

**A REVIEW OF PHILIPPINE
NATURAL RESOURCE
AND ENVIRONMENTAL MANAGEMENT
1986-1988**

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A REVIEW OF PHILIPPINE NATURAL RESOURCE
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Marian S. delos Angeles and Noela C. Lasmarias**

I. INTRODUCTION

This paper presents a review of policies which significantly influence the Philippine natural resources and environment (NRE). The two important extractive resources covered are the potentially renewable forests and exhaustible minerals where focus is made on primary resource-based activities. With respect to the natural environment, air and water quality are given emphasis.

To assess NRE policies, we undertake the following three tasks: (1) assess changes in goals and policies between the previous and the present administration (Section 2); (2) discuss current NRE management strategies within a policy framework (Section 3); and (3) evaluate progress and potential impacts in terms of certain indicators (Section 3). The summary and conclusions are presented in Section 4.

*This is Chapter VII of a bigger study entitled "An Assessment of the Performance of the Aquino Government in Selected Policy Areas, 1986-1988."

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II. ASSESSING CHANGES IN POLICY THRUSTS

A. NRE Concerns as Expressed in the 1987 Constitution and Development Plans

The present Constitution has more provisions for NRE management and development (e.g., Article XII, Section 6 of Article XIII, and Section 22 of Article XVIII, 1987 Constitution) than the previous one. Explicitly recognized are: the importance of NRE in economic development, equitable distribution of opportunities of use and benefits therefrom among Filipinos, and the expansion of the resources of productivity and sustainability of resources. Also noteworthy is the recognition of the rights of indigenous tribal communities to ancestral lands.

Although concern on the long-term sustainability of resources and equity in their use characterized management policies in the early eighties as reflected in the objectives of the 1983-87 Philippine Development Plan (Table 1), important gaps were notable in the formulation and implementation of corresponding programs. The present Development Plan (1987-92) addresses these gaps through community-based management of resources, poverty alleviation particularly of small farmers and landless workers, and promotion of ecological stability. Significantly, it also identifies key result areas (as stated in the same table) which enable a more effective measurement of goals and objectives.

One important general strategy identified in the earlier Plan is not, however, explicitly stated in the present version despite the fact that this is important in providing the operational framework for the key result areas. A policy statement on correct resource pricing is conspicuously absent in both the present and updated Plans. Yet this was given emphasis during the consultations made by the new administration with economists of the Policy Advisory Group (PAG) convened by the Department of Environment and Natural Resources (DENR or hereafter referred to as "the Department") in 1986. (Table 2.)

We note, however, the flexibility of the DENR in continuously addressing such an important policy gap. For example, Executive Order No. 192 (dated November 1987), which provides for the Department's structural and functional reorganization, also mandates it to include true valuation of resources as one of its functions. This is likewise reiterated in the recent draft of the Philippine Strategy for Sustainable Development (PSSD). Specific steps to operationalize resource and environmental management through pricing are currently being undertaken as noted in recent pronouncements by the President to raise forest charges and pollution fines.

Table 1
COMPARISON OF THE PAST AND PRESENT ADMINISTRATIONS' POLICIES

Pre-Aquino Administration (Medium Term Development Plan Period, 1983 - 1987)	Aquino Administration (1986 - 1989) (Medium Term Development Plan Period, 1987 - 1992)*	Philippine Strategy for Sustainable Development (1989, draft)
<p>A. Objectives:</p> <ol style="list-style-type: none"> Coordinated development for efficient and judicious utilization of natural resources to balance present and future requirements. Efficient management and increased productivity through the use of appropriate technology, stricter implementation of policies, and incorporation of environmental considerations into project planning. Institutional involvement to promote a conducive climate for the efficient and equitable sharing of natural resources development and utilization among Filipinos. <p>B. General Strategies:</p> <ol style="list-style-type: none"> Development approach in the management of natural resources. 	<p>A. Objectives:</p> <ol style="list-style-type: none"> Promote the efficient and judicious use of natural resources. Ensure the sustainable productive capacity of natural resources. Expand the implementation of community-based management of natural resources and conservation. Achieve a more equitable sharing of the benefits derived from the development and utilization of resources. Increase the sector's contribution to the national efforts directed towards poverty alleviation and enhanced welfare of small farmers and landless workers. Promote and maintain ecological balance. <p>B. General Strategies (Key Result Areas):</p> <ol style="list-style-type: none"> Sustainable development of the ecologically critical uplands. 	<p>A. Objectives:</p> <ol style="list-style-type: none"> Resource rehabilitation Resource recovery (recycling of materials/energy in various forms) Pollution control (setting of air, water, land quality targets and the instruments/institutions to achieve the same) Water reduction (adopting low and non-waste technology) <p>B. General Strategies:</p> <ol style="list-style-type: none"> Integration of economic and environment considerations in decisionmaking

Table 1 (cont'd)

Pre-Aquino Administration (Medium Term Development Plan Period, 1983 - 1987)	Aquino Administration (1986 - 1989)	Philippine Strategy for Sustainable Development (1989, draft)
<p>2. Use of a system of fiscal and administrative tools, such as privilege fees, user rate charges and taxes, as management tools aimed at providing remunerative exploitation incentive, encourage domestic processing, effect conservation and proper utilization of resource to reflect their scarcity value and cost of development and delivery, and penalize inefficient utilization patterns.</p> <p>3. Continuous assessment and updates of mass-oriented programs.</p> <p>4. Consistency and linkages with other sectoral priorities.</p> <p>5. Appropriateness and complementarity of technologies as to area-specific levels of efficiency and applicability.</p> <p>6. Encourage participation of the private sector.</p>	<p>2. Protection of the remaining natural forests.</p> <p>3. Rehabilitation of degraded and marginal areas.</p> <p>4. Determination and management of optimal land uses.</p> <p>5. Intensification of mineral exploration and development including off-shore areas.</p> <p>6. Expansion of the Integrated Social Forestry Program.</p> <p>7. Reestablishment of community-based forestry.</p> <p>8. Survey, allocation and disposition of alienable or disposable (A & D) lands for the Comprehensive Agrarian Reform Program (CARP).</p> <p>9. Nationalization in the disposition of public lands.</p> <p>10. Delineation and management of people's mining areas.</p> <p>11. Promotion of efficiency in natural resource-based industries.</p> <p>12. Preservation of biological diversity.</p> <p>13. Improvement of air and water quality in urban areas.</p> <p>14. Generation of data and technologies for the proper understanding and management of natural ecosystems and their functions.</p>	<p>2. Proper resource pricing</p> <p>3. Property rights reform</p> <p>4. Development of IDAJ</p> <p>5. Residual management (Pollution control)</p> <p>6. Environmental education</p> <p>7. Strengthening of citizens' participation</p> <p>8. Conservation-based rural development (population program)</p>

* The updated medium-term plan follows the same objectives and general strategies.

Sources of information: Philippine Development Plan, 1983 - 1987. Technical Annex. NSDA, 1983.
 Medium Term Philippine Development Plan, 1987 - 1992. NSDA, 1987.
 Updated Medium-Term Philippine Development Plan, 1989.
 Department of Environment and Natural Resources, Phil. Strategy for Sustainable Development

The second set of recommendations of the Policy Advisory Group focuses on achieving more equitable access to resource use (Table 2). An examination of the present key result areas and major programs for the environment and natural resources sector, as summarized in Annex Tables 1 and 2, shows concrete steps towards identifying the groups who should be given more access to resources such as activities on accelerated land titling, social forestry, and small-scale mining.

B. Administrative Reform and Support

The reorganization of the Department to include the environment-oriented bodies is an indicator of concern on environmental quality. It also implies that appropriate linkages are now being made between natural resources use and environmental quality. An "Environmental Management Bureau" resulted from the former National Environmental Protection Council and National Environment Center, and legal aspects of pollution management are tackled by the Pollution Adjudication Board (PAB), as depicted in Figure 1. Another indicator of the shift towards sustained development is reflected by the renaming of line agencies from "development bureaus" to "management bureaus." ^{1/}

There has been a considerable increase in funds available for natural resource and environmental management. Table 3, for example, shows budget increases measured in real terms for the DENR since 1985. The rate of increase is highest, with doubling of allocations, between 1988 and 1989.

In terms of expenditure shares for 1989, the following are noteworthy: (1) ₱784 M, or some 50 percent of projected expenditure by function, will finance regional operations; (2) ₱307 M, or 50 percent of funds for locally-funded activities, will be spent on reforestation and integrated social forestry; and (3) ₱819 M, or 75 percent of foreign assistance, will go to the forestry sector (Table 4).

There is therefore a marked thrust on forest renewal accompanied by decentralized operations of the Department. With respect to decentralization, Community Environment and Natural Resources Officers (CENROs) have been given the serious responsibility of carrying out DENR functions to the community. ^{2/}

^{1/} Among resource scientists, "development" traditionally implies exploitation rather than "economic/social development."

^{2/} A more complete version of Figure 1, not presented in this report, depicts significant decentralization of DENR functions.

Table 2
DENR RESOURCE POLICY ADVISORY GROUP: ECONOMIC POLICY RECOMMENDATIONS
FOR THE ENVIRONMENT AND NATURAL RESOURCES SECTORS
Summary

ENR Sector	Problem/Issue	Policy Direction
Forestry	<p data-bbox="653 943 968 1071">Undervaluation of resources that encourages rent-seeking resulting in overexploitation of resources.</p> <p data-bbox="653 1219 968 1308">Inequitable access to and sharing of benefits from resource exploitation.</p>	<p data-bbox="974 943 1600 1190">Realistic pricing that incorporates the implicit value of forest resources to various sectors of society and between present and future generations leading to an optimal level of cutting. Prices should reflect the cost of extraction including management and reforestation costs, scarcity value of forest resources, and the sacrifice of competing groups with alternative needs of future generations.</p> <p data-bbox="974 1219 1600 1258">Modified concept of property rights either through:</p> <ol data-bbox="974 1279 1600 1754" style="list-style-type: none"> <li data-bbox="974 1279 1600 1427">1) the granting of a BLANKET LEASE to the holder for all economically viable and environmentally allowable activities. The holder of the right can then sublease or subcontract the exploitation rights into different activities. The government can adjust the extraction or lease price upward to reflect the added return. <li data-bbox="974 1516 1600 1665">2) government explicitly dividing the exploitation rights over an area into various activities. In this case, the government does the planning and allocation. The extraction of rents is effected on an activity basis. <li data-bbox="974 1694 1600 1754">3) the adjustment of the lease period to allow and induce a replanting behavior that is optimal. <p data-bbox="974 1783 1600 1822">Complementary Policies:</p> <ol data-bbox="974 1843 1600 2080" style="list-style-type: none"> <li data-bbox="974 1843 1600 1991">1) Imposition of export taxes to: (a) favor local consumption of forest products over that of exporting them; (b) discourage log exports in favor of domestic processing; and (c) full liberalization of imported inputs into the wood processing industry. <li data-bbox="974 2021 1600 2080">2) A system of taxes and subsidies approximating the incidence of externalities.

Table 2 (Cont'd)

ENR Sector	Problem/Issue	Policy Direction
Mining and Geology	Undervaluation of mineral resources.	<p>Allocation of mining rights.</p> <ol style="list-style-type: none"> 1) Auction off claims to capture the true value of the resource. 2) Higher fees for claims may be used to help finance better monitoring and enforcement of government management efforts.
	Depressed mineral prices due to unfavorable market conditions lead to diminished profitability. The government then instituted short-term tax relief measures. This, however, became a source of graft and corruption due to its arbitrariness and discretionariness.	<p>Appropriate taxation.</p> <ol style="list-style-type: none"> 1) Research must be done to determine the true costs and returns of mining activities. This includes: (a) identification of the exact relationship between mineral prices and profitability; (b) assessment of the unit environmental costs of mining activities; and (c) assessment of the rental incomes received in the industry. 2) The taxation scheme should be one that combines direct income tax with variable indirect tax (i.e. varying with the mineral prices prevailing in the market). This must be adopted as a long-term commitment by the government. <p>Variable tax/export tax scheme:</p> <ol style="list-style-type: none"> (a) requires an estimate of the minimum price that assure the firms normal profits. Beyond this will already comprise rental incomes. (b) the convenient estimate of the minimum price would be the long-run world price which can be computed as a five-year moving average. (c) using (b) as a reference price, if the prevailing price of minerals is higher, then the government should tax the firm. Otherwise, no tax should be imposed if the reference and prevailing prices are equal or an automatic tax relief when the world prices are low.
	Lack of capital for investment.	<p>Investment Policy</p> <p>The formalization of a competitive long-term investment and development program for the industry requires that other countries' investment policies and incentive structures are determined and well-understood.</p> <p>Trade Policy</p> <ol style="list-style-type: none"> 1) the need for research and analysis into the world market trends in minerals, and how the Philippines would relate to the world market in the years ahead. 2) the need to expand the domestic markets of outputs.

Source: Cruz, W., C. Habito and C. Paderanga, Jr. (1986).

Figure 1
DENR ORGANIZATIONAL STRUCTURE

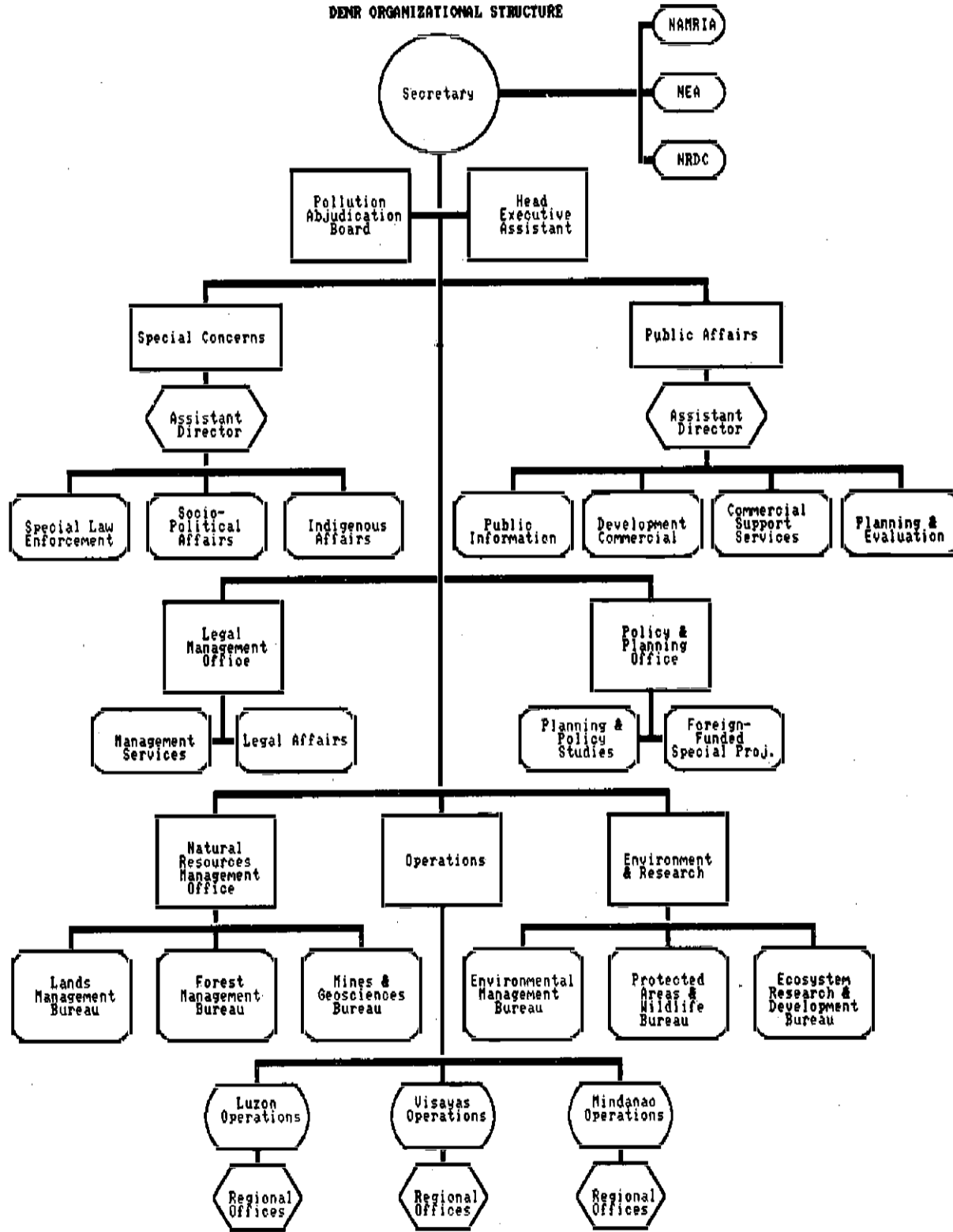


Table 3
 EXPENDITURE PROGRAM, BY OBJECT, 1985-1989
 DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
 (In thousand pesos at constant 1978 prices)

PARTICULARS	1985	1986	1987	1988	1989†	Ave. Annual Change 1985-1989
A. CURRENT OPERATING EXPENSES	258,624	359,145	410,083	477,374	1,046,505	47%
1. Personal Services	149,105	214,327	257,343	272,423	484,649	37%
2. Maintenance and Other Operating Expenses	109,519	144,817	152,739	204,951	561,856	62%
B. CAPITAL OUTLAYS	6,183	6,778	229,967	54,993	117,574	835%
C. NET LENDING & PRINCIPAL AMORTIZATION	0	0	0	0	0	
GRAND TOTAL	264,727	365,923	640,049	532,367	1,164,079	54%

† Deflated using a projected 1978 GNP deflator of 374.67.

Source: Department of Budget, 1985-1989.
 Details in Annex Table 3

Table 4
1989 EXPENDITURE PROGRAM, BY FUNCTION/PROJECT, DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
(In thousand pesos)

PARTICULARS	Total
A. Functions	1,419,465
1. Regional Operations	784,750
2. Salary Standardization	278,194
3. Administration of Personnel Benefits	113,863
4. General Administration and Support Services	181,897
5. Mines and Geo-Sciences Development	37,385
6. Land Management	26,888
7. Forest Management	24,887
8. Ecosystems Research and Development	22,949
9. Environmental Management	13,625
10. Protected Areas and Wildlife Resources Development	13,525
11. Adjudication of Pollution Cases	3,112
12. Coordination of Foreign-Assisted Projects	1,838
B. Locally-Funded Projects	646,518
1. Reforestation and Integrated Social Forestry Projects	387,217
2. Final survey of tenanted rice and corn lands and other lands covered by the Comprehensive Agrarian Reform Program in coordination with the Department of Agrarian Reform	173,579
3. Cadastral Survey	148,468
4. Conservation, Propagation and Expansion of Exotic Wildlife Species under the Calauit Project	5,163
5. Pilot Projects and Policy Studies for the Development of Resources	3,489
6. Improvement of the Department of Environment and Natural Resources Building	3,888
7. Inter-Agency Projects	2,798
8. Natural Resources Investment Promotion Program	2,268
9. Tamaraw Conservation Project	2,128
10. Lungsod Silangan Development Project	1,626
11. Pawikan Conservation Project	1,842
12. Natural Resources Management and Development	952
13. Exploration, Exploitation and Utilization of Philippine Minerals for the Agri-Chemical Industry	838
14. Special Projects for Mineral Exploration and Development of Mineral Reservation Areas, subject to the provisions of Section 8, P.D. No. 1385 and Section 48 of P.D. No. 1177	788
15. Stone Industry Resources Survey	521
16. Socioeconomic Enhancement of Mining Communities	313
17. Integrated Geological Survey of Economic Mineral Deposits	382
18. Zeolite Synthesis Using Indigenous Raw Materials	121
19. Small-Scale Mining and Exploration Techniques	97

Table 4 (Cont'd)

PARTICULARS	Total
C. Foreign-Assisted Projects	1,890,482
1. Forestry Sector Loan (ADB 889/890 PHI)	819,523 (100%)
2. Philippine Forestry Development Project (ADB 677 PHI)	82,758 (95%)
3. Allah River Irrigation Project (IDRC Grant 3-P-85-1013-02)	37,459 (37%)
4. Palawan Integrated Area Development Project (ADB Loan Nos. 528 & 529 PHI/EEC Grant)	29,685 (72%)
5. Rainfed Resources Development Project (USAID 492-T-068)	24,721 (37%)
6. RP-Japan Forestry Development Project-Watershed Management (JICA Grant)	22,640 (-)
7. Third Davao del Norte Irrigation Project (Soil Conservation and Watershed Management Component, ADB 580 PHI)	20,791 (14%)
8. RP-New Zealand Afforestation Project (NZ-Grant)	13,940 (-)
9. Dipterocarp Forest Management Project (FRG Grant)	8,860 (-)
10. RP-Japan Crocodile Farming Project	7,967 (-)
11. Project Preparation Facility (IBRD 2360 PH)	7,309 (72%)
12. Forest Fire Management Project (FAO Grant)	4,138 (-)
13. Bicol River Basin Development Project-Lake Bato Watershed Management (ADB 417 PHI)	2,804 (3%)
14. ASEAN-US Watershed Project (USAID Grant No. 498-0253-03)	2,655 (-)
15. Bamboo Research and Development Project (UNDP PHI/85/008/A/01/12)	2,193 (-)
16. RP-German Cebu Upland Project (FRG Grant)	1,230 (-)
17. Industrial Waste Exchange System Project (IDRC Grant 3-8-86-1040-2)	686 (-)
18. Seagrass Habitat Restoration Project (IDRC Grant 3-P-85-1013-02)	560 (-)
19. BLISS Waste Water Treatment Project (IDRC Grant 3-8-84-0245)	483 (-)
GRAND TOTAL	3,156,385 =====

Note: () - Percentage foreign loans

(-) - Foreign assistance is in the form of grants-in-kind such as consultancy services and equipment provided by the donor country and as such, are not reflected in the Department's budget allocation.

Source: Department of Budget as of October 1989.

It is not obvious from the same table that financial resources are substantially allocated for monitoring impacts on environmental quality, apart perhaps from the usual monitoring required in foreign-assisted projects and the remote sensing information generated by the National Mapping and Resources Information Authority. With this as a gap, proper identification of the magnitude and incidence of benefits and costs of NRE use appears unfeasible under the current set-up.

With respect to equity in resource use, considerable effort shall be exerted in providing basic information on the potential beneficiaries and the resources targetted for distribution. This includes cadastral surveys, activities related to the Comprehensive Agrarian Reform Program (CARP), and the ongoing census of forest occupants.

The other projects listed in the current Development Plan focus on the conservation of specific areas, endangered species and environmental rehabilitation. Not indicated in Table 4 are ongoing projects initiated by private groups, which DENR has sought to encourage, such as river revival, the allocation and preservation of certain areas for biodiversity, and the anti-smoke belching campaign.

III. ASSESSING NRE POLICIES AND MANAGEMENT: 1986-1988

To assess the performance of the first three years of the present administration's NRE management, we first present a conceptual framework for NRE management strategies. We then examine various indicators for specific NRE sectors, and derive pertinent issues that need to be tackled.

A. An Analytical Framework for Natural Resources and Environmental Management

The growing concern about the scarcity in the country's timber resources and the deterioration of the Philippine upland, water and air ecosystems indeed imply that special characteristics of natural environmental resources matter. The importance of these peculiarities differ across the sectors under study, implying variation in their management strategies.

For example, in the case of the dipterocarp species of the Philippine forests, the long renewal period of at least thirty years means potential conflict between current and future users. In addition, the role that the multi-canopied, tropical rainforests in sloped land play in minimizing the impact of heavy rainfall on the soil and their relationship with the rest of the ecosystem indicate competition even among the current users.

With respect to water and air, the manner in which these resources provide services is such that their utilization is common property and externalities in their use occur. On the other hand, while most mineral resources' extraction is mutually exclusive, their transformation into more usable forms is often accompanied by the generation of effluents into the environment.

Determination of the optimal use of natural and environmental resources thus entails decisions not only on the form and level of use but also on specific groups of users. How should such decisions be made and what issues confront policymaking vis-à-vis NRE intertemporal and intratemporal uses?

1. Accounting for the Costs and Benefits in Using NRE

Deciding on the optimum rate of using an NRE, and consequently, the amount of good or service derived therefrom, implies producing at the level when net benefits are largest, or as usually stated, when marginal benefits equal marginal costs. Because of the peculiarities involved in using the NRE, however, the following components of costs and benefits matter:

- A. the value of benefits, which derives from demand for the good or service, and
- B. costs which arise in the following forms:
 - (1) the opportunity cost of complementary factors of production (i.e., labor and capital);
 - (2) the indirect, often, off-site environmental costs; and,
 - (3) the future effects of scarcity.

The last two types of costs are usually left out in the pricing of NRE since the negatively impacted parties are usually different from the users themselves.

Unpriced, Environmental Effects

Because by-products of NRE-use usually occur at areas other than the site of use and, often, their impact on one sector does not diminish impacts on others, their effects are not priced. Those who bear the costs or disbenefits of resource use thus do not get compensated for through payments from the generator of negative effects through normal market transactions.

Undervaluing Future (Dis)Benefits

The future net benefits of resource stocks likewise tend to be undervalued under a number of cases. One instance is when the nature of resource use is via common access and saving some to meet future consumption has no assurance that it is indeed the

saver whose future welfare shall be enhanced. This is likewise true for resources whose use could be mutually exclusive but whose future availability is not assured due to imperfections in property rights, e.g., access is open to any user. A third case is when knowledge is limited with respect to other (potential) uses which may become feasible as a result of technological improvements.

In fact, even when future access is secure, future values are known, and use is mutually exclusive, the tendency for myopic decisions may yet prevail due to the discounting bias. This is particularly true for decisionmakers with short time horizons, or whose preference is for enhancing current net benefits versus future net returns.

Accounting for all costs implies using Q_3 in Figure 2 when the relevant marginal cost curve is EMC_3 , which includes all three costs. On the other hand, when the market fails to account for negative environmental externalities, too high resource use rates (such as Q_2) result, with the attendant large unintentional negative effects. These public "bads" are borne by other sectors of society. Conversely, those activities which produce positive externalities or public goods tend to be underproduced since providers do not get paid by users.

Non-consideration of both unpriced effects and future net benefits of resource use implies even higher use rates, as indicated by $Q_1 > Q_3$. Since the marginal cost curves in Figure 2 also reflect supply, the figure also implies that incorporation of all costs of resource use means higher prices that need to be paid by both resource users and eventually, the consumers of the resource-based commodity or service.

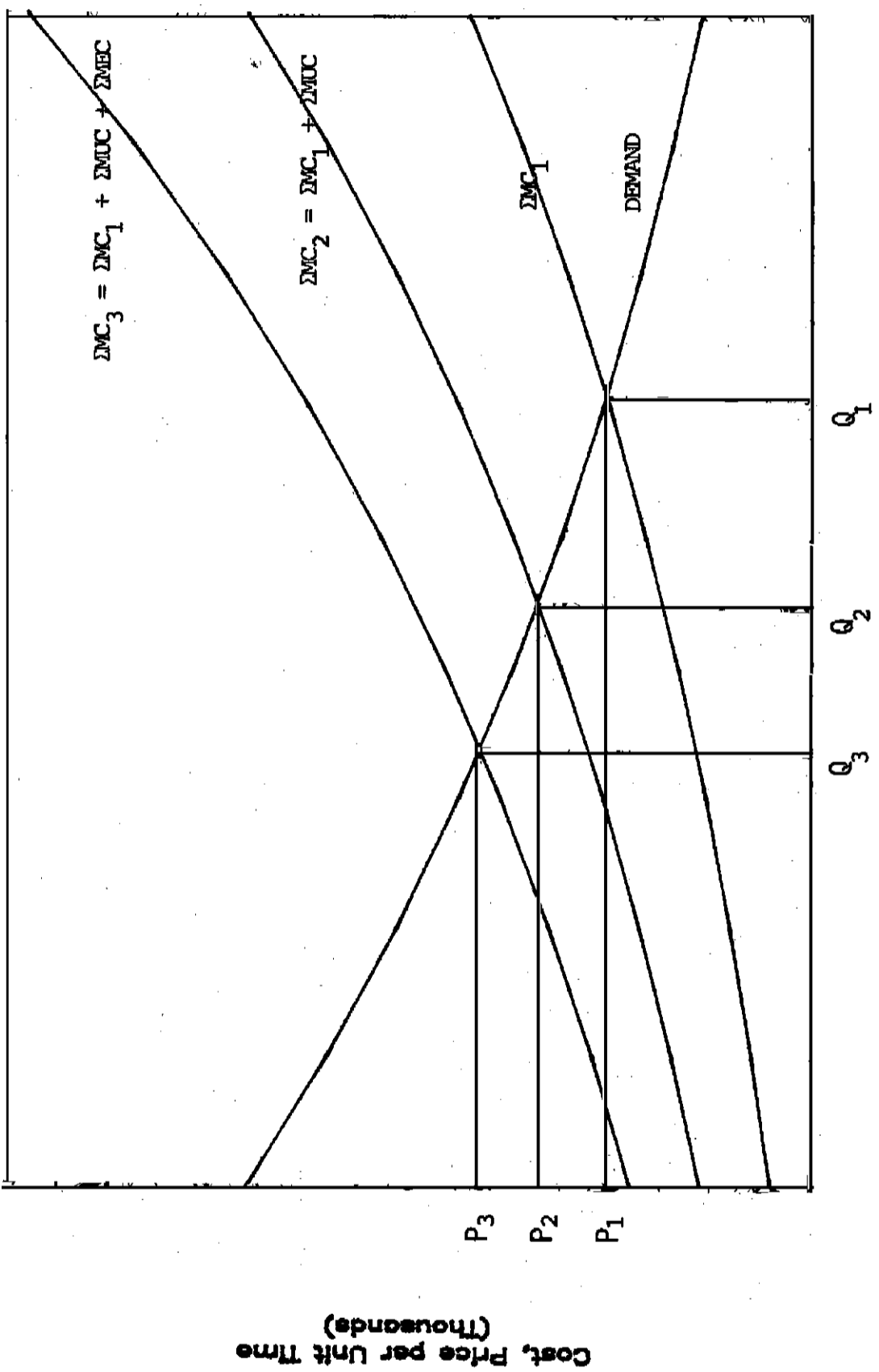
2. Implied Strategies for NRE Management

Consideration of the special characteristics of resource and environmental use obviously means providing the following conditions that would enable decisionmakers to incorporate the three costs arising from NRE use.

(1) NRE Monitoring and Accounting

First is the need for the monitoring of resource availability and environmental quality that would enable measurement of costs and benefits of NRE use. Given that positive and negative effects are borne by different groups, data on their incidence are likewise necessary. The nature of these information implies that they need to be provided with considerable support from the public sector.

FIGURE 2
**Optimum Level of Resource Development
 or Environmental Use**



NRE Production per Unit Time

Legend: MC_1 = private marginal cost of production, reflecting marginal opportunity cost of complementary inputs
 MUC = marginal user cost, reflecting change in present value of future costs due to natural resources and environmental scarcity
 MEC = marginal environmental cost

(2) The Role of Property Rights

Second, the system of allowing access to resources should enable users to earn the future returns from sustainable exploitation. Further, there is a need for an unambiguous system of secure property rights which defines who may use the resource, duration of use, and the extent of use. Most resource management schemes that are conservation-oriented, in fact, have relied heavily on a system of rules for regulating those granted access to the resource, necessitating monitoring and enforcement systems to be effective.

(3) Management by Prices

Third, incorporation of the costs of scarcity and environmental effects in pricing resources would lead to lower use rates at the primary level and, to some extent, decreased demand for the derived commodity or service at the final consumers' end. Payments for resource use thus imply interference in market transactions through a system of taxes (and subsidies).

(4) Joint Decisionmaking for Allocating Resources:
Minimizing Transaction Costs

A fourth solution is for bargaining to occur between the NRE user(s) and the affected party(ies). The need for government intervention arises when voluntary solutions become unfeasible because of high transactions costs, including information costs, cost of bargaining and enforcement costs. These differ according to the nature of activities, number of parties involved, and difficulties in valuing the costs and attributing their causes.

Items (2)-(4) are intervening mechanisms which may be used in combination, depending on specific characteristics of the NRE in use. They define the conditions under which resource (and environmental) use occur and greatly influence the behavior of resource users in the short run.

(5) Technological Change and R & D

A longer-term solution is to encourage shifts in both demand and supply curves, which would: (a) enable substitution among goods, (b) result in more efficient resource recovery, and (c) generate less destructive effects. Technological change may be encouraged directly through public investment in research and development. In addition, private initiative to alter technologies has likewise been responsive to price trends -- the extent to which resource scarcity and environmental degradation gets reflected in the pricing mechanisms is thus important.

(6) Investment in Natural Resource Renewal
and Environmental Rehabilitation

Finally, the curative measure involves resource renewal and environmental rehabilitation activities, a last resort that needs to be undertaken when resource supplies have reached critical levels and when serious deterioration of environmental quality has occurred. It should be noted, however, that investment in resource renewal is limited in terms of efficacy in resource conservation for as long as the conditions that lead to overexploitation and misuse prevail.

Given these key factors for rationalizing NRE use, we now proceed to examine key indicators that measure the extent to which they are addressed by current policies and strategies. We take this approach for the following reasons: (1) due to the importance of the time factor in resource use, a longer period of analysis is needed for measuring policy impacts; (2) as we earlier mentioned, significant budget allocation for NRE management shall be experienced only in 1989. Our interpretation of data in this study is thus conducted more to derive directions of change rather than to measure the magnitudes per se.

B. The Setting: Land As the Resource Base

1. The Need for Land-Use Planning and Allocation

Table 5 shows land use data in 1980 --- no such information is updated nor reported in the present Development Plan. ^{3/} Indeed, the "open land" area indicated in the Table, which covers some seven million hectares or 25 percent of the country's total land area as of 1980, is indicative of wasteful/destructive land-use. And yet sound management of land resources is important on the following counts: (1) the spatial aspects of development planning implies, at the very least, integration of activities across space (and time); and, (2) land scarcity appears inevitable with a rapidly growing population and slow institutional and technological changes.

It is indeed alarming that the present Development Plan does not indicate continuance, at the very least, of a national physical planning framework. Although there are indeed efforts on integrated area development planning at the provincial and regional levels, there is a marked lack of national level coordination and analysis.

^{3/} We define land use here as actual use vs. the DENR definition which is partly based on legal use.

Table 5
 LAND USE IN THE PHILIPPINES BY BROAD CATEGORY AND BY REGION, 1980
 (In thousand hectares)

Region	Total	Agri- culture	Forestry	Pasture	Settlements	Mining & Quarrying	Inland Fisheries	Open Land 1/
Philippines	30,000.0	8,844.3	11,475.3	708.2	719.7	88.2	675.8	7,408.5
NCR	63.6	4.0	-	-	59.8	-	0.6	-
I	2,156.8	375.5	666.0	29.3	69.0	64.2	40.9	903.9
II	3,640.3	513.4	1,866.4	81.3	29.4	-	78.4	1,071.4
III	1,823.1	730.9	340.5	48.5	56.3	-	84.2	562.7
IV	4,692.4	1,461.4	2,081.3	100.6	72.4	1.4	143.1	832.2
V	1,763.3	827.3	379.1	183.0	42.2	-	6.8	324.9
VI	2,022.3	704.6	408.0	21.3	90.3	10.6	44.7	662.8
VII	1,495.1	573.7	241.6	18.5	92.1	1.2	3.3	564.7
VIII	2,143.2	570.7	849.5	9.7	33.9	-	8.4	663.0
IX	1,868.5	847.2	521.7	17.1	34.6	-	33.2	414.7
X	2,832.8	850.9	1,493.0	67.0	55.9	10.8	34.2	313.0
XI	3,169.3	602.1	1,705.4	100.6	58.1	-	24.5	678.6
XII	2,329.3	686.6	922.8	31.3	26.5	-	165.5	496.6

1/

Open land refers to residual land with low potentials for development but can still be devoted to any of the broad land uses.

Source: Handbook on Land and Other Physical Resources, National Land Use Committee, NEDA, 1984.

Current efforts at decentralization augur well for localized joint decisionmaking and provide more flexibility and equity in solving site-specific NRE management problems. This needs to be complemented with higher level coordination particularly when tackling eventual trade-offs between competing land uses, implied aggregate supplies of land-based commodities and services, and siting of projects.

A basic requirement is information that allows assessment of land characteristics/capability versus utilization patterns. The only such information which is currently being generated for three pilot areas under the Natural Resources Management and Development Project of DENR needs to be implemented on a larger scale.

Relatedly, another glaring lack of concern is indicated by the absence of some assessment of population densities and movements, and weak or absence of a population policy that explicitly advocates moderate fertility and population growth (Herrin 1990, forthcoming). It should be noted that population stress on natural resources is reaching alarming proportions. C. J. Cruz et al. (1988), for example, point out that in the uplands, population densities reached 119 persons per square kilometer in 1988 compared to 96 persons per square kilometer in 1980. They also note that migration into the uplands is caused by both pull factors of activities in forested lands and push factors due to increasing landlessness and poverty in the lowlands.

C. Production and Employment in Natural Resource-Based Sectors

The capacity of primary resource-based industries to generate production and employment has diminished considerably. Table 6 shows a declining trend in forest-based production and slight increases in mineral-based activities. Production at the primary and secondary levels based on these resources have therefore been declining in proportion to gross national product.

In terms of exports, changes in the composition of forest-based products are notable in the shift away from hardwood log exports towards softwood and other species during the period 1981-1987 (Table 7). Mineral-based exports decreased largely due to declining copper export. Overall, these sectors comprise lower shares of the country's exports, beginning at 19 percent in 1981 and decreasing to only 10 percent in 1987.

Employment in the processing industries based on timber, wood and mineral production likewise followed the same trends at the national level (Table 8), contributing around 20 percent to total employment in 1986. However, on a regional scale, marked increases are seen for Regions 7, 8, 9 and 10.

Table 6
GROSS VALUE ADDED IN THE NATURAL RESOURCE-BASED SECTORS
(In million pesos at constant 1978 prices)

SECTOR	1970	1975	1980	1985	1986	1987	1988
1. FORESTRY	10,377	7,904	7,390	5,202	4,744	4,956	5,423
a. Logging	7,056	3,820	4,199	2,130	1,981	1,966	2,099
b. Wood & cork	1,498	1,531	2,005	1,617	1,170	1,255	1,381
c. Furniture & Fixtures	226	165	340	280	314	356	398
d. Paper & Paper Products	1,181	1,669	661	547	595	647	803
e. Publishing & Printing	416	710	526	619	684	732	742
2. MINERALS	7,359	12,338	12,935	10,896	10,481	11,102	12,351
a. Mining & Quarrying	2,012	2,663	4,120	3,257	2,897	2,850	2,975
b. Basic metal ind.	1,057	1,769	1,801	2,260	2,150	2,410	2,799
c. Metal Products	549	773	1,535	1,099	1,069	1,102	1,312
d. Non-met. min. prod.	1,162	1,691	1,346	808	885	960	1,145
e. Petroleum & Coal prod.	2,588	5,441	4,133	3,472	3,481	3,701	4,120
3. FISHERY	6,000	7,383	9,461	10,251	10,550	10,771	11,315
Total, forestry, min., fishery	23,736	27,625	29,786	26,349	25,775	26,829	29,089
Subtotal, primary ind.	15,068	13,874	17,700	15,646	15,428	15,587	16,389
Subtotal, res.-based manuf.	8,668	13,751	12,086	10,703	10,347	11,242	12,700
GVA in manufacturing	24,486	36,408	47,961	44,639	44,950	48,085	52,293
Percent res.-based mfg.	35.4%	37.8%	25.0%	24.0%	23.0%	23.4%	24.3%
GROSS NATIONAL PRODUCT	107,606	148,044	198,598	188,562	192,310	204,296	215,102
Percent forestry, min., fishery	22.1%	18.7%	15.0%	14.0%	13.4%	13.1%	13.5%
Percent forestry	9.6%	5.3%	3.7%	2.8%	2.5%	2.4%	2.5%
Percent minerals	6.8%	8.3%	6.5%	5.8%	5.5%	5.4%	5.7%
Percent primary industry	14.0%	9.4%	9.0%	8.3%	8.0%	7.6%	7.6%
Percent res.-based mfg.	8.1%	9.3%	6.0%	5.7%	5.4%	5.5%	5.9%

Source of basic data: Philippine Statistical Yearbook, various years.

Table 7
CONTRIBUTION OF THE NATURAL RESOURCES SECTOR TO TOTAL EXPORTS, 1981 - 1987
(F.O.B. value in thousand US dollars)

	1981	1982	1983	1984	1985	1986	1987
FORESTRY Subsector	17,318	17,246	17,991	24,698	29,175	22,334	31,000
Logs	76	79	74	95	39	27	0
Lumber	126	124	149	107	90	103	154
Plywood	111	67	77	58	52	57	65
Fuel wood, woodcharcoal, pulpwood	6,313	6,364	7,732	12,036	15,759	10,738	10,031
Pulp and waste paper	10,692	10,612	9,960	12,403	13,235	11,409	12,029
MINERALS Subsector	1,083,008	782,331	718,549	582,593	603,330	629,132	550,001
Gold	215,183	160,720	153,594	104,345	99,950	139,614	90,454
Copper concentrates	429,376	312,447	249,481	114,831	84,486	89,869	109,149
Chromite ore	25,000	15,000	10,000	19,000	12,000	10,000	7,000
Non-metallic mineral manufac- tures, particularly cement	47,255	39,549	25,718	20,587	22,750	16,790	18,904
Manufactures of metal, n.e.s.	18,284	19,415	10,938	9,915	7,930	9,522	17,143
Nickel and nickel ores	120,850	61,446	63,313	25,257	14,297	9,297	10,714
Iron ore conglomerates	116,349	105,622	114,377	105,024	94,982	85,151	75,878
Nickel concentrates	52,475	9,176	7,815	2,539	18,692	11,058	0
Iron and steel	30,169	21,933	27,856	36,304	40,130	33,365	36,473
Crude fertilizers and crude minerals	2,293	4,760	5,519	5,015	4,377	5,168	6,920
Metalliferous ores and metal scrap	16,702	13,750	9,091	12,760	13,997	17,204	5,939
Non-ferrous metals	9,072	10,505	40,847	126,936	189,731	202,094	171,427
T O T A L S							
All exports	5,720,397	5,020,593	5,005,291	5,390,646	4,620,954	4,841,700	5,720,238
Forestry and Minerals	1,100,326	799,577	736,540	607,291	632,505	651,466	581,001
Percent of total exports	19%	16%	15%	11%	14%	13%	10%

Source: Philippine Statistical Yearbook, various years.

Table 8
EMPLOYMENT RATE OF NATURAL RESOURCE-BASED MANUFACTURING BY REGION, 1983-1986
(In thousands)

	Total	R e g i o n											
		Metropolitan Manila Area (National Capital Region)											
		1	2	3	4	5	6	7	8	9	10	11	12
1983 Total	10,470,867	423,572	27,856	75,119	117,124	16,448	40,446	46,659	7,937	764,865	4,476,892	3,025,887	1,451,402
RBIs	4,418,954	80,943	7,934	10,165	21,841	2,480	4,931	19,245	771	336,780	2,095,154	1,358,238	469,657
(%)	42.2	19.1	28.5	14.1	18.6	15.1	12.2	41.2	9.7	44.0	46.8	44.9	32.8
1984 Total	637,323	355,794	10,301	44,780	76,162	4,500	26,505	38,315	3,869	5,377	22,973	27,944	12,537
RBIs	156,814	68,572	3,444	6,145	13,404	982	1,341	17,617	1,365	2,203	12,900	14,942	7,438
(%)	24.6	19.3	33.4	13.7	17.6	21.8	5.1	66.0	35.3	41.0	56.2	53.5	59.3
1985 Total	830,274	534,516	17,887	46,181	77,507	3,931	23,656	40,007	4,462	5,516	26,239	26,814	13,437
RBIs	145,789	59,968	8,509	5,857	11,931	812	1,324	17,412	1,831	2,304	13,665	13,321	8,645
(%)	17.6	11.2	47.6	12.7	15.4	20.7	5.6	43.5	41.0	41.8	52.1	46.2	64.3
1986 Total	619,106	347,900	8,995	41,310	77,139	3,155	23,478	37,779	849	6,008	17,282	34,405	8,939
RBIs	136,773	64,779	2,248	5,695	12,796	222	980	18,363	658	3,210	9,603	11,428	900
(%)	22.1	18.6	25.0	13.8	16.6	7.0	4.2	48.6	77.5	53.4	55.6	33.2	10.1

Notes: Natural resource-based manufacturing industries include wood & cork products, furniture & fixtures, paper & paper products, publishing & printing, non-metallic minerals, basic metal and metal products industries.

Source: Regional Statistics, NSCB.

With lower production in major resource extractive activities such as logging and copper mining, the share of both primary and secondary resource-based industries to overall employment declined from 52 percent in 1984 to 48 percent in 1987 (Table 9). It should be noted, however, that the employment figures used include agricultural employment since official statistics report agricultural, fishery and forestry all together. In fact, this data constraint has necessitated current DENR efforts to conduct censuses of upland and mining communities to provide firmer basis for allocating resources and planning economic/social development projects.

D. Forest and Upland Resources

1. Declining Forest Cover

Recent estimates indicate that only 24 percent of total land area is with significant forest cover, as presented in Table 10. If slope were used as a gauge of optimum forest cover, the proportion of land with at least 18 percent slope, which is 55.9 percent as indicated in Table 11, implies serious gaps in vegetative cover requirements.

Generally, the steeper the slope, the greater is the potential for massive soil erosion, as reflected in Table 12. However, since alternatives to forests exist, which also provide sufficient soil protection such as modified cropping systems (e.g., Cruz, R.V. 1982), then slope alone should not be considered as a rigid criterion in determining forest cover requirements.

The largest forest conversion rates during the last decades (1969-1987) were experienced in Regions 10 and 11, as Table 13 depicts. In terms of the national total, we have been deforesting at a rate of 179,000 hectares per year since the late sixties. On the other hand, reforestation rates have been low as Table 14 shows; thus, given that inadequate protection on cut-over forests prevents natural regrowth, the apparent net change in forest cover has been negative in the late seventies as indicated in Figure 3. The more recent picture shows a reversing trend beginning 1985; however, this is due largely to less old-growth forests left for logging rather than to significant increases in reforestation. ^{4/}

2. Production and Export of Timber Products

Similarly, production of logs and wood products has been declining since 1980, as the figures in Table 15, (and Figure 4)

^{4/} Results of the selective logging ban and cancellation of timber licenses beginning 1988 are not reflected in Figure 3.

Table 9
EMPLOYMENT RATES BY REGION, 1984-1987
(In thousands)

	TOTAL	R e g i o n											
		1	2	3	4	5	6	7	8	9	10	11	12
		Metro Manila Area (MCA)											
1984 Total	19,213	1,352	988	1,675	2,445	1,538	2,002	1,643	1,113	839	1,228	1,436	916
RBIs	9,983	814	691	636	1,106	962	1,260	957	740	512	748	805	640
(%)	52.0	60.2	69.9	38.0	45.2	62.5	62.9	58.2	66.5	61.0	60.9	61.6	69.9
1985 Total	19,804	1,295	981	1,791	2,385	1,534	1,899	1,686	1,281	959	1,256	1,538	938
RBIs	9,825	706	606	707	1,001	927	1,130	947	896	619	726	983	546
(%)	49.6	54.5	61.8	39.5	40.0	60.4	59.5	56.2	69.9	64.5	57.8	63.1	58.2
1986 Total	20,594	1,384	1,114	1,910	2,656	1,523	1,949	1,754	1,336	1,028	1,301	1,579	1,011
RBIs	10,438	828	771	725	1,174	880	1,169	957	892	664	742	960	644
(%)	50.7	59.8	69.2	38.0	44.2	57.8	60.0	54.6	66.8	64.6	57.0	60.8	63.7
1987 Total	20,796	1,410	1,055	1,909	2,720	1,538	1,933	1,693	1,259	1,040	1,283	1,568	1,001
RBIs	10,087	800	689	748	1,134	869	1,142	890	776	680	729	963	627
(%)	48.5	56.7	65.3	39.2	41.7	56.5	59.1	52.6	61.6	65.4	56.8	61.4	62.6

Note: RBIs include both primary and manufacturing industries.

Source: Regional Statistics, RSCB -
Philippine Statistical Yearbook, various years.

Table 10
REGIONAL FOREST COVER IN THE PHILIPPINES
(Based on LANDSAT images)

Region	Total Land Area (ha)	Forest Lands (ha)	Classified A & D (ha)	Forest Cover a/			
				Area Forested (ha)	Percent of Region Land Area	Percent of Regional Forestland	Percent of National Forest Cover
I	2,156,845	1,216,345	948,500	466,000	21.6%	38.3%	6.4%
II	3,640,300	2,405,020	1,235,272	1,629,000	44.7%	67.7%	22.5%
III	1,823,082	726,120	1,096,962	297,500	16.3%	41.0%	4.1%
IV - Palawan	1,489,626	1,155,027	334,599	696,600	46.8%	60.3%	9.6%
Others	3,386,093	1,456,750	1,009,630	601,200	17.8%	41.3%	8.3%
V	1,763,249	535,453	1,227,796	95,500	5.4%	17.8%	1.3%
VI	2,022,311	774,750	1,247,553	101,800	5.0%	13.1%	1.4%
VII	1,495,142	591,079	904,063	43,100	2.9%	7.3%	0.6%
VIII	2,143,159	1,059,212	1,003,947	443,800	20.7%	41.9%	6.1%
IX	1,868,514	963,337	905,177	273,400	14.6%	28.4%	3.8%
X	2,032,800	1,032,700	100,200	1,095,700	38.7%	59.0%	15.1%
XI	3,157,900	2,018,700	1,139,200	1,026,000	32.5%	50.9%	14.2%
XII	2,329,323	1,222,448	1,106,075	466,300	20.0%	38.1%	6.4%
T O T A L	30,100,344	15,956,965	13,131,774	7,236,700	24.0%	45.4%	100.0%

a/
Excluding brushland.

Source of basic data: RP - German Forest Resources Inventory Project, 1987 (various regions).

Table 11
SLOPE CLASSIFICATION BY REGION, 1984
(In thousand hectares)

Region	Slope Group											
	Total Hectares	Percent of Land Area	0 - 8 %		8 - 18 %		18 - 30 %		30 - 50 %		50 % and above	
			Hectares	Percent of Land Area	Hectares	Percent of Land Area	Hectares	Percent of Land Area	Hectares	Percent of Land Area	Hectares	Percent of Land Area
Philippines	30,000	100.0	7,779	25.9	5,424	18.1	7,836	26.1	6,285	20.9	2,677	8.9
I	2,157	100.0	575	26.6	197	9.1	217	10.1	732	33.9	437	20.2
II	3,640	100.0	780	21.4	582	16.0	550	15.1	1,150	31.6	579	15.9
III	1,823	100.0	1,028	56.4	131	7.2	228	12.5	254	13.9	181	9.9
IV	4,756	100.0	1,256	26.4	668	14.0	712	15.0	1,174	24.7	947	19.9
V	1,763	100.0	308	17.5	510	28.9	336	19.1	525	29.8	84	4.8
VI	2,022	100.0	907	44.9	328	16.2	376	18.6	242	11.9	170	8.4
VII	1,495	100.0	423	28.3	202	13.5	451	30.2	277	18.5	142	9.5
VIII	2,143	100.0	510	23.8	299	14.0	584	27.3	620	28.9	129	6.0
IX	1,869	100.0	490	26.2	629	33.6	463	24.8	280	15.0	7	0.4
X	2,833	100.0	359	12.7	737	26.0	1,498	52.9	238	8.4	-	-
XI	3,169	100.0	430	13.6	565	17.8	1,451	45.8	724	22.8	-	-
XII	2,329	100.0	713	30.6	575	24.7	970	41.6	71	3.1	-	-

1

NCR is included in Regions III and IV since the map scale (1:1.6 M) did not allow separation of NCR.

Source: Handbook on Land and Other Physical Resources, National Land Use Committee, NEDA, 1984.

Table 12
IMPLIED RELATIONSHIP BETWEEN SLOPE AND SOIL EROSION

	a		b
	Slope Group		Erosion Class
	0-18% Percent of Land Area	18% and above Percent of Land Area	Moderate to Severe Percent of Area Affected
Philippines	44.0	56.0	43.5
1	35.7	64.3	41.0
2	37.4	62.6	58.9
3	63.6	36.4	25.7
4	40.4	59.6	17.0
5	46.4	53.6	34.6
6	61.1	38.9	44.0
7	41.8	58.2	56.3
8	37.8	62.2	38.7
9	59.8	40.2	58.5
10	38.7	61.3	56.1
11	31.4	68.6	52.1
12	55.3	44.7	55.5

Sources of basic data:

- (a) Handbook on Land and Other Physical Resources, NEDA, 1984.
- (b) Agricultural Land Management and Evaluation Division,
Bureau of Soils and Water Management.

Table 13
LAND USE/FOREST TYPE AND ANNUAL FOREST CONVERSION RATE IN THE PHILIPPINES
(In hectares, by region)

Region	Dipterocarp		Pine	Mossy/ Submarginal	Mangroves	Brushland	Others	** TOTAL
	Old Growth	Residual†						
1 - 1969			216,250	198,355	89,810	292,390	418,940	1,214,945
1981			166,916	187,684	101,866	283,331	476,548	1,216,345
Rate			2,500	900	500			3,900
2 - 1969			1,232,200	56,300	412,700	279,800	533,600	2,512,600
1981			1,076,900	54,200	461,200	220,300	592,400	240,500
Rate	(21,600)	13,700	(7,900)	(200)	(100)			(9,100)
3 - 1969			328,700	700	68,800	76,200	269,900	736,900
1981			a	1,600	62,400	62,800	369,100	726,100
Rate	(5,500)	(2,300)	(7,800)	75	(200)			(800)
4.1 - 1969			615,900	187,900	21,300	261,800	369,900	1,456,800
1984			428,400		155,700	344,600	527,600	1,456,800
Rate	(13,700)	1,200	(12,500)			(2,100)	(1,400)	(1,600)
4.2 - 1964	600,300	82,600	682,900		342,600	46,900	27,900	1,474,600
1985	118,600	213,600	332,200		329,200	34,900	172,800	1,489,600
Rate	(22,900)	6,200	(16,700)		(600)	(600)		(17,900)
Corrected rate	(5,100)	(11,600)	(16,700)		(600)	(600)		(17,900)
5 - 1969			162,000	15,500	29,900	88,800	239,300	535,500
1984			79,200	12,000	1,200	54,800	388,300	535,500
Rate	(2,300)	(3,300)	(5,600)	(200)	(1,900)			(7,700)
6 - 1969			1,299,500	63,400	14,100	149,500	418,300	774,800
1987			59,800	36,500	4,400	81,000	593,100	774,800
Rate	(3,700)	(200)	(3,900)	(1,500)	(500)			(5,900)
7 - 1969			72,900	6,900	13,700	75,700	421,900	591,100
1987			14,700	21,800	3,700	7,700	543,200	591,100
Rate	(1,600)	(1,600)	(3,200)	(900)	(600)			(4,700)
8 - 1969			622,400	84,700	29,800	174,600	195,500	1,107,000
1984			482,200	27,500	6,000	128,100	503,400	1,059,200
Rate	(1,700)	2,300	(14,700)	(3,800)	(1,600)			(20,100)
9 - 1969			479,500	9,800	87,100	154,000	232,900	963,300
1987			281,000	3,800	60,500	97,900	600,100	963,300
Rate	(3,400)	(12,100)	(15,500)	(300)	(1,500)			(17,300)
10 & 11 - 1963	1,197,200	529,000	1,726,200	256,400	19,900	394,500	-	2,397,000
1980	317,200	931,000	1,248,200	256,400	25,400	481,100	53,300***	2,064,000
Rate	(51,765)	(28,118)	(79,882)	0	324			(79,559)
12 - 1969			657,800	75,400	7,300	193,000	288,900	1,222,400
1984			328,500	134,800	300	142,300	624,500	1,222,400
Rate	(3,800)	(14,700)	(18,500)	(400)	(100)			(19,800)
Total, First Inventory 1964-69			8,096,250					14,986,945
Second Inventory 1980-87			4,330,016					11,614,345
Conversion Rate			(175,882)					(178,959)

† Annual conversion/transformation of residual forest is equal to the transformation of the old growth forest less the destruction of the residual forest.

** Excludes brushland and other forests.

*** Plantation forest.

Source: DENR, RP - German Forest Resources Inventory, 1987 (various regions).

Table 14
APPARENT FOREST COVER CHANGES

Year	Area Deforested (000 ha)	Area Reforested (000 ha)	Net Area Reforested (000 ha)
1976	84	32	(52)
1977	84	52	(32)
1978	66	78	12
1979	62	79	17
1980	33	60	27
1981	25	64	39
1982	17	63	46
1983	121	79	(42)
1984	5	39	34
1985	14	23	9
1986	8	33	25
1987	8	41	33

Source of basic data: DENR, Forest Management Bureau.

FIGURE 3
Apparent Forest Cover Changes
(in thousand hectares)

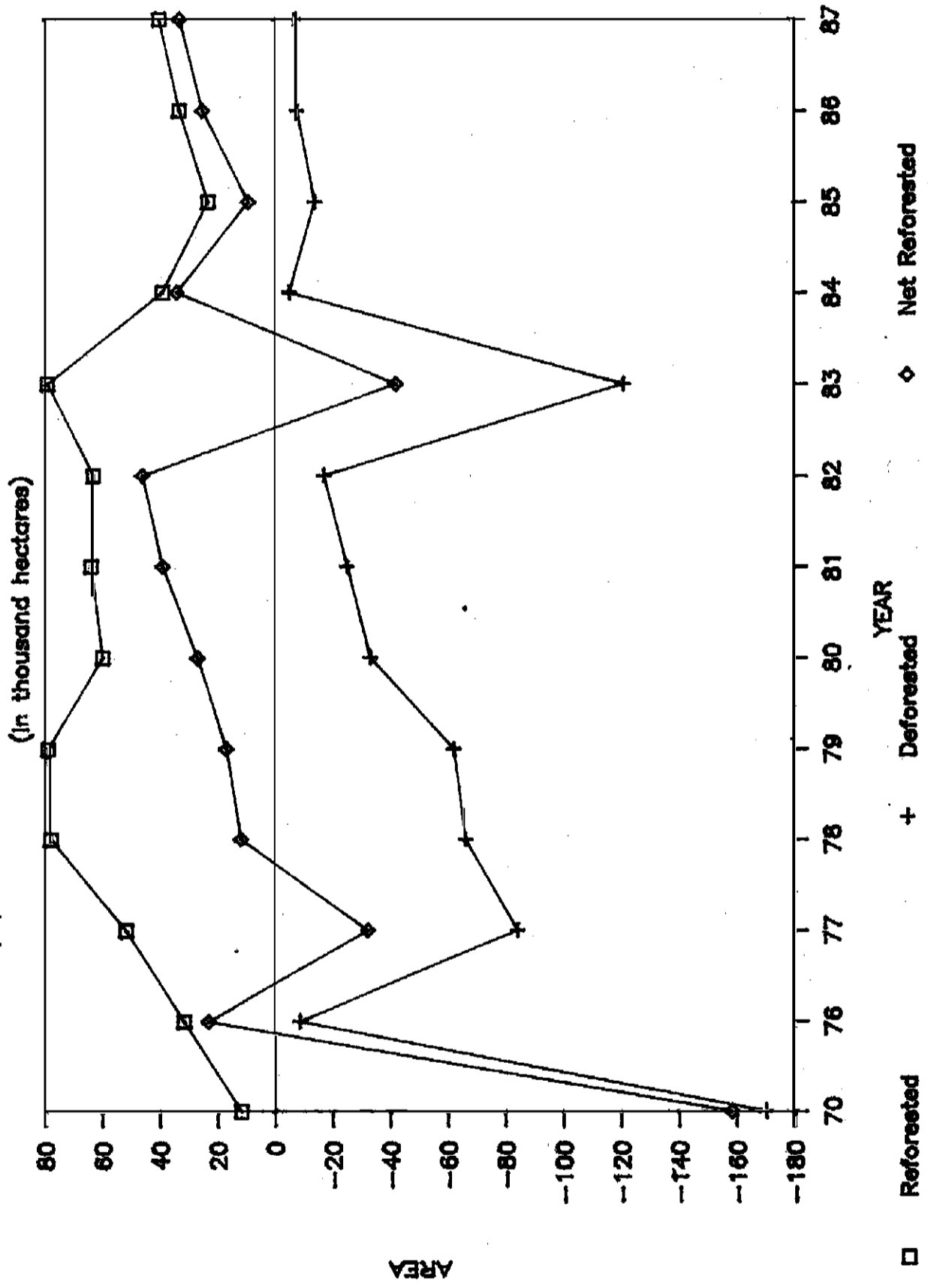
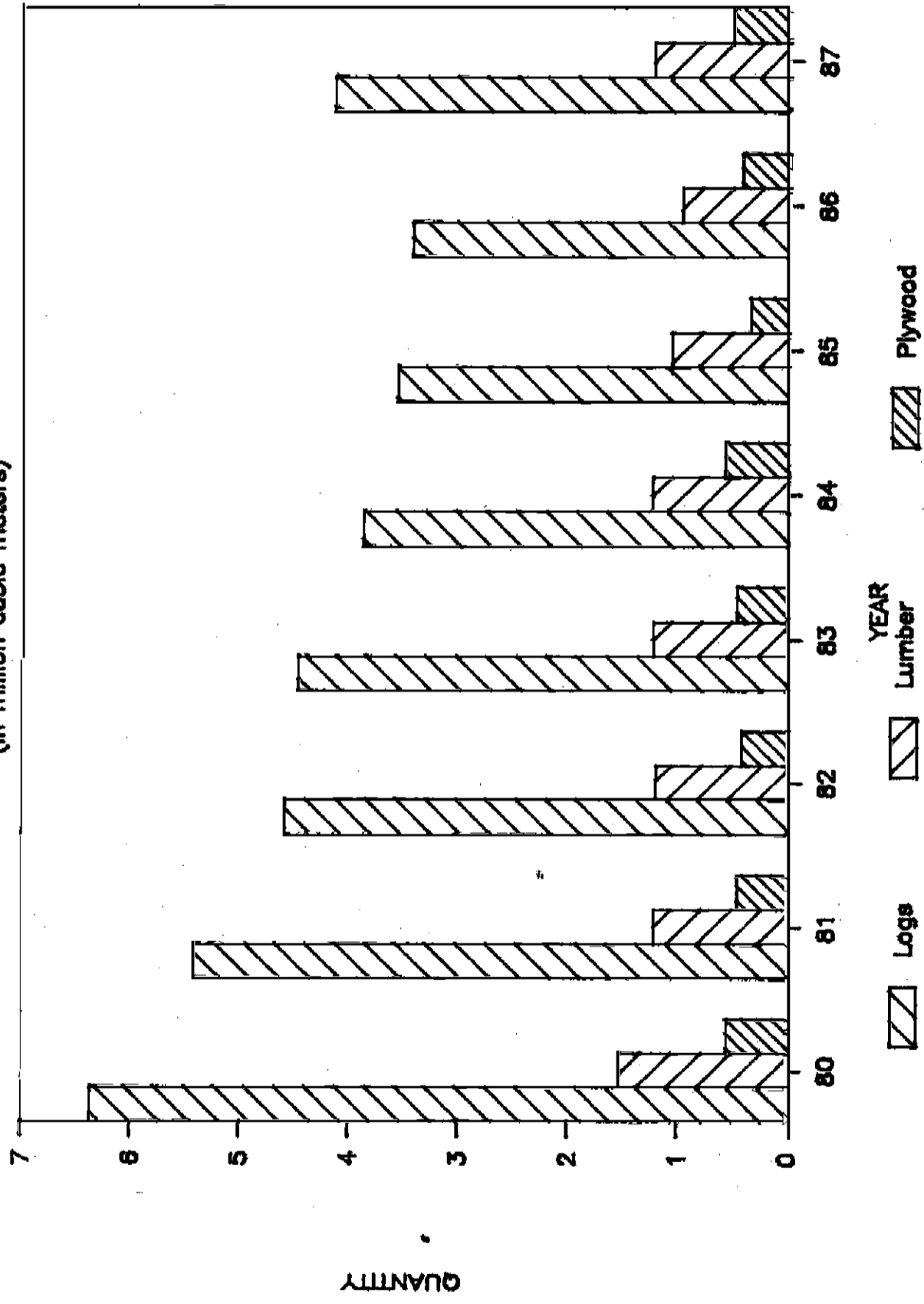


Table 15
PRODUCTION AND REPORTS OF LOGS, LUMBER AND PLYWOOD

	Quantity of Production (in 1,000 cu. meters)		Quantity of Exports (in 1,000 cu. meters)		Percent Exported (in per cent)		Value of Exports (in million US\$, P.O.B.)		Growth Rate of the Value of Exports (in per cent)				
	LOGS	LUMBER	LOGS	LUMBER	LOGS	LUMBER	LOGS	LUMBER	LOGS	LUMBER			
1970	11,005	1,341	330	219	202	84.1	16.3	59.8	243.0	13.0	20.0		
1971	10,680	860	653	157	311	79.0	18.3	47.6	223.6	74.2	38.9	471.1	94.6
1972	8,416	1,411	642	181	455	83.4	12.8	70.9	173.3	61.4	36.4	(22.5)	(17.2)
1973	10,446	1,060	732	427	535	66.5	40.3	73.1	202.0	74.0	54.3	16.6	20.4
1974	10,190	1,114	705	284	171	53.3	25.5	24.3	240.3	348.5	47.3	19.0	100.8
1975	11,156	2,274	466	254	175	61.3	11.2	37.6	283.2	195.6	32.6	17.8	31.7
1976	8,646	1,609	446	493	283	27.0	30.6	68.0	135.2	68.0	43.2	(52.2)	(65.2)
1977	7,873	1,567	489	457	221	26.0	29.2	45.2	133.8	67.0	40.6	(1.0)	(1.5)
1978	7,169	1,780	490	573	368	30.8	32.2	75.1	144.9	85.0	70.6	8.2	26.9
1979	6,596	1,626	503	915	393	18.9	56.3	78.1	144.4	198.0	85.2	(0.3)	132.9
1980	6,368	1,529	553	742	344	11.2	48.5	62.2	92.0	181.0	103.8	(36.3)	(8.6)
1981	5,420	1,219	437	547	371	13.0	44.9	81.2	76.3	126.0	110.7	(17.1)	(30.4)
1982	4,589	1,200	422	591	241	16.4	49.3	57.1	78.5	134.0	67.4	2.9	(1.6)
1983	4,468	1,222	439	723	294	17.6	59.6	64.1	73.7	149.0	76.7	(6.0)	20.2
1984	3,872	1,234	574	846	246	21.8	43.8	42.9	94.5	107.0	57.5	28.1	(28.2)
1985	3,568	1,062	350	454	238	12.7	48.2	68.0	39.2	99.0	51.8	(58.5)	(15.9)
1986	3,434	977	424	495	239	8.6	50.7	56.4	27.0	103.0	57.2	(31.2)	14.4
1987	4,147	1,233	517	493	261	8.1	40.0	50.5	8.3	134.2	65.1	(98.7)	49.7

Source of basic data: Philippine Statistical Yearbook, 1987.

FIGURE 4
Production of Forest Products
(in million cubic meters)



indicate. The ban on export of logs from dipterocarp species has apparently decreased exports to only six thousand cubic meters of plantation logs (of fast-growing species) in 1987, and increased lumber and plywood production.

However, computing for the log requirements of lumber and plywood in 1987 (by applying recovery rates of 60 and 43 percent, respectively) gives us an implied processed log requirement figure of only 3,263 million cubic meters. Some 884,000 cubic meters is unaccounted for which may partly indicate log smuggling. ^{5/} This was, in fact, reported for earlier years by Durst (1984) who investigated discrepancies in trade statistics between the Philippines and its log trading partners.

Timber licenses now number only 98, with an area coverage of four million hectares; the regions with largest areas are II (Cagayan and Isabela), X (Agusan del Sur and Bukidnon) and XI (Davao del Norte, Davao del Sur, and Surigao del Sur) ^{6/}, as indicated in Table 16.

3. Major Users of the Upland Resources

policy shifts in favor of the upland poor

Table 17 presents information on the distribution of permits for using the forests. A significant decrease in area under timber licenses from six million hectares in 1985 to only 1.8 million resulted from the decline in number of timber license agreement (TLA) holders from 148 to only 90. This is caused by a deliberate attempt to ban logging from irresponsible license holders; the total area affected by the partial logging ban covers 6.6 million hectares (See Table 18 for specific areas).

On the other hand, certificate of stewardship contract (CSC) holders almost doubled from 47,950 to 93,070 during the same period, indicating a major policy shift towards making the uplands more accessible to the poor (Table 17). While this is a commendable decision to favor a disadvantaged sector of society, the magnitude of the task remains formidable, given the size of the population directly dependent on upland resource use.

^{5/}
(4.14M log production - 2.055M log requirements of lumber - 1.202M log requirements of plywood - 0.006M logs from industrial tree plantations).

^{6/}
Only the provinces with the largest areas under timber license are mentioned here.

Table 16
 DISTRIBUTION OF EXISTING TIMBER LICENSE AGREEMENTS/PTPA
 (As of June 4, 1989)

Region	Total TLA/ PTPA	Total Area (ha)	AAC Based on TLA (cu m)	AAC Based on Approved TMP	1984-1988 Ave. Annual Log Prod. (cu m)
I	3	155,000	46,485		38,505
II	25	861,976	1,111,293	212,370	484,667
IV	8	353,653	462,743		135,527
V	1	34,480	25,000		832
VIII	5	295,510	552,731	293,605	169,702
IX	9	218,968	280,485	274,739	169,239
X	15	646,946	945,617	228,594	381,027
XI	22	949,995	1,892,730	152,147	464,729
XII	10	594,035	581,975		264,559
TOTAL	98	4,110,563	5,909,059	1,161,455	2,108,787

Notes:

- a. TLA - Timber License Agreement
- b. PTPA - Provisional Timber Production Agreement
- c. AAC - Annual Allowable Cut
- d. TMP - Timber Management Plan

Source of basic data: Department of Environment and Natural Resources.

Table 17
DISTRIBUTION OF FOREST AND TIMBER LICENSES AND PERMITS, 1980 - 1988
 (Area in thousand hectares; AAC in thousand cubic meters)

Year	Timber Licenses			ITP Lease			Tree Farm Lease			Agroforestry Park			CYP			ISP (CSCs)			
	No.	AAC	Ave. Area per TLA	No.	Area	AAC	No.	Area	Ave. Area per ITP	No.	Area	No.	Area	No.	Area	No.	Area	Community No.	Ave. Area per ISP
1980	191	6,500	13,699	34	70	1,439	3,110	12	88	7	101	9	2	1	-	-	-	-	-
1981	184	6,539	13,322	36	73	1,215	1,661	24	117	5	105	11	19	12	-	-	-	-	-
1982	186	6,709	12,079	36	51	830	1,122	52	219	4	110	13	47	28	631	41	-	-	-
1983	125	5,392	9,228	43	8	387	568	64	248	4	115	13	65	44	-	-	12,423	32	0.003
1984	142	5,878	9,027	41	15	469	738	81	285	4	109	15	81	86	-	-	28,574	78	0.003
1985	148	6,093	8,903	41	17	501	876	81	291	4	129	17	101	99	-	-	47,950	128	0.003
1986	142	5,675	8,231	40	17	174	285	83	286	3	136	22	125	124	-	-	60,090	154	0.003
1987	137	5,404	8,204	39	17	175	287	84	274	3	141	57	118	97	-	-	75,293	190	0.003
1988	90	1,864	1,986	21	8	-	-	90	313	3	132	18	132	133	-	-	93,070	227	0.002

Notes:

- TLA - Timber License Agreement
- AAC - Annual Allowable Cut
- Others - Other timber licenses include pulpwood, softwood, provisional, private land, civil reservation, ordinary, special and mangrove
- ITP - Industrial Tree Plantations: min. area, 50 hectares; max. area, 1000 hectares; duration of contract, 25 years & renewable thereafter.
- CYP - Commercial Tree Farm; terminated in 1983
- ISP - Integrated Social Forestry; started in 1983

Sources of basic data: 1987 Philippine Forestry Statistics, PNB.
 Research & Statistics Division, Planning and Policy Office, DENR.

Table 18
AREAS PRESENTLY COVERED BY LOGGING BAN

Region	Provinces Under Total Ban	Provinces Under Partial Ban
I	All provinces	None
II	Ifugao	None
III	All provinces	None
IV	All provinces except Palawan	There was perceived lifting of logging ban in Palawan when TLAs were allowed to operate in the northern part.
V	All provinces	None
VI	All provinces	None
VII	All provinces	None
VIII	Leyte and Southern Leyte	A TLA was granted in Southern Leyte which in effect lifted the ban in some parts of the province.
IX	Basilan	None
X	Misamis Occidental	None
XI	South Cotabato	The ban is partially lifted in some areas where the rivers and tributaries empty into the Pacific Ocean.

Other areas covered by logging ban:

1. All proclaimed watershed areas, wilderness areas, national parks, nature reserves and wildlife sanctuaries (per LOI 917).
2. All mangrove areas except those covered by Fishpond Lease Agreement (FLA) and existing permits (Presidential Proclamations 2151 and 2152; Radio message dated 6/13/86).
3. All small islands (Memorandum of PEA Venus dated 11/05/79).

T O T A L area covered by the logging ban inclusive of mangrove areas is approximately 6.6 million hectares.

Source of basic information: Department of Environment and Natural Resources.

the need for expanding the integrated social forestry program, and integrating tribal communities in development effort

First, as Figure 5 shows, the shares of forest land held by largeholders (TLAs) versus those by smallholders (CSCs) leave much to be desired. Slow progress in defining users of upland (and forest) resources is alarming vis-à-vis the upland population trend indicated in Table 19. According to Table 17, there were 93,070 stewardship certificate holders involving approximately 558,000 persons. ^{7/} This comprises only 6.5 percent of the target group, given that 48 percent of the upland population estimate for 1988, or 8.5 million, occupy forest land (Cruz, C. J. et al. 1988).

Second, a most often cited reason for the slow pace in granting CSCs is that the census of occupants is still ongoing, and information upon which to base the CSC awardees and delineation of land is not yet available. Indeed, there is urgency in providing a systematic census of forest occupants and population movements in the uplands for three reasons (C.J. Cruz et al. 1988): (1) it is important to provide planners with both the actual number of upland dwellers and the proportion of legitimate forest occupants, including migrants and tribal communities; (2) it is urgently needed in resolving critical problems in the uplands associated with population stress; and (3) there is a need to address low income and poverty in these areas.

Caution is indeed warranted to minimize the incidence of giving access to the nonpoor. ^{8/} However, the tribal minorities, who comprise some 70 percent of the upland population in forest land, are easier to identify. ^{9/} Moreover, many have long occupied well-defined upland areas; thus, on the grounds of equity between various upland poor groups and preserving cultural heritage, granting of secure upland rights should not be postponed for the cultural minorities.

Indeed, government efforts regarding tribal communities are largely in providing stewardship rights and livelihood opportunities or support services. These accelerated since 1987 through joint efforts with nongovernmental organizations (NGOs).

^{7/}

Assuming an average family size of six persons.

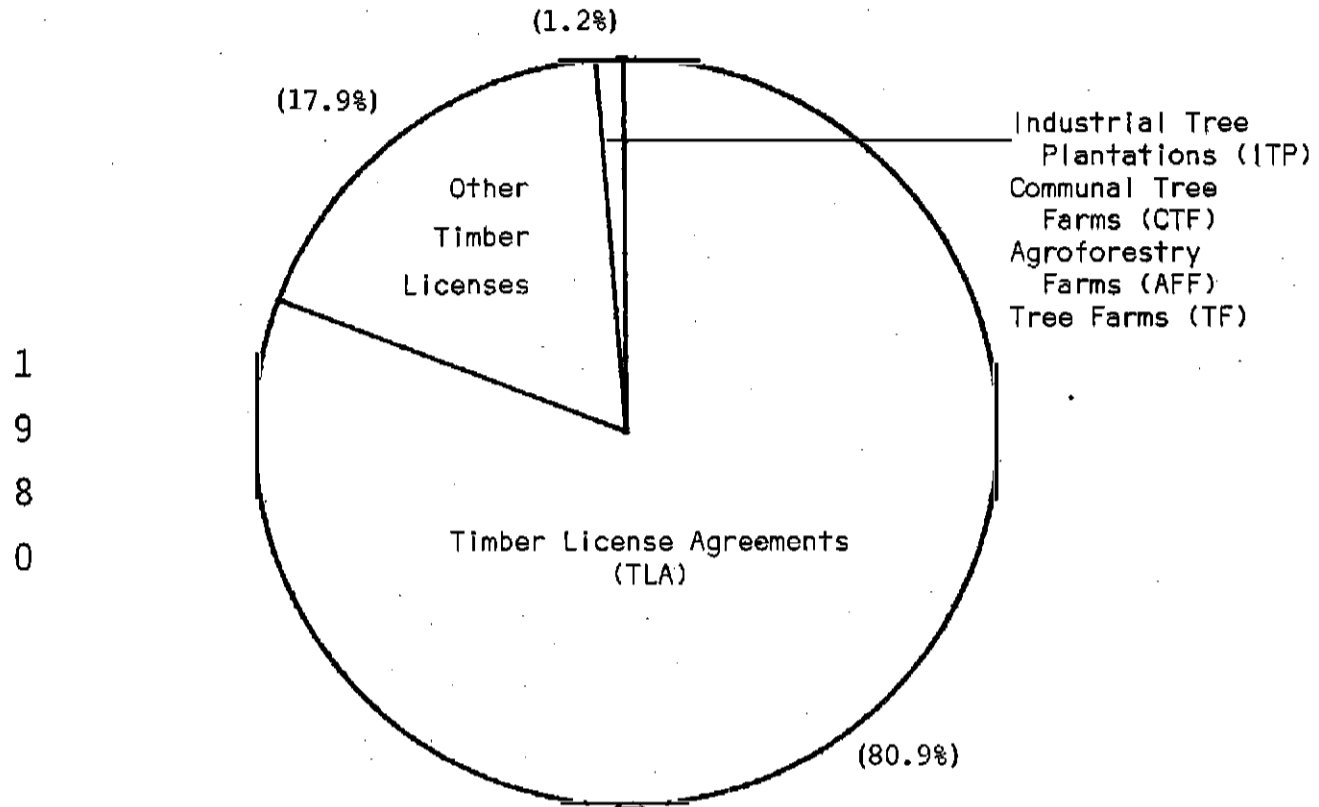
^{8/}

Cornista et al. (1988), for example, pointed out various forms of land tenure in upland areas, including share tenancy.

^{9/}

It should be noted, however, that no mention is made of them in official Forestry statistics.

FIGURE 5
Distribution of Classified Forest Land



1
9
8
0

1
9
8
8

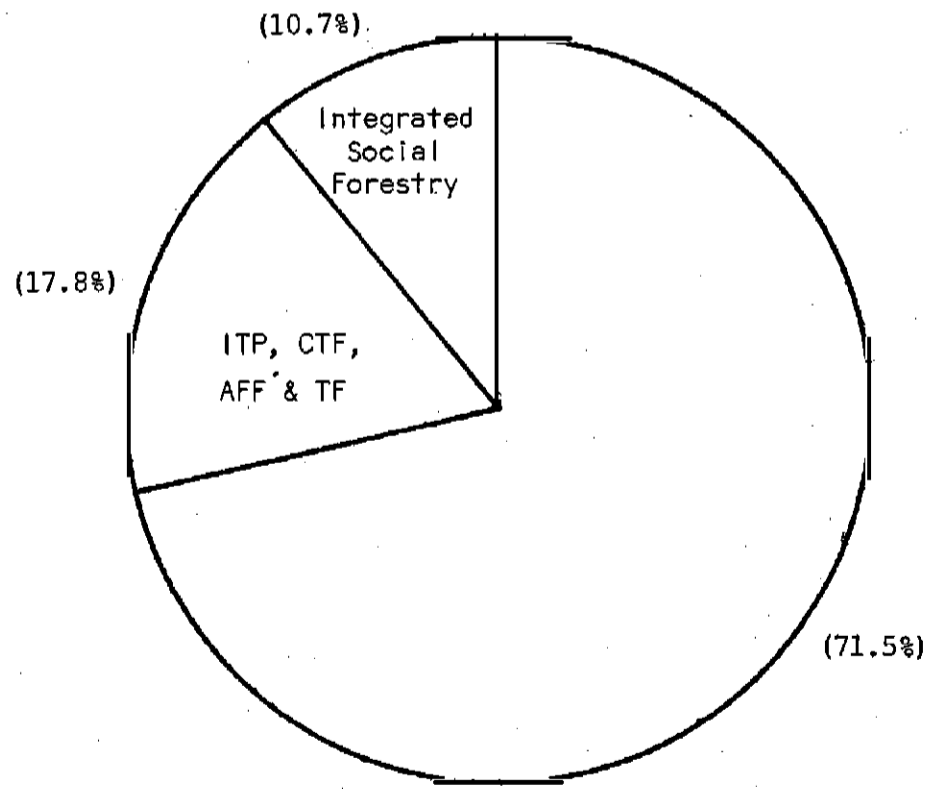


Table 19
PROJECTED UPLAND POPULATION BY REGION, 1981-1988

Region	1980	Growth Rate 1975-1980	1981	1982	1983	1984	1985	1986	1987	1988
Philippines	14,437,088	2.59	14,819,026	15,212,304	15,617,293	16,034,375	16,463,946	16,906,416	17,362,209	17,831,764
I	1,445,522	1.88	1,472,698	1,500,385	1,528,592	1,557,329	1,586,607	1,616,435	1,646,824	1,677,785
II	1,129,268	3.06	1,163,824	1,199,437	1,236,139	1,273,965	1,312,949	1,353,125	1,394,530	1,437,203
III	843,611	2.60	865,545	888,049	911,138	934,828	959,133	984,071	1,009,657	1,035,908
IV	1,299,226	3.11	1,339,632	1,381,294	1,424,253	1,468,547	1,514,219	1,561,311	1,609,868	1,659,935
V	1,056,419	1.41	1,071,315	1,086,420	1,101,739	1,117,273	1,133,027	1,149,002	1,165,203	1,181,633
VI	1,477,525	1.63	1,501,609	1,526,085	1,550,960	1,576,241	1,601,933	1,628,045	1,654,582	1,681,552
VII	1,839,817	2.33	1,882,685	1,926,551	1,971,440	2,017,374	2,064,379	2,112,479	2,161,700	2,212,068
VIII	944,817	1.82	962,013	979,521	997,349	1,015,500	1,033,982	1,052,801	1,071,962	1,091,472
IX	569,605	4.34	594,326	620,120	647,033	675,114	704,414	734,986	766,884	800,167
X	1,254,448	3.68	1,300,612	1,348,474	1,398,098	1,449,548	1,502,891	1,558,198	1,615,540	1,674,991
XI	1,833,747	4.05	1,908,014	1,985,288	2,065,692	2,149,353	2,236,402	2,326,976	2,421,219	2,519,278
XII	743,083	1.84	756,756	770,680	784,861	799,302	814,009	828,987	844,240	859,774

Source: Population projections from 1981 - 1988 were derived using the 1975-80 growth rates in C.J. Cruz et.al., "Population Pressure and Migration: Implications for Philippine Upland Development," CPDS Working Paper No. 86-06, 1984.

the high cost of postponing decisions on secure upland rights

Third, another impetus for minimizing delay in defining rights to uplands (including forest land) is that further postponement means such land shall continue to be used as an open access resource, implying no incentive at all for implementing sustainable cropping systems (delos Angeles 1986). Further, absence of property rights in most upland areas (including forest land) under conditions of poverty, unemployment and inadequate forest protection have both reinforcing pull and push factors for lowland to upland migration (Cruz, C.J. et al., 1988). Indeed, as Figure 6 indicates, deforestation and upland population increases are strongly correlated.

4. Inequitable Gains from Upland and Forest-based Activities

subsistence farming

Fourth, income inequity from forest-based activities continue to be an important factor in the insurgency problem (a significant portion of which dominates upland areas). Official statistics show that income from entrepreneurial forestry and hunting activities is generally much lower than threshold levels, as reported in Table 20. Indeed, most researchers report (e.g., C.J. Cruz, et al. 1987) subsistence livelihood for most upland communities. Moreover, despite under-reporting ^{10/} for those whose livelihood derives from activities that are considered "illegal" (such as "squatting" in forest land, rattan gathering in watersheds, and fuelwood collection), incomes from commonly exploited, publicly-held resources are often at subsistence levels. ^{11/}

high rents from timber extraction and wood processing

On the other hand largeholders of forest land, the timber licensees, continue to extract positive economic rents from logging because current charges continue to undervalue timber. As the first column of Table 21 indicates, government fees allow only nine percent of rent to be extracted from loggers, leaving retained rent of some ₱1,327 per cubic meter or 91 percent of economic rent. This results in an investment rent of around 137 percent from domestically sold logs, which is so many times larger than, say, an average ROI of 25 percent from other economic activities.

^{10/} Ono. (1982), for instance, found that the highest incidence of underreporting of income earned occurs in fuelwood gathering and trade.

^{11/} This has been termed "rent dissipation" in the literature on common property resources.

FIGURE 6
Phil. Forest Cover & Upland Population

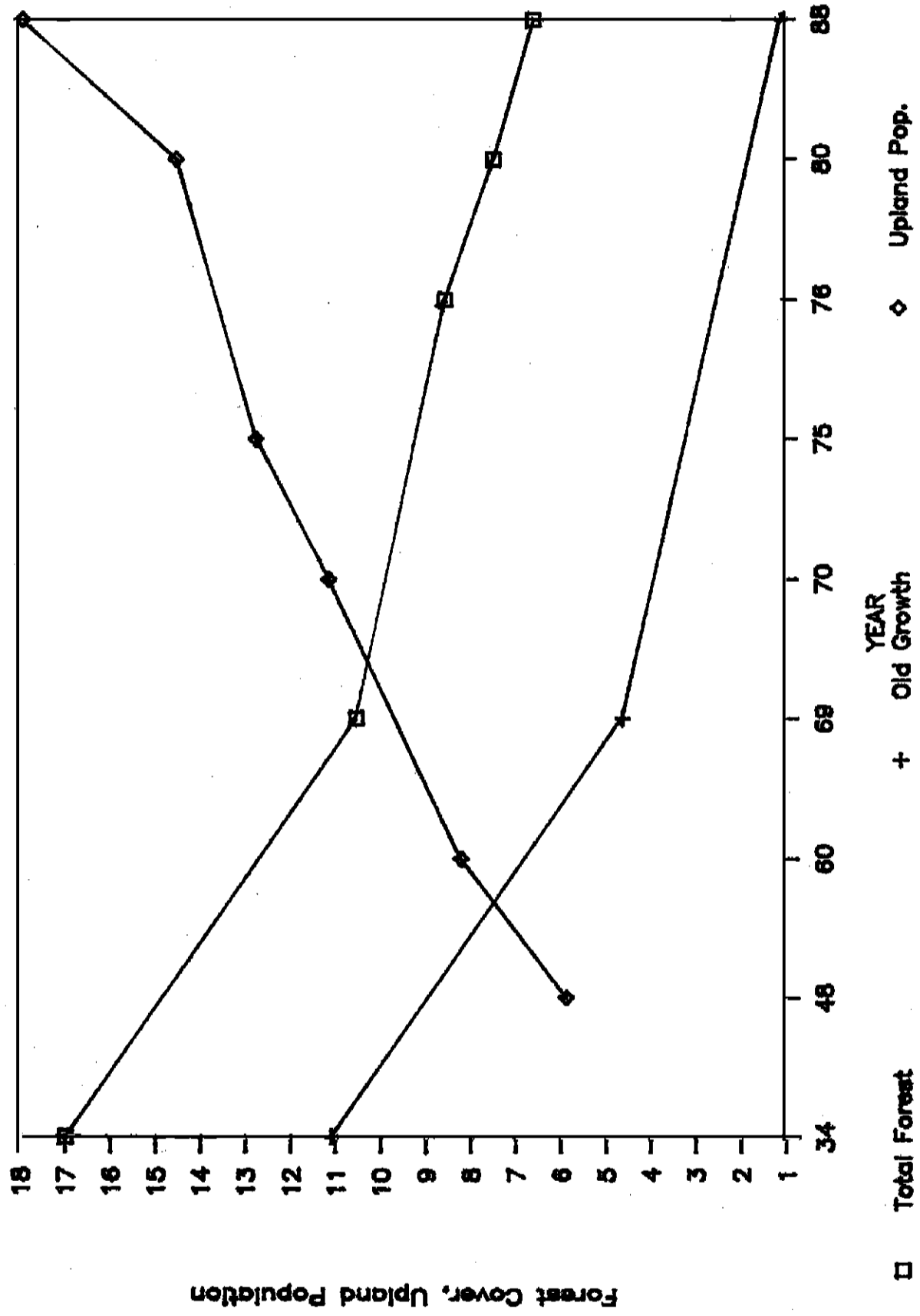


Table 20
ENTREPRENEURIAL INCOME FROM FORESTRY AND HUNTING, 1985

REGION	% Forest Land 1981 (a)	Average Income (b)	Comparison with Threshold Income (c)	Gini Ratio (d)
Philippines	24	3,710	< 28,584	0.30
National Capital Region	-	40,385	> 39,384	0.49
Region 1	22	2,901	< 28,488	0.38
Region 2	44	2,177	< 26,328	0.02
Region 3	16	7,939	< 30,600	0.20
Region 4	27	3,905	< 29,652	0.07
Region 5	5	1,793	< 25,776	-0.10
Region 6	5	2,385	< 29,388	0.25
Region 7	4	1,981	< 23,784	0.11
Region 8	21	1,898	< 24,192	0.32
Region 9	15	5,562	< 25,416	0.25
Region 10	47	2,945	< 27,144	0.10
Region 11	45	13,514	< 28,656	0.46
Region 12	20	3,297	< 26,796	0.43

- Notes: (a) Source: RP-German Resources Inventory, 1987
(various regions)
- (b) Source of basic data: Family Income and Expenditures
Survey, 1985 (Unpublished), National Statistics Office
- (c) Source: Economic and Social Indicators, 1986, National
Statistics Coordinating Board
- (d) The gini ratio is a measure of income inequality.
A value closer to 0.50 indicates unequal distribution
while closer to 0, indicates otherwise.

Table 21
 POTENTIAL RENT FROM LOGGING, 1987
 (In pesos per cubic meter)

Item	Domestic log sales		Exported Logs
	Proposed Tax rate: 20% (Case I)	Hypothetical Tax rate: 40% (Case II)	Export rate: 20% (Case III)
PRICE	2,932 <u>a/</u>	2,932 <u>a/</u>	4,428 <u>b/</u>
PRODUCTION COST <u>c/</u>	1,180	1,180	1,180
MARGIN FOR PROFIT & RISK <u>d/</u>	295	295	295
POTENTIAL RESOURCE RENT <u>e/</u>	1,457	1,457	2,953
GOVERNMENT SHARE, BY ALTERNATIVE SOURCES (% of potential resource rent)			
1. forest charge & reforestation deposit	130 (9%)	130 (9%)	130 (4%)
2. percent of output value, or ad valorem	586 <u>f/</u> (40%)	1,173 (80%)	886 <u>g/</u> (30%)
RETAINED RESOURCE RENT <u>h/</u> (% of potential resource rent)			
1. after forest charge & ref. dep.	1,327 (91%)	1,327 (91%)	2,823 (96%)
2. after % of output value	871 (60%)	284 (19%)	2,067 (70%)
IMPLIED TOTAL INVESTMENT RENT <u>i/</u> (% of production cost)			
1. after forest charge & reforestation deposit	1,622 (137%)	1,622 (137%)	3,118 (264%)
2. after % of output value	1,166 (99%)	579 (49%)	2,362 (200%)

Source: delos Angeles (1989), Table 5, p.16

Notes to Table 21:

- a. Local log prices were computed as a weighted average of wholesale prices for 1987, as reported in the 1988 Forestry Statistics; shares of species produced to total output were used as weights. Price of logs of the second species group (apitong, tanguile, red lauan and palosapis) which compose 61 per cent of total production dominate the weighted average price.
- b. F.O.B. export price of red meranti logs from Sabah to Japan.
- c. Source: delos Angeles (1989), Table 4.
- d. Computed as 25% of production cost.
- e. potential rent = output value - production cost - mpr
- f. 20% of domestic log price
- g. 20% of border price
- h. retained resource rent = potential rent - government share; cases (1) & (2) refer to forest charges and an ad valorem tax on output value, respectively.
- i. implied total investment rent = mpr + retained resource rent

The same table presents estimates of rent under alternative cases of taxation: forest charges cum reforestation deposit or the proposed ad valorem tax. The last column on exported logs is indicative of the more lucrative export market, which results in 264 percent investment rent. Further, if government had not banned log exports and continued imposing export taxes of 20 percent of market value, it would have earned an additional revenue foregone because of the log export ban. Indeed, as Moncayo (1988) earlier showed, at the time when log sale in the international market was allowed, the export tax was an important tool for government's appropriation of its share of timber values.

inefficient processing

High logging rents imply not only foregone government revenue but also a strong incentive for overcutting that is accompanied by rentseeking activities, or graft and corruption (W.D. Cruz et al., 1986), a larger industry size, and wasteful timber processing (delos Angeles et al., 1989). The wood processing industry continues to process logs at low recovery rates: 60 percent for lumber and 43 percent for plywood production. Rent estimates for these industries range from ₱212-₱1,497 per cubic meter log equivalent of lumber production and ₱1,006 per cubic meter equivalent of plywood, according to recent calculations by the DENR-ADB Forestry Master Plan Team which are presented in Table 22.

5. The Need to Reform Economic Incentives for Upland Resource Conservation

maximum rent extraction through tax reform

All these point to the argument for reforming the resource pricing system for appropriating government shares from timber harvesting. Currently pending bills aim at 20 percent ad valorem taxes on log values which, according to Table 21, captures only 40 percent of logging rent. A supplementary measure being considered, however, is the granting of power to DENR to be able to charge management fees which shall be used for forestry development. Since the country's revenue system does not assure that the earnings from the proposed 20 percent tax will be allocated by the national government for the forestry/upland sector, then DENR's additional collection is appropriate, provided that the amount collected allows full capture of the remaining rent.

incorporating environmental and intertemporal costs of deforestation

Revenue losses do not come from undervaluation of timber resources alone but also from the economic costs attendant to deforestation. For example, Cruz, W.D. et al. estimated the sedimentation in the Pantabangan and Magat reservoirs to annually cost ₱30 and ₱18 per ton sediment, respectively; these are

Table 22
DENR ESTIMATES ON ECONOMIC RENT a/
(In current pesos)

Item	Sawmills		Plywood mills	
	Low	Medium	High	High
Log quality	-----PHP-----			
Sales price, net mill	4,000	5,000	6,000	7,500
Variable cost				
Labor	413	375	360	450
Glue				650
Power and steam	80	80	80	400
Spares, consumables	120	120	120	160
Maintenance	100	100	100	160
Fuel and oil	35	35	35	45
Miscellaneous	80	80	80	80
Total variable costs	828	790	775	1,945
Fixed cost				
Adm., salaries	180	180	180	200
Office cost	120	120	120	120
Depreciation	110	100	100	200
Interest	210	243	278	303
Miscellaneous	70	70	70	70
Total fixed costs	690	713	748	893
Profit margin 10% sales	400	500	600	750
Wood opportunity cost b/ X recovery	2,082 50%	2,997 55%	3,877 60%	3,822 48%
-per cubic meter	1,041	1,648	2,326	1,835
Logging cost				
Operational cost	580	580	580	580
Overhead costs 30%	174	174	174	174
Profit margin 10%	75	75	75	75
Total logging costs	829	829	829	829
Economic rent	212	819	1,497	1,006

Notes:

- a. Preliminary, as of 25 July 1989; based on estimated price/cost level of latter half 1989.
- b. Wood opportunity cost is the maximum cost at which the industry would be able to purchase logs from outsiders.

Source: DENR (1989), Table 9, p. 53, based on personal communication from Pelkonen and Saastamoinen of the DENR-ADB Forestry Master Plan Team.

equivalent to ₱592 per hectare for Pantabangan and ₱366 per hectare in Magat. In addition to these estimates which pertain to the off-site losses from soil erosion (e.g., shortening of service lives of the dams in the two reservoirs and opportunity costs in irrigation), on-site losses, because of the need to replenish soil fertility after deforestation had occurred, was estimated at ₱1,068 per hectare at nominal prices (at shadow prices, the value is ₱2,716 per hectare). ^{12/}

the watershed as a management unit

Although the results of these studies are specific to their sites, they indicate the need for decisionmaking to reckon with the future, and environmental effects of various resource and land uses. The management of watersheds as a unit allows such integration across the spatial aspects of various activities and their corresponding costs (e.g., David et al. 1988).

subsidizing conservation-oriented technologies

Poverty in the uplands and the social benefits of conserving them imply that government needs to intervene to promote the adoption of conservation in upland/forest-based systems. Changes in the institutional set-up to guarantee secure property rights, as being attempted through the Integrated Social Forestry Program is a necessary, but not sufficient condition to encourage significant investments for conserving the upland resources. First, because of marked poverty among upland dwellers, preferences strongly favor fulfilling present needs. Since most upland conserving technologies take time for returns to be realized, such as higher harvest of tree products and improved on-site farm yields from soil conservation, they will have to be undertaken at the expense of allocating labor for activities that yield quick returns. Thus, for example, a study of participants of the Communal Tree Farming Program (an early component of the ISF) shows that despite the passage of a considerable time period of about five years, incomes were still at subsistence levels (delos Angeles et al. 1988). In fact, assigning a positive opportunity cost for labor resulted in negative returns either on a per farm or per hectare basis.

Second, as we earlier discussed, society benefits from the implementation of upland conservation and from forest renewal through lower environmental costs. Compensation for such benefits is thus due those who do conserve.

12/

These estimates would have, in fact, been much higher with foregone future timber harvests. These were not calculated by the researchers because the two watersheds had long been deforested and upland farming was the prevalent land use at the time of study.

This compensation should be more than the current ISF provision of providing seedlings to the upland communities. Rather, they should reflect payments for effort exerted in conservation activities. An issue that is currently being discussed is the conversion of the CSCs to a form that allows it to be a "bankable" instrument, thereby enabling upland farmers to obtain loans by using CSCs as collateral. Some perceive this as sufficient to generate funds for conservation and alleviate poverty. This may be the case if and only if loans are given at subsidized rates (implying the public bears part of their costs), and the upland farming system indeed allows higher future yields. In the case of (re)forestation aimed more at ecological stability than at increased production, however, loans are not appropriate as they may end up not being repaid at all. Rather, such funds should be generated by proper pricing of timber resources since such implies full accounting of all the costs involved.

6. Forest Land Use, Reforestation and Agro-forestry: Towards Technological Change in the Uplands

Current efforts at reforestation, involvement of the upland poor, and establishment of tree plantations are aimed at changing the composition of forest cover through a different set of "actors" under different "rules of the game." DENR, for example, has encouraged more participation from the private sector and has, in particular, enlisted the active involvement of non-governmental organizations (NGOs) in many of its upland-based activities. This is an important step in the right direction, not only in terms of encouraging equitable access to and net benefits from the NRE sector but also because in terms of minimizing transactions costs and the need for a large bureaucracy.

Strong community organizations have often been stated to be necessary for upland development, especially under the initial conditions of poor infrastructure and social services. Simultaneously, knowledge of private groups on the technical aspects of resource conservation is being raised through information and training components of various projects. At the other end, the DENR itself, which is manned by technical persons, needs to be oriented towards community organizations and dealing with the upland communities. It is, however, not apparent from the DENR Revised Mandate that provisions have been made with respect to the latter.

In addition, the need for technological change in restoring vegetative cover in the uplands (which imply a different set of products) likewise requires technical progress in the processing industries. These were recently discussed by Tesoro *et al.* (1989) and Revilla and others (1989) in terms of gearing the processing of smaller-sized logs towards providing low-cost, wood products for meeting the large backlog in the country's housing program.

In the case of agro-forestry, marketing infrastructure is an important component that needs to be built into the reforestation and social forestry programs, that aims to minimize on market imperfections as well as to encourage surplus production. This important aspect that concerns the expected changing mix of upland-based commodities does not appear to be a major concern, not having been mentioned in important DENR documents. This needs to be given more attention therefore since final product prices is an important determinant of adoptability of introduced or recommended cropping systems.

In fact, this implies that forest land use should be considered not only with respect to the needs of the local populace but also with respect to the other sectors (e.g., agriculture, energy, etc.) on the aggregate level. Thus, while current activities being conducted in support of forest land-use allocation such as timber resources inventory are basic to planning, effort likewise needs to be exerted towards assessing demand for various goods and commodities that may be produced from the uplands. It needs to be likewise evaluated by taking into account the additional concern of maintaining ecological stability, as illustrated by the ipil-ipil plantation problem of psyllid infestation.

A dominant strategy employed by the DENR is the imposition of bans (where price is infinite) on particular areas against specific uses such as the partial logging ban and the ban on mangrove conversion to fishponds. As mentioned earlier, a complementary tool is using the pricing mechanism to encourage conservation (and discourage overexploitation or misuse). Allowing both scarcity and environmental values to be reflected in decisionmaking on forest land use allocation is also justified for the following reasons: (1) it encourages more efficiency in downstream activities, (2) in the long run, it is more effective in leading to the adoption of new technologies versus regulations through the setting of environmental standards, as argued in standard resource economic literature, and (3) it enables government sharing of rents from resource use, thus raising public revenues.

Current steps in this direction with respect to timberlands is the use of Timber Production Sharing Agreements (TPSA) for allocating timber licenses. TPSA is conducted through bidding, with minimum bids of 25 percent of output values. This is still on its pilot stage, however, and therefore needs to be pursued further. Moreover, steps towards transparency in the process of contracting TPSAs should be accompanied with an active information dissemination campaign to minimize collusion among bidders and ensure that a more than equal chance is given to community-based logging which, with labor-intensive technologies, should be less costly.

E. Mineral Resources

1. Reserves and Capital Investment in Exploration

The Philippine mineral industry is dominated by copper and nickel among the metallics and cement, limestone, marble, silica and clay among the nonmetallics (Tables 23 and 24). In general, data on reserves show no increases, indicating minimal exploration activity, unlike in previous decades. According to the Revised DENR Mandate, joint ventures in this highly capital-intensive activity shall be pursued.

Scarcity - A Non-Issue in Managing Philippine Mineral Resources

Production of most minerals has increased modestly since 1986, as shown in Table 25. Figure 7 thus depicts a generally decreasing trend in the value of mining production (See also Table 26) over the last decade, caused largely by unfavorable price trends (Table 27). ^{13/} In fact, studies worldwide reveal that contrary to the alarm raised on the management of exhaustible resources, real mineral prices declined in the long term, indicating decreasing scarcity (Barnett and Morse 1963, Barnett, in Smith 1979). ^{14/} Indeed, technological change in exploration, mineral processing, and consumption indicates pending obsolescence of some minerals. For example, this was noted during the height of discussions on the advent of seabed mining leading to excess supplies of some metals (e.g., Santos et al. 1982). On the other hand, more uses are also being found for "old metals" which may counter the former's impacts.

2. Maximizing the Gains and Equitably Distributing Benefits from Depletable Resources

There are more important issues to take into account with respect to mineral resource-based activities. First is the maximization of gains from mining both at the local and national level through appropriate taxation.

Second is the capital intensity of most mineral production activities and the limited employment generating capability, without the development of downstream activities. Though some studies reveal positive local impacts in terms of infrastructure

^{13/} Because of the lag time in mineral production, copper price increase indicated in Table 27 is expected to cause higher production in subsequent years only. Thus, this is not reflected in Table 25.

^{14/} Moreover, contrary to expectation, real price trends signal increasing scarcity among the renewables such as timber.

Table 23
METALLIC MINERAL ORES RESERVES: 1975-1987
(In thousand metric tons)

Type of Ore	1975	1980	1985	1986	1987
Cadmium	47	47			
Chromite	10,696	94,853	32,072	30,115	29,024
Copper	3,206,225	4,313,253	4,092,439	4,017,190	3,881,255
Gold	520,876	2,014,467	101,043	101,920	101,557
Iron	3,536,635	1,237,905	474,362	474,362	474,362
Lead	10,332	9,360	6,303	6,313	6,313
Manganese	1,034	7,535	1,396	1,179	1,396
Mercury	5,582	15,097	16,243	16,243	16,243
Molybdenum	74,986	104,130	30,600	30,600	30,600
Nickel	3,814,936	1,700,854	1,605,074	1,569,867	1,556,101
Platinum	942	942			
Uranium	90	90			
Zinc	13,125	14,352	6,163	6,163	6,163
T O T A L	11,195,506	9,601,685	6,366,500	6,253,960	6,103,822

Sources of basic data: Philippine Statistical Yearbook, 1988.
Metallic Mineral Ore Reserves, MGB (1985, 1986
and 1987). Unpublished.

Table 24
NON-METALLIC ORE RESERVES, 1975 - 1987
(In thousand tons)

Kind of Ore	Estimated Reserves as of December 31				
	1975	1980	1985	1986	1987
Asbestos	4,201	24,498	24,498	24,498	24,498
Barite	-	149	163	163	163
Cement Raw Materials	9,953,552	6,849,886	6,204,710	6,508,301	9,507,569
Clay	293,736	1,061,502	1,117,880	1,121,967	1,121,963
Coal	-	-	-	-	-
Construction Materials	728,480	637,802	691,003	68,487	689,011
Diatomaceous Earth	3,543	2,903	3,903	3,903	3,903
Dolomitic Limestone	488,798	290,745	488,388	489,107	488,758
Feldspar	350,371	25,114	29,392	29,388	29,388
Gypsum	1,955	1,882	1,883	1,883	1,883
Limestone	6,390,706	8,793,041	9,217,440	9,304,599	9,308,072
Magnesite	1,491	26,536	26,534	26,534	26,534
Marble	3,309,436	3,942,751	4,154,944	4,154,934	4,154,925
Peat	2,016	2,016	-	-	-
Perlite	18,797	18,526	18,509	18,509	18,509
Pumice and Pumicite	31,678	21,878	21,878	21,878	21,878
Pyrite	19,042	987,324	987,016	988,584	988,481
Quartz	19,262	512,476	-	-	9,733
Rock Asphalt	550	-	-	-	-
Saprolite	172,981	-	-	-	-
Silica Rock	15,589	13,876	-	-	-
Silica rock form	-	-	1,207,922	1,007,912	1,207,840
Silica sand	75,117	765,810	107,921	114,605	113,717
Sulfur	39,408	29,453	29,454	44,011	44,011
Talc	268	503	603	503	503
Silica pebbles/cobbles	-	-	6,818	6,806	6,804
Bauxite	-	-	82,658	82,658	82,658
Bentonite	-	-	1,182	1,082	1,381
Guano	-	-	815	1,014	1,014
Limestone (Agricultural use)	-	-	310,545	312,458	312,949
Rock phosphate	-	-	2,346	2,407	2,407
T O T A L Non-metallics	21,920,977	24,008,671	24,738,299	24,957,483	28,168,535

Source: Philippine Statistical Yearbook 1988, NEDA, 1989.
Mineral Statistics Division, MGB.

Table 25
MINERAL PRODUCTION, 1980-1988
(In thousand units)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Precious Metals										
Gold	kg	20.0	23.6	26.0	26.1	25.7	33.1	35.4	32.6	30.5
Silver	kg	60.7	62.9	61.7	56.7	49.0	52.4	51.5	50.8	54.6
Base Metals										
Chromite	mt	496.1	439.2	321.1	266.9	259.2	272.0	202.2	188.3	165.7
Copper	mt	304.5	302.3	292.1	271.4	233.4	222.2	217.0	214.1	216.5
Iron	mt	0.0	5.7	5.6	2.6	0.0	0.0	0.0	0.0	0.0
Lead	mt	1.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manganese	mt	2.6	3.1	1.6	2.2	0.6	0.4	0.5	0.4	2.3
Molybdenum	mt	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Nickel	mt	47.1	29.2	19.6	13.9	13.6	28.2	12.7	8.5	10.3
Pyrite cinder	mt	75.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zinc	mt	6.0	5.3	3.0	2.3	2.2	1.9	1.6	1.1	1.4
Non-metallics										
Gypsum	mt	0.0	0.0	0.0	0.5	0.0	0.3	13.1	16.3	2.3
Coal	mt	325.0	318.2	556.8	1,019.6	1,216.4	1,258.9	1,235.5	1,169.2	1,335.7
Sand & Gravel	cu m	13,251.0	13,273.0	14,797.3	15,093.3	14,583.9	11,134.6	12,481.8	13,782.7	14,842.3
Salt	mt	346.4	355.3	364.4	381.9	401.0	421.1	442.1	466.4	492.1
Silica Sand/ Quartz	mt	476.6	484.3	527.3	408.3	432.3	345.3	307.3	213.4	255.4

Source of basic data: Philippine Statistical Yearbook, 1987.
Mineral Statistics Division, MGB.

FIGURE 7
 Value of Mining Production
 (in billion pesos, constant 1978 prices)

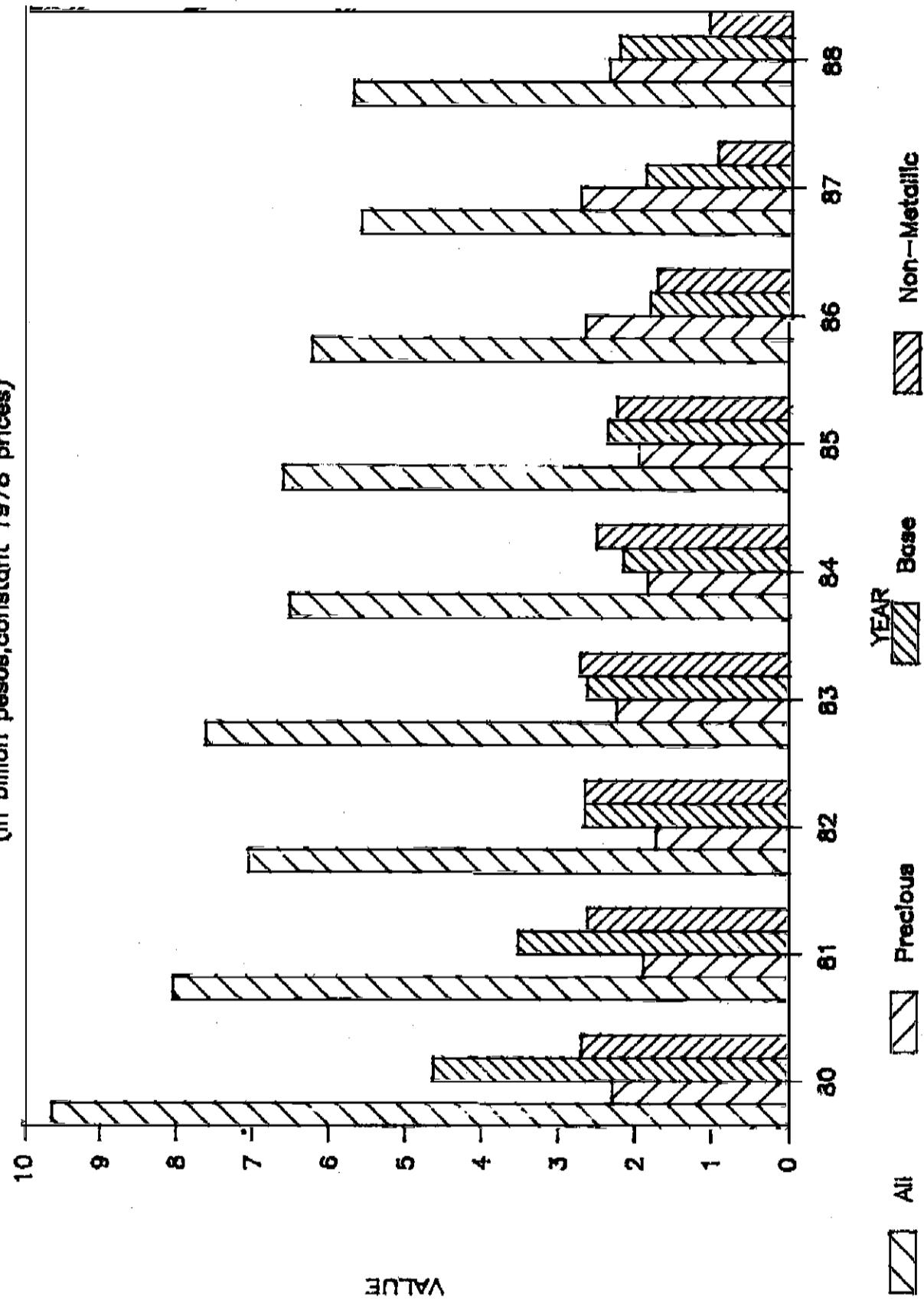


Table 26
 VALUE OF MINING PRODUCTION, 1980-1988
 (In million pesos, in constant 1978 prices)

COMMODITY/YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988
All Minerals	9,625.16	8,037.91	7,053.49	7,623.22	6,535.55	6,621.28	6,261.00	5,616.65	5,735.51
Subtotal, Precious Metals	2,292.16	1,891.04	1,730.73	2,257.26	1,854.36	1,979.49	2,677.87	2,750.54	2,389.84
Gold	2,090.77	1,787.99	1,654.72	2,135.90	1,780.10	1,920.73	2,623.33	2,687.43	2,330.40
Silver	201.39	103.05	76.01	121.35	74.27	58.76	54.54	63.11	59.45
Subtotal, Base Metals	4,636.48	3,521.63	2,663.62	2,633.92	2,166.43	2,300.32	1,838.63	1,900.07	2,256.43
Chromite	207.90	183.67	142.64	141.94	132.50	134.69	102.93	79.49	78.68
Copper	3,310.31	2,558.96	2,150.87	2,261.50	1,853.75	1,776.25	1,706.25	1,776.46	2,096.20
Iron	0.00	0.66	0.57	0.29	0.00	0.00	0.00	0.00	0.00
Lead	9.39	3.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese	0.66	0.71	0.35	0.35	0.07	0.03	0.05	0.05	0.22
Molybdenum	11.04	5.37	2.73	1.46	0.00	0.00	0.00	0.00	0.00
Nickel	1,079.02	750.63	360.06	223.53	173.96	464.88	26.09	42.01	77.45
Pyrite cinders	1.41	1.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00
Zinc	16.74	16.14	6.14	4.85	6.15	4.46	3.31	2.05	3.88
Subtotal, Non-Metallics	2,696.52	2,625.23	2,659.14	2,732.04	2,514.76	2,261.48	1,744.50	966.04	1,089.23
Gypsum	0.00	0.00	0.00	0.00	0.00	0.02	2.12	2.77	0.23
Coal	43.92	43.15	118.14	219.38	422.84	476.23	359.03	264.11	271.08
Sand & Gravel	460.52	467.59	535.64	571.35	426.01	337.87	381.63	402.66	449.89
Salt	153.28	144.24	136.46	177.79	127.13	115.22	122.22	119.37	116.73
Sand	13.78	14.67	17.29	31.51	17.40	0.11	0.10	0.00	-
Others	2,025.01	1,955.53	1,851.61	1,732.01	1,521.37	1,332.02	879.41	177.12	251.30

Source of basic data: Philippine Statistical Yearbook, 1988.
 Mineral Statistics Division, MGB.

Table 27
AVERAGE WORLD METAL PRICES

Metal	Unit	1985	1986	1987
Gold	\$/tr.oz.	317.31	367.68	446.21
Silver	\$/tr.oz.	6.14	5.50	6.97
Copper	Cents/Lb.	64.28	62.41	81.05
Lead	Cents/Lb.	19.33	18.39	27.09
Nickel	\$/Lb.	2.53	1.86	2.31
Zin	Cents/Lb.	34.57	34.18	36.42

Source: Mineral News Service Nos. 76, 81, 82 & 83, MGB.

facilities and taxes (e.g., Santos et al. 1982), the questions on equity remain to be addressed.

For example, if the information on address of mining lease contractors versus site of mining activity in Table 28 is indicative of where income taxes are paid, then nonmining regions gain more mining-based income taxes compared to mining regions. Indeed, statistics presented in Table 29 indicate this as well as the limited impact which mining has had on poverty alleviation.

Recently, a rise in gold panning, an activity that is small-scale, has dominated the industry. Table 30 shows the relative importance of Davao del Norte and Camarines Norte in terms of population involved in gold panning. In fact, the pending bill, "Minahang Bayan," addresses the property rights of such small-scale miners who, under current laws, are considered illegal miners.

3. Minimizing Negative Environmental Impacts: The Need For More Realistic Mining Effluent Charges

A third issue is the pollution that usually accompanies mining activities. Table 31 shows information on the damages incurred from mine wastes and tailings, from which we note, first, the absence of updated information, particularly on Marinduque where the effluents of copper mining wastes and tailings from Marcopper Company have become a major problem. Despite debate on the extent of pollution caused by the firm, to the credit of the present administration, rehabilitation work that is financed by pollution fees paid by the company is currently ongoing.

Second, the damage values indicated in the table are underestimates since they are calculated from losses on real property values --- these are largely based on assessed prices rather than on land opportunity costs. In comparison, Briones' (1987) calculation of damages from mine tailings in the Baguio mining district arrived at yearly losses are in the magnitudes of US\$5.75 M and US\$8.49 M in the Amburayan and Agno irrigation systems. These estimates are based on losses due to siltation of irrigation canals which imply rehabilitation costs, uncollected irrigation fees, reduced crop yield, and smaller irrigation service area.

rationale for estimating damage values

The rationale for assigning proper values to mining pollution damages stems from the need to charge correct pollution taxes, reduce mining activities, and appropriate funds for rehabilitation, or damage compensation, or both. With respect to the latter, government intervention is necessary when, under the circumstance of clearly identifiable bearers of (nondepletable) pollution costs, payments tend to undervalue damage because of the poor's willingness to accept lower compensation.

Table 28
DISTRIBUTION OF MINING LEASE CONTRACTS
(By region and address of lessee)

Region	1		2		3		4		5	
	Number	Area (Ha)	Number	Area (Ha)	Number	Area (Ha)	Number	Area (Ha)	Number	Area (Ha)
1	-	-	1	24.05	-	-	-	-	7	796.18
2	-	-	-	-	-	-	1	135.00	4	967.88
3	-	-	1	82.63	2	201.00	-	-	4	287.63
4	-	-	-	-	-	-	-	-	14	3,477.39
5	-	-	-	-	-	-	1	65.26	6	1,895.52
6	-	-	-	-	-	-	-	-	2	296.39
7	1	128.00	1	6.05	1	9.00	-	-	3	401.91
8	-	-	-	-	-	-	-	-	1	167.33
9	-	-	-	-	-	-	-	-	-	-
10	-	-	1	169.12	-	-	-	-	5	3,199.12
11	-	-	-	-	-	-	-	-	6	2,427.01
12	-	-	-	-	-	-	-	-	-	-
TOTAL	1	128	4	282	3	210	2	200	52	13,917

Note:

- 1 - Same region, different province
- 2 - Same province, different municipality
- 3 - Same province, same municipality
- 4 - Different region
- 5 - Address NCR, location other region

Source of basic data: "Equity in Mineral Resources Allocation," MGR. (Unpublished).

Table 29
ENTREPRENEURIAL INCOME FROM MINING AND QUARRYING, 1985

REGION	Average Income (a)	Comparison with Threshold Income (b)	Gini Ratio (c)
Philippines	10,326	< 28,584	0.378
National Capital Region	140,051	> 39,384	0.000
Region 1	11,562	< 28,488	0.309
Region 2	2,254	< 26,328	0.000
Region 3	10,856	< 30,600	0.000
Region 4	0	< 29,652	0.000
Region 5	5,352	< 25,776	0.270
Region 6	1,811	< 29,388	-0.004
Region 7	9,540	< 23,784	0.000
Region 8	5,997	< 24,192	0.000
Region 9	401	< 25,416	0.000
Region 10	9,376	< 27,144	-0.013
Region 11	5,742	< 28,656	-0.046
Region 12	598	< 26,796	0.000

- Notes: (a) Source of basic data: Family Income and Expenditures Survey, 1985 (Unpublished), National Statistics Office.
 (b) Source: Economic and Social Indicators, 1986, National Statistics Coordinating Board. Monthly threshold incomes were converted to annual threshold incomes.
 (c) The gini ratio is a measure of income inequality. A value closer to 0.50 indicates unequal distribution while closer to 0, indicates otherwise.

Table 30
GOLD PANNING AREAS IN THE PHILIPPINES, 1988

	Estimated Capacity (gm/d) (a)	Estimated # of Panners (b)	Estimated Population (c)	Total Provincial Population (d)	% Gold Panners to Provincial Population
Region 1					
1. Abra	150	320	970	187,351	0.17
2. Ilocos Sur	15	30	90	518,812	0.01
3. Benguet	2,000	3,000	9,557	442,575	0.68
4. La Union	75	150	455	544,265	0.03
5. Pangasinan	30	70	215	1,878,648	n.s.
Region 2					
6. Kalinga-Apayao	50	150	545	227,366	0.07
7. Nueva Vizcaya	1,000	1,750	5,658	383,339	0.58
8. Isabela	30	120	365	1,879,522	0.01
Region 3					
9. Tarlac	100	150	455	799,356	0.02
10. Bulacan	25	40	125	1,369,933	n.s.
11. Nueva Ecija	100	200	600	1,272,102	0.02
Region 4					
12. Rizal	40	50	150	743,283	0.01
13. Batangas	25	50	150	1,481,992	n.s.
14. Marinduque	45	50	150	283,016	0.02
15. Mindoro Oriental	100	120	365	568,215	0.02
16. Mindoro Occidental	10	40	125	276,130	0.01
17. Quezon	500	160	485	1,377,667	0.01
Region 5					
18. Masbate	250	2,000	5,688	788,161	0.29
19. Camarines Norte	4,000	12,000	31,393	379,739	3.16
Region 6					
20. Iloilo	20	50	150	1,693,684	n.s.
21. Negros Occidental	370	550	1,670	2,343,569	0.02
Region 7					
22. Cebu	10	20	60	2,475,182	n.s.
23. Bohol	60	300	910	913,842	0.03
Region 8					
24. Leyte	400	700	2,120	1,584,514	0.05
25. Eastern Samar	500	4,000	13,506	382,386	1.05

Table 30 (Cont'd)

	Estimated Capacity (gm/d) (a)	Estimated # of Panners (b)	Estimated Population (c)	Total Provincial Population (d)	% Gold Panners to Provincial Population
Region 9					
26. Zamboanga del Norte	1,500	2,500	7,204	701,921	0.36
27. Zamboanga del Sur	250	500	1,520	1,449,526	0.03
Region 10					
28. Misamis Oriental	1,000	1,500	4,379	800,632	0.17
29. Agusan del Sur	500	500	1,520	339,395	0.15
30. Agusan del Norte	1,200	2,000	5,608	453,001	0.44
31. Surigao del Norte	1,515	1,530	4,489	454,025	0.34
33. Bukidnon	253	2,130	4,090	706,794	0.27
Region 11					
34. Davao del Norte	30,000	30,000	101,156	871,493	4.36
35. Davao Oriental	1,000	3,000	9,557	416,162	0.72
36. Davao del Sur	200	350	1,050	1,426,010	0.02
37. Surigao del Sur	1,000	800	2,430	469,600	0.17
Region 12					
38. Sultan Kudarat	50	100	300	395,158	0.03
T O T A L	40,373	70,900	299,900	32,223,094	0.25

Sources: Mines and Geosciences Bureau (MGB), for columns (a)-(c).
National Statistics Office, for column (d).

Table 31
 VALUE OF DAMAGES TO CROPS, LAND AND PROPERTY FROM MINE WASTES AND TAILINGS
 (In pesos at current prices)

REGION	LOCATION (Mineral Commodity)	1979 to 1980	1981	1982	1983	1984	1985	1986	1987	1988
1	Benguet, Ilocos Sur Pangasinan, La Union (Gold/Copper/Silver)	2,107,994.05	78,230.00	46,752.57				96,474.59	347,237.00	211,601.24
4	Mariquina, Palawan (Copper/Gold)	60,726.00	-	12,959.20						
5	Aroroy, Masbate (Gold/Silver)	-	-	-						49,021.40
6	Sipalay, Neg. Occ. (Copper/Gold)	458,472.52	125,759.67	-				32,326.04		444,761.91
7	Toledo, Cebu (Copper/Gold)	338,962.92	7,184.00	148,791.00				9,391.00	6,006.00	154,265.90
10	Surigao del Norte (Gold/Silver)	-	-	-						26,677.53
TOTAL VALUE OF DAMAGES		2,966,152.49	211,173.67	208,502.77	-	213,682.56	2,026,245.60	138,191.63	353,243.00	886,327.98
In constant prices of 1978		2,135,458.96	134,419.90	120,382.66	-	74,609.83	574,658.42	38,894.35	95,807.70	-
Consumer Price Index (1970=100)		138.90	157.10	173.20	190.50	206.40	352.60	355.30	368.70	388.10

Sources: Mines and Geosciences Bureau (MGB),
 Philippine Statistical Yearbook, 1988.

F. Water and Air Quality

1. Compliance at the Industry Level

Statistics shown in Table 32 indicate the extent of water pollution control at the industry level. Based on the trends presented in Figure 8, we note the following: (1) the proportion of firms complying with water pollution requirements is double those who do not, implying high compliance rates; (2) on the other hand, this proportion has not increased substantially over the last decade to approximate full compliance; and (3) there is an increase in industry-level water pollution monitoring as reflected in the rising proportion of firms surveyed during 1985-87, in contrast to the sharp drop during 1984-85. Assuming that the survey is not biased (e.g., it is randomly conducted, by firm, and time of survey), this is a good indication. What remains to be considered, however, is the overall impact of the industry and water pollution control being undertaken by those who are not surveyed.

the need for household level waste management

In addition, there are other sources of water pollution, foremost, among which are wastes generated from households. UNEP (1986) reports that as of 1985, water pollution load from this source accounted for 70 percent of the total, according to the BOD (biochemical oxygen demand) measure. Substantial improvements on water quality thus imply the marked need for managing household waste through investment in sewage disposal (Table 33), as well as on waste management at the household level. With respect to the latter, innovations in garbage collection and disposal are necessary which encourage recycling and appropriate waste disposal. A fine system (₦2,000 per incident of garbage disposed illegally or during noncollection hours and non-designated places) has recently been put in place. But due to the enforcement difficulties, magnitude of the problem, and inefficient garbage collection, land pollution from garbage, which eventually leads to water pollution among others, still prevails.

the optimum level of pollution control

The current River Revival Project initiated by a private organization is noteworthy. However, given the costs entailed, this may be doubtful in terms of replicability. Such costs, in fact, imply that some optimum level of control (and pollution) is required. Figure 9 shows that this occurs when marginal abatement (or control) costs equal marginal damage cost. The latter curve also reflects demand for abatement. Hence, the optimum level Q^* pertains to the pollution level when the benefit from abatement less the costs is largest. What this implies is that pollution control to zero level pollution is not necessarily the optimum solution (although this may be what is desired).

Table 32
STATISTICS ON INDUSTRIAL WATER POLLUTION CONTROL FACILITIES, 1980-1987

YEAR	No. of Firms a in Industry	Firms Surveyed b by NEPC/EMB	Percent of Industry	c POLLUTIVE FIRMS					
				TOTAL		With WPCD		Without WPCD	
				Percent of Surveyed Firms	No.	% of Pollutive Firms	No.	% of Pollutive Firms	
1983	12,859	6,340	49	1,838	29	1,033	56	805	44
1984	13,815	6,521	47	1,057	16	734	69	323	31
1985	13,795	4,588	33	988	22	681	69	307	31
1986	13,554	5,311	39	1,029	19	681	66	348	34
1987	13,620	5,897	43	1,124	19	739	66	385	34

Sources: a - National Statistics Office.
b & c - Environmental Management Bureau.

Legend: WPCD - Water Pollution Control Device

FIGURE 8
Indicators of Water Pollution Control

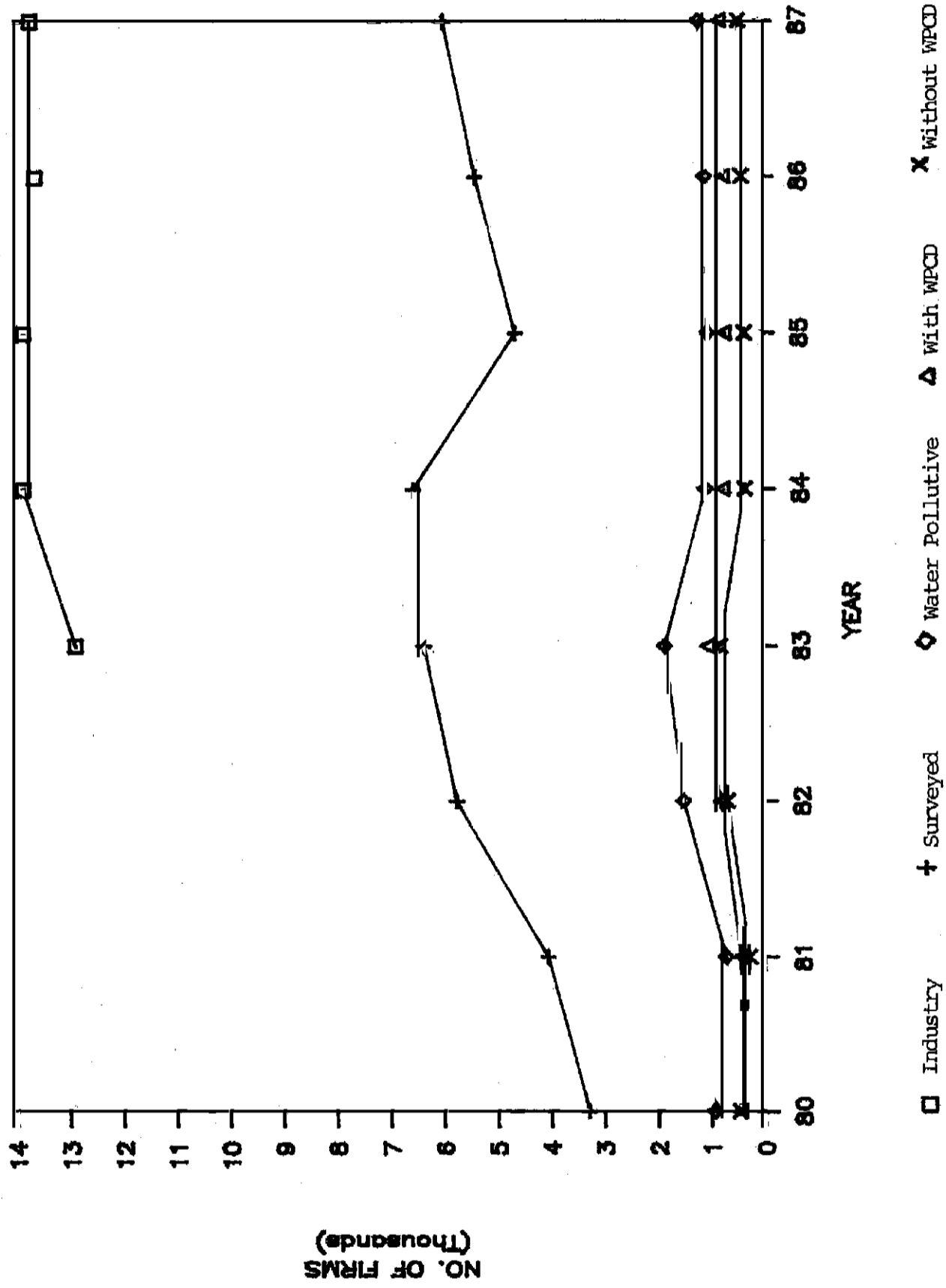
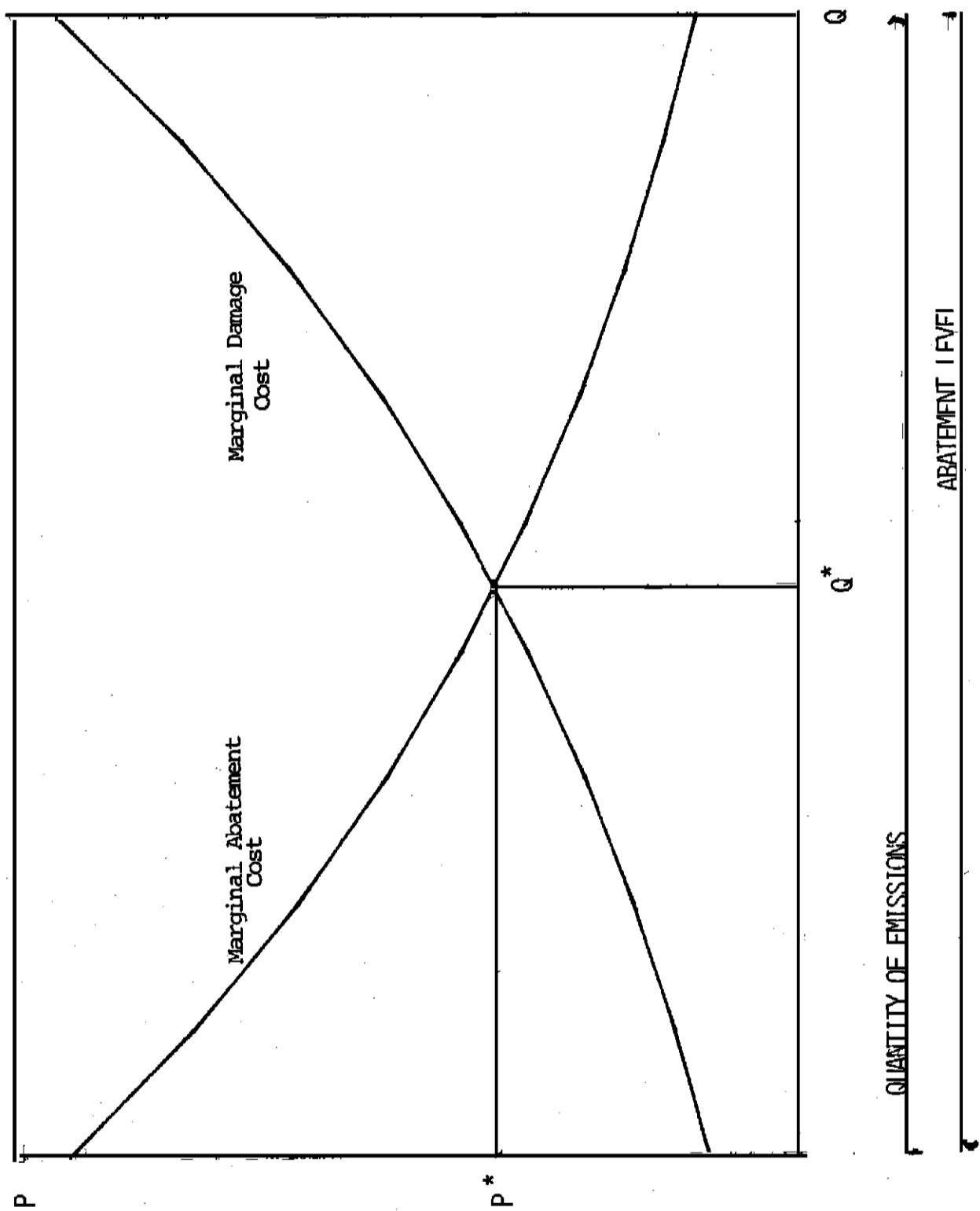


Table 33
 DISTRIBUTION OF SEWER CONNECTION IN METRO MANILA
 (Cumulative as of July 1989)

Sewerage System	Total as of July 1989	No. of Household served	Household Population	Percent Served
Manila Central Collection System	31,333	81,574	1,843,382	4.4
Quezon City	15,060	22,445	1,537,336	1.5
Other Isolated Sewerage Systems	2,361	2,365	4,283,076	0.1
T O T A L	48,754	106,384	7,663,794	1.4

Sources of basic data: Sewerage System Department, MWSS.
 Population Studies Division, National Census and
 Statistics Office.

FIGURE 9
Optimum Level of Pollution Abatement



private participation in pollution control

With respect to air quality, a growing awareness is evident particularly in the urban areas. For example, despite lack of updated information on air pollution because of the breakdown of air quality monitoring devices several years ago, the citizenry's response to the problem is evident in various nongovernmental organization's actions. One is the anti-smokebelching campaign composed of various NGOs (called Groups Against Smoke Belching Program or GASP) initiated by the Bishops'-Businessmen's Conference and the Philippine Ecological Network. Simultaneously, official statistics on industrial air pollution abatement presented in Table 34 show high compliance rates among those pollutive firms surveyed.

Management of pollution from vehicles is depicted in Table 35, which indicate low apprehension and testing rates, on the one hand, and high compliance among those tested, on the other. This is indicative of the difficulty in monitoring vehicular pollution. Furthermore, the problem is traceable to incomplete fuel burning by diesel-powered vehicles, majority of which comprise the public transport system, and inefficient burning by outdated gasoline-powered vehicles, which compose the majority of privately-owned transport. Much of the future directions for alleviating air pollution control is therefore required of public sector investments on less pollutive mass transport as well as on policies on private vehicles.

On the other hand, the private sector is also largely instrumental in increasing public awareness of the various impacts of water pollution and in organizing affected communities to press for pollution control. The current rehabilitation program for Calancan Bay is one result. Although this is a step towards more joint decisionmaking between affected party(ies), polluters and the government, the process still needs improvement. The protracted negotiation and litigation could have perhaps been avoided if property rights were clearly in place. It should be noted that when the "preemptive right" favors the polluter first, one can expect more pollution to occur than when it is the other way around. The affected party(ies) has to negotiate with the firm to control pollution when the latter is the holder of the right. But when the community has the "preemptive right," then the firm has to negotiate with the community first before it can dispose of pollutants.

The Tullahan River Rehabilitation Project is another case where a private firm, which disposes its wastes into the river, offers to coordinate with the government and pay for the cost of rehabilitation. Indeed, this could be a signal to government that, contrary to popular belief, private businesses are not really averse to supporting environmental concerns. The Tullahan River case, however, raises the point of how much are we willing to spend for environmental protection or rehabilitation, or both.

Table 34
 STATISTICS ON INDUSTRIAL AIR POLLUTION CONTROL FACILITIES, 1980-1987

YEAR	Firms Surveyed by NEPC/EMB	POLLUTIVE FIRMS					
		Percent of		With APCD		Without APCD	
		TOTAL	Surveyed Firms	No.	% of Pollutive Firms	No.	% of Pollutive Firms
1980	3,295	1,228	37	988	73	328	27
1981	4,059	1,672	41	1,141	68	531	32
1982	5,739	2,759	48	2,244	81	515	19
1983	6,348	3,217	51	2,649	82	568	18
1984	6,521	3,289	50	2,957	90	332	10
1985	4,582	3,095	68	2,821	91	274	9
1986	5,311	2,803	53	2,557	91	246	9
1987	5,897	3,058	52	2,802	92	256	8

Sources: Environmental Management Bureau (EMB).

Legend: APCD - Air Pollution Control Device

Table 35
INDICATORS OF ANTI-SMOKE BELCHING CAMPAIGN (1983-1987)

	1983	1984	1985	1986	1987
^a No. of Registered Vehicles	510,504	477,561	462,813	479,850	490,428
^b No. of Apprehended Vehicles	16,224	12,584	13,371	7,520	9,190
Percent apprehended of registered	3.2%	2.6%	2.9%	1.6%	1.9%
^b No. of Apprehended Vehicles Tested	5,366	3,160	5,297	1,726	2,047
Percent Tested of Apprehended	33.1%	25.1%	39.6%	23.0%	22.3%
Percent Tested of Registered	1.1%	0.7%	1.1%	0.4%	0.4%
^b No. of Certificate of Compliance (COC) Issued	2,270	1,907	2,196	1,225	1,316
Percent with COC of Tested	42.3%	60.3%	41.5%	71.0%	64.3%

Notes: a) Source: Land Transportation Commission.
b) Source: NPCC & EMB.

Obviously, when so much pollution has already occurred, the cost of resource/environmental rehabilitation also rises. Also, the complexity of the pollution problem in the Tullahan River needs more than cosmetic solutions. This means that all agencies of government must be coordinated and industries and public support must be generated.

pollution fines as a regulatory mechanism for pollution control

The current system of regulating industry-generated pollution is through pollution fines based on the following: (a) weights attached to four factors, namely: duration of violation in terms of the number of days (6.5), present condition of the environment (5.5), capacity of the source for discharging effluents (4.5), and average deviation from the effluent or emission standards (3.5); and (b) a point system based on the degree of pollution generated (1,3 and 5 or 1 to 5). The highest overall score of 100 is obtained by multiplying the weights by the categorical points (Table 36). The scores are then given corresponding daily fines which are applied three months after receipt of the order imposing the penalties to give time for the industry to comply with the regulations.

The point system supposedly should reflect the increasing marginal pollution costs, implying that worsening pollution is experienced as one moves across the score intervals (of 10 points). Thus, there should be an increasing marginal pollution fine as one moves across the intervals. This is not true, however, in the schedule of fines prepared in the PAB Resolution No. 10 (Table 37). The corresponding schedule shows a constant marginal increase of ₱500 which is not only insensitive to the severity of the pollution but is also regressive---i.e., increasingly pollutive firms pay lower increments in fines. In such a system, no incentive is given for the industry to pollute less since that would mean being penalized more. The system also does not reflect the extent of damage or potential damage that may be brought about by certain types of pollutants. For example, higher fines should have been imposed on highly toxic and hazardous materials.

For a regulatory mechanism to be effective, it should allow polluters to internalize the negative impacts of residuals. Pollution fines, for instance, must be high enough so that polluters will eventually opt on spending for pollution control devices to meet effluent/emission standards in the long run.

Although the current pollution load-based system is an improvement over the emissions concentrations-based system previously followed, it needs further modifications to allow more progressivity in the imposition of fines on increasingly severe pollution cases.

Table 36
RATING SYSTEM FOR POLLUTION PIMBS, 1988

Pollution Factor	Weight	Categorical Points				
		1	2	3	4	5
(1) Duration of Violation	6.5	< 1 year		1 to 2 years		> 2 years
(2) Present Resource Condition	5.5					
(a) Water		any parameter fails to meet criteria provided that discharge not more than 500 cubic meter/day	2 to 4 parameters fail to meet criteria	at least 5 parameters fail to pass criteria		
(b) Air		rural industrial/commercial	rural residential	urban industrial	urban commercial	urban residential
(3) Capacity of Source	4.5					
a. Water (cubic meter/day)		below 30	30 but < 100	100 but < 500	500 but < 1000	1000 and above
b. Air pollution:						
b.1. Steam boilers/oil heaters						
Rated hp		up to 50	up to 100	up to 200	up to 300	over 300
kgs./hr. cap. (steam)		up to 784	up to 1568	up to 3136	up to 4704	over 4704
kcal/hr. (steam)		up to 422	up to 844	up to 1676	up to 2531	over 2531
kcal/hr. (oil)		up to 375	up to 750	up to 1500	up to 2250	over 2250
b.2. Other fuel burning installations						
Grate surface, area		up to 0.9	up to 1.8	up to 2.7	up to 3.5	over 3.5
Solids Fuels, kgs./hr.		up to 112	up to 225	up to 340	up to 473	over 473
Oil, liter/hr.		up to 112	up to 225	up to 340	up to 473	over 473
Gas, cubic meter/hr.		up to 118	up to 225	up to 337	up to 474	over 474

Table 36 (Cont'd)

Pollution Factor	Weight	Categorical Points				
		1	2	3	4	5
b.3. Electric furnaces/ovens 3W	up to 75	up to 125	up to 175	up to 225	over 225	
Capacity, kg./hr. (steel)	up to 100	up to 185	up to 270	up to 375	over 375	
Capacity, kg./hr. (brass)	up to 180	up to 350	up to 515	up to 680	over 680	
Capacity, kg./hr. (iron)	up to 110	up to 205	up to 300	up to 405	over 405	
b.4. Incinerators						
Grate surface area, sq.m.	up to 1.0	up to 1.75	up to 2.75	up to 3.5	over 3.5	
Capacity (kgs./hr.)	up to 115	up to 225	up to 340	up to 475	over 475	
b.5. Air Pollution Installations (cubic meter/min.)	up to 50	up to 125	up to 200	up to 275	over 275	
b.6. Process equipment						
(1) other raw materials, (MT/hr.)	up to 1	up to 5	up to 7.5	up to 10	over 10	
(2) odorous raw materials, (kgs./hr.)	up to 10	up to 500	up to 750	up to 1000	over 1000	
(4) Average deviation from effluent or emission standards		3.5				
a. Water						
a.1. heavy metal and toxic substances	below 10%		10%-20%		over 20%	
a.2. physical and chemical substances	below 20%		20%-40%		over 40%	
a.3. BOD	below 25%		25%-75%		over 75%	
b. Air	below 20%		20%-40%		over 40%	

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

Table 37
SCHEDULE OF POLLUTION FINES, 1988

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

Legend:

- A = for violations of Section 8, P.D. 984, requiring any person or establishment to secure a permit from the Commission for the following:
- (a) construction, installation, modification or of any sewage works or any extension/addition thereto;
 - (b) increase in volume or strength of any wastes in excess of the permissible discharge specified under existing permit.
 - (c) construction, installation or operation of any pollutive industrial establishment or the extension of same.
- B = for all other pollution cases not covered by Section 8 of P.D. 984.

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

IV. SUMMARY AND CONCLUDING REMARKS

A. Gains in NRE Management

Although there are improvements in current NRE management over the past efforts, much still needs to be done in meeting the necessary conditions in NRE management (as enumerated in Section 3). Natural resource and environmental monitoring has to be put in place. This glaring lack in environmental and/or pollution monitoring could be traced to inadequately trained personnel and minimal budget allocation. From the total DENR budget, only about one percent goes to the environment.

Assignment of property rights as a management tool is often being used in favor of the poor. However, there is doubt as to whether the terms laid for community forestry or the integrated social forestry give sufficient long-term incentive for those awarded the rights to protect and manage the forest. Also the scale in which the ISFP program is implemented is insignificant versus the extent of upland population pressure. The question as to who benefits what in the future has to be answered, and government must sincerely address the compounding problems of rising upland population and upland poverty.

Strong pronouncement on the part of DENR in correcting the resource pricing mechanism could be noted. The Philippine Strategy for Sustainable Development currently tackles this issue. A pending bill in Congress also calls for increasing forest charges. But the problem needs more than strong pronouncements. The more tangible test is in making these pronouncements implementable policies given the present constraints of the Department and the government as a whole. The cooperation of the legislative body (or the Congress) and other agencies of government is also crucial.

A shift from the purely regulatory thrust to a developmental one can be gleaned from the increased private participation in shaping certain policies. To mention two, the Department exerted effort in conducting public fora to solicit public opinion, as in the logging ban issue, increasing forest charges, and the Calancan Bay rehabilitation case. It is, however, also noted that when certain constraining conditions are present, transaction costs (or the costs of negotiation) can be very high. The success of creating favorable private sector response, again, goes back to the incentive system provided -- e.g, assigning proper rights to resource use and the equitable distribution of benefits, inter- and intra-regionally and between social classes, first in the short-term, then in the long-term.

Investments into resource renewal and environmental rehabilitation have increased. With so much of the budget and grants going into resource renewal (forest renewal), one may

raise the question as to the capability of the present DENR machinery to effectively and efficiently manage increasing financial resources. We also raise the question as to how this effort will fare in the long run given the inadequate handling of other confounding upland problems.

In summary, however, our assessment notes positive gains in the management of NRE by the present administration in the following areas: (1) concrete steps taken towards more equitable access to resources such as the Integrated Social Forestry Program and Small-Scale Mining Program; (2) allocations for rehabilitative activities such as the National Reforestation Program and rehabilitation in polluted Calanacan Bay; (3) enlistment of private sector participation in various activities, ranging from reforestation to control of air pollution; and (4) reform of the administrative machinery of DENR.

B. Areas for Improvement

Due to the magnitude and complexity of NRE problems, however, the following still needs to be tackled: (1) national land-use planning; (2) using the pricing mechanism to reflect all costs of NRE-use; (3) accounting for the NRE and the incidence of NRE impacts; and (4) human resource development for NRE management. These require the involvement of major sectors of society and other government agencies. With respect to the latter, coordinated and consistent planning, development, and implementation are required.

Incorporation of the various costs and benefits of NRE use implies the need to train for skills that would enable NRE valuation studies to be conducted. Simultaneously, monitoring of information on changes in NRE use and their magnitude and incidence of impacts to be measured are basic to decisionmaking in NRE.

Lastly, population pressure on natural resources and the environment should be addressed since the gains from the policy shifts noted above could easily be mitigated by increased populations in the uplands or in the urban centers.

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Annex Table 1
THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES MISSIONS AND KEY RESULT AREAS, 1988-1992

Key Result Areas	Mission			
	Sustainable development of forest resources.	Optimal utilization of lands and minerals.	Social equity and efficiency in resource use.	Effective environmental management.
1. Sustainable development of ecologically critical uplands	X			
2. Protection of the remaining natural forests.	X			
3. Rehabilitation of denuded and marginal areas.	X			
4. Determination and management of optimal land uses		X	X	
5. Intensification of mineral exploration and development, including off-shore areas.		X		
6. Expansion of the Integrated Social Forestry Program.	X		X	
7. Establishment of community-based forestry.	X		X	
8. Survey, allocation and disposition of A & D lands for the CARP. 1/		X	X	
9. Rationalization in the disposition of public lands.		X	X	
10. Delineation and management of people's mining areas.		X	X	
11. Promotion of efficiency in natural resource-based industries.	X	X		X
12. Preservation of biological diversity.				X
13. Improvement of air and water quality in urban areas.				X
14. Generation of data and technologies for the proper understanding and management of natural ecosystems and their functions.	X	X	X	X

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A & D lands - Alienable and Disposable lands; CARP - Comprehensive Agrarian Reform Program.

Source of basic data: DENR, "Revised Mandate, Mission and Functions of the Department of Environment and Natural Resources," 1988, (unpublished).

Annex Table 2
KEY RESULT AREA VERSUS MAJOR PROGRAMS OF THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

Major DENR Programs	Key Result Areas													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Reforestation/Afforestation	X	X	X			X	X					X		
2. Integrated Protected Areas	X	X	X									X		
3. Integrated Social Forestry	X	X	X			X	X							
4. Forest Protection	X	X				X	X					X		
5. Forest Resources Inventory	X	X							X		X			X
6. Upland Productivity	X	X	X			X								
7. Land Classification/ Subclassification	X			X				X	X					X
8. Cadastral Survey								X	X					X
9. Emancipation Patent								X						X
10. Accelerated Land Titling (Handog Titulo)								X	X					
11. Small-scale Mining Development (Minahang Bayan)				X					X	X				
12. Geological, Geochemical and Geophysical Survey				X	X				X		X			X
13. Mineral Resources Inventory and Appraisal				X	X			X	X	X				X
14. Environmental Impact Assesment											X		X	
15. Pollution Control and Prevention											X	X	X	
16. River Revival Program												X	X	
17. Remote Sensing and Mapping	X	X		X					X					X
18. Ecosystems Research and Development	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Source: DENR, "Revised Mandate, Mission and Functions of the Department of Environment and Natural Resources," 1988. (Unpublished).

Annex Table 3
EXPENDITURE PROGRAM BY OBJECT, 1985-1989
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
(In thousand pesos at constant 1978 prices)

PARTICULARS	1985	1986	1987	1988	1989†
A. CURRENT OPERATING EXPENSES	258,624	359,145	410,883	477,374	1,046,585
1. Personal Services	149,105	214,327	257,343	272,423	484,649
Salaries		73,184	81,263	95,097	124,386
Wages		57,996	86,444	99,449	113,984
Honoraria and Commutable Allowances		1,661	2,006	2,134	4,092
Cost of Living Allowances		32,953	39,631	50,795	82,148
Terminal Leave		1,391	1,039	2,761	3,751
Fixed Expenditures		4,553	4,127	9,034	19,593
Others		42,589	42,833	13,153	135,983
2. Maintenance and Other Operating Expenses	109,519	144,817	152,739	204,951	561,856
Traveling Expenses	22,218	20,807	31,188	37,027	48,289
Communication Services	1,285	1,923	1,927	2,632	3,332
Repair and Maintenance of National Government Facilities	189	138	686	797	1,258
Transportation Services	87	288	152	1,063	1,885
Other Services	46,957	84,810	70,174	101,845	278,129
Supplies and Materials	22,589	18,992	27,133	33,388	54,146
Rents	3,866	3,602	3,641	3,588	5,871
Interests	0	0	0	0	0
Grants, Subsidies and Contribution	140	124	255	237	137,831
Awards and Indemnities	0	0	0	0	0
Loan Repayments	0	0	0	0	0
Losses/Depreciation	0	0	0	0	0
Water, Illumination and Power Services	3,881	4,698	5,046	5,791	7,826
Social Security Benefits and Other Claims	311	1,748	1,947	5,946	6,385
Auditing Services	0	2	0	4	5
Maintenance of Motor Vehicles for Official Travel	7,764	7,383	10,858	12,078	17,281
Discretionary Expenses	0	5	0	17	25
Representation Expenses	362	282	587	419	458
Extraordinary/Contingency/Emergency Expenses	29	176	30	134	184
Taxes and Licenses	0	0	84	0	0
Trading/Production	0	0	0	0	0
B. CAPITAL OUTLAYS	6,183	6,778	229,967	54,993	117,574
Land and Land Improvement Outlay	2,534	2,770	4,873	16,845	34,234
Buildings and Structures Outlay	2,985	1,377	2,847	2,682	1,294
Equipment Outlay	664	2,631	4,257	2,881	6,681
Investment Outlay	0	0	219,589	34,265	75,364
Loans Outlay	0	0	0	0	0
C. NET LENDING & PRINCIPAL AMORTIZATION	0	0	0	0	0
GRAND TOTAL	264,727	365,923	640,849	532,367	1,164,879
Percent Increase over the Previous Year		38%	75%	-17%	119%

† Deflated using a projected 1978 GNP deflator of 374.67.

Source: Department of Budget as of Oct. 1989.

Annex Table 4
1989 EXPENDITURE PROGRAM BY FUNCTION/PROJECT, DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
(In thousand pesos)

PARTICULARS	Current Operating Expenditures		Capital Outlays	Total
	Personal Services	Maintenance and Other Operating Expenses		
A. Functions	1,110,779	303,295	7,391	1,419,465
1. General Administration and Support Services	56,177	43,089	1,031	101,097
2. Administration of Personnel Benefits	113,063			113,063
3. Salary Standardization	278,194			278,194
4. Forest Management	13,259	11,542	6	24,807
5. Land Management	9,126	16,582	292	26,000
6. Mines and Geo-Sciences Development	12,901	24,329	75	37,305
7. Environmental Management	4,009	8,655	81	13,625
8. Ecosystems Research and Development	10,474	12,334	141	22,949
9. Protected Areas and Wildlife Resources Development	4,633	7,910	902	13,525
10. Coordination of Foreign-Assisted Projects	110	928		1,038
11. Adjudication of Pollution Cases	1,542	1,570		3,112
12. Regional Operations	614,411	176,356	3,983	784,750
B. Locally-Funded Projects	187,412	456,106	3,000	646,518
1. Pilot Projects and Policy Studies for the Development of Resources	279	3,130		3,409
2. Inter-Agency Projects	40	2,750		2,790
3. Natural Resources Management and Development	102	850		952
4. Natural Resources Investment Promotion Program	241	2,027		2,268
5. Tamaraw Conservation Project		2,120		2,120
6. Conservation, Propagation and Expansion of Exotic Wildlife Species under the Calauit Project		5,163		5,163
7. Pawikan Conservation Project	389	653		1,042
8. Lungsod Silangan Development Project	640	970		1,626
9. Stone Industry Resources Survey	51	470		521
10. Small-Scale Mining and Exploration Techniques	4	93		97
11. Zeolite Synthesis Using Indigenous Raw Materials	7	114		121
12. Socioeconomic Enhancement of Mining Communities	19	294		313
13. Exploration, Exploitation and Utilization of Philippine Minerals for the Agri-Chemical Industry	67	763		830
14. Integrated Geological Survey of Economic Mineral Deposits	45	257		302
15. Special Projects for Mineral Exploration and Development of Mineral Reservation Areas, subject to the provisions of Section 8, P.D. No. 1305 and Section 40 of P.D. No. 1177		700		700
16. Improvement of the Department of Environment and Natural Resources Building			3,000	3,000
17. Reforestation and Integrated Social Forestry Projects	180,619	126,590		307,217
18. Final survey of tenanted rice and corn lands and other lands covered by the Comprehensive Agrarian Reform Program in coordination with the Department of Agrarian Reform	928	172,651		173,579
19. Cadastral Survey	3,973	136,495		140,468

Annex Table 4 (Cont'd)

PARTICULARS	Current Operating Expenditures		Capital Outlays	Total
	Personal Services	Maintenance and Other Operating Expenses		
C. Foreign-Assisted Projects	271,600	691,498	126,227	1,090,402
1. Palawan Integrated Area Development-Project (ADB Loan Nos. 528 & 529 PHI/EEC Grant)	15,150	13,934	601	29,685
Peso Counterpart	6,198	1,986		8,184
Loan Proceeds		8,457	601	9,058
Grant Proceeds	8,952	3,491		12,443
2. Rainfed Resources Development Project (USAID 492-T-068)	11,435	10,837	2,449	24,721
Peso Counterpart	11,435	4,236		15,671
Grant Proceeds		6,601	2,449	9,050
3. Philippine Forestry Development Project (ADB 677 PHI)	34,835	24,167	23,756	82,758
Peso Counterpart	3,223	321	400	3,944
Loan Proceeds	31,612	23,846	23,356	78,814
4. Industrial Waste Exchange System Project (IDRC Grant 3-8-86-1040-2)	209	477	0	686
Peso Counterpart	209	477	0	686
5. RP-Japan Crocodile Farming Project	2,542	4,348	0	7,967
Peso Counterpart	2,542	4,348	0	7,967
6. Project Preparation Facility (IBRD 2360 PH)	4,929	2,300	0	7,309
Peso Counterpart	1,212	836	0	2,048
Loan Proceeds	3,717	1,544	0	5,261
7. Third Davao del Norte Irrigation Project (Soil Conservation and Watershed Management Component) (ADB 500 PHI)	8,892	5,579	6,320	20,791
Peso Counterpart	8,892	5,181	3,824	17,897
Loan Proceeds		398	2,496	2,894
8. Seagrass Habitat Restoration Project (IDRC Grant 3-P-85-1013-02)	223	337	0	560
Peso Counterpart	223	337	0	560
9. Allah River Irrigation Project (IDRC Grant 3-P-85-1013-02)	12,701	19,646	5,112	37,459
Peso Counterpart	12,701	5,854	5,112	23,667
Loan Proceeds		13,792		13,792

Annex Table 4 (Cont'd)

PARTICULARS	Current Operating Expenditures		Capital Outlays	Total
	Personal Services	Maintenance and Other Operating Expenses		
10. RP-German Cebu Upland Project (FRG Grant)	1,230	0	0	1,230
Peso Counterpart	1,230	0	0	1,230
11. RP-New Zealand Afforestation Project (NZ-Grant)	7,847	4,148	1,945	13,940
Peso Counterpart	7,847	4,148	1,945	13,940
12. Bamboo Research and Development Project (UNDP PHI/85/008/A/01/12)	1,246	947	0	2,193
Peso Counterpart	1,246	947	0	2,193
13. RP-Japan Forestry Development Project-Watershed Management (JICA Grant)	17,898	3,251	1,491	22,640
Peso Counterpart	17,898	3,251	1,491	22,640
14. Bicol River Basin Development Project-Lake Bato Watershed Management (ADB 417 PHI)	1,125	1,594	85	2,804
Peso Counterpart	1,125	1,594	85	2,719
Loan Proceeds				85
15. ASEAN-US Watershed Project (USAID Grant No. 498-0253-03)	1,644	1,011	0	2,655
Peso Counterpart	1,644	1,011	0	2,655
16. Forest Fire Management Project (FAD Grant)	1,409	1,086	1,643	4,138
Peso Counterpart	1,409	1,086	1,643	4,138
17. BLISS Waste Water Treatment Project (IDRC Grant 3-8-84-0245)	87	246	150	483
Peso Counterpart	87	246	150	483
18. Forestry Sector Loan (ADB 889/890 PHI)	145,473	591,375	82,675	819,523
Loan Proceeds	145,473	591,375	82,675	819,523
19. Dipterocarp Forest Management Project (FRG Grant)	2,725	6,135	0	8,860
Peso Counterpart	2,725	6,135	0	8,860
GRAND TOTAL	1,577,791	1,450,899	137,695	3,156,385

Source: Department of Budget as of October 1989.

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