conditions.

The Completed Ecological Profile

The Ecological Profile for the given sector, (Map 1 – Agricultural Resources Potential for example) is a properly scaled and labeled map describing salient features of the results of the evaluation through the use of a five-point evaluation scheme and appropriate color guide (or black and white screen) for choropleth. The significance of these results in the planning decisions as well as appropriate planning recommendations are also included in appropriate sections of the report.

ADVANTAGES OF THE ECOLOGICAL PROFILE METHODOLOGY

The Ecological Profile of Cavite Province was started in January 1984 and completed in May 1985 and conducted as a response to NACIAD's policy of integrating environmental considerations in the planning of IAD Projects. The natural resources units and their boundaries were all mapped out so that the evaluation of environmental quality was the result of a series of overlays and in some cases, the inclusion of other factors.

Adaptability to Planning and Decision-Making at the Local Level

Ideally, ecological profiles should be the basis for ecologically sound land use planning, particularly in the case of provinces which do not yet have a land use plan. The areas where the results can be considered, however, are of sectoral concern; for example, the preservation of critical forest and watershed areas. In many

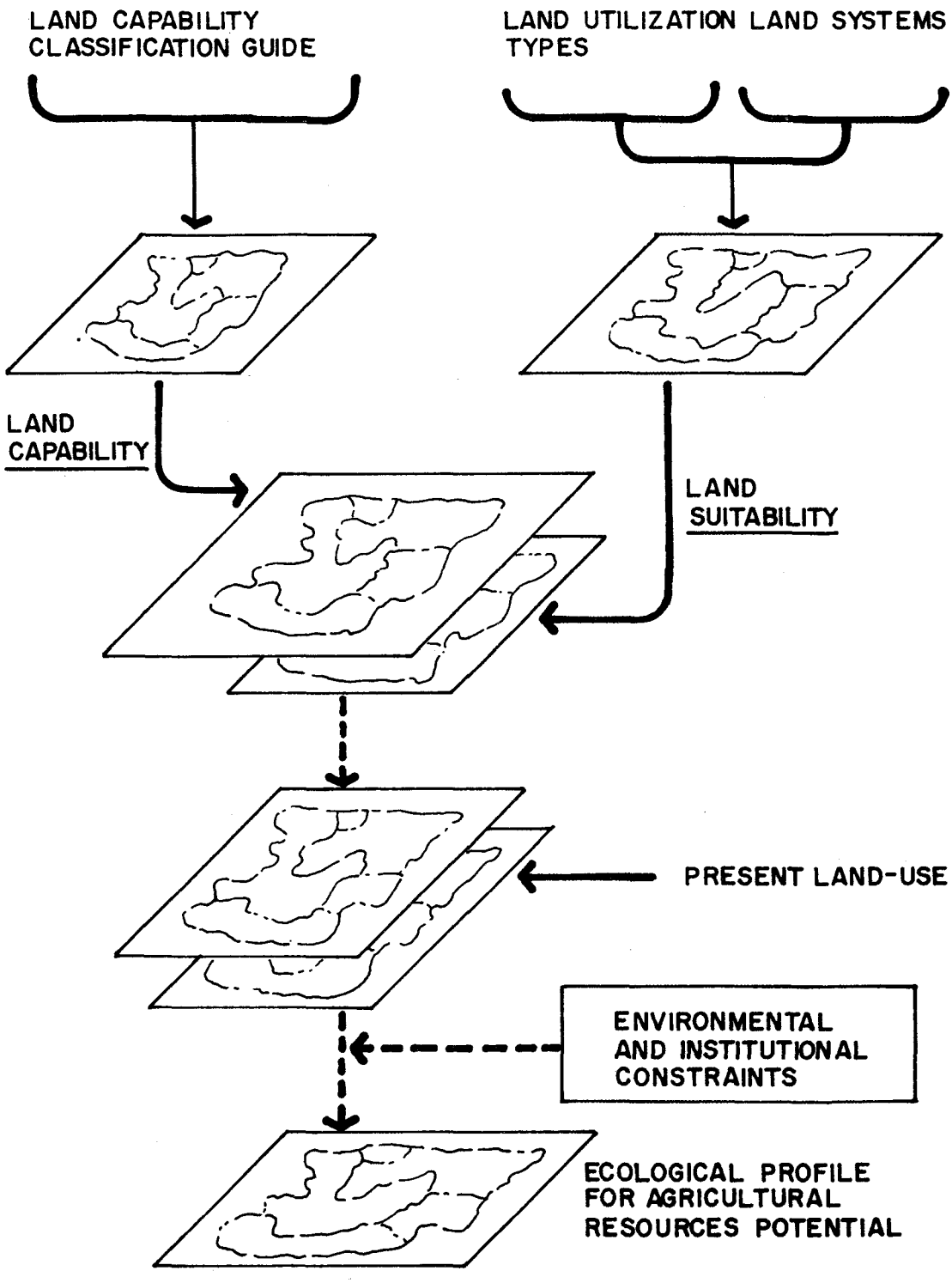
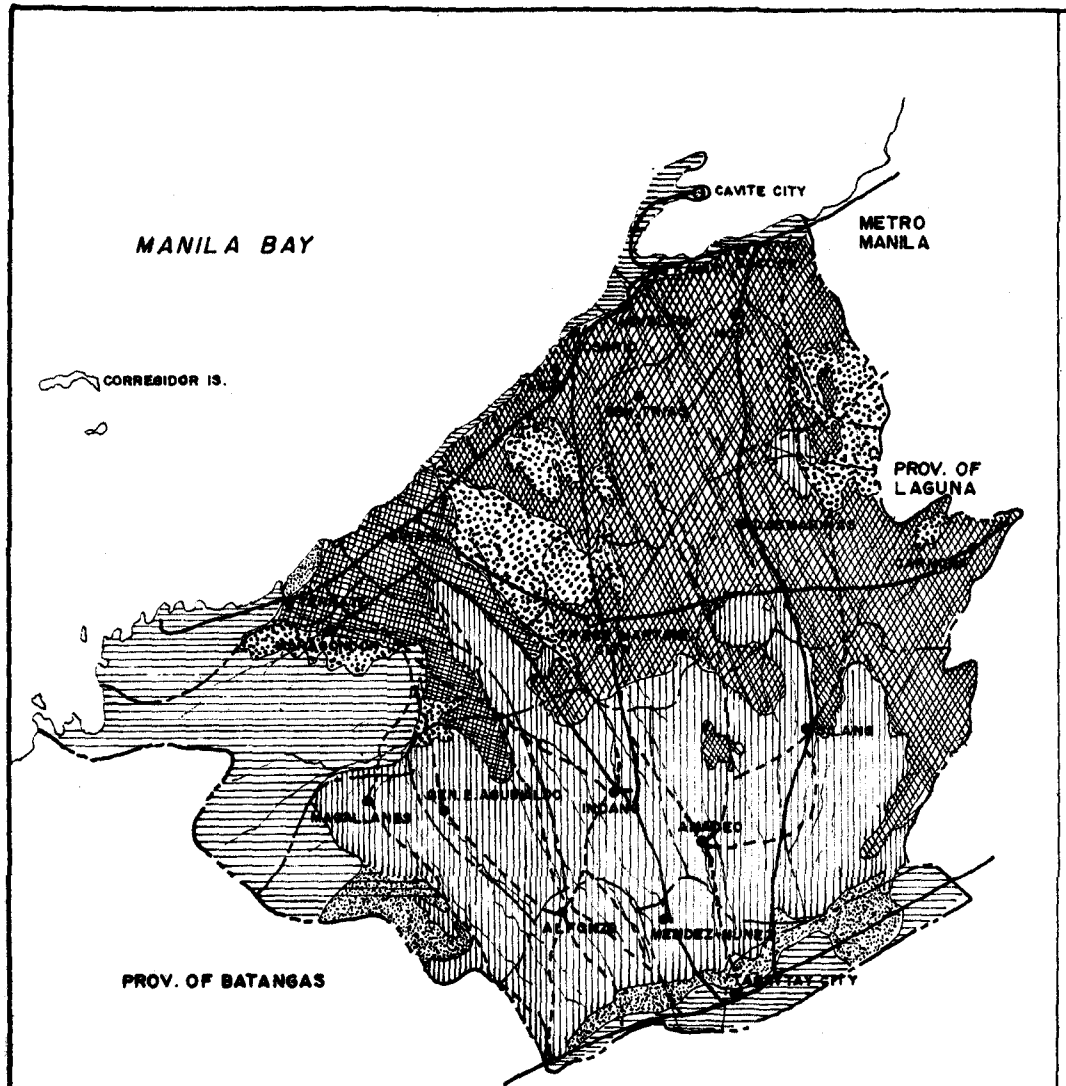


FIGURE 5. AGRICULTURAL RESOURCES OVERLAY METHOD

EVALUATION CLASS(Index)	PLANNING RELEVANCE	RESOURCE QUALITY	POLLUTION LEVEL	SPATIAL IMPORTANCE
V	Highest Planning Relevance;Factor considered for. further ecological studies	Important Natural Resources with highest quality	Very High Pollution	OF NATIONAL IMPORTANCE
IV	High Planning Relevance Factor must be considered	Natural Resource with high quality	High Pollution Level. with considerable impacts	OF PROVINCIAL OR REGIONAL IMPORTANCE
III	Planning Relevance exceeding the local level	Natural Resource with moderate quality	Moderate Pollution with slight impacts	
II	Minor Planning Relevance, usually local level	Natural Resource of low quality of local ~~importance~~	Low Pollution with negligible impacts	OF LOCAL IMPORTANCE
I	No Planning Relevance	Natural Resources with negligible importance	No trace of antrophogen pollution.	

TABLE 3 GUIDELINES FOR EVALUATION
Source: Adapted from the Ecological Profile of Pangasinan NEPC-NACIAD May, 1982.



PROVINCE OF CAVITE

N

0 1 2 3 4 5 10 15

KILOMETERS

MAP I
AGRICULTURAL RESOURCES POTENTIAL

LEGEND :

- PROVINCIAL BOUNDARY
- MUNICIPAL BOUNDARY
- FIRST CLASS ROAD
- SECOND CLASS ROAD
- RIVER / CREEK
- CHARTERED CITY
- PROVINCIAL CAPITAL
- MUNICIPALITY

SUITABILITY FOR CROP PRODUCTION

- AREA UNSUITABLE FOR CROP PRODUCTION
- MARGINALL UTILIZABLE UNPRODUCTIVE AREA FOR CROPLAND
- UNDER UTILIZED AND POTENTIALLY PRODUCTIVE AREA FOR CROPLAND
- PRODUCTIVE AREA FOR CROPLAND
- VERY PRODUCTIVE HIGHLY UTILIZED FOR CROPLAND

SOURCE : ECOLOGICAL PROFILE OF CAVITE PROVINCE, NEPC-NACIAD, 1984

instances, especially in areas devastated by seasonal flooding and the critical lack of water supply, especially for domestic use, environmental concern is a matter of special public interest. In urbanizing areas, this will be related to the control of sprawl, the preservation of prime agricultural lands, the protection from natural hazard risks, the promotion of environmental quality standards for existing and proposed industrial belts, solid waste management, and the conduct of inventory/monitoring for the remaining ecologically threatened sensitive and fragile ecosystems.

In general, the ecological profile methodology is useful in the following: the evaluation of the overall environment resources quality as an ecological basis for land use plans; for the identification of environmentally critical areas in regional and sub-regional planning; as a basis for the conduct of detailed ecological studies for recommending action plans and projects; and as basis for highlighting and discussing environmental issues affecting local governments.

The methodology offers a lot of options for better decision-making since by it, areas where immediate actions are necessary are easily identified. There are three ways by which ecological profiles can serve as effective tools for local governments. These are as follows:

1. As the basis for mayors and governors to introduce ecological concerns to their local constituents. This is articulated in the integration framework;

2. As the basis for the Planning and Development Staff (PDS) of provincial governments to recommend action projects to governors and mayors and to monitor environmentally critical areas and propose mitigative measures; and

3. As the basis for the local constituents, agencies and private groups to bring to the attention of decision-makers immediate concerns about the environment.

Cost Effectiveness

Municipalities already saddled with the burden of expensive projects may not need additional technical documents similar to the ecological profile to augment their local planning activities. However, in order to provide a better basis for planning or for the revision of existing plans (usually after five years) to rehabilitate ecological conditions, the ecological profile methodology can be a cost-effective alternative.

In order to come up with a geographic-based environmental quality characterization, the bulk of the cost would come from basic data gathering especially in areas where no data base is available. Considering that high costs are incurred in gathering data on such parameters as water quality, transmissivity (groundwater availability using tests wells), soil analysis (including those for land capability characterization), provinces and municipalities would need a lot of resources to come up with these data. In this case, the assumption is that a given province (or municipality) will start from nothing, that is, that no data are available. On the contrary, most municipalities have comprehensive development plans where physical parameters have already been included. This is true for such parameters as soil quality, surface and groundwater quality, geology, and others. In many instances, a comprehensive environmental quality characterization (including the socio-cultural environment) is included in the feasibility studies of different government and private-sponsored projects. Sifting the information from these reports and documents can greatly reduce the costs of data base collection. One of the first things that sectoral experts (specialists) do in preparing the ecological profiles is to determine which of these data bases are or are not available and in what format.

Built in the methodology is an essential cost-effective component. Environmental quality *indicators* such as the present land use and intensity can serve as good indicators for land degradation and pollution. There are cases, however where, because of the importance given to the evaluation of a certain parameter, a detailed data base characterization is essential. A province or municipality that considers certain resource endowments as critical to the environmental and ecological stability of the province may take extra effort and entail considerable amount of money to build up sufficient

data bases to accurately evaluate the sector for planning purposes.

Flexibility

Also built in the methodology is its inherent flexibility. The profile's focus on environmental quality characterization can be fine-tuned to respond to a specific geographic scale of inquiry. For example, regions can be evaluated as larger environmental resource units using the indicator approach. On the other hand, if data are available, site specific environmental quality characterization can be done at the local level. The same characterization can be the basis for project-based evaluation and can be used as prerequisite for Environmental Impact Assessment (EIA) of development projects. The disadvantage here however, is that, as the geographic scale of inquiry increases (from larger aggregations to smaller units), the availability and the reliability of the data parameters decrease. This is because most planning agencies and project developers tend to aggregate data.

Most line agencies do not consider ecological factors as part of their planning concerns. In a lot of cases, environmental data are available only in relation to specific project concerns where such data are necessary. A larger portion of the work being done for the ecological profiles is the sifting of available data and determining their usefulness for ecological evaluation. In many cases, there are a lot of data available in different formats from firms and agencies doing specific projects. A comprehensive knowledge of "who is doing what and where" is necessary. A prior requisite for a third kind of evaluation is the provision of *trained specialists* to examine data availability and usefulness. If we consider the process of data integration as one which requires a rather keen environmental perspective, many other problems related to the selection of available data can be solved.

The list of specific environmental planning parameters which can be regarded as basic requirements for provincial planning activities are: assessment of environmental quality (by sector), identification of ecological areas for conservation and protection, the mitigation of environmental problems through project implementation, planning and decision-making (including the designation of areas as environmentally critical for specific projects) for apparent and prospective ecological problems and planning assistance for municipal governments. This list is considered adequate and can be a sufficient guide to provincial governments in such activities as data gathering, review and monitoring of projects by provincial and national agencies, project regulation through the permit system, activity regulation through land use controls, and promotion of all types of development activities (agricultural development programs, economic/livelihood and conservation/development programs, and many others, which are often sponsored by and receive government financial assistance). The parameters enumerated above can be dovetailed with these activities.

Technical Manpower Requirements

A very distinct disadvantage in the application of the methodology at present is the lack of properly trained environmental planning specialists at the local level. When the ecological profile study began in 1983, it was obvious that the inter-disciplinary team of environmental specialists would require a much broader experience in dealing with environmental data, acquaintance with the kinds of projects and output materials line agencies make, and familiarity with policies and procedures for decision-making of local governments. The multidisciplinary team would still have to be acquainted with the evaluation methodology and the mapping procedures. Unlike the formulation of a town planning framework, where the approach is usually sectoral and non-integrative, ecological profiles by nature are cross-sectoral, integrative and wholistic. This is consistent with the integrated nature of environmental dimensions.

Normally, the provincial governments are not short of manpower for development planning purposes. The Provincial Development Staff (PDS) which is usually the size of a small division or a bureau section is the focal point of all development planning activities in the pro-

vince. The PDS has adequate training for development planning purposes with the technical expertise provided by NEDA, NACIAD, the HSRC or line agencies. The PDS is instrumental in the production of the Provincial Development Framework Plan.

From existing experience in dealing with the eco-profiles, the PDS, in coordination with concerned agencies of the government, served as the sole partners in the province in the completion of the study. They provided assistance from the regular "barangay consultation" sessions to data gathering, and ocular inspection trips. The training needs of the PDS can be met through a direct transfer of technology, when the province opts to provide for its own ecological profile becomes a requirement by the government for regions and provinces. The NEPC can provide the training workshops for the provincial as well as the municipal development planners.

At the municipal level, the Municipal Development Officer can acquire the necessary training at the provincial level. The previously trained Provincial Development Staff, since they are larger in number, can effect the coordination among the municipalities for provincial development planning purposes and may be able to include these trainings along with the other regular activities. This training may be the adequate venue for the NEPC to transfer the needed technology at the municipal level.

THE ECOLOGICAL PROFILE OF CAVITE: RESULTS AND ANALYSIS

A Brief Profile of the Study Area

The Province of Cavite is the southern gateway of the Metro Manila Area. Despite its proximity to the metropolis, Cavite is still very much agricultural, though the northern areas particularly Cavite City, Bacoor, Kawit, Noveleta and Rosario have been fully urbanized since 1967. Located at the periphery of the metropolis, Cavite has contributed to the agricultural needs of Metro Manila and is somehow dependent on its growth, but the steady concentration of development in the metropolis has only affected Cavite marginally and the little impact it had was absorbed by the northern towns at its fringe.

Cavite Province is considered a sub-regional action area which has a strategic location but a long neglected resource potential. As a first class province, it relies on agriculture, fishing and tourism and exhibits a high crop productivity. It is one of the leading producers of root-crops, vegetables and fruits.

Agriculture is considered a main source of livelihood of the people in the lowland and upland areas, and is a vital factor in the economic development of the province. With its resource endowments, favorable climate and location, the province has a potential of being an agricultural production center.

Population Distribution and Settlement Patterns

As expected, population density is heaviest in the northern town adjoining Metro Manila, with Rosario, the smallest town in the province, having the highest population density. The density is expected to increase in as much as the rate of increase of the population has been continually rising. On the other hand, Cavite City, the second most densely populated town, is becoming less densely inhabited owing to the decrease in the rate of population. The adjoining towns of Bacoor, Kawit, General Trias, have also displayed a consistent rate of increase in population density. These present trends show that the most densely populated towns will still be the northern areas of Cavite.[11]

Dasmariñas and Carmona have exhibited an explosive increase in population since 1980, considered the highest in Cavite. Carmona quadrupled its annual growth between 1960 and 1970 and then doubled its rate in the next five years (3.89%, 14.50% and 30.96%). Dasmariñas doubled its growth rate in the sixties (2.5% to 5.28%), after which the growth rate

[11] University of the Philippines, Institute of Environmental Planning, "Sub-Regional Development Options for Cavite Province", *Course Work Report:* Development Plan, 1980.

slackened slightly. The swollen population of these two towns is the outcome of their transformation into major resettlement and industrial zones. The least dense towns are located in the central and western sections of the province.

Settlement Patterns

The settlement pattern shows that it is highly polarized towards the northern region with the densest clustering around Cavite City. In the rest of the province, settlements are distributed throughout except in the built-up areas.

The urbanization of Cavite City spills over to the neighboring towns of Noveleta, Rosario, Kawit, and Bacoor which adjoin Metro Manila. These five towns form a continuous urban core covering 10 percent of Cavite's total land area. This concentration of population has made the area's average population density very high compared to the rest of the region.

The other towns of Cavite are dispersed throughout the province, along two major transport routes which divided the province into three parts. The size of the settlements decreases in inverse proportion to the distance from the major transport routes.

The settlements are situated mostly near the periphery of the province, leaving the central plains barely settled. This makes Trece Martirez, the capital, somehow isolated and having a low population density.

SUMMARY OF FINDINGS

Air Quality

Because the air pollution problem in Cavite Province is regarded as of minor relevance compared with the situation in Metro Manila or when compared with other more pressing problems such as soil erosion and urbanization, no air quality monitoring nor emission inventory has been undertaken to date.

The evaluation of potential air pollution risks areas was related to the intensity of industrial use and the vehicular traffice density, and even considering these measurable parameters, no actual emission inventory is available. Traffic densities, even if measured consistently, only provide a partial picture of the actuál extremes in air pollution. Data in industrial zones which provide a more homogenous source of air pollutants are not available.

From a strictly planning standpoint, the question of who will monitor air pollution can perhaps be answered by National Pollution Control Commission (NPCC), which is charged with monitoring industrial air and water pollution in the country. In view of the dearth of manpower and other resources of this agency, the responsibility has been passed on to the Provincial Development Staff (PDS) who spearhead the monitoring. Indicators, like the potential air pollution risk maps, can provide the provincial development staff with possible alternatives on areas where the risks of pollutant-related illness are greater and the sites needed for locating air pollution monitoring equipment.

In anticipation of accelerated population growth and in order to alleviate the existing adverse air pollution condition, there is a need to develop data base on emission types and characteristics, stack height, effective areas of influence and potential environmental impacts of existing and proposed industrial pollutive firms. Special concern must be given to the selection of industrial sites so that the areas are compatible with proposed industrial activities and can prevent the adverse impacts to the environment, especially to urban areas and those designated as areas of ecological and socio-ecological significance.

To alleviate domestic pollution, zoning can be adopted if necessary, especially with regard to industrial vis-a-vis residential location. Waste recycling can also be promoted to curb the practice of "backyard incineration".

Water Quality

Cavite Province exhibits both potentials and constraints in the use and management of water resources, a vital pre-requisite for ecologically balanced socio-economic development of a partly urbanized densely populated province. The surface freshwater resources of the province are characterized by a network of relative-

ly short and straight rivers having a generally northwest direction from the highlands to Manila Bay. Only Maragondon and Ilang-Ilang rivers are classified as "major" (the catchment area exceeds 40 km^2) and only Maragondon river exceeds the 10^3 cu.m./sec. (cubic meter per second) mean annual discharge.[12]

Due to the existence of two pronounced climatic seasons, with high rainfall from the end of May until November, the small size of the catchment area and intensive agricultural use make the river "flashy", characterized by an extreme variation between minimum and maximum discharge.

The planning relevance of these characteristics is obvious. During the rainy season, floods could occur endangering life, property and crops, while during the dry season, there is very limited water supply available for irrigation and other uses. In addition to this, the rivers are susceptible to water pollution which if caused by industrial or domestic sources during the dry months might exceed the self-purification capacity, limiting their use for domestic and agricultural purposes and rendering them health hazards. Together with the fact that water resources are limited, it is obviously clear that the future development of this densely populated area will depend on the successful protection, management and use of water resources.

In Cavite, rivers which have been classified by the National Pollution Control Commission (NPCC) and the National Irrigation Administration (NIA) have been limited to large ones. Land uses are good indicators of water quality and this can be applied using widely accepted classification standards.[13] Other than just plain sampling (since these procedures are quite tedious and very expensive) land use provides a good basis for water quality classification. In case of groundwater, there is a need for the determination of the factors affecting availability. This was not much of a problem since transmissibility test wells have already been evaluated by the National Water Resources Council (NWRC). The evaluation focused essentially on the constraints affecting availability like geology, intrusion of pollutants and present demand.

If the mapping techniques for the availability and the quality of groundwater can be further refined, these transmissibility values can be easily used at the provincial and the project levels (See Map 2 – Groundwater Use Restrictions).

Except for the few stretches of some rivers, water quality is still excellent to fair for most parts of the province. Only the eastern part of Manila Bay is affected by the discharge of domestic and industrial wastes and by on-going reclamation work resulting in the visible reduction of water quality. This problem renders some beaches unpleasant for recreation.

Most parts of the province have low to very low groundwater supply and some drastic changes are expected to take place within the next twenty years to satisfy the demand for groundwater.

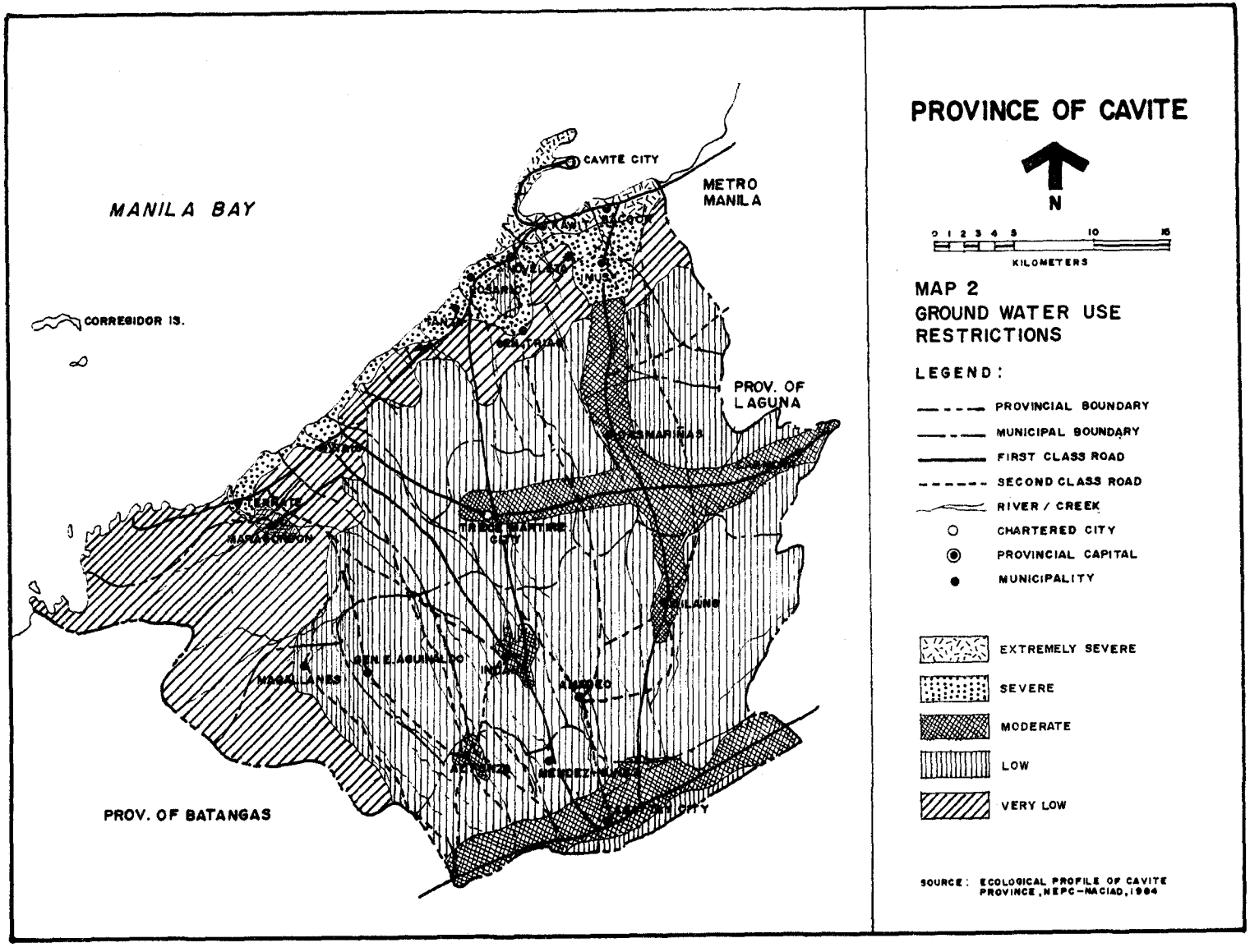
Land Resources

Land, especially good land with high agricultural value, is a limited resource and the pressure to convert agricultural use to non-agricultural ones has given rise to the need to preserve and protect lands with high agricultural and silviculture potential from encroachment. Prime agricultural lands are "those capable of sustaining a high level of crop production over time in a given climatic condition without adversely affecting the immediate and adjoining environment".[14] The suitability of the

[12] Bureau of Soils, Ministry of Agriculture. "Water Resources of Cavite Province" (Manila, 1981).

[13] The Biochemical Oxygen Demand (BOD) of one person is assumed at 50 mg./day. This means that areas with large population densities affect dramatically the self-purification capacities of the rivers. It can be assumed that population living in poblaciones fully contribute to the generation of wastewater since it is only here that drainage systems exist.

[14] Rogelio N. Concepcion, "Identification and Evaluation of Prime Agricultural Lands for Land Use Policy Formulation". The First National Conservation Conference Proceedings. December 1980.


MANILA BAY
CAVITE CITY
METRO MANILA
CORREGIDOR IS.
PROV. OF LAGUNA
PROV. OF BATANGAS
PROVINCE OF CAVITE
N
0 1 2 3 4 5 10 15
KILOMETERS
MAP 2
GROUND WATER USE RESTRICTIONS
LEGEND:
PROVINCIAL BOUNDARY
MUNICIPAL BOUNDARY
FIRST CLASS ROAD
SECOND CLASS ROAD
RIVER / CREEK
CHARTERED CITY
PROVINCIAL CAPITAL
MUNICIPALITY
EXTREMELY SEVERE
SEVERE
MODERATE
LOW
VERY LOW
SOURCE: ECOLOGICAL PROFILE OF CAVITE PROVINCE, NEPC-NACIAD, 1984

land for agriculture and forestry depends upon the combined effects of climate, soil and topography. Suitability refers to the possible use of the land for cultivation, and the range of crops and the flexibility of the cropping systems which it can permit.

For agricultural value and potential of the land, the most important considerations are *soil quality* and *soil fertility.* Soil quality is the basis for assessing overall suitability for agriculture and forestry. Areas of high quality soils may be subject to competing land uses and hence require proper protection and management. Although the Land Suitability and Land Capability Maps of the Bureau of Soils are technically accurate in terms of prescribing crop-soil land use relationships, they do not yet reflect other parameters for sufficient evaluation. For example, highly suitable lands which are developed and presently used and planted to agricultural crops and therefore do not require expensive development costs can only be reflected when suitability and present land use are evaluated. On the other hand, suitability and present land use may reflect incompatibility and therefore unprofitable use of land. This is true in a lot of cases when traditional land use preferences prevail over all other considerations.

The agricultural resources potential of Cavite provided an overview of the prime agricultural lands, classified according to suitability and present use as against traditional classification based on suitability. On the other hand, suitability and present land use are good indicators of agricultural potential, i.e., of areas highly suitable but are not presently used for agricultural activities. Based on these classifications, agricultural planners and decision-makers would be able to determine areas which are capable of sustaining agricultural activities as well as areas which provide venues for agricultural expansion.

Ecological Significance

Ecological Significance refers to the dominant type of ecosystems, their major function in relation to the other components of nature as well as their vulnerability against human impacts.

Intensive development in Cavite is most likely to be situated along the coasts similar to the location of Ecologically Significant Areas. In view of this, a more intensive effort has to be made in order to protect these areas from further deterioration especially the still productive mangrove and coral reef areas.

Mt. Palaypalay National Park along the southwestern tip of Cavite, the surrounding areas and the forests of Maragondon, Gen. Aguinaldo and Alfonso are the only remaining areas with forest cover. These areas have to be protected from destruction arising from illegal logging and kaingin. On the other hand, the remaining surviving coral reef communities are located on the northwestern coast of Cavite. They are classified as poor and fair with 9.3-4.5% coral cover. Fair coral cover is found on Limbones Point, Kaylabre Point and Karabao and Kaybangant Points. Unless siltation is abated, these remaining coral cover will soon be dead.

Mangrove areas contribute about 80% of ecologically significant ecosystems in Bacoor. These, by and large, contribute to the higher productivity for mussels and oyster farms along Bacoor Bay.

Natural Hazard Risks Areas

Natural hazard risk refers to the susceptibility of an area to respond to risks caused by natural phenomena. Hazards are normally classified as earthquakes, volcanism, flooding and subsidence. Other hazards are associated with climatic changes like typhoons and storm surges which are giant sea waves generated by typhoon winds. The consideration of these hazards is particularly important for all areas in the Philippines where risks are located due to their geological and climatic conditions.

The scale of the disaster due to natural hazards is the result of the interaction of several factors including the severity of the natural hazard, the size of the community affected, the degree of precautionary measures against the hazard which is built into the community, and the ability of the agencies at the local and pro-

vincial levels to cope with the socio-economic consequences of the disaster.

The determination of the magnitude and impacts due to flooding and volcanism (volcanic eruption and the associated ash and lava flow and earth tremors) is based on historic data, physiographic characteristics, and hydrogeologic setting.

Earthquakes and typhoons are regular occurrences in Cavite and in other parts of the Philippines. Typhoons of the seasonal nature increase rainfall and normally cause flooding in some parts of the province due to the overflowing of rivers. Typhoons are common occurrences in the months of July to November.

Structural setting and natural seismicity of the Philippine archipelago account for the frequency of earthquakes in all parts of the country. Cavite, as in the other provinces, has its own share of seismic activity. Historical records, however, do not indicate any high intensity earthquake activity within the province nor is there a record of any *seismic focus* within the political jurisdiction of Cavite. So far, there are no records of any major structural damage due to the activity of Taal Volcano.

Flood Risk Areas

The evaluation of flood risk areas was based on past flood occurrences. Questionnaires on the frequency, level and duration of floods, were distributed to the affected communities and municipalities and the results are augmented by an analysis of topography, slope characteristics and flood prone areas.

Flood prone areas are found along low-lying areas near fluctuating water bodies. These include the deltas, flood plains, rivers and marshes. The classification has been modified to include the areas with less than 3% slope and devoid of vegetation.

Volcanic Risks

The Commission on Volcanology (now the Institute of Volcanology) has kept a record of the eruption activities of Taal Volcano since its major eruption in 1911.[15] The available data which were utilized for the evaluation include a list of occurrences and major eruptions, and the costs and extent of the damages were mapped out on a volcanic risk map from historical data. The maps depict the areas affected by the lava flow and those affected by varying degrees of ashfall.

Mapping the natural hazard risks areas in Cavite has so far provided a basis for decision-makers and the public in general to enable them to consider and plan out mitigating measures, hazard preparedness, and policies to minimize the risks they pose. In this case, it should be very helpful to consider the planning relevance tables for the evaluation and mapping of areas susceptible to a variety of hazard risks.

INTEGRATING ENVIRONMENTAL CONSIDERATIONS IN LOCAL DEVELOPMENT PLANNING AND DECISION-MAKING: APPLICATIONS ON DEVELOPMENT ISSUES (IN CAVITE PROVINCE)

While specific development and planning recommendations are given for each environmental sector, the interplay of the sectoral results is seen as necessary when they are considered in the light of specific development problems in the province. The integration of several sectoral reports will be demonstrated shortly in the evaluation of development problems in the province. These development problems include: the Cavite Friar Land Irrigation Systems Project, Tourism and Coastal Zone Management, and the Protection and Rehabilitation of the Maragondon Watershed.

The Cavite Friar Lands Irrigation Project

The Cavite Friar Lands Irrigation System was constructed during the Spanish Regime (1521-1898) to supply irrigation water to a total of 16 irrigation components mostly rice lands. The old system usually had high dams

[15] The Philippine Institute of Volcanology. "Operation Taal" (unpublished Technical Report). 1980.

built of adobe blocks, with concrete masonry on slopes. The dams, however, were not provided with the necessary sluice resulting in the heavy deposition of silt. There were no control gates and intake and the canals were not equipped with necessary control structures. As a whole, the entire system is primitive and plagued with such problems as the inadequacy of the length of farm ditches to cover areas served, lack of mainlines so that the farm ditches have very irregular networks. The drainage problem has not been given much attention and as a result, out of the potential 16,000 hectares of irrigable lands, only about 14,000 hectares are served by the system during wet season and only 3,600 hectares during the dry season. In recent years, the project has come under the supervision of the National Irrigation Administration (NIA).

The Cavite Friar Land Irrigation Project of NIA is one of four major components of the Laguna de Bay Development Project.[16] It includes the rehabilitation of the existing irrigation system (serving 16,000 hectares), the full development of River Water, the expansion of groundwater extraction, and the importation of water from Laguna Lake through the installation of discharge pipes from a pumping station to be installed in Muntinglupa, Metro Manila.

The results of the Ecological Profile Study of the Agricultural Resources Potential Sector indicate that a large area identified as prime agricultural lands are presently underutilized and are considered as grassland areas. These large tracts of lands are situated along the southern part of the municipalities of Naic, almost encroaching on the southern boundaries of Trece Martirez and large areas of southern Tanza, while the others are located near the southern borders of Imus extending beyond southeastern parts of Bacoor. A considerable portion of these lands comprises the Cavite Friar Lands.

The results also indicate that there is a rather strong pressure of urbanization being experienced by the north and southeastern portions of Bacoor, Imus, Noveleta, Kawit, Rosario and now Dasmariñas and Carmona. It has been recommended that a policy which will regulate the encroachment of urbanization on *prime agricultural lands* is urgently needed.

The third pressure point comes from three prospective and expanding industrial belts; one near the southern boundary of Dasmariñas within the Bagong Bayan (New Town Complex), another along the Dasmariñas-Tanza-Trece Martirez Highway, and the third is the existing Export Processing Zone in Rosario. The development issue at this point is not whether to continue with the communal irrigation system project but whether these lands can be released for non-agricultural uses, especially urban development.

The present land use shows that very large areas considered in the profile as prime agricultural lands are intensively cultivated including the Cavite Friar Lands. These same areas may be "protected" from urban development in view of the fact that they are prime agricultural lands and the decision to convert to urban uses must be subject to closer scrutiny. But reviewing the development trends, pressure for development of these lands is inevitable from all directions and as prime agricultural lands are encroached upon, their inherent qualities begin to deteriorate with the conversion of the surrounding environment. On the other hand, increasing irrigable areas means increasing production, on the assumption that the surplus produce would meet particular inadequacies of supply whether within the province or for export. But the present supply of rice is adequate and the province can utilize cheaper inputs. This is true if the entire regional picture is considered. The most important factor, however, is the future outlook of the total environmental quality of the province. Although the northern areas are highly suitable for agriculture, urban development is moving south eastward and spilling west-northwest through the major roads.

The prime agricultural lands are continually being encroached upon by urbanization and industrialization, the net effect of which is

[16] NIA Laguna de Bay Development Project Feasibility Study. Nov. 1977, pp. 17-40.

deteriorating environmental quality. The picture of water supply in terms of water quality, for example, shows that the present sources of water irrigating 1[illegible]0 hectares during rainy season have been evaluated as slightly to moderately polluted. (Map 3 – Surface Water Quality). The pollution gradient increases northward as the rivers approach the area of urban sprawl. On the other hand, the proposed source of irrigation water during the dry season which is Laguna de Bay is considered eutrophic (deteriorated water quality) especially during the dry season. Hence, there is no guarantee of good quality irrigation waters from both sources.

Seen from all these developments, the more practicable solution is to gradually release the areas of the Cavite Friar Lands to urban development.

Tourism and Coastal Zone Management

The sub-regional structure of Cavite Province in relation to its internal and external functions is remarkably balanced. It is noticeable that the entire province is fringed by large areas devoted to or proposed for touristic activities and recreation. There are beaches with local and national significance; the scenic Tagaytay Ridge and the panoramic view of Taal Lake and Volcano. The upland areas are agricultural and the eastern section is rapidly urbanizing and serving a settlement function for Metro Manila and the highly urbanized central core.

From this standpoint, Cavite offers a diversity of recreational areas to the large commuter population of Metro Manila and its incoming migrants. The northwestern portion of Cavite is bounded by Manila Bay. The Bay has long since offered Cavite the coastline and expansive beach area. The surface water quality map (See Map 3) indicates that all beachlines northeast of Tanza are moderately polluted, limiting the use of waters to navigation and aquaculture (recreational uses are not included or *risky*). (See Table 1 Surface Water Quality, Classification and Specifications). However, the survey indicates that out of the 19 beach resorts on the entire coastline of Cavite, 13 are located northeast of Tanza (Noveleta, Tanza, Kawit). This means that majority of these beach resorts could go out of business sooner or later because of deteriorating water quality.

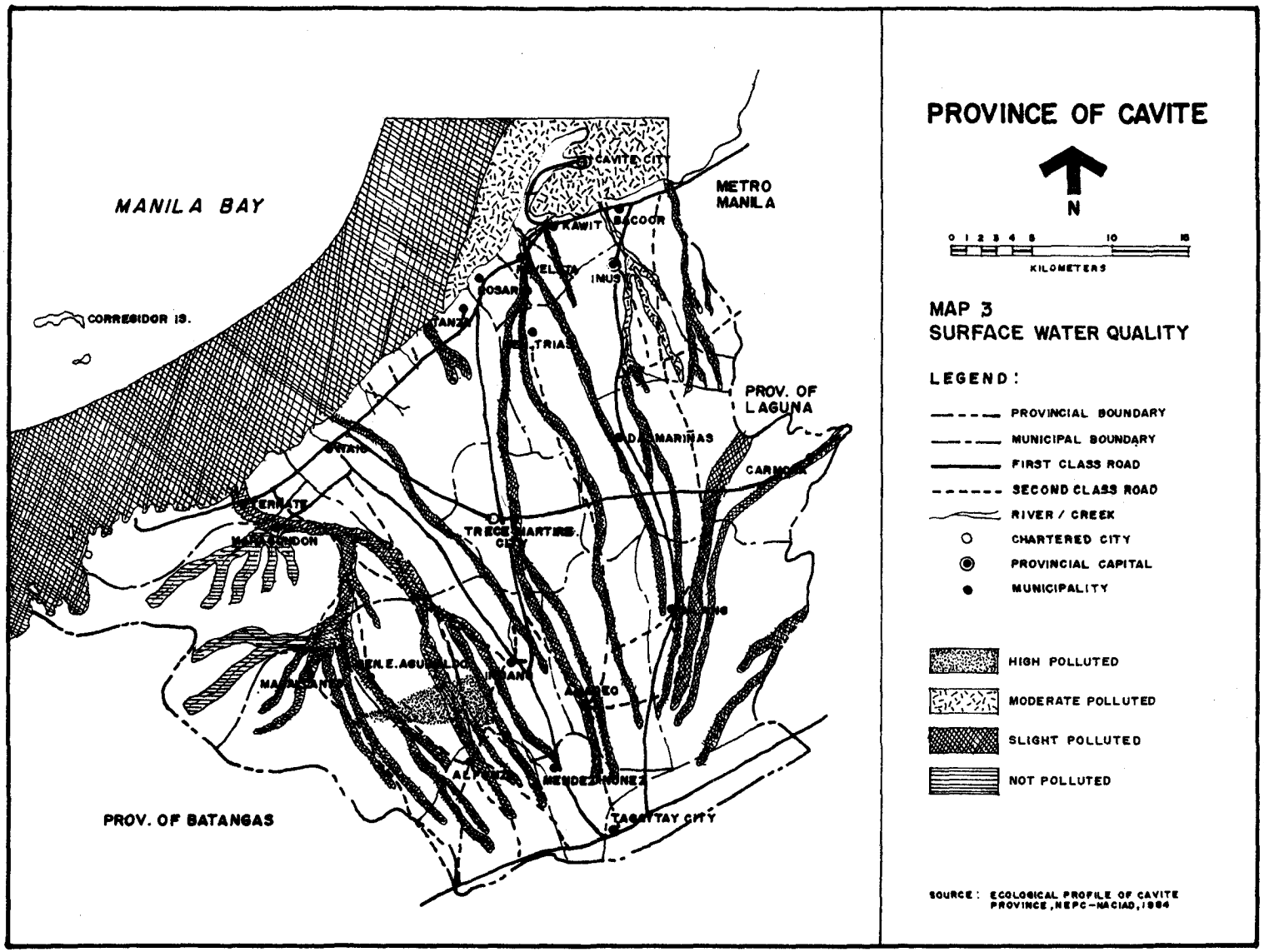
The alternative sites are situated northwest of Tanza where the waters can still be used for recreation. These sites can be further developed especially those west of Naic including the beaches of Ternate which offer a dramatic view of the entire Manila Bay-Cavite coastline. Evaluation conducted also shows that the adjacent coves contain fair coral cover, meaning that these are sufficient areas where recreational scuba-diving can be developed.

Protection and Conservation of Maragondon Forests

Cavite Province has very limited forest areas. Even the highland boundaries south of the province to Batangas do not have sufficient vegetation cover. They are mostly rolling shrubs and grassland types devoid of tall vegetation. The only remaining forest cover is located along Maragondon mountains on the southwestern coastlines. It will be noted that Mt. Palaypalay National Park is situated within these mountains and is characterized by secondary growth vegetation.

If Maragondon River is used as the basic reference point to delineate the watershed area, it can be seen that almost one third of the entire province especially the southwestern seaboard is drained by the Maragondon River watershed (See Map 3 – Surface Water Quality and Map 4 – Sites of Development Issue in Cavite Province). Considering the status of the vegetation cover, the size of the drainage and the crucial role that the highlands play in the future development of Cavite, this local watershed is considered critical. Taking note of the topography, the type of soil and the prevailing suitability of the land to agricultural use, it will have to be recommended that these areas be adequately vegetated to recover and maintain the stability of the watershed.

Mt. Palaypalay National Park is adequately vegetated perhaps because its rugged topography makes it very inaccessible. However, the Mayor of Maragondon has expressed fears that it may ultimately be encroached upon because



PROVINCE OF CAVITE

N

0 1 2 3 4 5 10 15

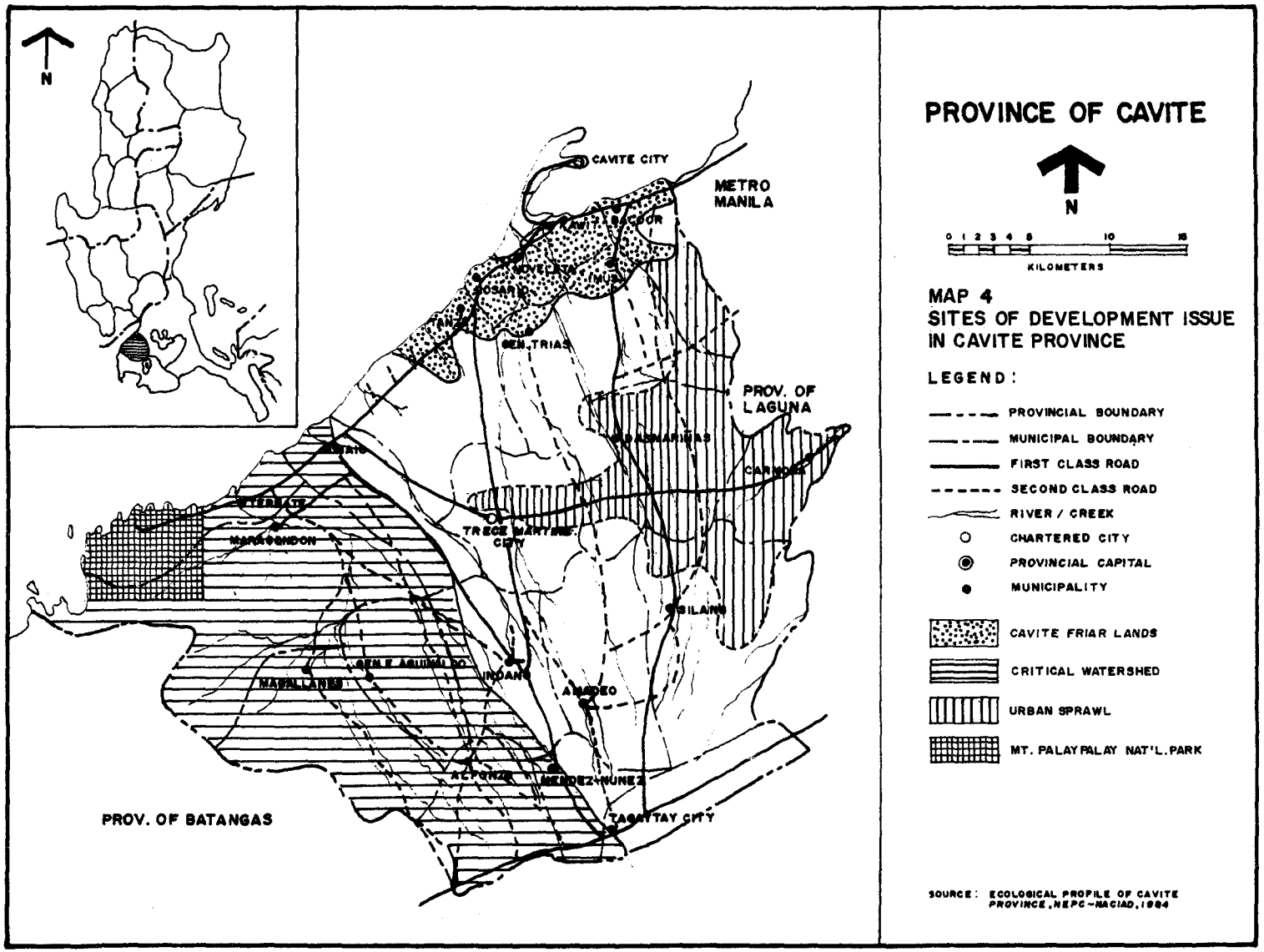
KILOMETERS

MAP 3
SURFACE WATER QUALITY

LEGEND :

- PROVINCIAL BOUNDARY
- MUNICIPAL BOUNDARY
- FIRST CLASS ROAD
- SECOND CLASS ROAD
- RIVER / CREEK
- CHARTERED CITY
- PROVINCIAL CAPITAL
- MUNICIPALITY
- HIGH POLLUTED
- MODERATE POLLUTED
- SLIGHT POLLUTED
- NOT POLLUTED

SOURCE : ECOLOGICAL PROFILE OF CAVITE PROVINCE, NEPC-NACIAD, 1984


PROVINCE OF CAVITE
N
0 1 2 3 4 5 10 15
KILOMETERS
MAP 4
SITES OF DEVELOPMENT ISSUE
IN CAVITE PROVINCE
LEGEND :
PROVINCIAL BOUNDARY
MUNICIPAL BOUNDARY
FIRST CLASS ROAD
SECOND CLASS ROAD
RIVER / CREEK
CHARTERED CITY
PROVINCIAL CAPITAL
MUNICIPALITY
CAVITE FRIAR LANDS
CRITICAL WATERSHED
URBAN SPRAWL
MT. PALAYPALAY NAT'L. PARK
SOURCE : ECOLOGICAL PROFILE OF CAVITE PROVINCE, NEPC-NACIAD, 1984
CAVITE CITY
METRO MANILA
BACOOR
KAWIT
NOVELETA
IMUS
ROSARIO
GEN. TRIAS
PROV. OF LAGUNA
CARMONA
TRECE MARTIRES CITY
SILANG
INDANG
AMADEO
MENDEZ-NUNEZ
TAGAYTAY CITY
PROV. OF BATANGAS

of the denudation at the foothills. The National Park has not yet been adequately inventoried and its actual boundaries on the ground have not been properly delineated. Already, the impact of much denudation is being felt especially by the towns of Ternate and Maragondon which are experiencing seasonal flooding and much siltation of the rivers. The governor, on the other hand, sees these areas as the possible sources of potable water supply for the entire province, assuming that the watershed areas recover their stability. In view of the discharge data of Maragondon River, this appears very feasible and may be the answer to the prospective shortage of water supply predicted in this profile by the year 2000. Because this is a critical watershed, rehabilitation and protection is necessary and because the stability of the highlands will mean the very survival of the province, protection and rehabilitation is imperative (See Map 4 — Sites of Development Issues in Cavite Province).

The Institutional Framework to Integrate Environmental Considerations in Planning and Decision-Making at the Local Level

General Considerations

In considering the institutional framework for local development planning and decision-making, it should be assumed that the ecological profile, due to the nature of its methodology, presentation, variety of applications and use can be an effective planning tool in the integration of environment in planning/development and decision-making processes at the regional down to the municipal level. In the succeeding discussions, the ecological profile methodology will be referred to either as the basis for environmental problem identification, or for environmental quality characterization.

The proposed framework has been formulated based on the experience and insights gained from "ecoprofiling".

The Regional Development Council (RDC) — The Regional Development Council makes decisions on development in conjunction with: The Regional Development Staff, NEDA Regional Offices, the Governors of the Province, Representatives of the Integrated Area Development Council, and regional offices of the implementing national agencies.

The RDC, with one of the Provincial governors acting as Council Chairman, uses the national development plan as the basis of its own plans in detail. The National Plan provides an overview of economic conditions existing in the region, outlines broad economic targets to be achieved during the planning period, identifies major areas of investments that the private sector should be encouraged to undertake and the major areas of undertaking to be pursued by government agencies, and estimates the financial requirements of the program. It also identifies the prospective roles of financing and defines the respective roles of the government, the private sector and the concerned development authorities in the region.

There are two main functions of the RDC. These are the preparation of the regional socio-economic development plans, policies and programs, and the coordination of implementation done by line agencies and local governments of their respective development activities. The NEDA Regional Office (NRO) acts as the technical arm of the RDC and assists in the formulation of plans of varying scope including principally a Five-Year Regional Development Plan, a Five-Year Regional Investment Program and their annual "roll-over" versions.

The Provincial Development Offices — While the role of the Provincial Development Council is not yet clear, the Provincial Development Offices appear to assume crucial roles in the coordination and integration of all plans at the provincial level. The more decentralized provincial governments try to create a stronger multi-disciplinary teams which comprise the provincial development staff. The PDS adopts a "quasi-coordination" role in linking the various development activities.

Municipal Development Boards — The Municipal Development Boards see to it that the projects conform with the needs of the munici-

palities. They are authorized to adopt zoning ordinances and regulations for their respective cities and municipalities. The Municipal Development Boards are supported by the Municipal Development Councils to ensure that development plans and the zoning ordinances are prepared and implemented based on the land use plan.

Policy Considerations

The policy considerations outlined hereunder shall serve as the basis for the goals and objectives of the proposed framework. These are:

1. That environmental considerations shall be instituted as a permanent and pervasive aspect in all planning and decision-making activities, especially those concerning the use of natural resources. Therefore, environmental dimensions must be considered even at the initial stage of conception of strategies, plans, projects in such a way as to promote the sustainability concept.

2. In the context of the country's present institutional structures, where sectoral concerns provide the venue for implementation of environmental protection, in terms of researches, laws, administration and development of appropriate technologies, it is especially necessary to complement sectoral structures with integrative-multi-sectoral ones which are either purpose-oriented (e.g. with respect to resources) or oriented to specific spaces (forestry prime agricultural lands, etc.) or problems (land reform).

3. In considering the environment as the "wellspring" of all resource use for furthering the objectives of socio-economic development, development planning should start with a careful analysis of the resource potentials of the environment in relation to socially defined basic needs. This may be an overstated policy, but assuming the sectoral nature of existing institutions, it could result in the overshadowing of basic social needs.

4. With regard to local participation in the planning process, of paramount concern over and above all other goals is that local residents/decision-makers should be given the freedom and authority to determine the kind of environment they want.

The desired features of the proposed framework are as follows:

a) It should, as much as possible, be made applicable to and utilize existing institutional structures for implementation of national and regional plans.

b) It should be planning-oriented, taking into account and integrating multi-sectoral development activities, and considering the concept of sustainability of resource use.

c) It should be able to open ways where important environmental concerns should be able to trickle down to the local level decision-making and at the same time strengthen (rather than weaken) the powers and therefore the capacity of local governments to determine the kind of environment they want.

d) It should be able to translate physical processes into social values.

e) It should foster the plurality of demands and needs on environment but at the same time be able to harmonize conflicting demands in order to thresh out priority goals and objectives for the environment.

The general framework would integrate the following considerations in the planning process specifically in the area of identifying resource constraints and potentials for development, land use planning, rehabilitation and pollution control.

At the Regional Level

The Ecological Profiles would focus on evaluating environmental quality and the identification of constraints and potentials to natural resources development. It is possible to put emphasis on the identification of environmentally critical areas on a regional basis, i.e., prime agricultural lands, forest reservation and protection areas, important or critical watersheds and river systems and natural hazard risk areas.

At the Provincial Level

The Ecological Profiles would focus on environmental quality, identification of environ-

mentally-critical areas, major ecological problems and at the same time make some recommendations for the suitability of siting the different projects. This aspect would be important for provincial level decision-making where provincial planning officials will be asked to consider EIS Reports of proposed projects. In relation to the Provincial Land Use Plan, the Ecological Profiles would help document sectoral environmental quality standards, laws and policies which would be applicable in the process of promoting environmental quality, integrate standards to land use planning and identify environmentally critical areas.

At the Municipal Level

At the Municipal Level, the Municipal Ecological Profile would also focus on decision-making for environmental enhancement, the mitigation of environmental problems and the implementation of rehabilitation projects and monitoring of environmentally critical projects. The evaluation based on the recommendations of the results of the Ecological Profiles at the different levels are inputted to the regional, provincial and municipal planning development and decision-making. The results of the discussion and decision-making processes are in turn inputted to the development plans for implementation. Monitoring activities, when the project has been carried out, is done by the provincial and municipal planning bodies in coordination with concerned government agencies.

Integrating Environmental Considerations in the Land-Use Planning Process

Land use planning, as pointed out earlier, has evolved in the past years into a permanent activity, and the institution tasked with the planning process is more or less in place at the local government legislature. The problem of integrating ecology and environment in this process, however, has to be addressed in greater detail, again using the general planning framework and the detailed town planning process.

Reconnaissance and Problem Identification

In much the same way as development needs and problems are identified, common ecological and environmental problems are included as part of the problem identification process. In many cases, ecological problems are perceived and the scoping process will provide the basis for the detailed data gathering. Accordingly, the more critical environmental problems are given attention because of their present impacts. These may include: destruction of local/critical watersheds, surface and groundwater pollution, and encroachment of prime agricultural lands.

Data Gathering and Analysis

Data gathering and analysis will be directed at establishing in concrete terms the relationship between development uses of the land and the existing and perceived environmental problems. The process will involve two facets. First, land capability i.e., the ability of the land to sustain maximum productivity for certain types of crop use will have to be established. Next, the environmental quality will be evaluated through ecoprofiling. This provides the basis for prioritization and the setting up of goals and objectives for environmental protection. The Ecological Maps generated in the process will provide the basis for choosing alternatives.

Generation of Alternatives

Build into the process (methodology) for ecological profile report is the scheme to generate alternatives for decision-makers and planners. The evaluation of environmental quality and their corresponding *decision maps,* of varying degrees of spatial significance, will aim at giving the planners a perspective of environmental quality and the consequences on its present and future status in relation to present use and future actions. The ranking (evaluation) process will serve as an objective presentation of alternatives and consequences to the environment.

Formulation of Goals, Policies, Objectives, and Strategies

Prioritization of problems will also result from determining the basic goals and objectives of the land use planning exercise. It is necessary that based on the resources, ecological setting and current environmental problems, the municipalities should adopt environmental goals and policies applicable to their respective settings. An *Optimum Land Use Plan,* for example, may aim to accommodate under various conditions all land uses dictated by market demand, but at the same time strive to conserve the most important natural feature of the planning area. In many instances, the goals and policies can be accompanied by the use of pre-determined (technically acceptable) development guides *"tailor-made"* to promote sound land use planning practices.

Generation of Recommendations and the Formulation of Programs and Projects

Recommendations including the formulation of programs and projects may come in the form of guidelines and specific action projects. General recommendations may vary from terms of reference to specific management actions (rehabilitation), development and if necessary *redevelopment, actions and protection of* natural resources such as public acquisition of the remaining natural areas.

Long range programs include the formulation of "home grown" standards for land use controls. They can also include action plans for the management of steep slopes, marsh areas and floodplains. Action projects include the implementation of pollution control regulations, mitigations and rehabilitation.

Project Implementation

For long range programs which are in many cases borne out of compliance with national and regional plans, implementation at the local level is usually coordinated with national agencies. These programs are often externally assisted by national or international funding sources including manpower and expertise. For local programs and short term action projects, Municipal Development coordinators often play key roles in program/project coordination.

Actually, these two approaches need not be viewed as mutually exclusive. A local planning agency may be involved in both short term action programs aimed at specific environmental objectives as well as long range and continuous reassessments of community directions. Since most of these areas have several public agencies mandated for environmental planning, it would appear to be feasible for attention to be given both short and long range planning. The crucial step would be to integrate the two functions in a meaningful fashion.

Feedback and Monitoring

Monitoring and feedback bring the planning process into full circle. With regard to environmental quality objectives, some indicators or systems performance may be formally designed and monitored such as air quality, water quality, open space and public accessibility to open spaces. A more advanced approach to this type of evaluation and monitoring is the development of an environmental quality information system together with the establishment of scientifically reliable environmental quality indicators.

Environmental Considerations for Provincial Development Plans

The purpose of ecological profile is to provide maps of varying ecological and spatial significance of environmentally critical areas for certain provinces. From these maps, planning recommendations may vary from the identification of critical ecological problems and the areas which need immediate mitigations, planning decisions for prospective and apparent ecological problems, planning assistance to local governments with regard to mitigating ecological problems and the consideration and integration of local environmental conditions in the proposed development plans.

Initially, if environment is considered as a separate sector, the Plan should include an overview of major environmental problems such as:

degradation of critical watersheds and other environmentally critical areas; siltation and sedimentation of major river system; and water pollution (surface and groundwater).

After an examination of the overview of the existing and prospective ecological problems has been made, the ecological profile study is conducted in consultation with the provincial and municipal development authorities and offices; the national and regional line agencies in the province; private groups; the general public and research institutions.

The focus of the ecological profile study may vary depending on the major ecological problem or predominant resource endowment of the province such as: Forest Functions Mapping for thickly forested provinces; Urban Pollution and Environmental Risks areas for predominantly urbanized areas; Comprehensive Ecological Profile for Evaluating environmental quality for provinces in general; Coastal Zone Functions Mapping for marine or lakeshore coastal province; and Island Ecosystems Function Mapping for most island provinces.

Integrating Environmental Considerations in Municipal Planning and Decision-Making Process

General Considerations

First, it is important to recognize that local governments have an important role to play in this framework, since they have gained some experience and expertise in land use planning and regulation at their level, particularly through the town planning, zoning and related programs instituted with the guidance and assistance of the Human Settlements Regulatory Commission. Although local governments' power and functions have been constrained by the centripetal tendencies of the past decades, measures have been taken by the central government to strengthen their roles in development activities.

Among these measures is the principle that would limit all ministries and national offices having to do with local governments, to standard and guideline setting. The intention is to obviate the need for prior central clearance on routine local government transactions. Another is to make regional offices the focal point of contact with local governments and therefore require substantial delegation of authority from national to regional offices. The third empowers provincial governors to coordinate national services within their region, call on national offices and employees stationed therein for advice and for non-confidential reports and papers. The Local Government Code of 1982 established the offices of the Provincial, City and Municipal Planning and Development Coordinators as common statutory positions along with the key offices of local government.

These basic "givens" at the provincial and local levels are important preliminary considerations for the integration framework. It appears that coordination among decision-makers is possible at the provincial level and there is sufficient planning and implementing machinery at the local level. The following scheme takes into account this possibility and seeks to provide the necessary mechanism to introduce and integrate environmental considerations using the Ecological Profile studies as basis.

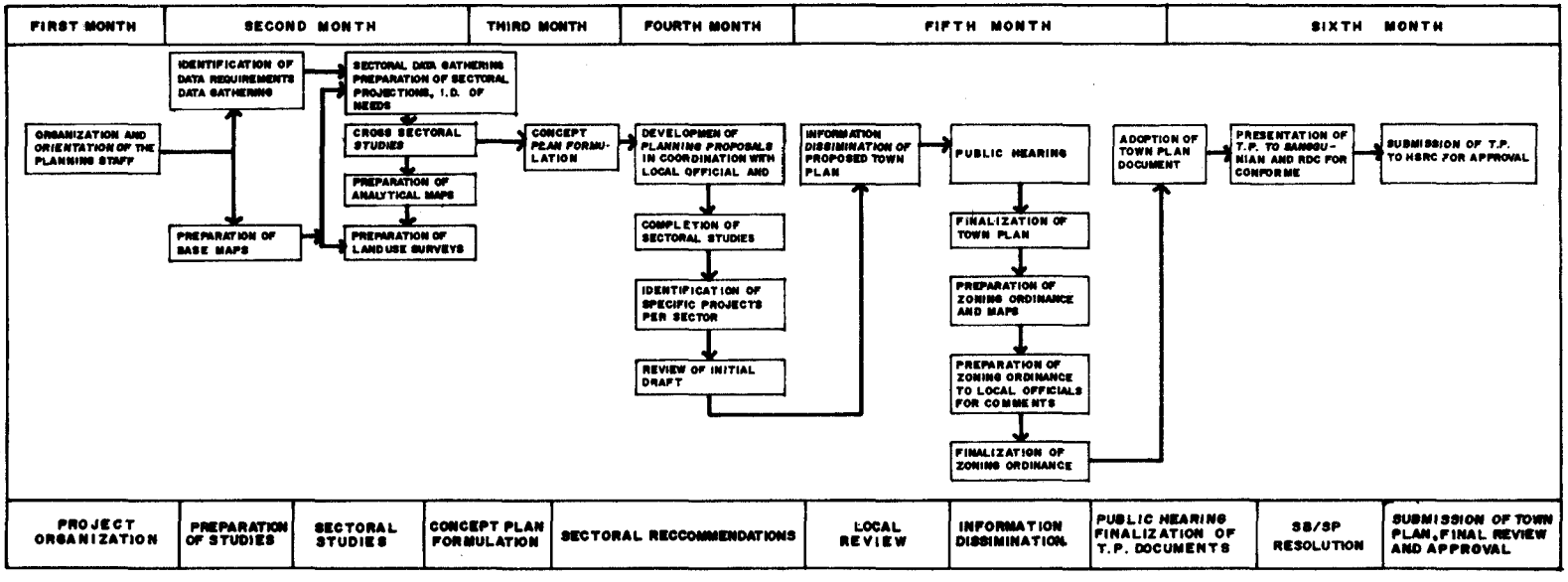
Integrating Environment in Town Planning and Decision-Making Process Using the HSRC's Town Planning Framework

As earlier discussed, the local planning process includes the identification of data requirements including the establishment of sectoral linkages, problem identification and the formulation of a concept plan, the identification of specific projects and programs for each sector, the dissemination of information on the proposed plan, public hearing, preparation of a zoning ordinance, adoption and enactment and presentation to the Regional Development Council (RDC) and the review and final adoption by the HLURB (See Figure 6 – Flowchart on Town Planning Activities).

The integrating activities and their corresponding steps in the town planning framework are as follows:

Data gathering and forging of Inter-Agency Linkages – For town planning activities, where

FIGURE 6. FLOWCHART OF TOWN PLANNING ACTIVITIES



SOURCE : HSRC-MHS "TOWN PLANNING GUIDELINES" MAKATI, METRO MANILA. MAY 1982.

ecological/environmental considerations have been predetermined to be included in the over-all planning exercise, the planner's frame of reference is to consider the different possible inputs including vital linkages where environment can come in at later stages of planning activities.

For the normal (regular) planning exercise, sectoral data gathering, the identification of development needs, including all other inputs (base maps, land use surveys, cross-sectoral studies, and others) are integrated and evaluated as inputs to concept and plan formulation.

In the planning exercise where ecological considerations are integrated, the *environment* is initially considered in the reconnaissance activity from the identification of development needs, evaluation of cross-sectoral studies and especially the inclusion of a broadly based Use Capability Study and Analysis. These inputs including some pre-evaluated thematic maps are the basic ingredients for preparing Ecoprofile Maps using the methodology presented earlier.

Preparation of Ecological Profiles – The Ecological Profile, consisting of maps and texts in environmental quality, evaluation of critical environmental problems and the outlining of prioritized environmental management prescriptions are developed according to prescribed developmental needs. There are at least two basic options in this process:

–Ecological Profiles/ecological maps of environmental quality are considered as a separate sector of data base and concept plan formulation of the proposed local framework plan.

–Ecological Profiles are developed as a separate document independent of the over-all development plan. For a Municipal or Town Plan, *The Land Use and Capability Study* can be used as an integrative document.

In both of the above-mentioned cases, the Ecological Profiles provide a formulated Terms of Reference and, to a certain extent, some programs which can be implemented to meet the ecological development needs of the municipality. It is, however, within this context that the planners and decision-makers would exert efforts in integrating these findings in the Framework Plan. The integration process would come in terms of the evaluation/analysis of existing ecological problems related to proposed development options and some basic management recommendations; the evaluation/analysis of resources potential uses and misuses; and the provision of an *Optimum Land Use Plan* in order to rationalize/accommodate and manage all conflicting and complementary uses.

Integration could also take place during the Public Hearing where the draft plan and the integrative environmental recommendations are reviewed, disseminated and commented upon. In cases where major amendments are proposed during the hearing, the plan is considered for re-integration and drafting.

Finalization of the Plan – The final approved plan which includes an identification of development needs, formulated planning strategies, policies, program/project costs and duration, proposed zoning ordinances and in a number of cases, the designation of ecological management areas, is put in final form for adoption and enactment (as stated earlier, a final *Optimum Land Use Plan* mapped out, may be necessary).

Adoption, Presentation and Approval – The Adopted Town Plan document is presented to the Sangguniang Bayan or the municipal legislative council and the Regional Development Council in cases where certain towns are of regional significance, for conforme. The confirmed plans are then received by the Human Settlements Regulatory Commission. The plan is ready for implementation and in certain cases, the plan will call for direct participation of national institutions and regional agencies. After this, the preparation of work programs and project assignments will follow.

The Role of the Planner

It is basically the concern of the development planners to integrate ecological considerations in local planning and decision-making since they are viewed by the public as responsible in curtailing the wanton misuse of resources

and in guiding the sustainable development and protection of the environment.

As a rule, people will not come to the planner unless a proposed development project arouses concern and they become organized. The planner must go to the people and explain to them the proposed project in detail. This can take the form of a properly published/advertised public hearing or direct contact with local leaders. But in most cases, this step is omitted from the planning process. The Ecological Profile methodology encourages the strengthening of the role of the planner in providing the venues whereby the planner is able to participate in the technical, political and public relations aspects of "ecoprofiling".

It is necessary, however, that the planner, in assuming the ecological basis of development, should be adequately trained and professionally equipped. In assuming the role of insuring that the development area is first evaluated on an ecological basis, the planner acquaints himself with the variety of approaches and methodologies, data, parameters and characteristics for ecological evaluation.

In the process of making recommendations for the integration, the planner is directly confronted with the variety of local interests including those related to political pressures, minority and majority interests, in this case, he assumes the role of an arbiter and a diplomat in seeing to it that all the concerns are taken into consideration.

Prospects

Environmental planning as part and parcel of the overall planning depends to a large extent on the quality of other branches of planning such as production versus investment planning. The practicability of environmental planning can be introduced in the fields and sectors which fulfill the following conditions:

— The necessary scientific knowledge is available or can be gained during the planning period to control the process under consideration.

—Technologies suitable to protect or improve the environment exists or can be developed during the planning period.

—The necessary resources (investment, current expenditures) can be raised.

—The State and its planning and management authorities are strong enough to enforce the implementation of the plan.

Except for stronger enforcement and implementation mechanism, majority of these prior considerations exist in the Philippines.

As considered earlier in the framework, for the integration of ecological profiles into the mainstream of national, regional and local planning activities, the prospects are many and multi-dimensional.

As the level of resources degradation increases, there will inevitably be an increasing clamor for a better environmental management programs especially in those sectors directly involved in resource use and development such as the mining sector, the fisheries and forestry sector, agriculture, etc. Sectoral concerns are more or less reflected in the regional/and subregional development schemes. The ecological profile can provide the necessary integrative procedures to evaluate and prioritize regional development goals related to natural resources management after considering all the other sectors. The "profiles" can then provide the basis for the judicious allocation of investment/capital resources to finance prioritized projects.

Planning and management authorities are generally not strong enough to undertake effective plan implementation, inspite of the existence of sufficient standards and legal bases to implement plans and enforce land use regulations. As of the final writing of this paper, various structural changes especially in view of the reorganization of various government agencies as a result of the February 1986 Revolution and the consequent change of government have spurred complementary changes in the field of natural resources management and environmental protection

By virtue of Executive Order No. 191,[17] the Ministry of Natural Resources has been transformed to the Department of Environment and Natural Resources in view of a major policy thrust of "giving equal attention" to environmental concerns as well as natural resources development. The E.O. was also issued in order to ensure the sustainable use, development management, renewal and conservation of the country's mineral lands and other natural resources including the enhancement of the quality of the country's environment . Under this Department, the former National Environmental Protection Council (NEPC), the National Pollution Control Commission (NPCC) and the Environmental Center of the Philippines (ECP) have been merged into an Environmental Management Bureau (EMB).

The more important structural revision relevant to this paper is the establishment under this EO of autonomous regional offices (Section 20—Field Offices of the Deparment) for the 13 regions of the country. Under this provision, it is explicitly stated that, "an Environment and Natural Resources Provincial Office shall be established in every province and the community offices in the municipalities whereever necessary". Among the major functions of the regional offices shall be to "conduct comprehensive inventory of the natural resources in the region and formulate regional short-term and long-term development plans for the conservation, utilization and replenishment of natural resources".

The far reaching implications of this structural changes for the Ecological Profile Methodology and the integrating framework discussed earlier are:

1. Providing for a regional ecological profile can be a sufficient basis in the formulation of the long-term and short-term development plans for the conservation, utilization and replenishment of regional resources. The need for a regional ecological profile has been sufficiently created.

2. Since the formulation of Provincial Ecological Profiles has been initiated for several provinces in the Philippines, the creation of the Natural Resources Provincial Office has provided a separate institutional venue at the provincial level for the full implementation of the provincial ecological profiling activities. The preparation of these profiles can be included as one of its functions.

3. Although the Community Offices of the DENR have not yet been established, the creation of these offices at the municipal level plants the seeds for providing natural resources and environmental dimensions at the community level.

4. In relation to the above, the Environmental Management Bureau (EMB) is mandated to advise the regional offices in the efficient and effective implementation of the policies, programs and projects for effective and efficient environmental management and pollution control, and in the dissemination of information on environment and pollution matters to the general public. The central office can then formulate a set of comprehensive ecological management plan for the regions. The transfer of the EMB's expertise to the field offices is necessary.

5. Finally, whereas according to this E.O., the decentralization is complete up to the municipal level, it is only in the Regional Offices where specific functions have been spelled out. The Provincial and Municipal Offices have yet to formulate theirs. In this case, there is greater possibility of using the Provincial and Municipal Ecological Profiles as the basis for spelling out these functions integrative to the regional level.

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