THE PHILIPPINE ENVIRONMENTAL AND
NATURAL RESOURCES ACCOUNTING PROJECT
(ENRAP – PHASE IV)

MAIN REPORT

2000

Department of Environment
and Natural Resources

Philippine Economic – Environmental
and Natural Resources Accounting System

Environmental and Natural Resources
Accounting Project

Supported by the

United States Agency for
International Development

THE PHILIPPINE ENVIRONMENTAL AND
NATURAL RESOURCES ACCOUNTING PROJECT
(ENRAP – PHASE IV)

MAIN REPORT

2000

This document was made possible through a grant provided by the United States Agency for International Development (USAID) under the terms and conditions of Contract No. 492-0465-C-00-4042-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of USAID. This document may be reproduced or quoted in other publications as long as proper reference is made to the source.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS and ABBREVIATIONS

A and D	Alienable and Disposable
ADB	Asian Development Bank
AV	Assessed Value
ALV	Average Land Value
BOD	Biochemical Oxygen Demand
CA	Commonwealth Act
CAMAR	Calapagan-Marayag
CBFM	Community-Based Forest Management
COMVAL	Compostela Valley
CRMP	Coastal Resources Management Project
CVM	Contingent Valuation Method
DA	Department of Agriculture
DAO	Department of Environmental and Natural Resources Administrative Order
DENR	Department of Environment and Natural Resources
DNS	Direct Nature Services
DOE	Department of Energy
DRC	Domestic Resource Costs
DTI	Department of Trade and Industry
EAS	Economics Affairs Service
EIA	Environmental Impact Assessment
EMB	Environmental Management Bureau
EMS	Environmental Management Specialist
ENMR	El Nido Marine Reserve
ENR	Environment and Natural Resources
ENRA	Environmental and Natural Resources Accounting
ENRAMIS	Environmental and Natural Resources Accounting Management Information Systems
ENRAP	Environmental and Natural Resources Accounting Project
ENRED	Environmental and Natural Resources Economics Division
ER	Economic Rent
ERDB	Ecosystems Research Development Bureau
EWDS	Environmental Waste Disposal System
FMB	Forest Management Bureau
FMIS	Forest Management Information System
FSP	Forestry Sector Project
GEM	Growth with Equity in Mindanao Program
GIS	Geographical Information Systems
GOLD	Governance and Local Democracy Project
GS	Government Share
HINP	Hundred Islands National Park
HTNP	Hinulugang Taktak National Park
IFMA	Industrial Forest Plantation Management Agreement
IPAF	Integrated Protected Area Fund
IRG	International Resources Group
IRR	Internal Rate of Return
LAUD	Land Utilization and Management Division
LGCAMC	Lingayen Gulf Coastal Area Management Commission

LGU	Local Government Unit
LLDA	Laguna Lake Development Authority
LMB	Land Management Bureau
LMS	Land Management Sector
MAC	Marginal Abatement Cost
MANP	Mt. Arayat National Park
MEC	Marginal Environmental Costs
MGB	Mines and Geo-Sciences Bureau
MKRNP	Mt. Kitanglad Range Natural Park
MPC	Marginal Private Costs
MPNP	Mt. Pulag National Park
MPR	Margin for Profit and Risk
MT	Metric Tons
MUC	Marginal User Costs
MV	Market Value
NAFCO	National Abaca and Other Fibers Corporation
NAMRIA	National Mapping and Resource Information Authority
NAPWNC	Ninoy Aquino Parks and Wildlife Nature Center
NDP	Net Domestic Product
NEB	Net Environmental Benefits
NEDA	National Economic and Development Authority
NGO	Non-Government Organization
NIA	National Irrigation Administration
NIPAS	National Integrated Protected Area System
NOx	Nitrogen Oxide
NP	National Park
NPPFRDC	Ngan-Panansalan-Pagsabangan Forest Resource Development Cooperative
NPV	Net Present Value
NRM	Natural Resources Management
NRMP	Natural Resources Management Program
NSCB	National Statistical Coordination Board
NSO	National Statistics Office
OJT	On the Job Training
PAMB	Protected Area Management Board
PASU	Protected Area Superintendent
PAWB	Protected Areas and Wildlife Bureau
PCG	Philippine Coast Guard
PCSD	Philippine Council for Sustainable Development
PEENRA	Philippine Economy-Environment and Natural Resources Accounting
PLA	Pasture Lease Agreement
PLNP	Paoay Lake National Park
PNOC	Philippine National Oil Company
PCC	Pollution Control Costs
PPSEAO	Planning, Policy Studies and Economics Affairs Office
PPSO	Planning and Policy Studies Office
PSEEA	Philippine System of Integrated Environmental and Economic Accounting
PSIC	Philippine Standard Industrial Classification
PUCC	People's Upland Countryside Cooperative
REECS	Resource Environment and Economics Center for Studies
SACCK-FRDC	San Antonio Concepcion Candiis Kidawa-Forest Resource

	Development Cooperative
SEEA	System of Integrated Environmental and Economic Accounting
SER	Shadow Exchange Rate
SNA	System of National Accounts
SOCSARGEN	South Cotabato, Sarangani, General Santos City
TC	Total Costs
TR	Total Revenues
UNDP	United Nations Development Project
UNSEEA	United Nations System of Integrated Environmental and Economic Accounting
UPLB	University of the Philippines Los Baños
USAID	United States Agency for International Development
WDS	Waste Disposal Services
WQMS	Water Quality Management Section
ZV	Zonal Value

EXECUTIVE SUMMARY

The Philippine Environmental and Natural Resources Accounting Project (ENRAP) is a USAID-financed technical assistance to the Department of Environment and Natural Resources (DENR). During its final phase (1997-2000) the following objectives were attained: refinement and update of the ENRA accounts; policy reforms for enhancing environmental and natural resource management; intensified institutionalization of the Philippine Economic-Environmental and Natural Resources Accounting (PEENRA) System; capacity building in the conduct of environmental economic analysis by the DENR; and dissemination of ENRAP methods and results to various user groups.

THE ENRA ACCOUNTING RESULTS

The ENRAP framework estimates values of nature-based goods and services that are not marketed or are excluded from conventional income accounting: unmarketed fuelwood production, depreciation of natural resources, waste disposal services, unpaid environmental quality services (recreation), and negative outputs or environmental damages (e.g., pollution).

The accounts cover negative and positive interactions between economic and environmental systems and have the following features: double-entry book-keeping (allowing for modifications on both sides of the T-accounts), valuation of both market and non-market goods and services; and the inclusion of both positive and negative changes in the stocks of environmental and natural resources. The results indicate that since some of the additions and subtractions cancel out, the over-all difference from the traditional indicators is not large. For instance, for the two years 1988 and 1992, the difference between the ENRA modified net domestic product and traditional net domestic product is less than the statistical discrepancy entry.

The accounting process itself has yielded different numerical indicators at the sector and sub-national levels that reveal where the problem areas are.

Natural Resource Depreciation. Fishery, forest, mineral and soil stocks depreciated by P2.6 billion in 1988, to a higher P6.8 billion in 1992 and then to a lower rate of P1.2 billion in 1996 (in 1985 prices). Depreciation was highest for forest and fisheries during 1988-1992 while it worsened for upland soils during 1992-1996. Simulations of policy options to address natural resource depreciation indicate several strategies. For Lingayen Gulf, fishing effort need to be restricted to allow reversal towards economic sustained yield harvests. This finding contributed to the current policy to ban additional entry of commercial fishers. Reversal of forest depreciation to forest appreciation resulted from both the protection and enhancement of the growth of secondary timber production forests and the establishment of plantations. The primary option to further enhance the management of residual and plantation forests is to resolve the policy impasse on the commercial logging ban in favor of sustained yield harvesting. This strategy would maximize the economic value of production forests allowing for benefits to accrue to forest based communities and enable effective management of the other forests for watershed protection and biodiversity conservation. Unregulated fuelwood extraction has declined in importance as a major threat to forests.

Waste Disposal Services. Air emissions continued to be caused mainly by motor vehicles during the period 1988 to 1995. Efforts to reduce pollutants from motor vehicles had been underway in the mid-nineties with the reduction of lead in gasoline, and the imposition of a differential tax between leaded and unleaded gasoline. The recent passage of the Clean Air Act seeks to further reduce air emissions from transport and industrial sources. Strategies such as intensified anti-smoke belching, leaded gasoline phase-out, and reduction of fuel sulfur content result in a net gain from P40.8 B to P117.7 B, with IQ effects included in the high end of these estimates of net present values. At the national level, uncontrolled water discharges continue to be contributed largely by household wastes, surface run-off, and industrial discharges. In the area covering South Cotabato province, Sarangani province, and General Santos City (SOCSARGEN), livestock and poultry production and solid waste generation are likely to increase, causing higher pollution loads.

Environmental Damages. Updated estimates of irrigation systems losses from pollution reveal much higher damages, with most caused by silting due to high erosion rates. Thus the strategy of encouraging investments in resource conservation in upland areas is important both in terms of reducing on-site resource depreciation and reducing damages downstream.

Environmental Quality Services. Recent information from two national parks (Hundred Islands National Park and Mt.Pulag National Park) indicates that coastal and forest areas provide higher values of direct nature services than previously estimated..

Net Environmental Benefits. Net environmental benefits (NEB) are composed of waste disposal services from air and water, environmental damages due to air and water pollution and direct nature services. The large increase in the value of direct nature services resulted in much higher NEB.

These results indicate that while aggregative indicators of sustainable development remain elusive and are still subject to further analytical work here and by the international community engaged in environmental and natural resources accounting, the lessons gained from specific environmental problems already provide tools for analyzing the options for improving resource management in the Philippines.

FORMULATION OF ECONOMIC INSTRUMENTS

ENRAP provided technical assistance to DENR bureaus for the conduct of empirical work for developing the following economic instruments to enhance resource management.

Land Management Bureau: Patrimonial Properties. Case studies conducted on government property in the commercial district of Davao City illustrate how far rental or lease fees have lagged behind the assessed and zonal values. Update of such fees to rates within assessed and zonal values could increase revenue fivefold and generate the much-needed income for the national government.

Ecosystems Research and Development Bureau: Optimizing Use of Grasslands. Nationwide surveys of pasture lands provided the basis for increasing fees from P15-P20 per hectare to a graduated schedule that starts with P100/ha/yr in year 1, reaching P500 in year 5 (DAO 99-36).

Forest Management Bureau: Industrial Forestry and Geothermal Reservation. Computational methods for estimating the potential sharing of economic rent between government and industrial tree farmers and geothermal use of forest lands were developed. The results provided the basis for negotiating fair shares of rents expected from the commercial users of forest lands.

Protected Areas and Wildlife Bureau: National Parks. Among the five sites for which user fee studies were completed, four protected area management boards (PAMBs) issued respective resolutions covering the following: increased entrance fees for visitors at Hundred Islands National Park and Mt. Pulag National Park; increased fees for the use of facilities located in Hundred Islands National Park; increase in fees for the use of Paoay Lake for aquaculture; and the charging of development fees on telecommunication facilities at Mt. Kitanglad Range Natural Park.

Environmental Management Bureau: Wastewater Discharge Fees. Empirical work to prepare for the implementation of revised wastewater discharge fees indicates marked differences in marginal abatement costs across three areas/regions. These differences have implications on the design of the appropriate (flexible) wastewater discharge fee system. They likewise indicate those areas where lower incremental abatement costs are likely to occur and where higher pollution reduction is expected to be undertaken.

Competitiveness Concerns. Improved environmental management either through strict enforcement of regulations or the application of economic instruments to reflect full cost pricing could result in declining comparative advantage. However, the proportion of firms without comparative advantage would increase by a significant degree only when pollution control costs are at least 5% of output values. The problem is likely to be only a short-run concern, since the pollution control cost estimates are mostly based on end-of-pipe controls. Shifting to newer and less pollutive technologies is likely to occur in the medium term, along with increased trade liberalization, globalization of markets and improvements in the financial markets.

Future Directions. These economic instruments include only those that were feasible for the DENR to revise in the short run. In the medium-term, additional instruments, which include user rights that provide the basis for market-based transactions should be pursued, including the system for allocating such rights, such as competitive bidding or auction of the forms of use provided for by the 1986 Constitution.

INSTITUTIONALIZATION: DENR PEENRA

ENRAP aimed at enhancing capacity at specific offices of the DENR to implement Executive Order Number 406 (1997) that institutionalizes the Philippine Economic Environmental and Natural Resources Accounting (PEENRA) system. Management support, significant time involvement and budgetary allocation were key to ensuring sustainability of ENRA institutionalization. Among the accomplishments of the process are:

1. trained staff in the rudiments of ENRA among the DENR bureaus, though uneven, with the skills most developed at the Forest Management Bureau and the Ecosystems Research and Development Bureau;
2. creation of an ENRA within the DENR policy and planning office
3. continuing work on ENRA-type activities and the formulation of economic instruments

In terms of the continuing update of the specific accounts, the accounting entries for unmarketed household production, natural resource depreciation and waste disposal services are underway to being generated regularly by DENR bureaus. However, entries such as environmental damage and environmental quality services require specialized information that is feasible to generate and process only with the involvement of other government agencies and inputs from higher levels of expertise normally found at academic and research institutions.

SUB-NATIONAL ACCOUNTING: ENRAP Support to the Sarangani Province

Locating the LGU-ENRAP institutionalization at the Sarangani province was based on: (a) serious effort in the province to address resource use problems; (b) appreciation of the need for a sound information base for decision-making, (c) high potential for collaboration with other USAID-assisted projects, and (d) availability of a resource and environmental economics specialist based in the region.

Despite these advantages, local institutionalization is severely constrained. First, environmental problems do not coincide with political boundaries. In the case of the Sarangani Bay Protected Landscape, while the Bay is bounded by most of the Sarangani Province, other LGUs host most of the municipalities whose activities generate impacts that inevitably end up in the Bay, namely, South Cotabato, Sarangani and Sultan Kudarat Provinces, and General Santos City.

Second, given that various environmental and resource scarcity problems transcend political boundaries, the information system should be flexible enough for aggregation and dis-aggregation to suit the nature of the environmental problem. The recent effort initiated by the Forestry Development Center, with collaboration from NAMRIA, the DENR and ENRAP to formulate a uniform GIS-based information system needs further inputs from the NSO.

Third, consistency, quality assurance, and promptness are needed to allow for comparability across areas, independent analysis, and constituency to be built among local stakeholders. Given the costs of generating information and the demand for such information to originate from various sectors, it is likely to be more cost effective to continue investing in improvements of the information generating instruments used by the NSO and the DENR, instead of taking on the information systems of each LGU individually.

ENRAP OUTREACH ACTIVITIES

ENRAP outreach activities may be grouped into three categories: those that aimed at building constituency for policy reforms; those that aimed at providing technical inputs for specific needs; and those aimed at contributing to the local and worldwide efforts at environmental and natural resource accounting. These activities were implemented through publication of the ENRA Guidebook, the compilation of all the ENRAP outputs into electronic, searchable format in CD-ROM for wider dissemination, the conduct of briefings to various groups locally and abroad, regular issuance of the Policy Updates which presents ENRAP results in layman terms, and participation in collaborative efforts with other government and donor agencies.

THE PHILIPPINE ENVIRONMENTAL NATURAL RESOURCES ACCOUNTING PROJECT PHASE IV

MAIN REPORT

1. INTRODUCTION

The Philippine Environmental and Natural Resources Accounting Project (ENRAP) is a USAID-financed technical assistance to the Department of Environment and Natural Resources (DENR). During its final phase (1997-2000) the following objectives were sought: generate/ refine/ update environmental and natural resources indicators as inputs to national and local development planning and policy formulation; enhance linkages and strengthen coordination among public and private sector policy decision makers with respect to environment and natural resources management issues; identify and recommend solutions to current environmental and economic issues; replicate application of the ENRA framework in specific geographical areas and/or sectors; and use the data and information generated as benchmarks and bases for the USAID Mission's policy reform agenda and advocacy in the forest, fishery, industrial, agriculture and manufacturing sectors.

This final report presents the achievements of the Project in attaining these objectives and recommends directions for follow through by the DENR. It draws from the various reports produced by ENRAP and the DENR counterparts (**Appendix 1**).

Part 2 presents the accounting results and their indications of natural resource and environmental problems for the country and selected sites. Specific policy studies that drew from the accounting results and which were conducted to provide directions for improving environmental and natural resource management for specific problem areas are discussed. Policy studies that focused on empirical work for developing economic instruments for the DENR to implement to enhance resource management are summarized in Part 3. Part 4 reports on the efforts at enhancing capacity at specific offices of the DENR to implement Executive Order Number 402 that institutionalizes the Philippine Economic Environmental and Natural Resources Accounting (PEENRA) system. Lessons from attempts to institutionalize accounting at the provincial level are discussed in Part 5. Part 6 describes the activities at extending accounting results to key users and decision-makers. Concluding remarks are presented in the final section.

2. THE ENRA ACCOUNTS AND POLICY IMPLICATIONS

Environmental and natural resource accounting aims to develop the information base needed for understanding environment-economy interactions at various levels. At the aggregate level, enhancement of the System of National Accounts (SNA) with ENRA adjusted indicators of national income seeks to provide indications of sustainable development of the economy. The same information system likewise generates data for examining specific resource-based economic sectors and localized or ecosystem-specific concerns as well.

As with most efforts at environmental accounting, the starting point for ENRAP is the system of national accounts. The entries in conventional income accounting represent flows of

goods or services as recorded in the market transactions participated by individual households, firms and the government. Various nature-based goods and services that are not marketed, even though they are "economic," are not included. These excluded goods and services fall into one of three categories: input services (e.g., waste disposal services); unpaid output or environmental quality services (e.g., recreation and aesthetic services); and negative outputs (e.g., pollution). The basic ENRAP strategy is to append these non-marketed services that draw from environmental assets to the marketed services that are already accounted for in the conventional accounts. The monetary value of these services are obtained by using estimated shadow prices set to an approximate value that would be expected were these goods and services marketed.

2.1 The ENRA Modified National Income Accounts

The ENRA entries include unmarketed fuelwood production, depreciation of natural resources, and net environmental benefits which are composed of waste disposal services provided by air and water, environmental quality services such as nature-based recreation, and environmental damages. As presented in **Table 1**, the ENRAP accounts include both negative and positive interactions between economic and environmental systems. The accounts exhibit the following features: double-entry book-keeping (allowing for modifications on both sides of the T-accounts), valuation of both market and non-market goods and services; and the inclusion of both positive and negative changes in the stocks of environmental and natural resources.

The results presented indicate that some of the additions and subtractions cancel out. Thus, the over-all difference from the traditional indicators is not large. For instance, for the two years 1988 and 1992, the difference between the ENRA modified net domestic product and traditional net domestic product is less than the statistical discrepancy entry. A similar picture holds for the ENRA-modified gross domestic product versus traditionally measured gross domestic product.

An emerging perspective, in fact, is to avoid comparing traditional indices with ENR-adjusted indices since each index measures different scores. Rather, it may be important to track the value and time trend of the ENRA adjusted NDP: a positive value implies sustainable (Hicksian) income, and increases in this value through time indicate sustainable development. The positive and increasing real values of the ENRA-modified net domestic product for the country appear to indicate sustainable development at the national level.

Notwithstanding the exploratory nature of most aggregated, environmentally adjusted NDP calculations, the accounting process itself has yielded different numerical indicators at the sector and sub-national levels that reveal where the problem areas are. This process includes developing a framework that views environmental and natural resources as important economic assets that need to be used wisely and generating information that is key to examining environmental concerns economy-wide. Examples of the lessons derived from the resource accounting entries are discussed subsequently.

2.2 Natural Resources Depreciation

High extraction rates characterized Philippine natural resource use over the past three decades, contributing to the depreciation of these resources. Thus, fishery, forest, mineral and soil stocks depreciated by P2.6 billion in 1988, to a higher P6.8 billion in 1992 and then to a lower rate of P1.2 billion in 1996 (**Table 1, in 1985 prices**).

The situation was worst for the potentially renewable resources, forests and fisheries, in the late eighties and the early nineties. In 1988, Philippine dipterocarp forests depreciated by P823 million in 1988; however, this slowed down to a lower depreciation of P162 million in 1992 and reversing to appreciate by P416 million in 1996/7. Depreciation of the fishery resources, particularly the small, surface-dwelling fishery resources, was highest in 1992. These are largely open access; thus easy entry and exit from fishing contributed to much higher depreciation rates, albeit at highly erratic trends indicated in **Figure 1**, which are likely due to short-term adjustments made by the fishers to lower returns from fishing.

With respect to the non-renewable resources, a continuous trend of soft mineral prices contributed to declining extraction; thus, depreciation of gold and silver decreased from P658 million in 1988 to only P194 million in 1996. However, in the case of the topsoil in upland areas with at least 8 per cent slope, depletion is high. Depreciation of soils in these lands which are 70 per cent forest and 30 per cent A and D is estimated to have increased from P334 million in 1988 to P 906 million in 1996.

2.2.1 Addressing Fishery Resources Depreciation

The long-term trend of the fishery asset value appears to be downwards with fishers apparently reacting to non-increasing productivity or catch per unit effort. The erratic depreciation of pelagic (surface-dwelling) fisheries (**Figure 1**) may be due to a series of alternating entry to and exit from the open access waters, as fishers note cycles of negative and positive fishing rents.

Indeed, ENRAP Phase III analysis indicated that over the last 50 year period, total fishing effort at the national level had been double the level that would have sustained economic returns. Thus, without substantial improvements in fisheries management, a decline in earnings was anticipated for the late nineties resulting in higher unemployment (Padilla and Cortez 1996).

A similar situation was anticipated in Lingayen Gulf, a major fishing ground. Several policy options were analyzed by ENRAP including seasonal closures, moratorium on commercial fishing, and much lower future entry to include reduction of municipal fishers. The results of the options on sustainable yield (**Figure 2**) encouraged the Lingayen Gulf Coastal Area Management Council to press for a reduction of fishing effort through the issuance of a Fisheries Administrative Order by the Department of Agriculture limiting additional entry of commercial fishers into the area.

2.2.2 Directions for Improving the Management of Forests

Earlier it was noted that the forest depreciation indicated for 1988 and 1992 reverted to forest appreciation in 1996. One factor of this reversal is that there is not much to depreciate among the natural forests anymore since these had declined to low levels; hence, the ban on logging of old-growth forests in the late eighties. Forest appreciation resulted from both the protection and enhancement of the growth of secondary timber production forests and the establishment of plantations. Recent increases in the area and volume of these types of forests are indicated in **Figure 3**.

Several options in forest management need to be considered to further enhance the management of residual and plantation forests. One such option is to make a final decision on the proposed commercial logging ban whose debate has remained unresolved for the past fifteen years. Simulations were run to determine the effect of three options: selective logging as currently prescribed through the allowable annual cut formula, commercial logging ban, and managing the forest based on economic sustained yield maximization principles. The results presented in **Table 2** indicate that the forest asset values are highest once the residual forests are managed efficiently as timber production forests, including harvesting them based on cutting cycles that maximize economic yield. On the other hand, a commercial logging ban obviously converts the forest into a non-economic asset (Scenario B).

Forest management has shifted from large-scale users during the fifties throughout the seventies to small-scale users in the eighties. This has resulted from a policy shift that favors forest-based communities and recognizes the problems of high population density and marked poverty in the uplands. The upland poor is said to have comprised the poorest groups in the country during the eighties. Indeed, in 1985 the average entrepreneurial family income from forestry and hunting was only P3,710 and was much lower than the poverty threshold income. However, the picture appears to be changing: during the period 1990-1994 average family income increased to P44,263, and was almost at level near the poverty threshold income (delos Angeles 2000). This change may be due in part to an increasingly cash economy in the uplands, improved measurement of income, and, as intended by policy, increased access by the poor to the upland resources. **Table 3** indeed reveals that community-based forest management could be viable, as reflected by high stumpage values in three out of the four CBFM sites. However, improvements are needed to address the high cost and low revenues for some sites, which may include better marketing conditions that may currently be hampered by the impasse on the logging ban debate.

Similar flexibility in regulatory policies is also in order for industrial forest plantations. The figures presented in **Table 4** indicate two sets of computations for plantation returns based on information on yields used by the ADB-assisted Forestry Sector Project and field studies conducted by the Ecosystems Research and Development Bureau (ERDB). The ADB assisted reforestation sites appraisal generally applied lower yield estimates than those generated by ERDB, thereby generating lower net present values per hectare of tree plantations. The table also presents simulations performed on the rotation ages for harvesting plantations and reveals that 12 years are optimal given the projected cost and price trends. These simulations reveal the need for flexibility to be built into harvest decisions to allow the highest economic values to be earned from forest plantations. This flexibility includes the firms' ability to determine rotation ages, albeit subject to the

prescribed environmental impact analysis; in addition, government sharing of the production proceeds, as prescribed by law, also allows for flexibility to be built into negotiated sharing agreements.

2.3 Unmarketed Fuelwood Production

Fuelwood gathering has been one of the major causes of deforestation in the past thirty years. The availability of fuelwood from plantation forests, fewer sources and cheaper alternatives (e.g., liquefied petroleum gas) appear to have resulted in lower collection from public forests. This decline in unregulated harvesting is indicated in **Table 5** that shows at most 10 per cent collection from forestlands in 1995, and a declining trend of unmarketed fuelwood gathering **(Figure 8).** This decline in unmarketed fuelwood gathering implies much lower entries into the ENRA adjusted accounts as indicated in **Table 1.**

2.4 Waste Disposal Services

The ENRAP valuation of waste disposal services provided by the environment are based on estimates of uncontrolled emissions and discharges from all sectors and the prospective cost of abatement. The 1995 estimates are based on the updated emission coefficients used for the previous years, NSO information on production, and DOE data on fuel consumption.

2.4.1 Air Pollution

Air emission estimates are presented in **Table 6** for the years 1988, 1992 and 1995. The shares of pollution generated by various economic sectors remain the same during the period 1988 to 1995, since most of the policies to reduce air pollution were undertaken after 1995. As noted in the previous reports of ENRAP Phases II and III, these shares vary according to the type of pollutant. Fine particulate matter emissions are contributed mostly by households due to fuelwood burning and high dependence on motor vehicles. Fuelwood burning, public utility vehicles, motor vehicles for distributing food products and food processing establishments generate most of the sulfur dioxide, NOx, volatile organic compounds and carbon monoxide emissions.

The values of waste disposal services as presented in **Figure 4** indicate the following shares: 95% of the value of air emissions come from mobile sources mainly from households, vehicles for hire, and industries. The other 5% is contributed by stationary sources such as manufacturing companies of food, beverage and tobacco, basic metal industries, paper and paper products and chemicals, petroleum, coal, rubber and plastic products.

2.4.2 Options for Reducing Emissions from Motor Vehicles

Efforts to reduce pollutants from motor vehicles had been underway in the mid-nineties with the reduction of lead in gasoline, and the imposition of a differential tax between leaded and unleaded gasoline. The recent passage of the Clean Air Act seeks to further reduce air emissions from transport and industrial sources. ENRAP studies on the reduction

of air pollution from motor vehicles include options as presented in **Table 7**. Both private net benefits and social net benefits were estimated. The figures presented in the table represent the social net benefits computed from avoided health damages from the pollutants, the additional cost of pollution control and the foregone government revenues from taxes (with the assumption that taxes earned by government tend to generate higher social productivity as opposed to being retained in private hands).

Among the three mechanisms for reducing fine particulate matter emissions, restructuring of diesel tax rates to favor the use of cleaner fuels would be the most economically efficient strategy. However, since equity is a major consideration and alternative mass transport is not yet widely available, the current strategies of intensifying anti-smoke belching activities and prescribing lower sulfur content for fuel, as provided for in the Clean Air Act together achieve close to three billion pesos of net present value (NPV). In the case of lead emissions from transport, the ban of leaded fuels, already in effect during 2000 and 2001, generated high social net benefits, even when based on the conservative approach of excluding the potential gains from reduced impacts on children's IQ.

2.4.3 Water Pollution

As done with air pollution estimates, uncontrolled water discharges from industrial sources were refined and updated using refined data on emissions coefficients and recent data on industrial output. Likewise, household discharges were updated using projected population and housing figures for 1995. Refinements and updates were not made for discharges from surface run-off since information was not available on the large-scale adoption of soil conserving technologies in forest and upland agriculture lands in the whole country.

The reduction in specific economic activities such as mining and quarrying, paper and paper products manufacturing result in lower pollution loads (suspended solids). **Table 8** indicates the various types of pollutants generated by different economic sectors, with household-generated pollution increasing considerably.

In terms of shares to the total value of environmental waste disposal services, domestic sources contributed 48% (**Figure 5**). Surface run-off had a total contribution of 38%, while industries were the smallest sources of water pollution at 14%.

The earlier simulations in ENRAP III to estimate the future pollution load accompanying projected economic growth without changes in mitigation measures at the national level were replicated for the area covering South Cotabato province, Sarangani province, and General Santos City (SOCSARGEN). The results presented in **Figure 6** reveal the problematic sectors whose increased economic activities would have generated higher pollution loads: livestock and poultry production and solid waste generated management.

2.5 Environmental Damages

Environmental damages from water pollution were updated based on projections for dams and health impacts under the status quo, and refined estimates on irrigated rice lands from recent information from the National Irrigation Administration (NIA). The values presented in **Table 9** imply higher damage on the fisheries and rice production sectors. Higher unit

values in real terms of fish products account for the increased foregone earnings from fish production due to damaged coral reefs.

In the case of foregone values from irrigated rice production, the recent NIA data appears to indicate higher damages. Most of such damage is due to the effects of soil erosion and sedimentation primarily, and mine tailings, secondarily (**Table 10**). The regional distribution of foregone rice production values is reflected in **Table 11** with uneven impacts during wet and dry seasons across the regions.

2.6. Environmental Quality Services or Direct Nature Services (DNS)

Using the benefits transfer method, the previous 1988 and 1992 ENRAP estimates of unpaid, recreational values were based on two sites (Mt Makiling for forest-based recreation and a tropical beach area in Florida; adjusted for purchasing power parity). Recent information from recreational surveys conducted in two national parks (Hundred Islands National Park and Mt.Pulag National Park) were used to refine the estimates for 1996, resulting in higher values of direct nature services (**Table 1**).

2.7 Net Environmental Benefits

Net environmental benefits (NEB) are composed of waste disposal services from air and water, environmental damages due to air and water pollution and direct nature services. The large increase in the value of direct nature services resulted in much higher NEB. Interpretation of this result is however currently constrained by the differences in data for the DNS accounting entry.

2.8 Conclusions on the Benefits of Accounts Development

The formulation of ENRA adjusted income accounts requires assembling of information from various agency sources and specialized studies for area-specific problems. While the lessons from aggregate indicators are still under debate in the resource accounting community, various sub-accounts proved to be rich databases for providing insights into specific resource scarcity and pollution problems. The interaction among these sectors and various environmental problems could be addressed under the comprehensive framework of ENRA; this would not have been possible if partial, sector specific accounts were compiled individually and at different points in time. For instance, it became feasible to conduct benefit cost analysis to assess the prospective impacts of reducing air pollution from transport. In addition, since the accounting entries were tagged to various economic sectors, the implications of economic growth and development strategies on environmental and natural resource use could be addressed. The direction of the relationship and implications of resource problems on economic concerns were also investigated, again while drawing from the accounting results. A listing of the policy studies that were performed using various indicators that were generated during the accounting processes is presented in **Table 12**.

Thus, while aggregative indicators of sustainable development remain elusive and are still subject to further analytical work here and by the international community engaged in

environmental and natural resources accounting, the lessons gained from specific environmental problems already provide tools for analyzing the options for improving resource management in the Philippines.

3. FORMULATION OF ECONOMIC INSTRUMENTS

The additional instruments for improving environmental management that were pursued by the DENR through the technical assistance of the ENRAP team consisted mainly of reformed administrative fees. In 1997, each DENR bureau was tasked to examine available instruments that could be reformed to reflect correct resource pricing. Each DENR bureau was guided in the development of framework, data gathering and processing and formulation of recommendations by the ENRAP team. The ENRAP team that was tasked with assisting DENR to formulate economic instruments took this opportunity to achieve two objectives: initiate the process for resource pricing reforms and develop capacity at the bureaus for the conduct of economic studies.

The economic rationale used in reformulating the administrative instruments includes: addressing resource scarcity through the appropriation by government of the surpluses earned from using these resources for production or consumption; addressing pollution by the formulation of pollution-load based instruments; and enhancing resource management through the generation of revenues through these instruments. A supplementary motivation was to update the existing fees, many of which were prescribed by outdated laws during the time when natural resources were not scarce.

3.1 Land Management Bureau: Patrimonial Properties in Davao City

The most significant bottleneck to improving the allocation and management of land resources is the extremely slow progress of cadastral surveys: as of 1998, only half of the country had been surveyed with the other half in various stages (**Table 13a**). This problem does not augur well for the anticipated increase in man-land ratio and consequently, more intense resource use conflicts. In addition, government needs to improve its function of managing patrimonial property. A case study conducted on government property in the commercial district of Davao City, for example, illustrates how far rental or lease fees have lagged behind the assessed and zonal values (**Table 13b**). An attempt to correct the situation through the issuance of DAO 98-20 in 1998 spells improvements in the implementation of the Public Land Act (CA 141) and updating of rental rates to within assessed and zonal values. If fully implemented, the total revenue from such property could increase fivefold and generate the much-needed income for the national government.

3.2 Ecosystems Research and Development Bureau: Optimizing Use of Grasslands

The residual forests and open areas are not the only portions of forestland where on-site management needs to be improved significantly. Areas that were formerly under Pasture Lease Agreements (PLAs) also have good potential for generating higher net revenues, as reflected in **Table 14**. Even if government tried to appropriate a rent of P500 per hectare for these areas from the new users, much may still be gained as a result of shifting the land-use away from pasture towards other uses. Thus the recent move to increase PLA fees from

P15-P20 per hectare to a graduated schedule that starts with P100/ha/yr in year 1, reaching P500 in year 5 is a move in the right direction (DAO 99-36).

3.3 Forest Management Bureau: Industrial Forestry and Geothermal Reservation

Earlier, **Table 4** (Section 2.2) presented the potential net present values from industrial forest plantations and information on the potential sharing of economic rent between government and the private investor through a production sharing agreement. This arrangement is one of the four mechanisms for private use of publicly owned natural resources under the 1986 Constitution.

Another variation of this mechanism is the memoranda of agreement signed between the DENR and agencies tasked with overseeing specific forest lands/watersheds for the purpose of providing power, irrigation and water supply. One such study that sought to contribute to revising the agreement between the Philippine National Oil Company and the government was conducted by the FMB. The study resulted in the charging of fees of P1,700 per hectare of the operable area under the PNOC, provided that the areas under the geothermal reservation were made available for improved land management (**Table 15**). This rate appears to be more reasonable than the application of a much earlier law that mandates for the fee to be 1 per cent of the value of the improvements on the land, a potential deterrent to efforts at improving land productivity.

3.4 Protected Areas and Wildlife Bureau: National Parks

The NIPAS Act allows for the reformulation of fees in protected areas and provides for the Integrated Protected Area Fund (IPAF). The IPAF is a mechanism for earmarking the revenues from fees towards improved protection and management through resolutions passed by the Protected Area Management Board, which is multi-sectoral. **Table 16** summarizes the types of fees examined for various national parks.

The results of the studies for this sector are presented in **Table 17.** Among the five sites for which user fee studies were completed, four PAMBs issued respective resolutions adopting the study recommendations. The studies resulted in the following: increased entrance fees for visitors at Hundred Islands National Park and Mt. Pulag National Park; increased fees for the use of facilities located in Hundred Islands National Park; increase in fees for the use of Paoay Lake for aquaculture; and the charging of development fees against telecommunication facilities located on the summit of Mt. Kitanglad Range Natural Park.

3.5 Environmental Management Bureau: Wastewater Discharge Fees

Building on the initial success of the environmental user fees designed for the Laguna de Bay a few years ago, current EMB efforts attempt to extend the application to other water bodies and incorporate other concerns. Empirical work performed to prepare for the implementation of revised wastewater discharge fees indicates marked differences in marginal abatement costs across three areas/regions (**Table 18**). These differences have implications on the design of the appropriate (flexible) wastewater discharge fee system for the whole country that is primarily aimed at encouraging good behavior. In addition, they

indicate those areas where lower incremental abatement costs are likely to occur and where higher pollution reduction is expected to be undertaken.

3.6 Formulating Economic Instruments for Enhancing ENR Management: Future Directions

DENR and other relevant institutions exhibited political will in the formulation of economic instruments for environmental and natural resource management **(Table 19).** There are thus future prospects for further enhancing resource management. The traditional "command and control" mode of implementing regulatory policies tends to be complex, expensive to implement and therefore ineffective. In addition, detailed rule making allows little room for flexibility among those being regulated to choose the right technology for improving resource extraction, pollution control, and environmental rehabilitation. Thus, other mechanisms are needed to get the users of various resources to fully account for the effects of their activities on scarcity, environmental externalities and social impacts.

The use of economic instruments to complement rule making which has already been initiated should be pursued further. The list provided in **Table 20** indicates only those instruments that were feasible for the DENR to revise in the short run. In the medium-term, additional instruments, which include user rights that provide the basis for market-based transactions should be pursued, including the system for allocating such rights, such as competitive bidding or auction of the forms of use provided for by the 1986 Constitution. The basic principle is that the user, or a sub-set, e.g., the polluter, pays. That is, the resource user either pays for the resource or environmental service equivalent to the rate of use (and damage) or avoids such payment by shifting to improved technology that saves on the resource or reduces pollution.

In terms of specific directions, among the areas for continuing work are user fees based on the volume of air and water discharges beyond safe levels and payments for the provision of environmental services such as watershed protection, nature-based recreation, maintenance of habitat, and carbon sequestration. The corresponding enhanced resource prices may be used to regulate the use rates and encourage conservation activities and may, in the process generate revenues for monitoring, resource rehabilitation and payment of damages, at least in the short-run. To provide the legal basis for exploring such price reforms a legal study was implemented (Oliva 2000) which presents the caveats on additional work in this area.

3.7 Competitiveness Concerns

A major concern usually expressed during the public consultations conducted by various bureaus and regional officials and stakeholders on the proposed revisions in fees for wastewater discharge, pasture lease fees and the like was the decline in competitiveness of the relevant sector. The likely vulnerable sectors are those belonging to the primary industries whose pollution abatement cost-output ratios tend to be higher than 1 per cent (ENRAP III Main Report).

In general, however while comparative advantage may be expected to decline in the short-term, it need not result to comparative disadvantage. In fact, at the baseline conditions

with zero share of environmental control costs, only 40 percent of industrial output is apparently produced with comparative advantage, implying that several underlying causes of weak competitiveness should be addressed regardless of the environmental problem (**Figure 7**). Sensitivity by industry representatives to the imposition of environmental fees thus arises from certain conditions (e.g., infrastructure bottlenecks; outdated technologies caused by high protectionism in the past) which need to be addressed in order for higher growth rates to be achieved.

The imposition of appropriate user fees would likely increase the proportion of firms without comparative advantage higher by a significant degree only when the fees are at the 5% level of output or higher. The problem is likely to be only a short-run concern, since the pollution control cost estimates are mostly based on end-of-pipe controls. Shifting to newer and less pollutive technologies is likely to occur in the medium term, along with increased trade liberalization, globalization of markets and improvements in the financial markets.

4. INSTITUTIONALIZATION: DENR PEENRA

The issuance of Executive Order 406 signed on 21 March 1997 paved the way for the institutionalization of environmental and natural resources accounting (ENRA) through the creation of the Philippine Economic-Environment and Natural Resources Accounting (PEENRA) System. The PEENRA system is envisioned to improve the existing statistical system and ensure effective integration of environmental and natural resources accounting in socio-economic planning and decision-making. The Department of Environment and Natural Resources (DENR), the National Economic and Development Authority (NEDA), and the National Statistical Coordination Board (NSCB) were identified as the organizations to spearhead the institutionalization of ENRA.

This report focuses on the ENRA technical assistance to the DENR in accounting environmental economics work at the various bureaus. An assessment of the institutionalization process is provided using indicators such as staff capability, time inputs, management support, and availability of funds and logistical support. In addition, insights on challenges and opportunities for sustaining the initial PEENRA efforts are presented.

4.1 The Institutionalization Process

4.1.1 The Organizational Set-up

The mandate of the DENR in the PEENRA system is to compile sector-specific resource accounts, conduct research in support of policy development related to environment and resource accounting, and to generate environmental and natural resources accounting data. PEENRA units were established in offices, bureaus, and attached agencies of the DENR to conduct environmental and natural resources accounting work. A total of six bureaus specifically tasked to protect and manage the country's natural resources and environmental integrity were identified to take-charge of the ENRA efforts within the Department. Special orders were issued by the Bureau directors instructing a select group of technical staff from each Bureau to attend to ENRA efforts. Staff members from the Planning and Policy Studies Office (PPSO) were also appointed to be part of the different

working groups. PPSO is tasked to coordinate all ENRA initiatives within the Department (the complete list of DENR counterparts is presented in **Appendix 2**).

An ENRAP consultant and research associate/research assistant were assigned to work with the various Bureau counterparts, particularly to provide technical assistance in drawing up ENRA-related activities and to provide guidance in carrying out ENRA work.

4.1.2 The Institutionalization Process: ENRA Training and Research Activities

The institutionalization process can be characterized as primarily a human resources development/capability building program with two components: the research component and training component. The strategy was to impart general concepts and methods used in environmental and resource economics through formal training sessions, lectures, workshops, write-shops (**Appendices 3 and 4**), and also through informal consultations with individual consultants. These sessions were not only designed to create an awareness about and appreciation for environmental economics or environmental and resource accounting but also to prepare the Bureau counterparts to do actual ENRA research work.

4.2 The Research Component

The following is a brief description of the six bureaus involved in ENRA work and their ENRA research outputs. The nature of ENRA research varied according to the mandate and functions of each of the identified DENR-PEENRA entity **(Table 21).**

4.2.1 The Ecosystems Research and Development Bureau (ERDB)

The ERDB is the research arm of the DENR. Its overall mandate is to provide relevant technology and information that will contribute to: a) sustained and enhanced productivity of natural resources; and b) the protection of the environment to improve quality of life.

ENRA work in ERDB focused on the formulation of an economic instrument designed to protect and manage Philippine grasslands. The Grassland Pricing Project was comprised of three major components: 1) rent estimation; 2) valuation of grassland degradation and rehabilitation; and 3) economics of alternative land uses.

4.2.2 The Environmental Management Bureau (EMB)

The EMB is a line agency that is in-charge of urban and industrial environmental concerns. It is primarily tasked to assist and advise the Secretary on policies, programs and projects related to environmental management, conservation, and pollution control. EMB also helps in the formulation of environmental quality standards, as well as their attendant rules and regulations.

Initially, there were two main ENRA tasks to be accomplished at the Bureau: 1) formulation of an economic instrument for pollution control; and 2) updating of the environmental waste disposal services (EWDS) accounts. Two working groups were created (i.e. air quality

management and water quality management) to formulate appropriate activities, work plans, and expected outputs. However, due to budgetary problems, the water quality issue was given priority and efforts were then focused on designing a wastewater discharge permitting system based on the concept of pollution charges.

4.2.3 The Forest Management Bureau (FMB)

The FMB is a staff bureau that is tasked with providing technical support to the DENR Secretary on issues regarding the management of the country's forestlands. ENRAP assistance to FMB included building capacity for accounting methods appropriate to forest resources, providing technical assistance on intensively conducted studies that apply resource and environmental economics concepts, and supplying advice on selected issues for discussion. Several studies became the venue for applying environmental and resource economics concepts. These include:

1. Forest accounts updates (at the national level) on the following resources dipterocarps, plantations, mangroves, rattan, and fuelwood;
2. Case studies on the applicability of the ENRAP framework to community-based forest management areas;
3. Pricing issues (determining appropriate government shares); and
4. Review of different forest policy studies.

4.2.4 The Land Management Bureau (LMB)

As a DENR line agency, LMB is responsible for formulating and recommending policies and programs for the efficient and effective administration, survey, management and disposition of alienable and disposable lands of the public domain and other lands outside the responsibility of other government agencies.

ENRA-work at the LMB consisted of two activities: 1) an inventory of foreshore lease areas; and 2) two case studies on the evaluation of land-use options. However, after a process of consultations, work was narrowed to the development of methods for the proper valuation of public lands, specifically on the valuation of patrimonial lands in Davao City.

4.2.5 The Mines and Geosciences Bureau (MGB)

ENRA activity at the MGB was limited to updating the 1992 mineral accounts using 1995 data and examining the estimated negative rents accrued by the mining industry. This involved determining whether it was a result of data problems/ inconsistencies or a reflection of the poor performance of the industry.

4.2.6 The Protected Areas and Wildlife Bureau (PAWB)

Serving as a staff bureau of the DENR, PAWB is mandated to formulate policies, rules and regulations relative to the establishment and administration of the National Integrated Protected Areas System (NIPAS) and the management of other biologically important

components of the environment. The bureau also monitors and coordinates the planning and implementation of the country's various programs and projects on biodiversity as well as provides technical assistance to DENR regional offices.

ENRA work at PAWB involved the formulation of user fees in protected areas in view of their many existing users for various purposes. Pilot testing activities for the fee system developed were conducted in the following protected areas: Hundred Islands National Park, Paoay Lake National Park, Mt. Pulag National Park, El Nido Marine Reserve, and Mt. Kitanglad Range Natural Park.

4.3 The Training Component

The bureau counterparts underwent a series of training sessions, discussions, lectures, and seminar workshops on the following general topics:

- ENRAP framework;
- Environmental economic principles and tools;
- Environmental Economics and Policy Development;
- Market-based instruments and their applications to the environment and natural resources sector;
- Valuation techniques;
- Environmental damages; and
- Data processing and management training (to enhance capacity to handle the PEENRA data requirements).

Each bureau also had specialized training courses on ENRA topics and valuation methods specifically related to their research areas.

The LMB counterparts tried to learn the concepts for estimating lease or rental fees for alienable and disposable lands that are leased out to the public. Workshops about land management related topics were also conducted.

The MGB and FMB counterparts underwent several write-shops and practice sessions on estimating and re-estimating the mineral and forest accounts. Estimation methods such as the change in asset value and the net price method were learned. The FMB counterparts spent part of their own PEENRA budget on additional training in spreadsheet management and programming methods.

The EMB group conducted several workshops and training on EWDS (environmental waste disposal services account), monitoring and controlling land and groundwater contamination from hazardous wastes, and pollution load estimation.

The PAWB counterparts together with Protected Area Superintendents (PASUs) were trained on estimating fees for the use of resources in protected areas, designing and conducting travel cost and contingent valuation surveys, and statistical methods used in travel cost and CVM studies.

4.4 An Assessment of the Institutionalization Process

Carrying out ENRA work is highly technical in that it requires at the very least knowledge of basic economics, mathematics, statistics, as well as relevant technical information about specific natural resources (i.e. bio-physical processes, forest regeneration rates, cutting cycles, environmental impacts, carrying capacity of an ecosystem, and the like). Ideally, the different working groups should be composed of economists, statisticians, and "technical" personnel.

At the minimum, the counterparts gained a genuine appreciation of ENRA and its relevance to the nature of work at the Department of Environment and Natural Resources. If the objective is to just continue with the same outputs, such as updating of the environment accounts– forest accounts and mineral accounts for the FMB and the MGB respectively, and for PAWB to continue with the travel cost and CVM surveys, there is confidence that the Bureau counterparts would be able to replicate such outputs. However, ENRA problems and research work are most often case-specific and dynamic in that slight variations in ecological systems, socio-economic profiles, and other environmental factors would entail different analytical frameworks, methodologies, and survey approaches. In this case, external assistance from resource and environmental economists should be sought.

Both the ERDB and the FMB groups are fortunate to be composed of staff members that are trained in economics. The FMB group is made up of the staff from the Forest Economics Division and the ERDB group has significant educational training on economics. Therefore, both groups were able to produce research outputs with some but not total dependence on ENRAP consultants.

4.4.1 Personnel Capability

This section describes the composition of each of the DENR-PEENRA teams, including some educational profiles, job designations, and areas of specialization. The ability of the counterparts to conduct ENRA research can be compromised if the people involved are not properly equipped with fundamental tools to carry on the work. More detailed personnel profiles are contained in the individual institutionalization reports prepared by the ENRAP consultants.

<u>The ERDB Team</u>

The level of education of the ERDB staff is fairly high with 12% composed of Ph.D. graduates and 33% with Master's degrees. The proximity of the ERDB office to UPLB also helped in promoting pursuit of higher education among the staff. The expertise of the ERDB staff is varied and wide with the different ecosystems represented. Twenty-seven staff members specialized in economics. The educational advantage of the ERDB staff over the other DENR units is well recognized and was the main factor why there were high expectations from them in terms of quality research. Indeed, the ERDB team was one of the most efficient teams, producing reports and research outputs well in advance of deadlines. The team was prolific in that additional ENRA work were sought including assistance to the Laguna Lake Development Authority in exploring water pricing issues of the Lake.

The ERDB has a pool of well-trained technical staff whose basic orientation is research. Their technical/scientific orientation is a key ingredient in any environmental or resource economics study. The fact that the team has 27 economists in their pool is a significant advantage over the other Bureaus. There is still however a need to expand/enhance expertise among these economists to handle environmental issues/problems.

The PAWB Team

PAWB assigned three divisions to collaborate with ENRAP: the Biodiversity Division, Planning Division, and Recreation Division. Different staff members served as key counterparts at various stages of the joint activities. During the planning and drafting of the Fee System Guidelines for Protected Areas, the supervising EMS worked closely with ENRAP. However, during pilot-testing activities, several counterparts from the three divisions were involved. The key counterpart was a senior EMS, while the other counterparts were junior ecosystem management specialists.

Both PAWB and PPSO counterparts were very active in participating in field activities. They were well represented in each of the study sites, particularly during the presentation of study proposals, data gathering, and presentation of the respective study results. PAWB counterparts could be relied on to gather data in the field, and even supervise enumerators. Unfortunately, data processing, analysis, and report writing are tasks that the counterparts did not have any active involvement in. There was lack of confidence among the counterparts to undertake such technical work. None of the counterparts possessed the minimum skills required to be able to absorb the rudiments of this part of the research work. However, one major advantage of the PAWB Team was the overwhelming support it enjoyed from the Bureau's Assistant Director, who even actively participated in some of their ENRAP-related activities.

The MGB Team

The team was led by the head of the Mineral Economics Division. Initially, two staff, later expanded to four, from the same division, two from the environment division, two from the geology division, and one from the planning office comprised the rest of the team. However, it was noted that only the mineral economics staff members were active throughout the duration of assistance. Two new members trained in statistics and economics were hired in the latter part of the institutionalization process. Three of the counterparts are trained engineers and the team leader is a geological engineer.

While ENRAP provided the counterparts with opportunities to improve their analytical skills, they were unable to cope with the analytical demands of economic and environmental accounting work. To a large extent, the counterparts have mastered the procedural mechanics of accounts development but remain inadequate in terms of interpreting the results analytically.

The LMB Team

The team was led by the head of the Land Utilization and Management Division (LAUD) with assistance from the staff of LAUD and Planning and Policy Division. The team leader is a lawyer, only two of the members are economics-trained, three are geodetic engineers and the rest are trained in the social sciences. Some time in the middle of the assistance,

an assessment of the composition of the team was conducted which led to a revised special order designating five new members and the exit of two staff.

The ENRAP consultant assigned to this team pointed out that the major constraint in the institutionalization process at the LMB was the staff's lack of background in economics. Throughout the process, the lack of background in economics and the lack of research skills, particularly on the part of the team leader became a serious handicap in carrying out ENRA work. The consultant also noted that while there was strong interest and enthusiasm to learn the concepts and research methods, there was not enough time to allow the group to internalize all the necessary ENRA concepts.

Another constraint reported was the regulatory orientation of the staff given the long-standing mandate of the Bureau, i.e. disposal of alienable and disposable lands. While the LMB director at the time of the assistance was committed to support the shift of the Bureau's mandate from a regulatory to policy development and land management orientation, the shift may take a while before economic principles and methods can be imbibed.

The FMB Team

The team consists mostly of members of the forest economics division, whose chief was designated as the team leader. Two other team members are from other FMB divisions on management information systems and statistics. In addition, staff from the PPSO coordinated work with the team.

The team consists mostly of technical staff holding either middle-level or higher positions in the Bureau. All but one or two holding permanent positions are likely to continue careers in government (at least during the next few years). Most of the counterparts had baccalaureate degrees in forestry, while three had post-graduate courses in economics. Other professional training includes statistics, public administration, urban and regional planning, and business administration. Two of the counterparts had been exposed to the first phase of ENRAP (1991-1992) which focused on forest resources accounting.

The team's ability to conduct the update and refinement of forestry accounts, implement policy studies, and examine relevant literature is considerable. The ENRAP specialists were clearly effective in instilling skills, as the "trainees" were highly skilled and well motivated. It is likely that the team will be able to continue refining and updating work and examining net benefits from various forest land uses. In terms of the environmental valuation studies, more coaching from specialists and more collaboration with other agencies like the ERDB, PAWB, and non-government organizations are needed.

With respect to the conduct of policy studies and their effective dissemination to reform policies, considerable limitation may be noted in getting the policy recommendations adopted. There are areas for improving the team's ability to convince decision-makers and stakeholders the merits of their policy recommendations.

The EMB Team

Out of the more than 15 EMB staff included in the Special Order to do ENRA work, only 7 became actively involved during the Marilao study. In 1999, only three EMB technical staff

members were actively involved in the Region 7 and 11 activities. One became permanently assigned to EMB-ENRA activities while other WQMS staff members were being called upon to assist during training, workshops, and consultations.

There are several staff members with Master's degrees in environmental management, management engineering, environmental science/studies, environmental engineering, environmental toxicology, and chemistry. Undergraduate degrees of the staff include engineering, political science, biochemistry, development economics, commerce, chemical engineering, and chemistry. While the group is endowed with highly technical staff, it is lacking in personnel with adequate economics training.

The observation of the consultant is that there is a feeling of inadequacy among the group in doing the EWDS accounts because the persons currently assigned have not attended any of the hands-on sessions. Those who have attended previous EWDS activities have not acquired sufficient skills and confidence to transfer knowledge to other staff members. Frequent changes in personnel assigned to ENRA work from one phase of the project to another contributed to the problem.

While almost all EMB technical staff had received orientation on ENRA, none received sufficient training to do ENRA independently, i.e. without the kind of support ENRAP provided. Only three technical staff had a good orientation of EWDS and the use of the ENRAP guidebook. Given limited staff allocation to do ENRA work, it may not be possible for the agency to do ENRA without external assistance.

4.4.2 Time Inputs

A common observation among ENRAP consultants was that the efficiency of the counterparts in doing ENRA work was significantly hampered by the minimal time inputs dedicated to the staff's ENRA endeavors. ENRA work was not the primary and major task of most of the Bureau counterparts. Continuity of ENRA work was always disrupted due to day-to-day tasks. In many instances, as reported by the Consultants, scheduled meetings had to be canceled due to conflicts in schedule, with the pressure on the counterparts to attend to the more urgent day-to-day work demanded by their superiors. In some cases, counterparts felt that the ENRA work was an additional burden and thus caused the lack of motivation to engage in the work in a sustained fashion.

Most of the time, out of town write-shops and workshops had to be sponsored by ENRAP to provide a focused venue for the counterparts to get back to ENRA work and produce results. The EMB is the only Bureau that designated one staff member to solely work on ENRA-related activities. Clearly, though, one person can not do all the tasks required.

A good set-up is exemplified by the FMB group. FMB-ENRA work was incorporated in other Bureau functions and projects so that ENRA work became part of the regular tasks of the Bureau. An example of this is the Forest Management Information Systems (FMIS)-which was promoted on account of current data problems and inconsistencies encountered by the team in estimating depreciation values.

4.4.3 Management Support

In general, ENRA initiatives within the various Bureaus enjoyed considerable support from management. In fact, ENRA was identified by top officials as one of the key result areas for the year 2000.

At PAWB, the Assistant Director oversaw the conduct of joint activities and the Director was constantly informed of all activities. This arrangement assured the support of top management. Besides having an appreciation and interest in ENRA efforts it also helps when the Director has some knowledge of environmental economics and experience as a researcher, such as the case of the ERDB director. The LMB director on the other hand, sat in a number of the team meetings and provided moral support and contributed some ideas. In view of his support, the time involvement of the staff in ENRA work did not pose any conflicts with other regular office work.

Unfortunately, at the MGB there was lack of support and to some extent interest on ENRA-activities on the part of the management. This contributed to the slow pace of the institutionalization process at the Bureau. Attempts to regularly brief the management on ENRA activities were unsuccessful.

4.4.4 Availability of Logistical Support, and Research and Training Funds

The lack of logistical support in terms of computers hindered the smooth implementation of the accounts development (a computer-intensive activity) at the MGB. In a number of instances, meetings were postponed due to lack of computer access to complete assigned tasks. During workshops and/or write-shops ENRAP almost always had to provide for the equipment needed.

In the case of ERDB, the bulk of the budget releases to the Bureau went to salary and maintenance and operating expenses. There were special budgets to support some research activities but were always minimal.

Based on the overall assessment among the consultants about the capability of the counterparts to undertake ENRA work, it appears that external funding is still needed to further enhance research capabilities of the various counterparts.

4.4.5 Sustaining ENRA within the Bureaus: Challenges and Opportunities

<u>Sustainability of ENRA at MGB</u>

Environmental accounting, specifically and limited to the development of the mineral accounts, is an activity that can already be implemented at the Bureau without external assistance. The importance of the accounts and the procedures involved are well understood by the staff. It is however necessary to address the issues of the lack of management and logistical support in the immediate term so that concerned staff can engage in ENRA in a sustained way.

The management should find it useful to develop analytical skills in environmental economics among the staff of the Mineral Economics unit to allow them to address relevant issues on economy-environment interactions, particularly with respect to minerals. The mining sector is an area of study where the application of environmental economics principles can be very useful.

Sustainability of ENRA at PAWB

It is highly unlikely that fee estimation using the draft fee system guidelines can be undertaken solely by the counterparts at this point. They will need to be guided and supervised in gathering data. More importantly, they can not undertake the data analysis portion of the study, nor can they write the reports. The key people that participated in the institutionalization process could continue the work, as long as there is external guidance provided.

Sustainability of ENRA at ERDB

The ERDB team has considerable advantage in terms of personnel capability and management support. The only obstacle noted to sustaining ENRA work within this organization was the availability of research and training funds. Training on environmental economics and valuation tools are still needed to be able to carry on more in depth research and policy formulation.

Sustainability of ENRA at FMB

ENRAP consultants identified key ingredients to the continuation of the accounting and policy work of the FMB/PEENRA team. These include:

1. Continued motivation to apply the learned skills towards improving analytical work—the dedication and commitment of the members of the team are reflected in their outputs. The team's enthusiasm in conducting the various activities was notably non-declining. The continuation of the ENRA effort in the Forestry sector will undoubtedly benefit from ensuring the permanence of this team and its leadership.

2. Presence of skilled individuals to continuously improve on the work and collaborate with other offices. With respect to resource depreciation (updating forest accounts) and looking at net benefits from various forestland uses, the team is highly skilled and therefore capable of continuing this work. For studies on environmental valuation, more coaching/external assistance is needed. In terms of conduct of policy studies and their effective dissemination to reform policies, considerable limitation may be noted in getting the policy recommendations adopted.

3. Allocation of resources to continue improving the information base and statistical system. There is no doubt that the team would continue attempts to generate better information for its accounting work, provided it is allocated with the necessary resources.

Sustainability of ENRA at EMB

The two years of institutionalization effort at the EMB had created a high level of appreciation on ENRA and its uses in environmental management. Key technical staff had acquired minimum skills to do data processing and analysis. However, the team would still need outside assistance to do ENRA activities. Currently, the agency would still require assistance to train other agency personnel, including regional staff to do ENRA.

Future assistance on ENRA institutionalization, if any, should focus on the following:

1. analysis of the organizational structure and needs of EMB for effective ENRA implementation;
2. commitment of a critical number of technical staff assigned for ENRA work;
3. training a pool of ENRA trainers; and
4. enhancing ENRA data management skills.

Sustainability of ENRA at LMB

The lack of fundamental economics background among the members of the LMB team, the regulatory orientation of the agency, and the lack of motivation in some of the members as evidenced by their non-performance are major constraints to the sustainability of ENRA at the Bureau. Unless these obstacles are overcome, it is unlikely that ENRA initiatives can be sustained, despite the fact that there is support by management, particularly from the director.

4.6 Lessons Learned/Recommendations

The institutionalization process was the most important activity of the final phase of ENRAP. It was intended to ensure that ENRA be sustained within the DENR bureaucracy beyond ENRAP. The institutionalization process therefore should have accomplished the following at the Bureau-level:

1. trained staff in the rudiments of ENRA;
2. created a unit within the Bureau to carry on with ENRA-related activities; and
3. instilled commitment among the counterparts in continuing ENRA-type activities through some form of written assurance e.g., administrative orders or circulars

As pointed out in the sections above, the following elements are important in ensuring success of the institutionalization process:

1. Management Support;
2. Significant Time involvement of Counterparts;
3. Appropriate Educational Qualifications and experience; and
4. Motivation, Dedication, and Commitment to conduct ENRA work.

The ENRA accounts for unmarketed household production, natural resource depreciation and waste disposal services are underway to being generated regularly by DENR bureaus. However, entries such as environmental damage and environmental quality services require specialized information that is feasible to generate and process only with the

involvement of other government agencies and inputs from higher levels of expertise normally found at academic and research institutions. DENR and the NSCB will need to continue collaborating with other specialists and ENRA practitioners for these.

5. SUB-NATIONAL ACCOUNTING: ENRAP Support to the Sarangani Province

5.1 The Sub-national ENRA Institutionalization Process

The ENRA efforts at institutionalizing accounting at the LGU level were implemented in Sarangani Province in Southern Mindanao. The province oversees the Sarangani Bay Protected Landscape and has itself initiated its own environmentally oriented activities. The provincial government hosts various resource conservation–oriented projects, including one resident ENRAP consultant. ENRAP activities aimed at institutionalization included formal lectures, guidance of counterpart staff in data generation, formulation of the ENRA management information system for the province with GIS-based data management forms (ENRAMIS/GIS), and exploration of economic instruments for addressing environmental problems in the Sarangani Bay.

Locating the LGU-ENRAP institutionalization at the Sarangani province was based on the following factors: (a) serious effort by the province's top officials to address resource use problems in their locality; (b) appreciation by the provinces' top managers of the need for a sound information base for decision-making, (c) high potential for collaboration with other USAID-assisted projects, such as the NRMP, CRMP, GOLD and GEM all operating in the area, and (d) availability of a resource and environmental economics specialist based in the region.

Figure 8 depicts the project's operational framework when it was implemented in 1998-1999. ENRAP inputs included the services of a part-time consultant based in the province, reading materials, training sessions, a GIS-based software for analyzing land-use (Blackland GRASS), and the data-base format for gathering and processing information. Among the outputs during the two year period were: the generation of province-wide data for generating the accounts on waste disposal services through estimates of pollution loads from various sectors including households and conceptual work on the formulation of economic instruments.

5.2 Assessment of LGU-Level Accounting: Future Directions

Despite these accomplishments and the advantages of locating localized ENRA capacity building at an environmentally responsible province such as Sarangani the institutionalization of ENRA in its totality (e.g., accounting and policy support) at the LGU level is severely constrained by three aspects.

The first fundamental aspect is that environmental problems do not coincide with political boundaries. Thus, analysis and solutions to such problems transcend the political area of jurisdiction of the Sarangani provincial government and require collaboration with neighboring LGUs. In the case of the Sarangani Bay Protected Landscape, while the Bay is bounded by most of the Sarangani Province, other LGUs host most of the municipalities whose activities generate impacts that inevitably end up in the Bay, namely, South

Cotabato, Sarangani and Sultan Kudarat Provinces, and General Santos City. The four LGUs have yet to work together in a concerted effort and in collaboration with the Protected Area Management Board that is chaired by the DENR. The PAMB's evolution into a unifying mechanism for the Bay has been constrained by constant changes in the DENR management.

The effectiveness of area-wide management bodies is circumscribed by the laws that tend to be unique to the created institutions. The experiences of the two other sub-national areas assisted by ENRAP are cases in point. For the Lingayen Gulf, the relevant body, the LGCAMC, is mostly consultative and recommendatory. Thus the Council needed the DA for the imposition of restricted entry of additional fishers into the Gulf. On the other hand, in the case of Laguna de Bay, the LLDA has full police and fee collection powers, and is therefore a more powerful and effective organization. In the case of the Sarangani protected landscape, which is part of the Sarangani provincial responsibility but whose pollution originates from other neighboring LGUs, there is a need for collaboration among various political entities.

The second fundamental aspect is the efficiency of generating information: is the generation of information best achieved through a centralized or a decentralized set-up? Given that various environmental and resource scarcity problems transcend the boundaries of political units, then the information base needs to be flexible enough to enable various forms of aggregation and dis-aggregation to suit the nature of the environmental problem being analyzed. The recent effort initiated by the Forestry Development Center, with collaboration from NAMRIA, the DENR and ENRAP to formulate a uniform GIS-based information system needs further inputs from the NSO. The system is being piloted and needs to be advanced towards its own institutionalization in the future.

The third fundamental aspect of localized accounting is the need for consistency, quality assurance, and promptness to allow for comparability across areas, independent analysis to be made, and constituency to be built among local stakeholders. Given the costs of generating information and the demand for such information to originate from various sectors, it is likely to be more cost effective to continue investing in improvements of the information generating instruments used by the NSO and the DENR, instead of taking on the information systems of each LGU individually.

Thus, in the long term, the development of accounts for various levels of analysis will benefit from improvements in the standard System of National Accounts and the various instruments that the National Statistical Office implements for its social and economic statistics. These instruments will need to be complemented with a geo-referenced information system, to enable numerous reconfigurations of data to suit the ecosystem-specific problem being addressed at hand.

6.0 ENRAP OUTREACH ACTIVITIES

ENRAP outreach activities may be grouped into three categories: those that aimed at building constituency for policy reforms; those that aimed at providing technical inputs for specific needs; and those aimed at contributing to the local and worldwide efforts at environmental and natural resource accounting.

6.1 Building Constituency for ENRA and ENR Policy Reforms

The publication of the ENRA Guidebook primarily for the DENR counterparts is expected to have spill-over effects to other potential implementing bodies such as environmental NGOs and specialists practicing valuation and extended benefit cost analysis. In addition, the compilation of all the ENRAP outputs into electronic, searchable format in CD-ROM, is expected to result in wider dissemination of the results.

To contribute to informed decision-making at various levels, ENRAP implemented a focused outreach program to the Philippine Council for Sustainable Development (PCSD), chaired by the National Economic and Development Authority (NEDA), conducted briefings to relevant committees at the legislative branch, and held roundtable discussions on specific issues. In addition, several workshops were conducted and co-sponsored with the DENR/PEENRA to consult stakeholders of the proposed policy reforms.

A significant strategy in the final phase of ENRAP was the involvement of professionals in advocacy work by FRIEND, Inc. for the regular issuance of the Policy Update where ENRAP results were presented in layman terms **(Table 22)**. A number of articles that appeared in the Policy Update appeared in national newspapers as well.

6.2 Provision of Technical Inputs to Specific Environmental and Natural Resource Management Initiatives

ENRAP provided inputs to other training initiatives implemented by DENR, USAID-financed projects, professional groups, LGUs, NGOs and other institutions **(Appendix 5)**.

Three important activities initiated by multilateral institutions received considerable inputs from the ENRAP team. These were: the World Bank and NEDA initiative on the formulation of rural development strategy and natural resource management indicators; the drafting of the terms for the preparation of the master plan for the sustainable management of coastal and marine resources initiated by the DENR and UNDP; and the implementation of the Philippine SEEA by the NSCB as financed by the UNDP.

The ENRAP accounting entries were used to formulate pressure-state-response indicators for looking into specific natural resources problems (listed as the paper authored by delos Angeles in **Appendix 1**). ENRAP organized, financed and provided leadership to five specialists to assist the DENR/UNDP initiative for preparing the terms of reference for coastal/marine resources master planning. An additional member of the six-person team was the policy specialist of the Coastal Resources Management Project funded by USAID. ENRAP continued to input to the PEENRA Steering Committee whose secretariat is the National Statistical Coordinating Board (NSCB). NSCB was likewise the agency that implemented the UNDP-financed pilot study, the Philippine System of Economic-Environmental Accounts (PSEEA).

6.3 Support to Local and Global Environmental and Natural Resources Accounting Initiatives

ENRAP continued to participate in the international efforts at environmental and natural resources accounting through presentations at international workshops (**Appendix 6**). In addition, the final ENRAP conference held in February 2000 gathered international specialists who presented comparisons of various accounting efforts implemented worldwide. Among the presentations were the project's inputs to international efforts at improving the UNSEEA. Towards this end, a paper comparing the ENRAP and Philippine SEEA applications was produced and is expected to provide additional insights to the PEENRA steering committee and the NSCB.

7.0 CONCLUDING REMARKS

In the final phase of the USAID-assisted Philippine Environmental and Natural Resources Accounting Project (ENRAP), the following objectives were achieved: refinement and update of the ENRA accounts; policy reforms for enhancing environmental and natural resource management; intensified institutionalization of Philippine Economic-Environmental and Natural Resources Accounting (PEENRA) System; capacity building in the conduct of environmental economic analysis by the DENR; and dissemination of ENRAP methods and results to various user groups.

The objective of providing support to USAID in terms of SO4 and SO5 indicators took the form of generating benchmark information against which the long-term impacts of USAID assistance may be assessed in the future. This was achieved particularly since the ENRAP accounts were generated for the years 1988, 1992 and 1996 while most of the present projects commenced in the mid-nineties. The current indicators used by USAID for assessing the SO4 and SO5 projects are basically progress and process indicators. Enhanced NRM is a long-term process whose impacts on renewable natural resources and reduced greenhouse gas emissions will need time to pass to allow for impacts to be manifested through the ENRA accounts.

Table 3
Stumpage Values, Community Based Forest Management (CBFM) Sites, Region XI
(P/cu m)

Cost/Site	NPPFRDC (COMVAL)	PUCC (New Bataan)	CAMAR (Marayag)	SACCK-FRDC (Laac)	Average	Ratio to Log Price (%)
LOG Price, Cu. m.	4,602.50	4,100.00	3,561.00	3,742.00	4,001.38	100
Less: Production Cost	3,659.00	1,689.22	1,967.36	2,268.40	2,396.00	60
a: Harvesting, etc.	3,235.00	1,588.47	1,814.72	2,014.00	2,163.05	54
b: Overhead	424.00	100.75	152.64	254.40	232.95	6
Margin for Profit and Risk	1,097.70	506.77	590.21	680.52	718.80	18
Stumpage value, per cubic meter	**(154.20)**	**1,904.01**	**1,003.43**	**793.08**	**886.58**	**22**

NPPFRDC - Ngan-Panansalan-Pagsabangan Forest Resources Development Cooperative
COMVAL - Compostela Valley
PUCC - People's Upland Countryside Cooperative
CAMAR - Calapagan-Marayag
SACCK-FRDC - San Antonio Concepcion Candiis Kidawa-Forest Resources Development Cooperative

Source: Manrique, M.S. and A.P. Cabrera. *Community-Based Forest Management (CBFM) Case Study on Environment and Natural Resource Accounting.* ENRAP IV Technical Paper. 2000.

Table 4
Net Present Value (NPV), Internal Rate of Return (IRR) and Government Share (GS) in Simulated IFMA Production

Model	NPV per hectare at 14% (Peso)	Government Share, (%) IRR - MPR of 25%
I. ADB/DENR Forestry Sector Project Estimates		
MODEL 1: Rotation Age 15		
Low Yield	41,208	0.5
High Yield	59,516	3.9
AVERAGE	**50,362**	2.17
MODEL 2: Rotation Age 12		
Low Yield	48,764	3.7
High Yield	69,037	7.5
AVERAGE	**58,900**	**5.6**
MODEL 3: Rotation Age 7		
Low Yield	15,109	(0.47)
High Yield	25,351	4.8
AVERAGE	**20,230**	**2.14**
II. Ecosystems Research and Development Bureau Estimates		
MODEL 1: Rotation Age 15		
Low Yield	72,188	5.9
High Yield	104,351	10.32
AVERAGE	**88,270**	**8.10**
MODEL 2: Rotation Age 12		
Low Yield	83,148	9.7
High Yield	118,786	14.42
AVERAGE	**100,967**	**12.05**
MODEL 3: Rotation Age 7		
Low Yield	32,487	7.83
High Yield	50,284	14.13
AVERAGE	**41,386**	**11.0**

MPR = Margin for Profit and Risk

Source: Cheng, A. et.al. *Derivation of Government Share (GA) in Industrial Forest Management Agreement* (IFMA) Production. ENRAP IV Technical Paper. September 1998.

Table 5
Value of Unmarketed Fuelwood Production (or Consumption)
by Source and Area: 1995

Source/Area	Price (Peso/Ton) Nominal	Price (Peso/Ton) Real (1994=100)	Quantity (Tons)	Value (Million Pesos, 1994=100)
Gov't Land or Forests			428,640	269.9
Urban	962	891	153,369	136.6
Rural	523	484	275,271	133.3
Own & Private lands			3,990,321	2,512.7
Urban	962	891	1,427,748	1,271.8
Rural	523	484	2,562,573	1,240.9
TOTAL			4,418,961	2,782.6
Urban	962	891	1,581,117	1,408.4
Rural	523	484	2,837,844	1,374.3

Source: Bello, A S. and R.T. Buen. *Accounting for Unmarketed Fuelwood Production: 1995* (with 1996-2000 Projections). ENRAP IV Technical Paper. March 2000.

Table 6
Sources of Air Pollution: Philippines, 1988, 1992 and 1995

Sector	PM			PM_{10}			SOx			NOx			VOC			CO			Pb		
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
	Emissions (metric tons)																				
I. AREA	1,219,329	1,222,701	1,371,028	1,204,957	1,170,801	1,354,670	4,918	4,784	5,781	31,305	28,808	35,143	1,880,313	1,720,603	2,114,568	8,900,484	8,134,066	9,997,942	0	0	0
1. Households	1,178,686	1,078,490	1,325,469	1,178,686	1,078,490	1,325,469	4,917	4,784	5,780	31,049	28,792	35,100	1,872,440	1,713,281	2,105,634	8,889,020	8,133,371	9,996,032	0	0	0
a. Fuelwood	978,628	892,042	1,151,154	978,628	892,042	1,151,154	3,553	3,239	4,180	24,874	22,674	29,260	1,554,648	1,417,096	1,828,722	7,380,578	6,727,562	8,681,728	0	0	0
b. Other fuel types	200,058	186,449	174,315	200,058	186,449	174,315	1,364	1,545	1,600	6,175	6,119	5,840	317,793	296,185	276,912	1,508,442	1,405,809	1,314,304	0	0	0
2. Others	40,643	144,211	45,558	26,271	92,310	29,200	1	0	1	256	16	43	7,873	7,321	8,934	11,465	695	1,911	0	0	0
II. MOBILE	137,003	210,468	286,926	86,865	133,644	182,735	35,097	43,418	62,122	92,705	137,644	181,983	162,000	243,337	335,818	740,582	1,055,107	1,367,082	848	859	238
1. Households	58,818	88,232	120,284	35,808	53,954	73,772	1,870	2,355	3,369	13,885	18,156	24,005	64,305	100,042	138,063	277,555	372,331	482,424	283	213	63
2. For hire	27,139	41,712	56,864	17,578	26,944	36,842	6,212	8,532	12,208	15,083	25,578	33,817	38,139	55,053	75,975	110,211	171,636	222,386	114	99	29
3. Government	4,761	5,858	7,986	3,092	3,781	5,170	2,217	1,659	2,373	5,013	4,734	6,269	5,699	6,984	9,639	28,777	30,923	40,067	36	20	6
4. Diplomatic	621	368	501	402	221	301	373	41	59	1,007	201	264	554	301	414	3,245	2,049	2,649	5	1	0
5. Industries	45,663	74,300	101,291	29,986	48,744	66,650	24,425	30,831	44,113	57,716	88,976	117,638	53,303	80,958	111,726	320,793	478,168	619,556	411	325	140
a. Food mfg.	16,323	26,928	36,710	10,719	17,666	24,156	8,731	11,174	15,988	20,632	32,247	42,635	19,054	29,341	40,492	114,673	173,300	224,542	147	118	35
b. Mfr. of wood & wood prod.	8,297	13,603	18,545	5,449	8,925	12,203	4,438	5,645	8,077	10,487	16,290	21,538	9,685	14,822	20,456	58,289	87,547	113,434	75	60	18
c. Crude pet. & nat. gas explo.	5,623	8,581	11,698	3,693	5,629	7,697	3,008	3,561	5,095	7,108	10,276	13,586	6,564	9,350	12,903	39,505	55,224	71,552	51	38	11
d. Gen. eng'g. const.	4,726	7,645	10,423	3,104	5,016	6,858	2,528	3,172	4,539	5,974	9,155	12,105	5,517	8,330	11,496	33,202	49,203	63,751	43	33	10
e. Others	10,694	17,542	23,915	7,022	11,508	15,736	5,720	7,279	10,415	13,516	21,007	27,774	12,483	19,114	26,378	75,124	112,895	146,276	96	77	23
III. STATIONARY	305,164	359,700	500,786	227,784	237,626	289,781	269,338	310,740	445,218	43,904	46,049	63,707	18,198	19,218	10,074	47,172	55,788	72,076	0	0	0
1. Food mfg.	112,897	127,962	145,102	76,176	88,582	103,889	20,683	24,980	32,330	2,937	3,936	3,403	13	17	18	208	257	309	0	0	0
2. Iron & steel basic inds.	63,539	63,686	65,291	60,969	61,092	61,356	8,335	9,524	17,994	1,288	1,474	4,636	258	280	308	438	479	616	0	0	0
3. Mfr. of paper & allied prod.	28,219	29,492	30,575	28,091	29,290	30,519	10,598	12,243	16,829	1,217	1,504	1,709	6	7	9	7,903	8,235	8,524	0	0	0
4. Mfr. of chem. & plastic prod.	15,202	14,640	14,538	13,085	12,463	13,115	8,905	8,494	11,167	639	596	878	743	769	795	58	54	80	0	0	0
5. Others	85,307	123,921	245,280	49,463	46,199	90,901	220,817	255,498	366,898	37,822	38,539	53,083	17,177	18,145	8,944	38,565	46,762	62,547			
TOTAL	1,661,496	1,792,870	2,158,740	1,519,607	1,542,071	1,837,186	309,354	358,941	513,121	167,914	212,501	280,834	2,060,511	1,983,158	2,460,458	9,688,238	9,244,961	11,437,100	1,059	807	238

continued

Table 6 (continued)

Sector	PM			PM_{10}			SOx			NOx			VOC			CO			Pb		
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
	Share (%)															Share (%)					
I. AREA	73.39%	68.20%	63.51%	79.29%	75.92%	73.74%	1.59%	1.33%	1.13%	16.64%	13.56%	12.51%	91.25%	86.76%	85.94%	91.67%	87.98%	87.42%	0.00%	0.00%	0.00%
1. Households	70.94%	66.15%	61.40%	77.57%	69.94%	72.15%	1.59%	1.33%	1.13%	16.49%	13.55%	12.50%	90.87%	86.39%	85.58%	91.75%	87.98%	87.40%	0.00%	0.00%	0.00%
a. Fuelwood	58.90%	49.75%	53.33%	64.40%	57.85%	62.66%	1.15%	0.90%	0.81%	14.81%	10.67%	10.42%	75.45%	71.46%	74.32%	76.18%	72.77%	75.91%	0.00%	0.00%	0.00%
b. Other fuel types	12.04%	10.40%	8.07%	13.17%	12.09%	9.49%	0.44%	0.43%	0.31%	3.68%	2.88%	2.08%	15.42%	14.94%	11.25%	15.57%	15.21%	11.49%	0.00%	0.00%	0.00%
2. Others	2.45%	8.04%	2.11%	1.73%	5.98%	1.59%	0.00%	0.00%	0.00%	0.15%	0.01%	0.02%	0.38%	0.37%	0.36%	0.12%	0.01%	0.02%	0.00%	0.00%	0.00%
II. MOBILE	8.25%	11.74%	13.29%	5.72%	8.67%	9.95%	11.36%	12.10%	12.11%	55.21%	64.77%	64.80%	7.86%	12.27%	13.85%	7.64%	11.41%	11.95%	80.07%	91.62%	100.00%
1. Households	3.54%	4.92%	5.57%	2.36%	3.50%	4.02%	0.60%	0.66%	0.66%	8.27%	8.54%	8.55%	3.12%	5.04%	5.61%	2.86%	4.03%	4.22%	26.72%	26.43%	26.43%
2. For hire	1.63%	2.33%	2.63%	1.16%	1.75%	2.01%	2.01%	2.38%	2.38%	8.98%	12.04%	12.04%	1.85%	2.78%	3.09%	1.14%	1.86%	1.94%	10.76%	12.31%	12.31%
3. Government	0.29%	0.33%	0.37%	0.20%	0.25%	0.28%	0.72%	0.46%	0.46%	2.99%	2.23%	2.23%	0.28%	0.35%	0.39%	0.30%	0.33%	0.35%	3.36%	2.46%	2.46%
4. Diplomatic	0.04%	0.02%	0.02%	0.03%	0.01%	0.02%	0.12%	0.01%	0.01%	0.60%	0.09%	0.09%	0.03%	0.02%	0.02%	0.03%	0.02%	0.02%	0.43%	0.16%	0.16%
5. Industries	2.75%	4.14%	4.69%	1.97%	3.16%	3.63%	7.90%	8.59%	8.60%	34.37%	41.87%	41.89%	2.59%	4.08%	4.54%	3.31%	5.17%	5.42%	38.81%	40.26%	58.65%
a. Food mfg.	0.98%	1.50%	1.70%	0.71%	1.15%	1.31%	2.82%	3.11%	3.12%	12.29%	15.17%	15.18%	0.92%	1.48%	1.65%	1.18%	1.87%	1.96%	13.87%	14.59%	14.59%
b. Mfr. of wood & wood prod.	0.50%	0.76%	0.86%	0.36%	0.58%	0.66%	1.43%	1.57%	1.57%	6.25%	7.67%	7.67%	0.47%	0.75%	0.83%	0.60%	0.95%	0.99%	7.05%	7.37%	7.37%
c. Crude pet. & nat. gas explo.	0.34%	0.48%	0.54%	0.24%	0.37%	0.42%	0.97%	0.99%	0.99%	4.23%	4.84%	4.84%	0.32%	0.47%	0.52%	0.41%	0.60%	0.63%	4.78%	4.65%	4.65%
d. Gen. eng'g. const.	0.20%	0.43%	0.48%	0.20%	0.33%	0.37%	0.82%	0.88%	0.88%	3.56%	4.31%	4.31%	0.27%	0.42%	0.47%	0.34%	0.53%	0.56%	4.02%	4.14%	4.14%
e. Others	0.64%	0.98%	1.11%	0.46%	0.75%	0.86%	1.85%	2.03%	2.03%	8.05%	9.89%	9.89%	0.61%	0.96%	1.07%	0.78%	1.22%	1.28%	9.09%	9.51%	9.51%
III. STATIONARY	18.37%	20.06%	23.20%	14.99%	15.41%	16.32%	87.06%	86.57%	86.77%	28.15%	21.67%	22.69%	0.86%	0.97%	0.41%	0.49%	0.60%	0.63%	0.00%	0.00%	0.00%
1. Food mfg.	6.79%	7.14%	6.72%	5.01%	5.74%	5.65%	6.69%	6.96%	6.30%	1.75%	1.85%	1.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2. Iron & steel basic inds.	3.82%	3.55%	3.02%	4.01%	3.96%	3.34%	2.69%	2.65%	3.51%	0.77%	0.69%	1.65%	0.01%	0.01%	0.01%	0.00%	0.01%	0.01%	0.00%	0.00%	0.00%
3. Mfr. of paper & allied prod.	1.70%	1.64%	1.42%	1.85%	1.90%	1.66%	3.43%	3.41%	3.28%	0.72%	0.71%	0.61%	0.00%	0.00%	0.00%	0.08%	0.09%	0.07%	0.00%	0.00%	0.00%
4. Mfr. of chem. & plastic prod.	0.91%	0.82%	0.67%	0.86%	0.81%	0.71%	2.88%	2.37%	2.18%	0.38%	0.28%	0.31%	0.04%	0.04%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5. Others	5.13%	6.91%	11.36%	3.25%	3.00%	4.95%	71.38%	71.18%	71.50%	22.52%	18.14%	18.90%	0.83%	0.91%	0.36%	0.40%	0.51%	0.55%	0.00%	0.00%	0.00%
	% Change from 1988 to 1992, 1992 to 1995															% Change from 1988 to 1992, 1992 to 1995					
I. AREA	0.28	12.13		-2.83	15.70		-2.73	20.84		-7.98	21.99		-8.49	22.90		-8.61	22.91				
II. MOBILE	53.62	22.90		53.85	22.90		23.71	43.08		48.46	32.21		50.21	38.00		42.47	29.57		-22.27	-63.85	
III. STATIONARY	17.87	29.05		4.32	29.05		15.37	43.26		4.69	38.35		5.01	-47.58		16.26	29.20				
TOTAL	7.91	20.41		1.48	19.14		16.03	42.95		26.55	32.16		-3.75	24.07		-4.58	23.71		-23.74	-70.49	

continued

Table 6 (continued)

Sector	PM 1988	PM 1992	PM 1995	PM_{10} 1988	PM_{10} 1992	PM_{10} 1995	SOx 1988	SOx 1992	SOx 1995	NOx 1988	NOx 1992	NOx 1995	VOC 1988	VOC 1992	VOC 1995	CO 1988	CO 1992	CO 1995	Pb 1988	Pb 1992	Pb 1995
AGRI, FORESTRY & FISHERY	1,792	815	815	1,414	787	787	389	325	325	1,169	946	946	2,353	908	908	16,381	5,376	5,376	7	3	3
11 Agric'l crops production	6	38	38				3	3	3	8	16	16	8	54	54	45	377	377	0	0	0
111 Palay production	17	19	19				9	8	8	22	23	23	20	22	22	123	121	121	0	0	0
112 Corn production	0	0	0				0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
113 Vegetable production	217	234	234				116	97	97	274	280	280	254	255	255	1,524	1,507	1,507	2	1	1
114 Fruits and nuts (excluding coconut) production	81	88	88				43	36	36	103	105	105	95	96	96	570	564	564	1	0	0
115 Coconut production including copra-making	263	284	284				141	118	118	333	340	340	307	310	310	1,849	1,828	1,828	2	1	1
116 Sugarcane production	-	-	-				-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
117 Tobacco production	-	-	-				-	-	-	-	-	-	-	3	3	-	-	-	-	-	-
118 Fiber crops production	141	152	152				75	63	63	178	182	182	165	166	166	991	979	979	1	1	1
119 Agri. crops production	335	361	361	220	350	350	179	150	150	423	433	433	393	398	398	2,353	2,325	2,325	3	2	2
12 Livestock, poultry and other animal products	86	93	93	57	90	90	46	39	39	109	112	112	102	103	103	607	600	600	1	0	0
121 Livestock and livestock products	249	268	268	163	260	260	133	111	111	314	321	321	291	293	293	1,746	1,725	1,725	2	1	1
122 Poultry & poultry products	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
129 Raising of other animals, including their products	100	108	108	66	104	104	53	45	45	126	129	129	117	118	118	702	694	694	1	0	0
13 Agricultural services	100	108	108	66	104	104	53	45	45	126	129	129	117	118	118	702	694	694	1	0	0
130 Agricultural services	-	-	-	-	-	-	3,387	3,943	3,943	6,262	8,011	8,011	2,235	2,590	2,590	5,814	6,613	6,613	-	-	-
14 Fishery	1,802	2,598	2,598	1,186	2,514	2,514	1,091	1,163	1,163	2,279	3,111	3,111	2,093	2,823	2,823	12,582	16,669	16,669	18	11	11
141 Ocean (off-shore) and coastal fishing				1,186	2,514	2,514															
142 Inland fishing																					
143 Operation of fish farms																					
149 Other fishery activities																					
15 Forestry																					
151 Logging operations																					
159 Other forestry activities																					
16 Hunting, trapping and game operation																					
160 Hunting, trapping and game operation																					
MINING & QUARRYING	30,870	63,779	63,779	12,334	25,045	25,045	19,706	13,633	13,633	4,959	5,533	5,533	2,857	3,950	3,950	18,955	22,972	22,972	21	16	16
21 Metallic ore mining	3,020						19,336	-	-	4,084	-	-	2,024	-	-	12,092	-	-	15	-	-
211 Gold ore mining	-						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
212 Other precious metal ore mining	-						-	-	-	-	-	-	22	-	-	-	-	-	-	-	-
213 Copper ore mining	27,158						210	-	-	496	-	-	459	-	-	2,759	-	-	4	-	-
214 Nickel ore mining	393						160	-	-	377	-	-	349	-	-	2,095	-	-	3	-	-
215 Chromite ore mining	298						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
216 Iron ore mining	-						-	-	-	-	-	-	2	-	-	10	-	-	0	-	-
219 Other base metal ore mining	1						1	-	-	2	-	-									
22 Non-metallic mining and quarrying	22,117	28,885	28,885	12,272	19,960	19,960	4,558	5,321	5,321	9,861	14,221	14,221	9,101	12,942	12,942	54,210	75,785	75,785	69	52	52
221 Coal mining	15,882						14,446	-	-	3,994	-	-	1,537	-	-	8,851	-	-	11	-	-
222 Crude petroleum & natural gas exploration & prodn	5,623						3,008	-	-	7,108	-	-	6,564	-	-	39,505	-	-	51	-	-
223 Stone, quarrying, clay and sand pits	1,750						535	-	-	966	-	-	891	-	-	5,295	-	-	7	-	-
229 Other non-metallic mining and quarrying	127						47	-	-	101	-	-	108	-	-	560	-	-	1	-	-

continued

3/

Table 8 (continued)

Sector		PM			PM_{10}			SO_x			NOx			VOC			CO			Pb		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
MANUFACTURING																						
31	Manufacture of food, beverage and tobacco	133,230	160,710	160,710	89,464	119,664	119,664	39,317	45,974	45,974	28,349	43,115	43,115	22,468	34,371	34,371	134,655	202,170	202,170	172	137	137
311-312	Food manufacturing	129,220	154,890	154,890	86,696	114,657	114,657	29,415	36,154	36,154	23,569	36,183	36,183	19,188	29,508	29,508	114,881	173,557	173,557	147	118	118
313	Beverage manufacturing	3,440	4,865	4,865	2,179	4,084	4,084	7,914	8,537	8,537	4,049	5,771	5,771	2,684	3,882	3,882	16,124	22,882	22,882	21	16	16
314	Tobacco manufacturing	570	955	955	389	924	924	989	1,284	1,284	730	1,161	1,161	615	981	981	3,651	5,731	5,731	5	4	4
32	Textile, wearing apparel and leather industries	3,555	5,457	5,457	2,544	5,195	5,195	11,605	11,502	11,502	4,582	6,486	6,486	3,273	5,006	5,006	19,698	29,434	29,434	25	20	20
321	Textile manufacturing	2,584	3,850	3,850	1,900	3,639	3,639	10,782	10,549	10,549	3,351	4,556	4,556	2,151	3,260	3,260	12,936	19,224	19,224	16	13	13
322	Wearing apparel	624	1,359	1,359	548	1,316	1,316	720	827	827	1,046	1,633	1,633	953	1,478	1,478	5,648	8,624	8,624	7	6	6
323-324	Manufacture of leather and leather products	146	248	248	97	240	240	103	126	126	185	298	298	169	269	269	1,014	1,586	1,586	1	1	1
33	Manufacture of wood and wood products including furnitures and fixtures	11,504	16,513	16,513	8,022	15,799	15,799	5,431	6,351	6,351	11,349	17,567	17,567	10,530	16,066	16,066	62,700	94,258	94,258	80	64	64
331	Manufacture of wood and wood products	10,935	15,470	15,470	7,608	14,789	14,789	5,069	5,901	5,901	10,554	16,317	16,317	9,794	14,926	14,926	58,296	87,550	87,550	75	60	60
332	Mfr. & repair of furniture	629	1,044	1,044	414	1,010	1,010	362	450	450	795	1,250	1,250	736	1,140	1,140	4,405	6,708	6,708	6	5	5
34	Manufacture of paper & paper products; Printing and publishing	30,304	32,828	32,828	29,480	32,521	32,521	11,716	13,631	13,631	3,853	5,499	5,499	2,447	3,652	3,652	22,551	29,706	29,706	19	15	15
341	Manufacture of paper and allied products	29,579	31,623	31,623	28,984	31,354	31,354	11,326	13,128	13,128	2,937	4,056	4,056	1,598	2,333	2,333	17,462	21,951	21,951	12	9	9
342	Printing, publishing and allied industries	725	1,205	1,205	476	1,167	1,167	391	503	503	916	1,443	1,443	850	1,318	1,318	5,089	7,755	7,755	7	5	5
35	Manufacture of chemical products, petroleum, coal, rubber & plastic products	20,194	22,079	22,079	16,488	19,362	19,362	15,018	15,037	15,037	11,012	9,475	9,475	6,418	8,667	8,667	65,253	87,475	87,475	35	28	28
351,352 & 356	Manufacture of chemicals and plastic products	18,153	19,492	19,492	15,023	17,162	17,162	10,484	10,507	10,507	4,369	6,407	6,407	4,206	6,079	6,079	20,788	31,284	31,284	27	21	21
353)	Petroleum refineries	1,339	1,569	1,569	961	1,231	1,231	1,952	2,010	2,010	5,715	1,796	1,796	1,586	1,652	1,652	40,708	50,688	50,688	4	3	3
354)	Mfr. of miscellaneous prods of petroleum & coal	6	8	8	3	3	3	52	58	58	11	15	15	0	0	0	1	1	1	-	-	-
355	Rubber products	697	1,010	1,010	501	967	967	2,530	2,463	2,463	917	1,257	1,257	626	935	935	3,756	5,504	5,504	5	4	4
36	Manufacture of non-metallic mineral products	10,290	11,823	11,823	3,745	6,874	6,874	23,407	21,499	21,499	16,559	17,736	17,736	4,215	6,047	6,047	25,192	35,477	35,477	32	24	24
361)	Mfr. of pottery, china and earthenware	388	518	518	282	500	500	1,461	1,221	1,221	509	640	640	351	492	492	2,080	2,861	2,861	3	2	2
362)	Manufacture of glass and glass products	1,227	1,665	1,665	989	1,620	1,620	1,092	1,319	1,319	2,279	2,955	2,955	818	1,151	1,151	4,692	6,523	6,523	6	4	4
363)	Mfr. of cement	6,669	6,839	6,839	1,220	2,308	2,308	20,133	18,058	18,058	12,065	11,567	11,567	1,475	2,065	2,065	8,967	12,281	12,281	11	8	8
369)	Mfr. of other non metallic mineral products	2,006	2,802	2,802	1,253	2,445	2,445	720	891	891	1,706	2,575	2,575	1,571	2,338	2,338	9,453	13,812	13,812	12	9	9
37	Basic metal industries	80,041	86,918	86,918	62,634	64,719	64,719	11,335	13,016	13,016	4,589	6,226	6,226	3,048	4,256	4,256	17,183	23,903	23,903	21	16	16
371)	Iron & steel basic industries	65,429	66,573	66,573	62,210	63,888	63,888	9,346	10,722	10,722	3,676	4,932	4,932	2,464	3,426	3,426	13,714	19,061	19,061	17	13	13
372)	Non-ferrous metal basic industries	14,612	20,345	20,345	423	831	831	1,988	2,294	2,294	912	1,294	1,294	584	830	830	3,469	4,842	4,842	4	3	3
38	Manufacture of fabricated metal products, machines and equipment	2,728	4,494	4,494	1,777	4,293	4,293	1,992	2,465	2,465	3,483	5,444	5,444	8,043	10,931	10,931	18,705	28,357	28,357	24	19	19
381	Manufacture of fabricated metal products	718	1,210	1,210	452	1,113	1,113	679	878	878	939	1,507	1,507	3,767	4,623	4,623	4,709	7,326	7,326	6	5	5
382	Manufacture of machinery except electrical	484	805	805	318	780	780	263	338	338	612	964	964	2,421	3,589	3,589	3,402	5,180	5,180	4	4	4

continued

Table 6 (continued)

	Sector	PM			PM_{10}			SOx			NOx			VOC			CO			Pb		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
383	Manufacture of electrical machinery, etc.	915	1,504	1,504	605	1,456	1,456	658	782	782	1,160	1,804	1,804	1,065	1,639	1,639	6,344	9,604	9,604	8	7	7
384	Mfr. of transport eqpt.	564	902	902	372	873	873	367	436	436	713	1,081	1,081	736	1,099	1,099	3,926	5,773	5,773	5	4	4
385	Manufacture of professional and scientific measuring and controlling equipment	29	45	45	19	44	44	15	19	19	36	54	54	34	49	49	203	290	290	0	0	0
386	Mfr. & repair of metal furnitures and fixtures	17	29	29	11	28	28	9	12	12	22	34	34	20	31	31	122	185	185	0	0	0
39	Other manufacturing industries	277	474	474	182	459	459	148	197	197	350	568	568	329	524	524	1,945	3,052	3,052	2	2	2
390	Other mfg. industries	277	474	474	182	459	459	148	197	197	350	568	568	329	524	524	1,945	3,052	3,052	2	2	2
	ELECTRICITY, GAS & WATER																					
41	Electricity	12,795	14,738	14,738	11,346	13,927	13,927	184,971	214,134	214,134	31,955	37,123	37,123	670	907	907	3,165	4,299	4,299	4	3	3
411	Electricity generation and distribution		14,738	14,738	11,346	13,927	13,927	-	214,134	214,134	-	37,123	37,123	-	907	907	-	4,299	4,299	-	3	3
412	Electricity distribution to consumers	-	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	Gas & steam	2	2	2	1	2	2	1	1	1	3	3	3	147	182	182	15	15	15	0	0	0
421	Gas manufacture and distribution through systems	-	-	-	-	-	-	-	-	-	-	-	-	-	180	180	-	-	-	-	-	-
422	Steam heat & power plants	-	2	2	1	2	2	-	1	1	-	3	3	-	2	2	-	15	15	-	0	0
43	Waterworks & supply	2	3	3	2	3	3	1	1	1	3	3	3	26	32	32	17	17	17	0	0	0
430	Waterworks & supply	-	3	3	2	3	3	-	1	1	-	3	3	-	32	32	-	17	17	-	0	0
	CONSTRUCTION																					
50	Construction	44,383	143,512	143,512	28,518	95,239	95,239	3,725	4,945	4,945	8,056	12,387	12,387	8,097	12,005	12,005	44,583	66,195	66,195	57	45	45
501	Gen. bldg. construction	-	27,821	27,821	15,406	18,440	18,440	-	913	913	-	2,316	2,316	-	2,894	2,894	-	12,383	12,383	-	8	8
502	Gen. eng'g. construction	-	114,972	114,972	12,822	76,104	76,104	-	3,687	3,687	-	9,210	9,210	-	8,331	8,331	-	49,208	49,208	-	33	33
503	Special trade constuction	-	719	719	291	696	696	-	344	344	-	862	862	-	780	780	-	4,604	4,604	-	3	3
	WHOLESALE & RETAIL TRADE																					
61	Wholesale trade	1,163	1,255	1,255	764	1,215	1,215	622	521	521	1,470	1,502	1,502	1,366	1,378	1,378	8,170	8,075	8,075	10	5	5
618	Petroleum & petroleum products and wholesaling																					
62	Retail trade	618	686	686	406	645	645	330	277	277	781	798	798	5,233	5,782	5,782	4,339	4,289	4,289	6	3	3
628	Petroleum and petroleum products and retailing																					
	TRANSPORTATION, STORAGE AND COMMUNICATIONS																					
71	Transportation services	27,622	42,174	42,174	17,934	40,982	40,982	16,785	22,012	22,012	24,421	37,324	37,324	41,946	59,158	59,158	121,406	182,450	182,450	118	101	101
711	Railway transport	16	17	17	10	16	16	308	336	336	227	248	248	57	62	62	83	90	90	-	-	-
712	Road passenger transport	27,142	41,715	41,715	17,580	40,495	40,495	6,212	8,532	8,532	15,083	25,578	25,578	38,140	55,054	55,054	110,215	171,640	171,640	114	99	99
713	Water transport	-	-	-	-	-	-	9,886	12,861	12,861	7,357	9,791	9,791	1,406	1,869	1,869	2,984	3,972	3,972	-	-	-
714	Air transport	251	211	211	204	248	248	245	188	188	1,484	1,431	1,431	2,059	1,880	1,880	6,625	5,266	5,266	2	1	1
719	Services allied to transport	213	230	230	140	223	223	114	96	96	270	276	276	283	293	293	1,500	1,482	1,482	2	1	1
72	Storage & warehousing	8	8	8	5	8	8	4	3	3	10	10	10	40	48	48	54	54	54	0	0	0
720	Storage & warehousing	-	8	8	5	8	8	-	3	3	-	10	10	-	48	48	-	54	54	-	0	0
73	Communication	153	165	165	100	159	159	82	68	68	193	197	197	232	248	248	1,072	1,059	1,059	1	1	1

continued

Table 6 (continued)

Sector		PM			PM_{10}			SO_x			NO_x			VOC			CO			Pb		
		1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
FINANCING, INSURANCE, REAL ESTATE & BUSINESS SERVICES																						
81	Banking institution	398	419	419	255	405	405	208	174	174	491	501	501	459	462	462	2,727	2,695	2,695	3	2	2
82	Financial intermediaries	93	100	100	61	97	97	50	42	42	118	120	120	109	110	110	654	646	646	1	0	0
83	Insurance	66	71	71	43	69	69	35	29	29	83	85	85	78	79	79	461	456	456	1	0	0
84	Real estate	129	150	150	89	145	145	63	53	53	153	160	160	164	181	181	1,011	1,176	1,176	1	1	1
85	Business services	319	344	344	210	334	334	171	143	143	404	412	412	377	381	381	2,243	2,217	2,217	3	2	2
COMMUNITY, SOCIAL AND PERSONAL SERVICES																						
91	Public admin. & defense	4,761	5,858	5,858	3,092	5,692	5,692	2,217	1,659	1,659	5,014	4,734	4,734	5,699	8,984	8,984	28,778	30,923	30,923	35	20	20
92	Sanitary and similar services	-	-	-	-	-	-	-	-	-	-	-	-	28	35	35	-	-	-	-	-	-
93	Education sovices	87	93	93	57	90	90	46	39	39	109	112	112	102	103	103	608	601	601	1	0	0
94	Medical, dental, other health & vet. services	141	152	152	93	148	148	76	63	63	179	182	182	11,053	11,054	11,054	992	981	981	1	1	1
95	Other social and related community services	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-
96	Recreational and cultural services	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-
97	Personal and household services	-	-	-	-	-	-	-	-	-	-	-	-	273	298	298	-	-	-	-	-	-
98	Restaurants & hotels	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-
99	International organizations and other extra-territorial bodies	621	368	368	402	383	383	373	41	41	1,007	201	201	554	301	301	3,245	2,049	2,049	5	1	1
HH	Household sector	1,237,504	1,166,722	1,166,722	1,214,494	1,165,178	1,165,178	6,766	7,131	7,131	44,935	46,949	46,949	1,936,745	1,813,323	1,813,323	9,166,575	8,505,702	8,505,702	283	213	213
NATURE	Nature sector	n.e	n.e	n.e	n.e.	n.e.	n.e.	n.e	n.e	n.e	n.e	n.e	n.e	n.e	n.e	n.e	n.e	n.e	n.e	n.e	n.e	n.e
	TOTAL	1,680,052	1,814,641	1,814,641	1,519,678	1,642,348	1,642,348	364,800	405,577	405,577	228,586	287,304	287,304	2,093,340	2,026,300	2,026,300	9,866,905	9,479,162	9,479,162	1,059	807	807

Note: PM_{10} from fuel combustion is not computed.

Source: *Value of Direct Environmental Waste Disposal Services, 1995 Update*. EPIRAP IV Technical Paper. 1997.

Table 7
Social Net Benefits from Options for Reducing Air Pollution
(In Year 2000 Prices)

Options	NPV, Million Pesos, 12%
Reduction of PM_{10}	7,962
Successful Anti-Smoke Belching Program	1,855
Diesel Desulphurization	1,134
Diesel Tax Restructuring	4,973
Ban on Leaded Gasoline	
including IQ effects	109,341
excluding IQ effects	32,802
TOTAL, w/ IQ effects	117,303
TOTAL, without IQ effects	40,764

Source: Manasan, R., et al. *An Assessment of Policies in Controlling Air Pollution from Motor Vehicles* in Metro Manila. ENRAP IV Technical Paper. July 1998.

Table 8
Sources of Water Pollution: Philippines, 1988, 1992 and 1996

Sector	BOD_5			SS			TDS			Oil			N			P		
	1988	1992	1996	1988	1992	1996	1988	1992	1996	1988	1992	1996	1988	1992	1996	1988	1992	1996
	Effluents (metric tons)																	
I. Industries	**2,052,463**	**2,413,636**	**2,642,665**	**64,834,299**	**44,182,004**	**38,339,383**	**1,144,261**	**1,866,800**	**2,970,660**	**13,973**	**18,559**	**24,940**	**268,313**	**269,564**	**272,612**	**8,208**	**8,314**	**8,921**
1. Primary	**736,509**	**738,118**	**742,887**	**64,316,009**	**43,633,630**	**37,762,496**	**0**	**0**	**0**	**0**	**0**	**0**	**234,874**	**235,418**	**236,793**	**0**	**0**	**0**
a. Livestock	736,509	738,118	742,887	5,297,465	5,312,138	5,346,846	0	0	0	0	0	0	234,874	235,418	236,793	0	0	0
b. Mining and quarrying	0	0	0	49,017,601	38,321,391	32,403,650	0	0	0	0	0	0	0	0	0	0	0	0
2. Manufacturing	**180,042**	**161,289**	**179,077**	**171,136**	**184,690**	**178,171**	**1,144,261**	**1,866,800**	**2,970,660**	**13,973**	**18,559**	**24,940**	**2,867**	**1,972**	**1,661**	**0**	**0**	**0**
a. Food, beverages and tobacco	116,884	126,711	146,363	120,433	134,297	159,327	1,022,883	1,732,403	2,900,759	11,247	15,508	23,972	2,057	1,138	798	0	0	0
b. Textile, wearing apparel & leather industries	25,692	21,092	18,925	14,207	12,507	11,875	36,166	30,983	28,943	455	533	603	341	399	452	0	0	0
c. Mfr. of paper and paper prod.	7,363	7,192	7,412	16,342	17,155	4,304	56,850	59,392	39,690	0	0	0	0	0	0	0	0	0
d. Mfr. of fab. metal prod., mach. and eqpt.	167	193	217	12,414	13,004	310	8,969	10,576	0	1,014	1,256	0	0	0	0	0	0	0
e. Others	5,936	6,111	6,159	7,739	7,725	2,356	19,393	23,446	1,268	1,257	1,262	365	458	434	301	0	0	0
3. Services	**1,160,912**	**1,514,229**	**1,720,701**	**346,059**	**363,786**	**408,717**	**0**	**0**	**0**	**0**	**0**	**0**	**26,581**	**32,174**	**34,268**	**8,208**	**8,314**	**8,921**
a. Electricity, gas and water	0	0	0	239,388	287,695	333,471	0	0	0	0	0	0	0	0	0	0	0	0
b. Retail trade	0	0	0	37,973	22,663	16,478	0	0	0	0	0	0	0	0	0	0	0	0
c. Community, social and personal services	**1,160,912**	**1,514,229**	**1,720,701**	**70,737**	**53,428**	**58,768**	**0**	**0**	**0**	**0**	**0**	**0**	**26,581**	**32,174**	**34,268**	**8,208**	**8,314**	**8,921**
i. Sanitary and similar services	1,006,336	1,394,894	1,469,443	0	0	0	0	0	0	0	0	0	16,119	22,709	23,857	3,224	4,542	4,771
ii. Others	154,576	119,326	131,259	70,737	53,428	58,768	0	0	0	0	0	0	12,462	9,465	10,411	4,984	3,772	4,149
II. Domestic (HH)	**3,368,167**	**3,809,520**	**5,641,116**	**1,536,769**	**1,705,653**	**1,878,314**	**0**	**0**	**0**	**0**	**0**	**0**	**270,750**	**302,179**	**361,398**	**108,279**	**120,432**	**137,394**
III. Surface Runoff	**2,232,917**	**2,232,917**	**2,232,917**	**444,265,362**	**443,913,133**	**444,353,875**	**0**	**0**	**0**	**55,712**	**38,754**	**62,575**	**1,729,630**	**1,720,266**	**1,731,109**	**29,866**	**29,097**	**30,177**
1. Agriculture	736,237	736,237	736,237	146,108,968	146,108,968	146,108,968	0	0	0	0	0	0	566,336	566,336	566,336	9,014	9,014	9,014
2. Forestry	1,496,681	1,496,681	1,496,681	297,022,047	297,022,047	297,022,047	0	0	0	0	0	0	1,151,293	1,151,293	1,151,293	18,325	18,325	18,325
3. Urban	0	0	0	1,124,337	782,118	1,262,860	0	0	0	55,712	38,754	62,575	12,001	2,636	13,480	2,527	1,758	2,838
TOTAL	**7,643,547**	**8,456,073**	**10,416,699**	**510,636,410**	**489,800,790**	**484,611,572**	**1,144,261**	**1,866,800**	**2,970,660**	**69,685**	**57,313**	**87,515**	**2,269,693**	**2,292,007**	**2,365,119**	**146,353**	**157,843**	**176,492**

continued

Table 8 (continued)

Sector	BOD_5			SS			TDS			Oil			N			P		
	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995	1988	1992	1995
	% Share																	
I. Industries	**26.86**	**28.64**	**24.41**	**10.96**	**9.02**	**7.91**	**100.00**	**100.00**	**100.00**	**20.05**	**32.38**	**28.50**	**11.76**	**11.76**	**11.63**	**5.61**	**5.27**	**5.05**
1. Primary	**9.62**	**8.73**	**7.13**	**10.85**	**8.91**	**7.75**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**10.36**	**10.27**	**10.01**	**0.00**	**0.00**	**0.00**
a. Livestock	9.62	8.73	7.13	1.06	1.08	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b. Mining and quarrying	0.00	0.00	0.00	9.79	7.82	6.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Manufacturing	**2.04**	**1.91**	**1.72**	**0.03**	**0.04**	**0.04**	**100.00**	**100.00**	**100.00**	**20.05**	**32.38**	**28.50**	**0.13**	**0.09**	**0.07**	**0.00**	**0.00**	**0.00**
a. Food, beverages and tobacco	1.53	1.50	1.41	0.02	0.03	0.03	89.39	93.30	97.65	16.14	27.06	27.39	0.09	0.05	0.03	0.00	0.00	0.00
b. Textile, wearing apparel & leather industries	0.34	0.25	0.18	0.00	0.00	0.00	3.16	1.67	0.97	0.65	0.93	0.69	0.02	0.02	0.02	0.00	0.00	0.00
c. Mfr. of wood and wood prod.	0.10	0.09	0.07	0.00	0.00	0.00	4.97	3.20	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d. Mfr. of paper and paper prod.	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.57	0.00	1.46	2.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
e. Others	0.08	0.07	0.06	0.00	0.00	0.00	1.69	1.26	0.04	1.80	2.20	0.42	0.02	0.02	0.01	0.00	0.00	0.00
3. Services	**15.19**	**17.91**	**15.56**	**0.07**	**0.07**	**0.08**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.26**	**1.40**	**1.45**	**5.61**	**5.27**	**5.05**
a. Electricity, gas and water	0.00	0.00	0.00	0.05	0.06	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
b. Retail trade	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c. Community, social and personal services	15.19	17.91	15.56	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.26	1.40	1.45	5.61	5.27	5.05
i. Sanitary and similar services	13.17	16.50	14.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.99	1.01	2.20	2.88	2.70
ii. Others	2.02	1.41	1.26	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.41	0.44	3.41	2.39	2.35
II. Domestic (HH)	**43.93**	**45.05**	**54.15**	**0.31**	**0.35**	**0.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**11.94**	**13.18**	**16.28**	**73.98**	**76.30**	**77.85**
III. Surface Runoff	**29.21**	**26.41**	**21.44**	**88.74**	**90.63**	**91.70**	**0.00**	**0.00**	**0.00**	**79.95**	**67.62**	**71.50**	**76.31**	**75.05**	**73.13**	**20.41**	**18.43**	**17.10**
1. Agriculture	9.63	8.71	7.07	29.19	29.83	30.15	0.00	0.00	0.00	0.00	0.00	0.00	24.99	24.71	23.95	6.16	5.71	5.11
2. Forestry	19.58	17.70	14.37	59.33	60.64	61.29	0.00	0.00	0.00	0.00	0.00	0.00	50.79	50.23	48.68	12.52	11.61	10.38
3. Urban	0.00	0.00	0.00	0.22	0.16	0.26	0.00	0.00	0.00	79.95	67.62	71.50	0.53	0.12	0.57	1.73	1.11	1.61
	Change from 1988 to 1992 (%)																	
I. Industries	17.60			-19.43			62.27			32.82			1.22			1.29		
II. Domestic (HH)	13.44			10.99									11.61			11.22		
III. Surface Runoff	0.00			-0.08						-30.44			-0.54			-2.57		
TOTAL	31.04			-8.51			62.27			2.38			12.29			9.94		

Note: Effluents from community, social and personal services exclude loads of urban runoff attributed to public administration and defense (PSIC 91).
Source: *Value of Direct Environmental Waste Disposal Services: 1995 Update*. ENRAP IV Technical Paper. 1997.

Table 9
Environmental Damages from Water Pollution, 1988, 1992 and 1996
(In 1985 Million Pesos)

	Value of Damages		
	1988	1992	1996
Health	**552**	**592**	**447** [1]
Off-site Damages			
Coral Reefs (foregone fish production)	610	638	1653 [2]
Reservoirs (reduced life span of dams)	51	51	132 [2]
Agricultural production (foregone rice production in reduced irrigated land areas)	11	12	1176 [3]
Inland fisheries (foregone fish production in Laguna de Bay)	47	17	43 [2]
Total	**1270**	**1310**	**3451**

Note: 1 Value is for the year 1995.
2 Based on 1992 estimates, projected to 1996 to allow for real price increases of affected products.
3 Value is for the year 1997; an updated estimate based on recent NIA data.

Table 10
Affected Irrigated Areas in National and Communal Irrigation Systems, 1997
(In Hectares)

Sources of Pollution	National Irrigation Systems		Communal Irrigation Systems	
	Wet Season	Dry Season	Wet Season	Dry Season
Mine Tailings	9,600	8,738	487	398
Soil Erosion and Sedimentation	14,191	6,549	323	226
Piggery	709	627	492	320
Chemical Plants or Distilleries	607	395	58	58
Food Manufacturing or Processing Plants	1,465	1,465	214	194
Salt Intrusion	270	460	699	718
Schistosomiasis	1,880	1,229	97	97
TOTAL AREA	**28,722**	**19,463**	**2,370**	**2,011**

Source: Segayo, M.L.P. *1997 Estimates of Environmental Damages in Irrigation Systems*. ENRAP IV Technical Paper. March 2000.

Note: Attribution factors used for these estimates are based on V. Santos et. al. (1985).

Table 11
Value of Foregone Palay Production at Current Price
1997

Region	Value of Foregone Production (1000 PhP)	
	Wet	Dry
CAR	69,414	57,954
I	186,465	288,944
II	276,386	207,535
III	343,196	340,145
IV	161,537	195,581
V	44,883	30,447
VI	89,179	161,724
VII	14,918	24,449
VIII	-9,052	52,737
IX	36,079	47,233
X	87,035	86,069
XI	53,649	49,132
XII	81,230	123,398
XIII	35,660	41,013
TOTAL	1,470,581	1,706,360

Table 12
ENRAP Policy Studies

Level of Analysis/ Policy Concern	Description of Straight Forward Accounting Results	Simulation Approach
Economy-wide/National:		
Global competitiveness and trade liberalization		Trade and environment interaction (Pollution Intensity and Domestic Resource Cost simulations)
Environment effects of macro-economic development plans		Alternative growth targets impacts on residuals (Input-Output)
Economy-wide/Subnational:		
Environmental effects of regional development plans		Region XI alternative growth targets (Input-Output)
Environmental effects of economic development plans		Socsargen water pollution (scenario-building)
Sources of pollution	Metro Cebu air pollution	
Sectoral/National:		
Environmental water pollution from small-scale industries	Piggery water pollution	
Food Security		Rice self-sufficiency (Input-Output)
Economic impacts of fishery collapse		Fisheries collapse (Input-Output/Linear Programming)
Sectoral/Subnational:		
Phaseout of leaded gasoline		Gasoline-lead reduction in MM (Cost Effectiveness Analysis; Benefit Cost Analysis)
Air pollution from motor vehicles		Alternative policies to control particulate matter and lead (counterfactual analysis)
Carbon sequestration function	Angat Watershed case study	
Overfishing		Lingayen Gulf Fisheries (management options analysis)

Source: Bennagen, E. 1996.

Table 13a
Status of Cadastral Survey as of 1998

STATUS	No. of Cities/ Municipalities	Area (ha)
Approved	865	15.90 M
In-Progress	382	9.20 M
Partially Surveyed	290	3.40 M
Unsurveyed	73	1.50 M
TOTAL	1610	30.00 M

Source: LMB. 1999.

Table 13b
Land Values per Square Meter by Source, Davao City, 1998
(Philippine Pesos)

LESSEE	Prevailing Rates[1]	Assessed Value[2]	DAO 98-20[3]	Zonal Value[4]	Listed Market Rate[5]
1 Takekawa	4,933	10,000	12,313	14,625	33,625
2 Totoki Daiyen7	311	6,000	8,263	10,525	33,625
3 Furukawa	n. a.	10,000	11,750	13,500	33,625
4 Mitsui Bussan Kaisha7	53	6,000	9,238	12,475	33,625
5 Kashiwabara	4,629	10,000	11,438	12,875	33,625
Average	**2,482**	**8,400**	**10,600**	**12,800**	**33,625**

1 Currently prevailing DENR/LMS rates based on the average of the LMS-appraised, zonal, and assessed values. The last appraisal was conducted in 1995 and used the 1985 zonal and assessed values.
2 AV prevailing effective 1997 to present.
3 Average of ZV and AV.
4 ZV prevailing effective 1996 to present.
5 Based on DTI listed cost of doing business in Davao City. Davao Factbook 1996-1997 edition.
6 As per LMS records of "occupancy permit fee."
7 Computed as ((Vi/AVLMS-DENR)-1) * 100%, where V = appraised value based on i = AV, ZV, MV, ALV, DAO 98-20.

Source: Tenazas, A., et.al. *Valuation and Rental Determination of DENR-Administered Patrimonial Properties.* ENRAP IV Technical Paper. March 2000.

Table 14

Economic Returns and Rent from Alternative Uses of Pastureland in Cancelled Pasture Lease Agreement Areas, Selected Sites, 1999

	Net/Annualized Income and Rent per hectare in pesos (10% discount rate)					
	Site Class A		Site Class B		Site Class C	
Land Use	Net Income	Economic Rent	Net Income	Economic Rent	Net Income	Economic Rent
Agriculture						
Corn	9,300	4,740	6,494	2,967	4,700	1,550
Palay	12,256	9,633	10,030	7,627	6,200	3,800
Reforestation	12,263	9,565	8,354	5,759	5,815	3,478
Agroforestry	37,546	28,759	29,430	21,762	22,102	15,016
Pasture (current)	1,253	882	913	553	631	345

Source: Francisco, H.A., et.al. *Pricing of Grassland Resources in the Philippines: Rent, Grassland Degradation and Rehabilitation and Alternative Land Uses.* ENRAP IV Technical Paper. January 2000.

Table 15
Comparison of Rentals/Government Share
(PNOC Site)

Policy/Regulation	Rent/Government Share in PhP/Hectare/Year
DENR 93-66 (CA 141)	546,715 (1% of improvements)
DENR 98-27 (Interim Rate)	3,000
FMB/PEENRA Study	1,664

Source: Quintos, M. et. al. *Derivation of Government Share from Energy Resource Extraction Project.* ENRAP IV Technical Paper. August 1999.

Table 16
Matrix of Fees Estimated for Selected National Parks,
1997 to 1999

Protected Area	Entrance Fee	Facilities User Fee	Resource User Fee	Development Fee
Hundred Islands National Park	X	X		
Mt. Pulag National Park	X			
Paoay Lake National Park			X	
Mt. Kitanglad Range Natural Park				X
El Nido Marine Reserve				X
Hinulugang Taktak National Park	X	X		
Mt. Arayat National Park	X	X		
Ninoy Aquino Parks and Wildlife Nature Center	X	X		

Source: Padilla, J.E. and R.M Rosales, 2000.

Table 17
Summary of Fees Recommended
by the PAWB-ENRAP Team, 1997 - 2000

Type of Fee	Protected Area	Recommended Fees		PAMB Actions
Entrance Fee	Hundred Islands National Park	Peak: Students: P10 Adults: P20 Foreigners: P80	Off-peak: Students: P5 Adults: P10 Foreigners: P40	HINP PAMB Resolution 99-6: P10.00
	Mt. Pulag National Park	P100		MPNP PAMB Resolution No. 3, s. 2000: P100/$15
Facilities User Fee	Hundred Islands National Park	A. Lucap Point 1. Guestroom a. Aircon: P2,600 b. Non-aircon: P700 2. Family Room: P3,500 3. Bathhouse: P10 4. Souvenir Stalls: P480 B. Islands 1. Pavilions: P500 2. Picnic Tables: P75 3. Picnic Sheds: P150 4. Lodging a. Nipa huts: P1,000 b. VIP guesthouse: P4,000		HINP PAMB Resolution 99-6: Bathhouse = P10 Pavilions = P500 Picnic tables = P75 Picnic sheds = P150
Resource User Fee	Paoay Lake National Park	Fish farmers: 1. CY 1999 = P250 per fishcage 2. CY 2000 = P300 per fishcage Crop farmers: 1. Commercial crops: P400/ha. 2. Subsistence crops: no fee		Paoay Lake NP PAMB Resolution 01-8-99: Fish farmers: 1. CY 2000 = P250/cage 2. CY 2001 = P300/cage
Development Fee	Mt. Kitanglad Range Natural Park	Based on CA 141: P30,239 per firm per year Based on 10% excess profit: P90,356 per firm per year		MKRNP PAMB Resolution No. 87, s. 1999: Average of P30,000/commercial firm/year
	El Nido Marine Reserve	Based on CA 141: A. Island resorts 1. Per room: P24,213 2. Per resort: P782,883 B. Cottages 1. Per room: P557 2. Per cottage: P3,452	Based on 25% excess profit: A. Island resorts 1. Per room: P1,397 2. Per cottage: P45,163 B. Cottages: 1. Per room: P2,678 2. Per cottage: P16,604	

Source: Padilla, J E. and R.M. Rosales, 2000.

Table 18
Computed Marginal Abatement Costs (MAC) for BOD_5 Pollution Reduction, Selected Areas, 1999

1. Aggregate MAC	=	PhP 8.83 per kg BOD
2. MAC Region 3	=	PhP 10.57 per kg BOD
3. MAC Region 7	=	PhP 22.53 per kg BOD
4. MAC Region 11	=	PhP 12.11 per kg BOD

Source: Lasmarias, N.C. and N.E. Mendoza. *Design and Analysis of a Wastewater Discharge* Permitting System in the Philippines. ENRAP IV Technical Paper. March, 2000.

Table 19
List of Administrative Orders Passed During ENRAP IV

1. ***Fisheries Administrative Order No. 194 Series of 1998:*** " Moratorium on Commercial Fishing Vessels in Lingayen Gulf"

   Imposes a three-year moratorium on the issuance of licenses for new fishing vessels and bars fishers from other areas/regions from entry into Lingayen Gulf.

   The ENRAP Lingayen Gulf studies provided the empirical basis of the economic and sustainability gains of reducing fishing effort in the Gulf.

2. ***DENR Administrative Order No. 99-36:*** *"Revised Rules and Regulations Governing the Administration, Management, Development and Disposition of Forest Lands Used for Grazing Purposes".*

   Sections on Government Production Share – Basis of Government Share (Section 26) and Transitory Period (Section 28) and Scoring System to account for varying site conditions (Section 8; Annex A) and incentives for sustainable grazing practices (Section 27 and Annex B) are based on nationwide empirical work and subsequent consultations conducted by ERDB-PEENRA Team with technical assistance from ENRAP.

3. ***DENR Administrative Order No. 99-53:*** " Regulations Governing the Integrated Forest Management Program (IFMP)

   The section on Profit Sharing (***Chapter V. Sec. 21)*** is drawn from the initial experience of four negotiated IFMAs based on FMB's application of the computational methods implemented by the FMB/PEENRA Team with technical assistance from ENRAP.

4. ***DENR Administrative Order No. 2000-30:*** "Annual Government Share/Rental for Special Use of Forestland for Energy Projects."

   Amends DAO 98-27 and uses the FMB/PEENRA Study on Government Share from Forestland Used for Energy Projects as basis for P1,700 per hectare share/rental .

5. ***DENR Administrative Order No. 2000-40:*** "Reconfiguration and Redefinition of Functions of the Planning and Policy Studies Office"

   Institutionalizes the former PEENRA Unit into an Environmental and Natural Resources Economics Division (ENRED) under the Economics Affairs Service (EAS) of the Economics Affairs Services, one of three under the Planning, Policy Studies and Economics Affairs Office (PPSEAO).

   This initiative was undertaken by DENR to expand the scope of the former Planning, Policy Studies Office (PPSO) to institutionalize the conduct of environmental and resource economics work by the DENR subsequent to the turn-over of ENRAP in April 2000.

6. ***DENR Administrative Order No. 2000-51:*** "Guidelines and Principles in Determining Fees for Access to and Sustainable Use of Resources in Protected Areas"

Table 20
ENRAP and DENR/PEENRA Economic Instruments Studies

Natural Resource	Rationale/Issues	ENRAP Study Sites	Pricing Concepts	Instruments	Legal (Status)
LAND					
Grasslands	Decline in the productivity of the country's grasslands is attributed to mismanagement (i.e. overgrazing, frequent burning, extensive land-use practices, etc.; degraded grasslands contribute to soil erosion. Abandoned or cancelled PLA areas have high opportunity cost.	24 ranches in 6 provinces (Isabela, Nueva Vizcaya, Nueva Ecija, Palawan, Misamis Oriental and Bukidnon)	Govt. appropriates econ. rent = (TR-TC) - MPR but modifies amount to be paid with credits for good soil conservation practices	Pasture Lease Fees Potential additional instruments for alternative land uses, and rehabilitation of degraded areas	DAO No. 99-36 DAO No. 2000-23 *Amending DAO No. 99-36*. Updated fees as follows: Year 1 = P200/ha. Year 2 = P275/ha. Year 3 = P350/ha. Year 4 = P425/ha.
Patrimonial Properties	Very low rent paid with minimal update since the 1930s, by corporations leasing patrimonial properties	5 commercial patrimonial properties in Davao City (NAFCO properties)	Net Present Value	Land rent based on appraised market values	DAO 98-20
Forest (production)	Degraded forest lands need to be rehabilitated; increase private sector investment in tree plantation by clarifying rules in IFMA and production sharing (one of 4 new instruments in 1986 Constitution). Clarify mechanism for government to earn share of resource rent from forest plantation holders. IFMA still subject to EIA on which Environmental Guarantee Fund may still be applied.	Starting point: Generic Forest Plantations based on ERDB and FSP data. IFMA proponents negotiate with DENR subsequently.	Government Share = Stumpage Price - Production Cost - Margin for Profit - Margin for Risk	Government Share (% GS value of 5% of Gross Revenue)	DAO 97-04 (signed previously) Four (4) IFMAs were signed in 1998.
Protected Areas (recreation sites)	User fees for recreation and extraction of resources	Hundred Islands National Park (HINP) Mt. Pulag Natl. Park (MPNP) Paoay Lake Natl. Park (PLNP) Mt. Kitanglad Range Natural Park (MKRNP) El Nido Marine Reserve (ENMR) Mt. Arayat Natl. Park (MANP) Hinulugang Taktak Natl. Park (HTNP) Ninoy Aquino Parks and Wildlife Nature Center (NAPWNC)	Willingness-to-Pay Contingent Valuation Travel Cost Method Cost Recovery	1. Entrance Fee 2. Development Fee 3. Facilities User Fee 4. Resource User Fee 5. Concession Fee 6. Royalty	NIPAS Act DAO No. 2000-01 HINP PAMB Res. No. 99-6 MPNP PAMB Res. No. 3 s. 2000 Paoay Lake PAMB Res. No. 01-8-99 MKRNP PAMB Res. No. 87 s. 1999

continued

Table 20 (continued)

Natural Resource	Rationale/Issues	ENRAP Study Sites	Pricing Concepts	Instruments	Legal Status
WATER					
Extraction	Need for correct resource pricing for water extraction given the multiple use of the resource and possible competition among various users. This is expected to complement the environmental user fee system currently applied on pollution load.	Laguna de Bay	True Economic Value = MPC+MUC+MEC	May result in the revision of the fees charged to Ayala Land, Inc. and the formulation of fees on irrigation systems drawing from the Lake.	Study is on-going.
Pollution	Need to charge polluters based on pollution load and the ambient quality of receiving bodies	Marilao, Bulacan; Regions 7 and 11	Proposed fees incorporate pollution load, abatement cost and ambient quality. A generic formula is proposed to allow for later inclusion of various pollutants	Revision of IRR on Wastewater Discharge Permit	Draft DAO
Fisheries	Need to regulate and generate gov't. revenues from fish pen and cage aquaculture	Lingayen Gulf	ER = Net Profit - (Margin for Profit & Risk + Imputed Family Labor)	Set rentals, fees or charges to capture LGU's share in resource rent	FAO No. 194 Series of 1998

Table 21
Outputs of the Institutionalization Phase by Bureau

FOREST MANAGEMENT BUREAU (FMB)	
Forest Accounts Update	Dipterocarps Plantations Mangroves Rattan Fuelwood
Case Studies (CBFM areas)	Region 5 Region 2
Valuing Environmental Effects	Environmental Damage Estimates on Irrigation Systems
Pricing Issues (appropriate government share)	IFMA Energy (geothermal) resource extraction
ECOSYSTEMS RESEARCH AND DEVELOPMENT BUREAU (ERDB)	
Pricing Philippine Grasslands	Rent Estimation Valuation of Grassland Degradation and Rehabilitation Economics of Alternative Land Uses
MINES AND GEOSCIENCES BUREAU (MGB)	
1995 Mineral Depreciation Accounts Examination of Negative Rents in the Mining Industry	
LAND MANAGEMENT BUREAU (LMB)	
Development of Valuation Methods for Patrimonial Properties	
PROTECTED AREAS AND WILDLIFE BUREAU (PAWB)	
Pilot Testing Activities on Estimating User Fees for Users of Resources Within Protected Areas	Hundred Islands National Park Paoay Lake National Park Mt. Pulag National Park El Nido Marine Reserve Mt. Kitanglad Range Natural Park Mt. Arayat National Park Ninoy Aquino Parks and Wildlife Nature Center Hinulugang Taktak National Park Pasonanca Watershed
ENVIRONMENTAL MANAGEMENT BUREAU (EMB)	
Wastewater Discharge Permitting System Environmental Waste Disposal Services (EWDS) Accounts	Regions 7 and 11; Marilao River System, Bulacan

Source: Delos Angeles, M.S., et.al. *Department of Environment and Natural Resources/Bureau Level Institutionalization Reports*. November 2000.

Table 22
List of Policy Updates
(by FRIEND, Inc.)

No.	Title	Date Issued
1	Greening the Gross Domestic Product	August-98
2	The Monster at Home	September-98
3	Pricing Nature	October-98
4	Breathing Clean Air Is A Basic Right	December-98
5	A Step In A Long Journey?	January-99
6	Clean Air Act and Incineration: To Ban Or Not To Ban, That's The Question	February-99
7	Banning Incineration Technologies: Is It The Right Policy?	March-99
8	Incineration Ban May Violate WTO Principles	May-99
9	Soild Waste Management Act: Ultimate Solution To The Garbage Crisis?	July-99
10	Government To Make Greater Use Of Economic Instruments Full-Cost Pricing	Aug-Sept-99

Figure 1
Appreciation (Depreciation) of Philippine Pelagic Fisheries (1998-1999)

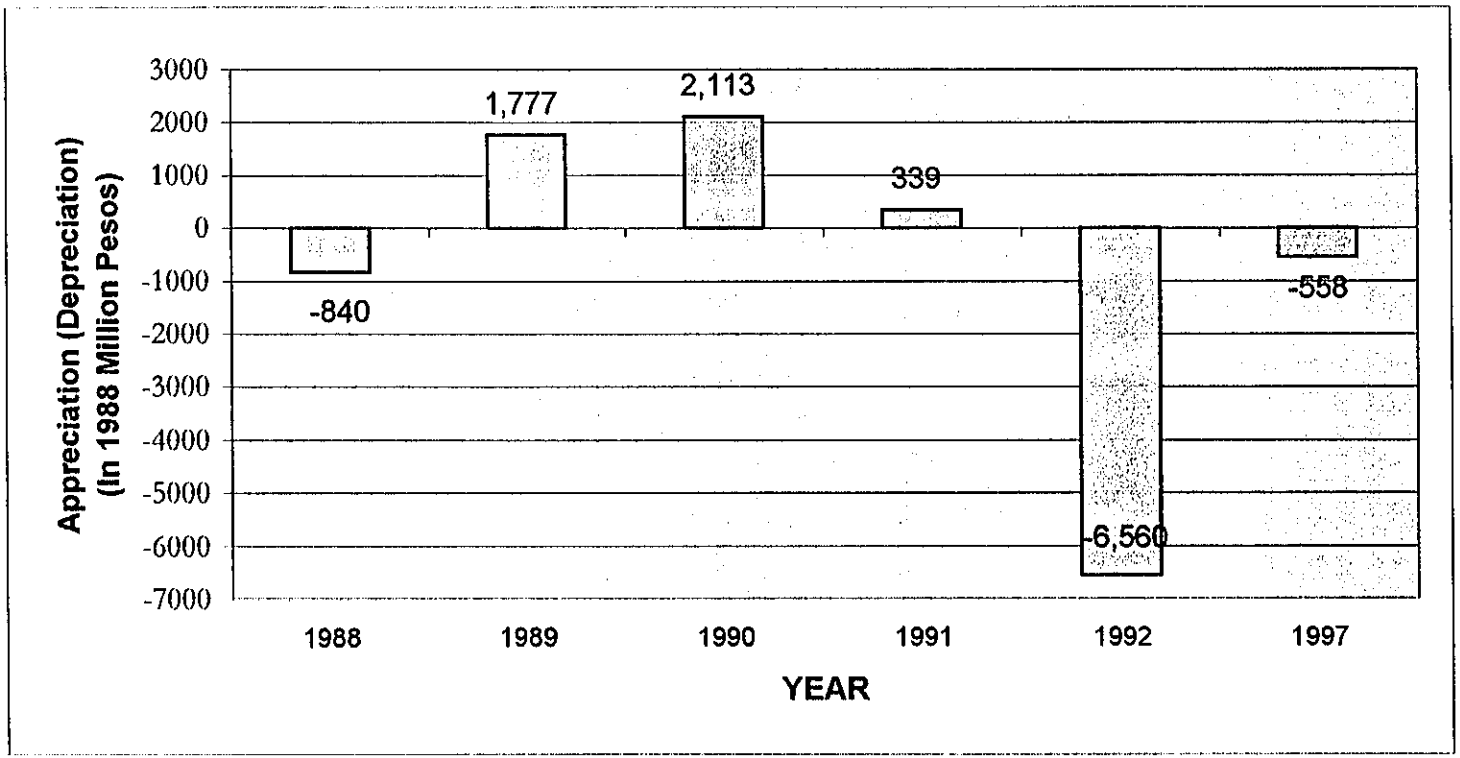
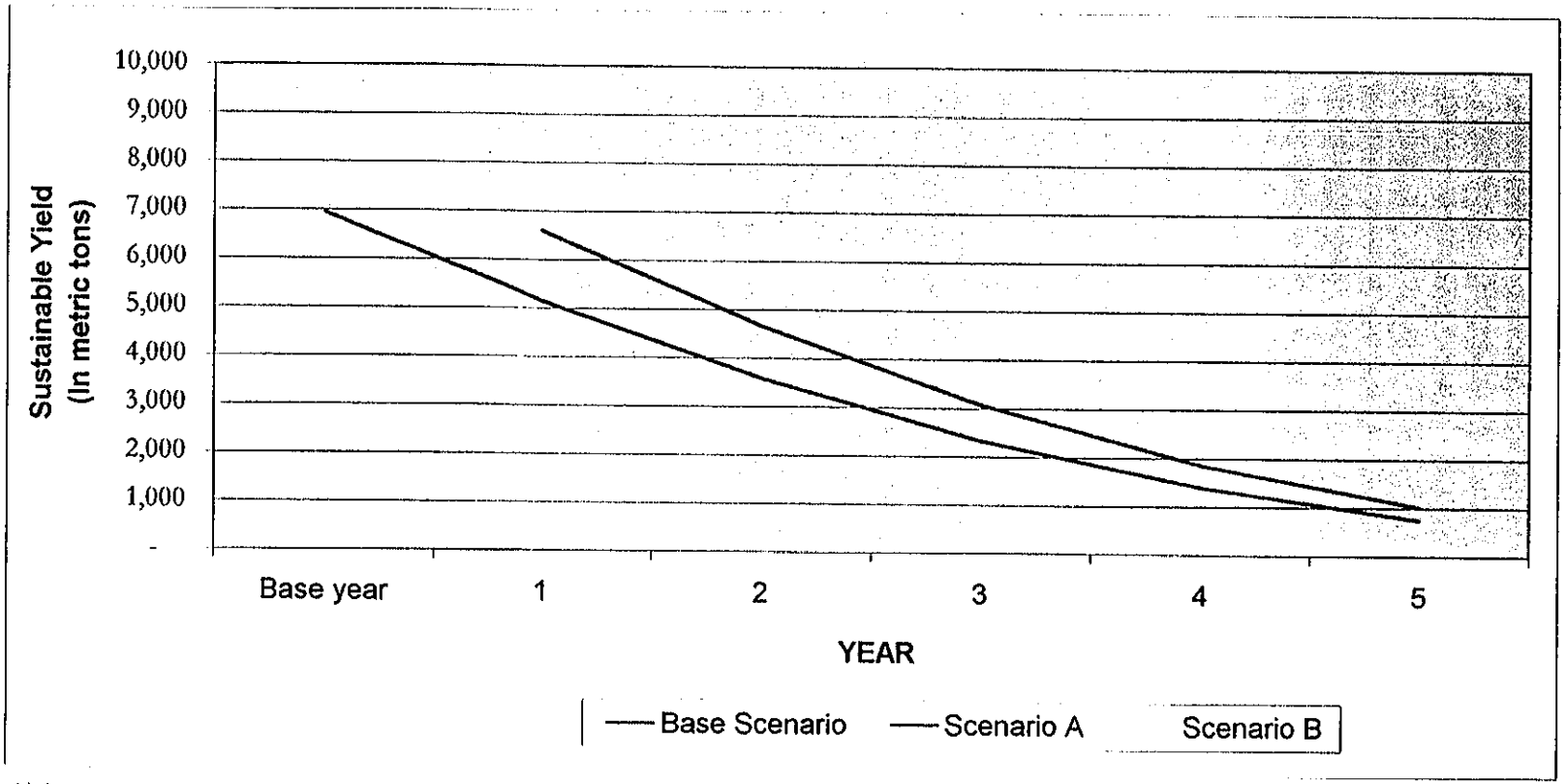


Figure 2
Projected Impacts of a Five-Year Moratorium on the Lingayen Gulf Fisheries, Philippines



Note:

Base Scenario: Status Quo

Scenario A: Moratorium on Commercial Fishing only.

Scenario B: Moratorium on Commercial Fishing with additional control on Municipal Fishing.

Source: Padilla, J.E. and A.C. Morales, 1997.

54

Figure 3a
Estimated Area of Second Growth Dipterocarp Forest and National Plantations, 1992-1997

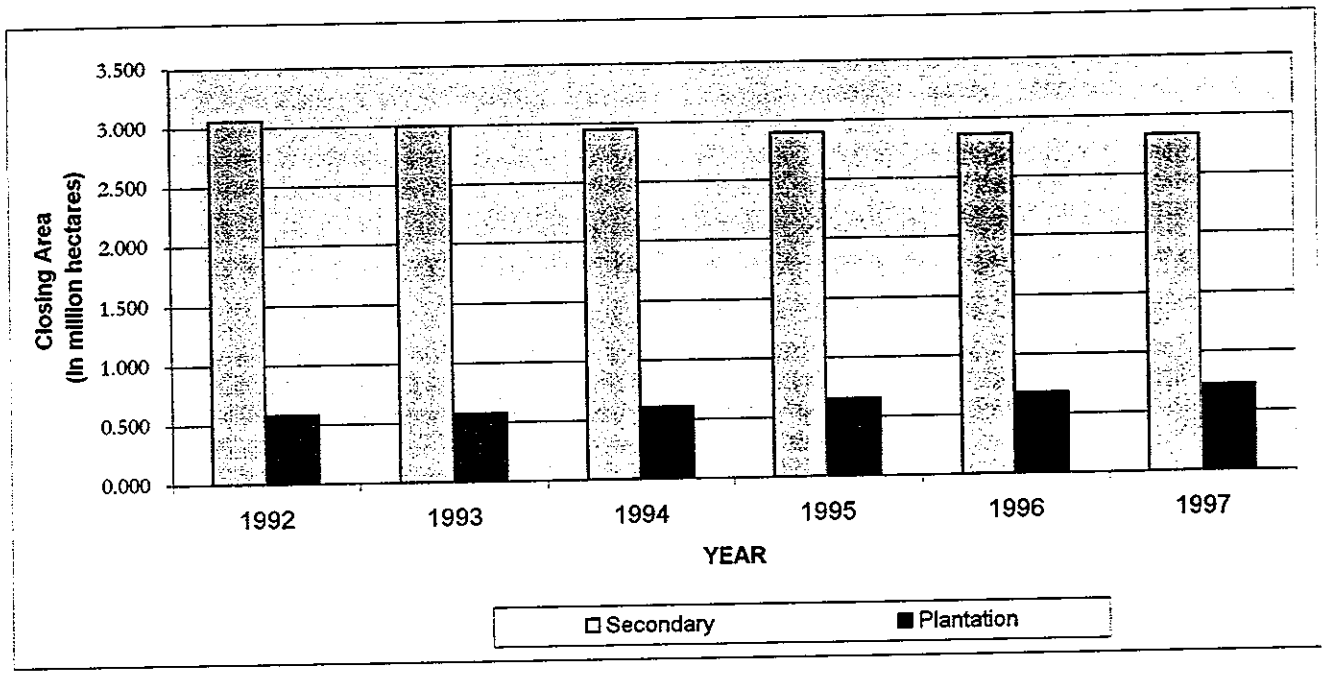
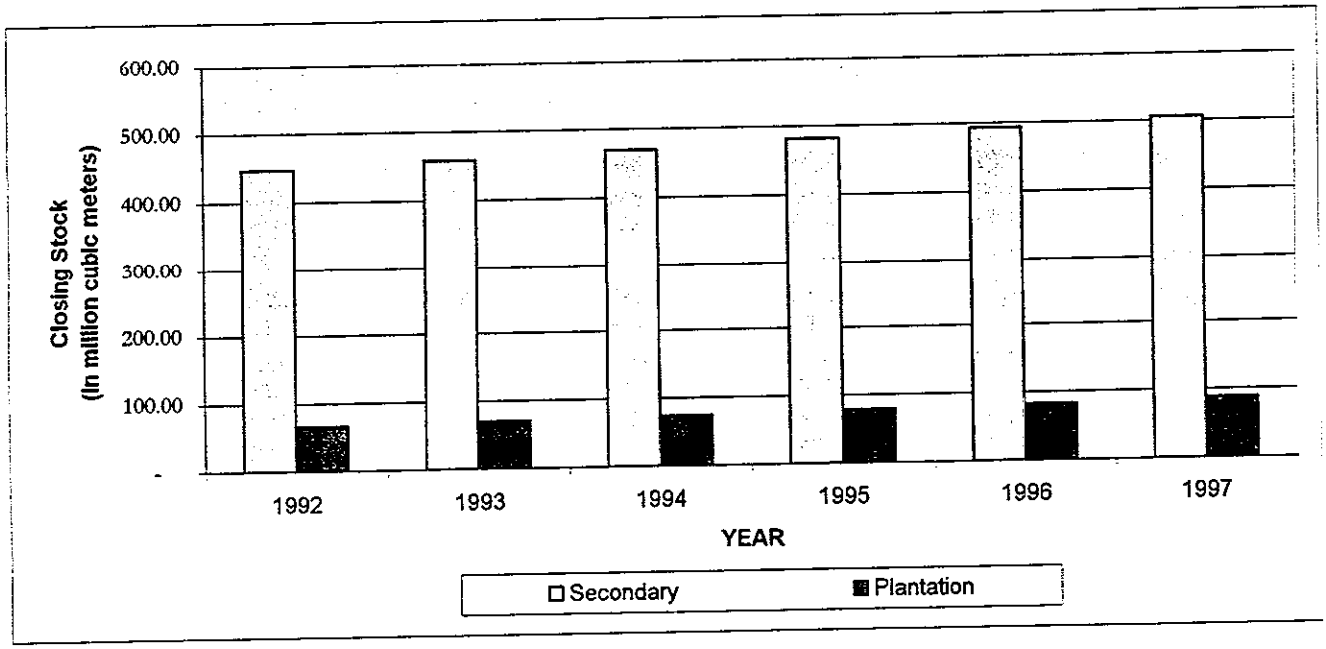


Figure 3b
Estimated Volume of Secondary Growth Diptercarp Forest and National Plantations, 1992-1997



Sources:
1. Castillo, A.L., A.A. Cheng and A.V. Javier. *Forest Plantation Accounts Update*. ENRAP IV Technical Paper. March 2000
2. Catindig, D.R., et al. *An Update of the Philippine Dipterocarp Forests Accounts (1992-1997)*. ENRAP IV Technical Paper. March 2000.

Figure 4
Value of Waste Disposal Services (WDS) Provided by Air: Philippines, 1995
Shares by Type of Emitting Sources, In Percent

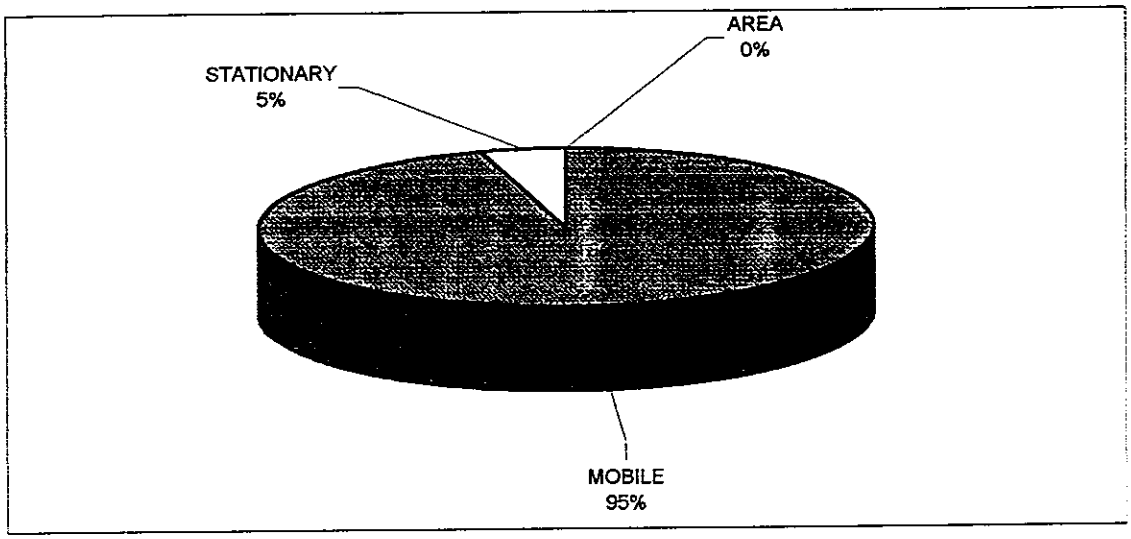
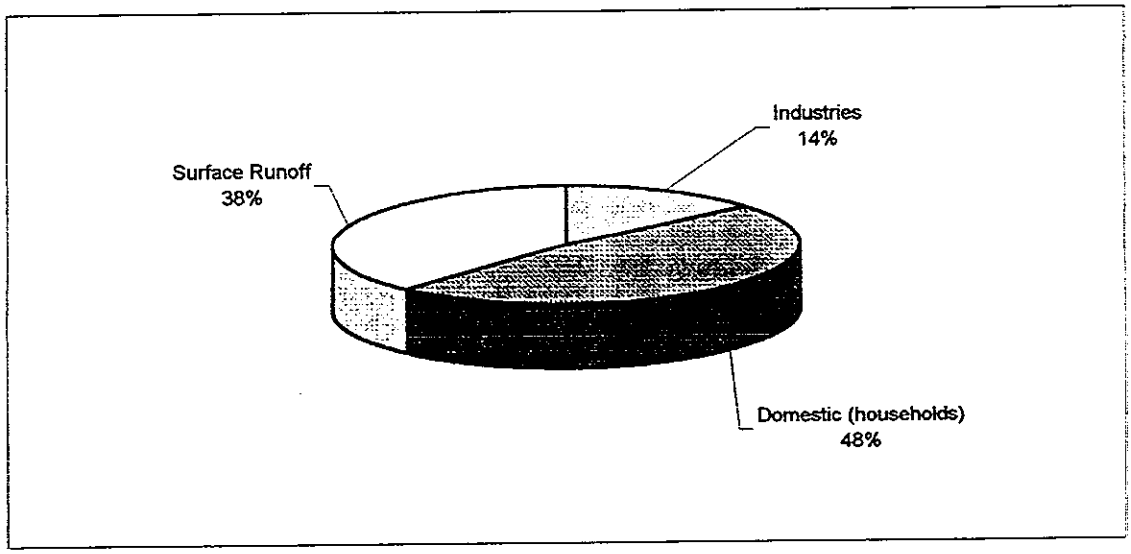
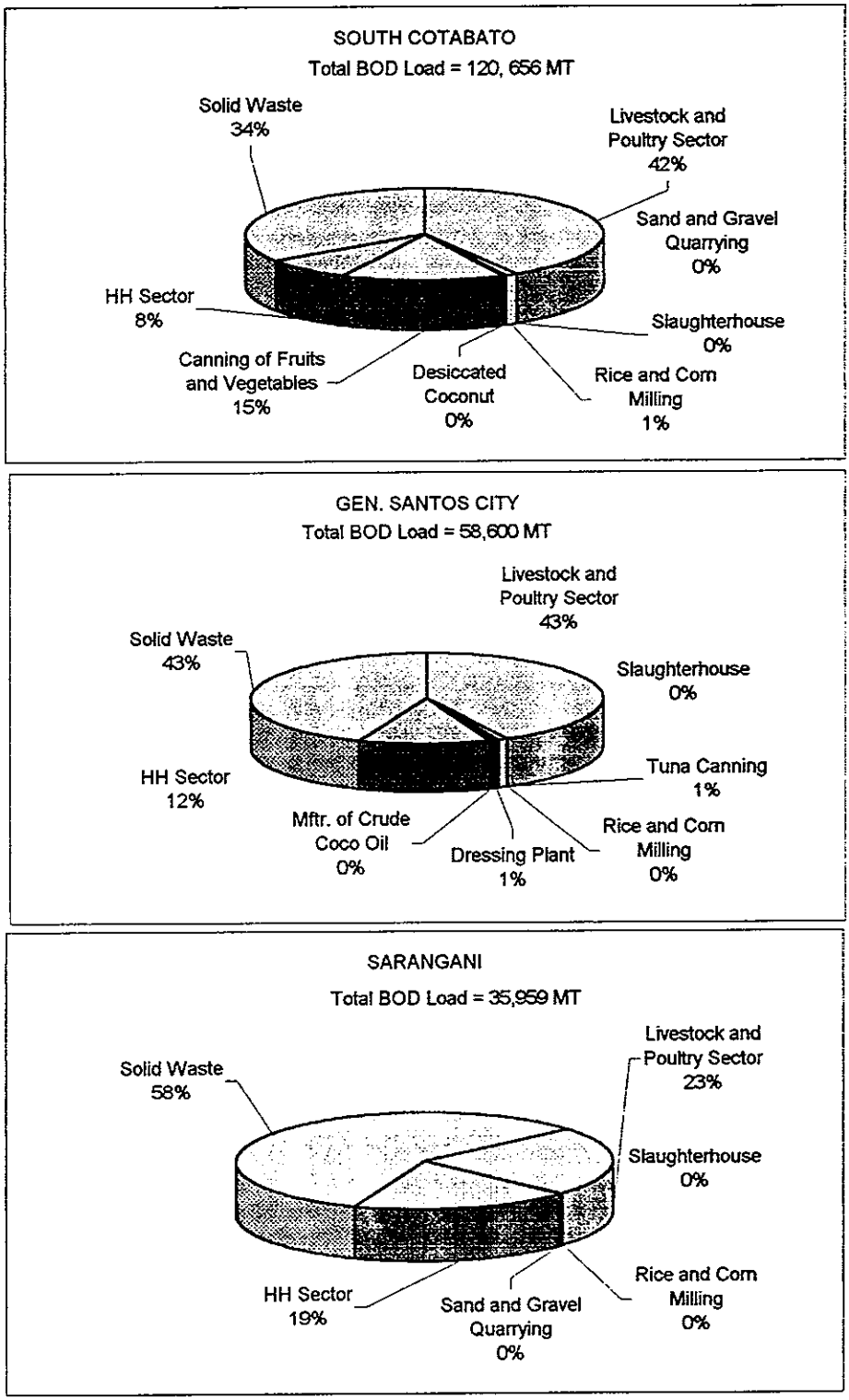


Figure 5
Value of Waste Disposal Services (WDS) Provided by Water: Philippines, 1995
Shares by Discharging Sources, In Percent



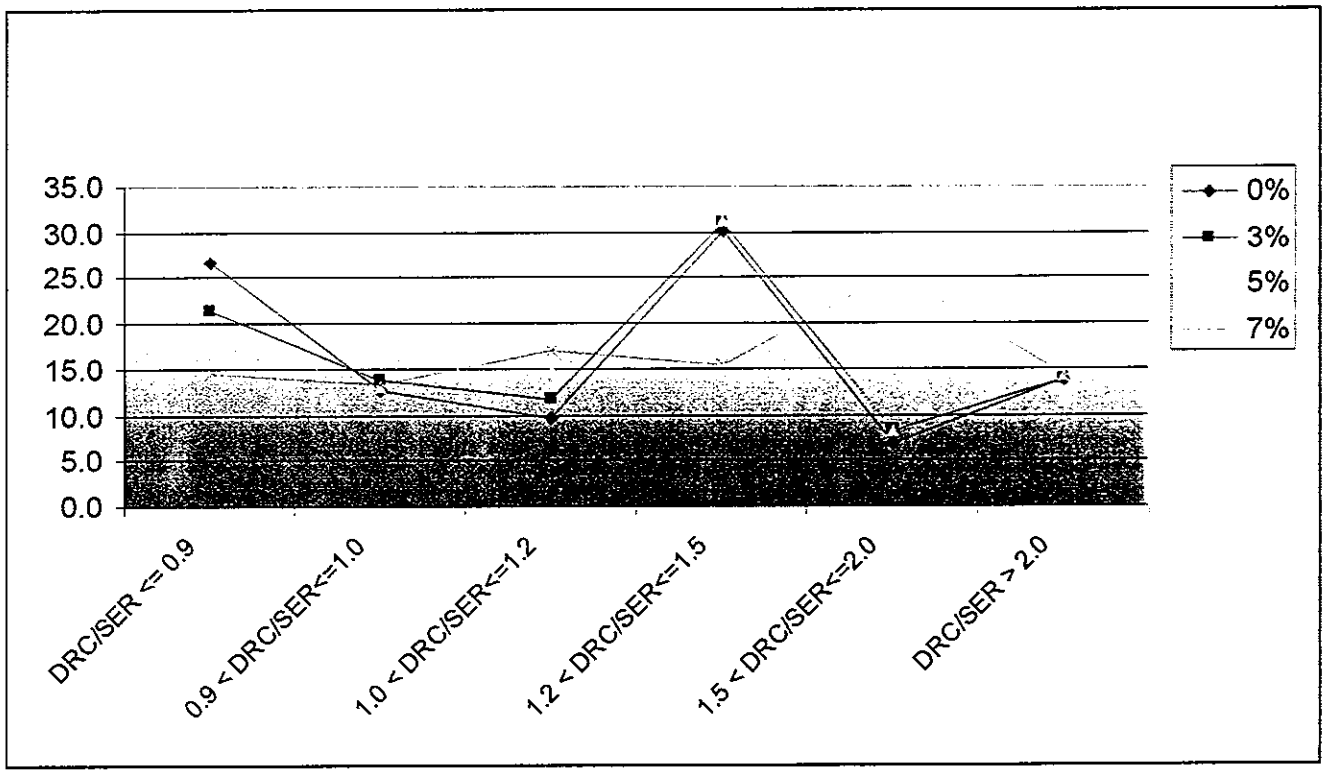
Source: *Value of Direct Environmental Waste Disposal Services: 1995 Update*. ENRAP IV Technical Paper. 1997.

Figure 6
Projected Biochemical Oxygen Demand (BOD) Loads of Major Sectors in Socsargen 2002, With Current Development Plan, Shares by Sector



Source: Francisco, H.A.F. ENRAP IV, *SOCSARGEN Study*, preliminary estimates

Figure 7
Percent Share of Output, at Varying Levels of Prospective Pollution Control Cost (PCC)



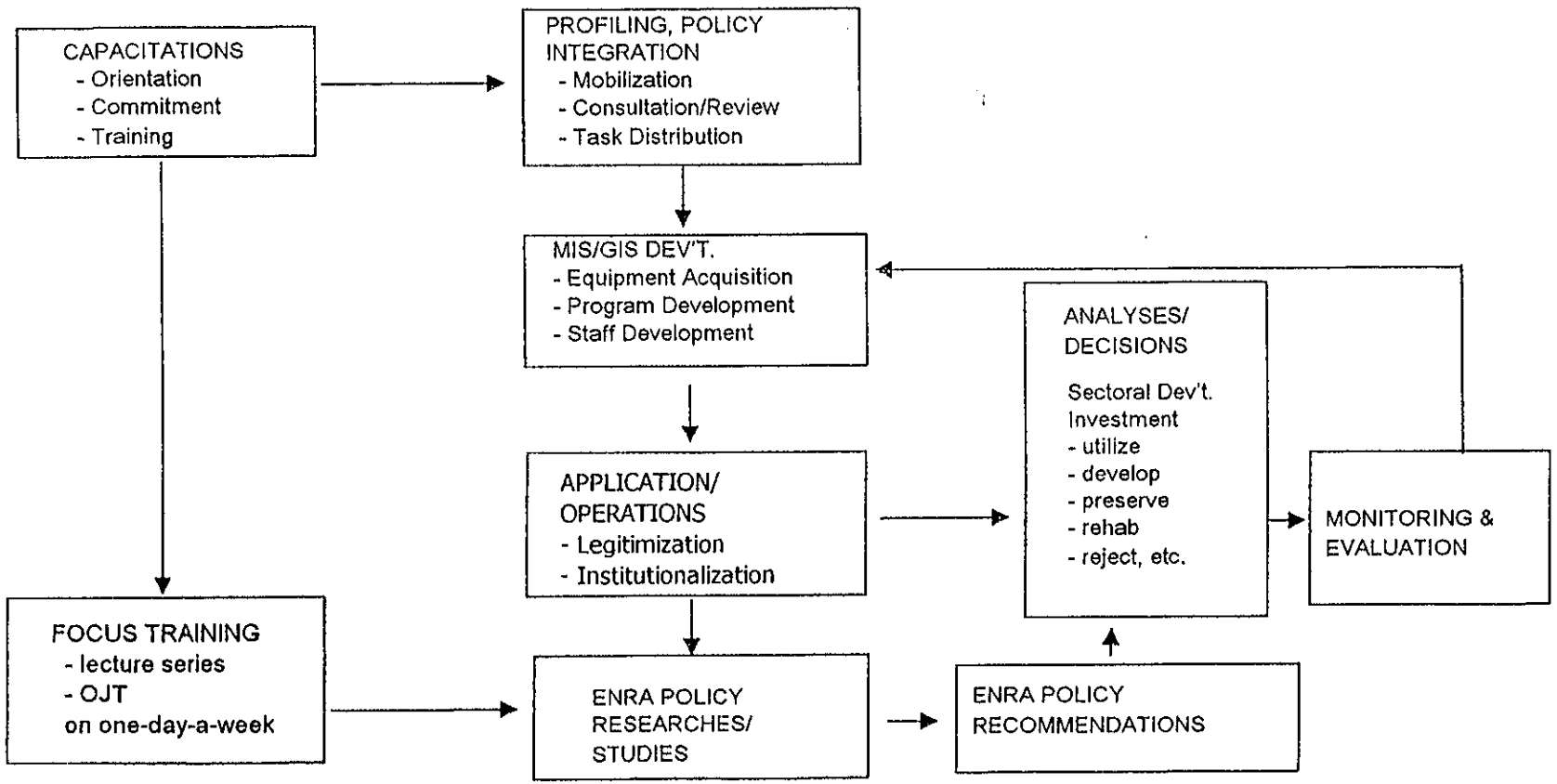
Notes:

DRC/SER <=0.9	Huge comparative advantage
0.9<DRC/SER<=1.0	Comparative advantage
1.0<DRC/SER<=1.2	Borderline
1.2<DRC/SER<=1.5	Mild comparative disadvantage
1.5<DRC/SER<=2.0	Comparative disadvantage
DRC/SER>2.0	Huge comparative disadvantage

DRC = Domestic Resource Costs
SER = Shadow Exchange Rate

Source: Medalla, E.M. *Impact of Environmental Regulation and Costs on Competitiveness.* ENRAP IV Technical Paper. Novembe

Figure 8
ENRAP-Sarangani: Project Operational Framework



Appendix 1
LIST OF ENRAP IV REPORTS

Published
ENRAP IV: Main Report
IRG, EA, REECS and DENR

Guidebook for Environmental and Natural Resources Accounting: Methods and Procedures

Searchable Hyperlinked Electronic Library of Files

Institutionalization Reports:

Analysis of the Institutionalization of ENRA at the Environmental Management Bureau (EMB)
by: N. Lasmarias

Institutionalization of ENRA at the Ecosystem Research and Development Bureau (ERDB) Processes and Assessment.
by: H. Francisco

ENRAP Institutionalization at the Forest Management Bureau/PEENRA Unit (FMB)
by: M. delos Angeles and J. Séve

Institutionalizing Environmental Accounting at the Lands Management Bureau (LMB): ENRAP's Perspective
by: E. Bennagen

Institutionalizing Accounts Development at the Mines and Geo-sciences Bureau (MGB):ENRAP's Perspective
by: E. Bennagen

Institutionalization of ENRA at the Protected Areas and Wildlife Bureau (PAWB)
by: J. Padilla and R. M. Rosales

Institutionalization of ENRA at the Laguna Lake Development Authority (LLDA)
by: H. Francisco

Studies Conducted by DENR Counterparts with Technical Assistance from ENRAP Consultants

FMB

1997 Estimates of Environmental Damages in Irrigation Systems
by: L. Segayo

Accounting for Unmarketed Fuelwood Production: 1995 (with 1996 - 2000 projections)
by: A. Bello and R. Buen

An Update of the Philippine Dipterocarp Forest Accounts (1992-1997)
by: M. Quintos, A. Sibucao, Jr. D. Catindig, A. Lachica and C. Pablo

Community-Based Forest Management (CBFM) Case Study on Environment and Natural Resource Accounting
by: M. Manrique, and A. Cabrera

Derivation of Government Share from Energy Resource Extraction Project
by: A. Cheng, A. Bello, A. Sibucao, Jr., A. Javier, M. Quintos, D. Catindig, A. Lachica, A. Pablo, A. Castillo, G. Francisco, E. Estrada and M. delos Angeles

Derivation of Government Share (GS) in Industrial Forest Management Agreement (IFMA) Production
by: A. Cheng, A. Bello, A. Sibucao, Jr., A. Javier, M. Quintos, D. Catindig, A. Lachica, A. Pablo, A. Castillo, G. Francisco, E. Estrada and M. delos Angeles

Forest Resources Accounts Update: 1989-1997 Rattan Resources Accounting Update
by: G. Francisco and Ma. L. Segayo

Forest Plantation Accounts Update
by: A. Castillo, A. Cheng and A. Javier

Philippine Mangrove Forest Resources Accounting Report: (1992-1997)
by: E. Estrada

PAWB
A Report on the Survey of Tourists at Mount Pulag National Park
by: J. Padilla, R. Rosales, S. Baun, T. Blastique, E. Corcuera, R. Buen and S. J. Cabrera

A Report on the Survey of Tourists and Resorts at Hundred Islands National Park
by: J. Padilla, R. Rosales, A. Meniado, T. Blastique, S. J. Cabrera and R. Buen

Determination of Development Fees for Tourism Establishments Located in El Nido Marine Reserve
by: J. Padilla, R. Rosales, T. Blastique, E. Corcuera, R. Buen, S. J. Cabrera and I. Matubis

Determination of Water Fees for Fish Culture and Irrigation for Paoay Lake National Park
by: J. Padilla, R. Rosales, T. Blastique, S. J. Cabrera and B. Nuñez

Determination of Development Fees for Telecom/Broadcast Companies Operating on Mt. Kitanglad Range Natural Park
by: J. Padilla, R. Rosales, T. Blastique, E. Corcuera, R. Buen, S. J. Cabrera and I. Matubis

Manual for the Implementation of the Fee System Guidelines in Protected Areas
by: J. Padilla, R. Rosales, C. Ulep, A. Meniado, T. Blastique, S. J. Cabrera, E. Corcuera and R. Buen

A Framework for the Formulation of Market-Based Instruments and other Mechanisms in Protected Areas in the Philippines
by: J. Padilla and C. Ulep

EMB
Design and Analysis of a Wastewater Discharge Permitting System in the Philippines
by: N. Lasmarias, N. Mendoza and A. Casorla

Analysis of the Water Pollution Abatement Costs in Region XI
by: N. Lasmarias, A. Casorla and M. V. Navaluna with the assistance of DENR Region XI-Environmental Sector

Framework for the Application of an Environmental User Fee System for Water Pollution Management in the Philippines
by: N. Lasmarias, A. Casorla, N. Mendoza, M. V. Navaluna, R. Virgino, N. Zabala, T. Legaspi, B. Nuñez, C. Reyes and K. Shih

Estimation of Marginal Abatement Costs for the Treatment of BOD_5 in Industrial Effluent in Region VII
by: R. Virgino, N. Lasmarias, N. Zabala and A. Casorla

Analysis of a Wastewater Discharge Permit Fee for Industrial Waste Water Pollution: The Case of Marilao River, Bulacan
by: N. Lasmarias, A. Casorla and W. Billones

Sarangani Province
ENRAP Sarangani: Institutionalizing an ENRA System at the Provincial Level
by: N. Perez, R. Paraba and F. Basino

MGB
Philippine Mineral Accounts
by: E. Bennagen and B. de Vera

ERDB/LLDA

Pricing of Grassland Resources in the Philippines: Rent, Grassland Degradation and Rehabilitation and Alternative Land Uses
by: H. Francisco, M. Rivera, E. Perino, L. Florido, E. Castillo, J. Ebora, and F. Siapno

Water Resources and Economic Instruments for Laguna Lake
by: H. Francisco, M. Rivera, J. Alcalde and L. Malocloc

LMB

Valuation and Rental Determination of DENR-Administered Patrimonial Properties
by: E. Bennagen, L. Castro, A. Tenazas, A. Andal, D. Antonio, R. Balbuena, V. Balde, E. Cabotaje, C. Cirunay, C. Dayag, E. Garcia, L. Lucero, M. Lucero, S. Nejal, A. Pascua, F. Verbo, M. Vicente, L. Arzadon (PPSO), and T. Escubio (PPSO).

PPSO

*Users' Manual: Fuel Sales Database for the Department of Energy
by: E. Miraflores

Studies Conducted by ENRAP Consultants and Researchers

A Model for Measuring a Mining Firm's Depletion and Contribution to Sustainable Economic Growth
by: T. Santos

An Estimation and Valuation of the Carbon Storage Function of Angat River Watershed and Forest Area
by: L. Castro

Environmental Accounting as a Guide to Policy Development: The ENRAP Experience

Impact of Environmental Regulation and Pollution Control Costs on Competitiveness
by: E. Medalla

The Economics of Fishpen and Fishcage Aquaculture in Lingayen Gulf, Philippines
by: J. Padilla and A. Morales

A Hydrological Study of Paoay Lake
by. R. Faminialagao and F. Lazaga

Proposed Terms of Reference for the Preparation of Master Plans for the Sustainable Management of Coastal and Marine Resources and Environment
by: L. McManus, A. Trinidad, P. Aliño, M. A. Meñez, J. Padilla, A. Morales, V. Palaganas of CEP and F. Eleazar, FASPO

Value of Direct Environmental Waste disposal Services: 1995 Update
by: E. Bennagen and A. Morales

Natural Resources Management
by: M. delos Angeles

Economic Instruments:

*Use of Fuel Tax Differentiation in Vehicular Pollution Control in Metro Manila
by: R. Manasan, M. delos Angeles, A. Inocencio, D. T. Ramirez and L. Rufo

*An Assessment of Policies Controlling Air Pollution from Motor Vehicles in Metro Manila
by: R. Manasan, M. delos Angeles, A. Inocencio, L Rufo, C. Rufo and D. T. Ramirez

Alternative Policies to Control Lead Emissions from Motor Vehicles in Metro Manila
by: M. delos Angeles, R. Manasan, D. T. Ramirez, A. Inocencio, L. Rufo, C. Rufo, Jr. and L. Castro

Alternative Policies to Control PM10 Emissions from Motor Vehicles in Metro Manila
by: M. delos Angeles, R. Manasan, D. T. Ramirez, A. Incencio, L. Rufo, C. Rufo, Jr. and L. Castro

Notes on the Use of Economic Instruments for Environmental and Natural Resources Management
by: R. Manasan and M. delos Angeles

Pricing Natural Resources Through the ENRA System: Legal Considerations
by: R. Oliva

Lingayen Gulf Studies:
*Evaluation of Economy-Environment Interactions in the Lingayen Gulf Basin: A Partial Area-Based Environmental Accounting Approach
by: J. Padilla, L. Castro, A. Morales and C. Naz

*Evaluation of Fisheries Management Alternatives for Lingayen Gulf: An Options Paper
by: J. Padilla and A. Morales

*Potential Ecological Effects of Nutrient Loadings into Lingayen Gulf
by: D. McGlone and M. San Diego-McGlone

SOCSARGEN Studies:
*Economic Development and the Environment in SOCSARGEN, Mindanao, Philippines (Integrative Report)
by: H. Francisco, M. delos Angeles, N. Calara, R. Bagarinao, A. Indab and M. T. de Guzman

*Environmental Waste Disposal Services: General Santos City (Main Report)
- Soil Erosion from the Agriculture Sector in General Santos City
- Waste Disposal Services for the Industrial Sector in General Santos City
- Pollution from the Household Sector in General Santos City
- Water Resources Assessment: General Santos City

*Environmental Waste Disposal Services: Sarangani Province (Main Report)
- Soil Erosion from the Agriculture Sector in Sarangani Province
- Waste Disposal Services for the Industrial Sector in Sarangani Province
- Pollution from the Household Sector in Sarangani Province
- Water Resources Assessment: Sarangani Province

*Environmental Waste Disposal Services: South Cotabato (Main Report)
- Soil Erosion from the Agriculture Sector in South Cotabato
- Waste Disposal Services for the Industrial Sector in South Cotabato
- Pollution from the Household Sector in South Cotabato
- Water Resources Assessment: South Cotabato

*** Out of copy available in SHELF.**

Appendix 2
LIST OF COUNTERPARTS, Nov. 1997-April 2000

Environmental Management Bureau (EMB), DENR
ENGR. NICANOR MENDOZA, Chief, Water Quality Section/Environmental Quality Mgt. Division
MR. WILFREDO BILLIONES, Engineer, Water Quality Section
MR. ALLAN LEUTERIO, Sr. Environmental Management Specialist, Water Quality Section
MS. CHARMION GRACE S. G. REYES, Environmental Management Specialist II, Environmental Impact Division
MS. MICHICO VENUS NAVALUNA, Supervising Environmental Mgt. Specialist, Water Quality Section
ENGR. CEASAR SIADOR, JR., Chief, Air Quality Section
ENGR. JEAN ROSETE, Sr. Environmental Management Specialist, Air Quality Section
MS. KAREN SHIH, Environmental Management Specialist II, Environmental Information Education Division
RENATO VENGCO, Water Quality Management Specialist

Ecosystems Research and Development Bureau (ERDB), DENR
FOR. CELSO DIAZ, Director
MR. JUAN EBORA, Science Research Specialist, Forest Ecosystem Research Division
FOR. LEVI FLORIDO, Chief, Grassland and Degraded Areas Ecosystem Division
MS. ENRIQUETA PERINO, Sr. Science Research Specialist, Grassland and Degraded Areas Ecosystem Division
MS. MERLYN RIVERA, Sr. Science Research Specialist, Upland Farm Ecosystem Division
MS. FLORITA SIAPNO, Science Research Specialist, Grassland and Degraded Areas Ecosystem Division

Forest Management Bureau (FMB), Economics Division, DENR
MS. MAYUMI QUINTOS, Chief
MR. ALEJANDRINO S. SIBUCAO, JR., Economist
MS. DOLORES R. CATINDIG, Supervising Forest Management Specialist
MS. AUREA P. LACHICA, Sr. Forest Management Specialist
MR. CELESTINO J. PABLO, Supervising Forest Management Specialist
MR. ALEX CHENG, Sr. Forest Management Specialist
MS. ALICIA L. CASTILLO, Sr. Forest Management Specialist
MS. ANNALISA V. JAVIER, Economist
MR. GENESIS J. FRANCISCO, Sr. Forest Management Specialist
MS. ALMA S. BELLO, Statistician
MR. EUGENE V. ESTRADA, Information Systems Analyst

Laguna Lake Development Authority (LLDA), DENR
MS. ALICIA BONGCO, Chief, Project Management Division
MS. DOLORA NEPOMUCENO, Chief, Planning and Project Development Division
MS. LEONOR POSERIO, OIC, Personnel Section/Administrative Division
MS. SORAYA SARMIENTO, Statistician, Planning and Project Development Division
MS. JOCELYN STA. ANA, OIC, Environmental Quality Mgt. Division
MS. MARISTEL ESPIRITU, OIC, Foreign and Locally Assisted Project
MR. JOSE E. SALANDANAN, Community Development Officer

Land Management Bureau (LMB), DENR
ATTY. ARTHUS TENAZAS, Chief, Land Administrative & Utilization Division
ENGR. FERNANDO VERBO, Engineer, Land Administrative & Utilization Division
MS. CORAZON CIRUNAY, Engineer, Land Administrative & Utilization Division
MS. CARMELITA DAYAG, Statistician, Land Administrative & Utilization Division
MR. ALEX ANDAL, Land Management Examiner, Land Administrative & Utilization Division
ENGR. VICTOR BALDE, Chief, Urban Land Mgt. Section
MR. RAINIER BALBUENA, Land Management Officer, Planning and Management Staff
MR. ELMO CABOTAJE, Economist, Planning and Management Staff
MR. REGINO CARREON, Staff, Survey Division
MS. ERMA GARCIA, Special Investigator, Office of the Director
MR. DANILO MEDINA, Administrative Division
MS. SHIRLEY NEJAL, Engineer, Geodetic Survey Division
MS. ALEX PASCUA, Chief, Planning and Management Staff
MS. EMMELYNNE TALABIS, Project Development Officer, Planning and Management Staff

MR. ARTURO VIRAY, Draftsman
ENGR. DANILO ANTONIO

Mines and Geo-sciences Bureau (MGB), DENR
MS. MARJORIE COLLADO, Statistician, Mineral Economics Division
MS. HELEN GADDI, Science Research Specialist, Planning and Policy Division
MS. TERESITA MAÑALAC, Development Management Officer, Mineral Economics Division
ENGR. JERRY SALVADOR, Sr. Science Research Specialist, Lands Geology Division
MS. CHERRY LIZ SOLIJON, Statistician, Mineral Economics Division
MS. EDNA TAMBASEN, Economist, Mineral Economics Division
ENGR. BENJAMIN DE VERA, Development Management Officer, Mineral Economics Division
ENGR. RODOLFO VELASCO, Engineer, Mineral Environmental & Safety Division
ENGR. DULCISIMO DOMINGO, Sr. Science Research Specialist, LGSD
ENGR. GERONIMO BADULIS, Jr., Supvg. SRS, MESD
ENGR. ANTHONY V. CLEMENTE LABORTE, Sr. Science Research Specialist, MGSD
ENGR. JEREMIAH GRATE, Economist II, MEIPD
MS. ALICIA S. ALICIA, HRMO III Adms.
ENGR. CONRADO R. MIRANDA, Supvg. SRS, MGD

Department of Environment and Natural Resources (DENR)
DR. NOEL PADILLA, Chief, Planning and Policy Studies Economic Affairs Office & PEENRA Unit
MS. LEONOR ARZADON, Dev't. Mgt. Officer, Planning and Policy Studies Economic Affairs Office
MS. RUBY BUEN, Development Mgt. Officer, Planning and Policy Studies Economic Affairs Office
MS. IMELDA MATUBIS, Development Mgt. Officer, Planning and Policy Studies Economic Affairs Office
MR. RAYMOND VIRGINO, Dev't. Mgt. Officer, Planning and Policy Studies Economic Affairs Office
MS. NELITA TABADA, Executive Assistant
MS. LOVELLA SEGAYO, Statistician, Planning and Policy Studies Economic Affairs Office
MS. NENITA ZABALA, Economist, Planning and Policy Studies Economic Affairs Office
FOR. ELEAZAR ELAIRA, Dev't. Mgt. Officer, Planning and Policy Studies Economic Affairs Office
MS. MELINDA CAPISTRANO, Planning Officer, Economic Affair Services
MS. BELLA NUÑEZ, Economist, Economic Affair Services
MS. NELIA VILLANUEVA , Information Technology Officer, Policy Formulation Division, PSS
MS. LIBERTY FERNANDEZ, Statistician, Planning and Policy Studies Economic Affairs Office
MS. MA. TERESA LEGASPI, Statistician, Planning and Policy Studies Economic Affairs Office
MS. LILIA RAFLORES, OIC, Planning Service
MR. YUL JOSE MALICSI, Computer Analyst, Management Information Systems Division
MR. NELSON GOROSPE, OIC, Research Studies Division
MS. CRISTINA PAULINO, OIC, Career Management Division

Protected Areas and Wildlife Bureau (PAWB), DENR
MR. CELESTINO ULEP, Assistant Director
MS. ANGELITA MENIADO, OIC, Biodiversity Division
MS. TERESITA BLASTIQUE, Sr. Environmental Management Specialist
MS. SARAH JANE CABRERA, Computer Programmer, Planning Division
MS. EVANGELINE CORCUERA, Statistician, Recreation Division

Natural Resources Management Program (NRMP), DENR
MR. ANSELMO CABRERA, Project Development Officer
MS. MOONYEEN MANRIQUE, Project Development Officer

Department of Health (DOH)
DR. CRISTY GALANG, Medical Specialist, Environmental Health Impact Division
ENGR. VICTOR MOLINA, Engineer, Environmental Health Impact Division

SOCSARGEN
MR. RENE PARABA, Provincial Planning and Development Coordinator, Alabel, Sarangani
MR. DANILO SUPE, Provincial Planning Development Coordinator, South Cotabato

Lingayen Gulf Coastal Area Management Commission
Gen. VALERIO PEREZ, Executive Director

Appendix 3
TRAININGS ORGANIZED BY ENRAP

1. Training-Workshop on the Valuation of the Environmental Impacts of Power Plants for NAPOCOR and DOE
   June 13-15 1997, NAPOCOR Bldg., cor. Agham Rd. and Quezon Ave., Diliman, Quezon City

2. ENRAP Policy Workshop for all DENR counterparts
   September 30, 1997, Manila Galleria Suites, Pasig City

3. Planning Workshop
   February 3, 1998, Cravings Restaurant, Katipunan Ave., Quezon City

4. Out-of-Town Planning-Cum-Training Workshop for LMB counterparts
   - introduced basic environmental economic concepts
   - discussed and composed detailed activities and strategies
   - established link with DENR Region XI

   April 20-25, 1998, Samal Island, Davao City

5. Training on Environmental Economics for Local Government Units
   April 20-29, 1998, Samal Island, Davao City

6. Training Workshop on Environmental Economics and Policy Development (EEPD) for all DENR Bureau Counterparts
   June 28 to July 11,1998, Punta Baluarte Resort, Calatagan, Batangas

7. Lecture-Training on Basic Statistics and Econometrics for PAWB-PPSO Counterparts
   July 30, 1998 and August 13, 1998, ENRAP Library, FMB Building, Visayas Ave., Quezon City

8. ENRAP-Sarangani Training Workshop on MIS-GIS for Sarangani Staff
   Sept. 14-23, 1998, Sarangani, Gen. Santos City

9. Training Workshop on Monitoring and Control of Land and Groundwater Contamination from Hazardous Wastes for DENR counterparts, staff and Regional Technical Directors.
   October 5-9, 1998, EDSA Byron Hotel, Boni Ave., Mandaluyong City

10. Training on Basic Benefit Cost- Analysis for LMB counterparts
    October 7, 1998, LMB Office, Escolta, Manila

11. Training on MS Office and Windows 95 for PPSO-PAWB counterparts
    October 16, 1998, PAWB Conference Rm., NAPWNC, North Ave., Quezon City

12. Hands on Training on data analysis for Paoay Lake Study for PAWB counterparts
    October 27, 1998, Off. of the Asst. Dir., NAPWNC, North Ave., Quezon City

13. DENR-Philippine Economic-Environmental and Natural Resources Accounting Planning Workshop for all DENR counterparts
    November 6, 1998, Cravings Restaurant, Quezon City

14. Hands on Training on data analysis for Hundred Islands National Park Study for PAWB counterparts
    November 19, 1998, ENRAP Office, Katipunan Ave., Quezon City

15. Environmental Technical Working Group Planning Workshop for EMB counterparts
    November 19-20, 1998, ADB-RRS Conference Rm. EMB, Quezon City

16. Training enumerators for NAPWNC and HTNP surveys for NAPWNC Staff, HTNP Staff and PAWB Staff
    December 4, 1998, PAWB Conference Rm., APWNC, North Ave.,. Quezon City

17. Hinulugang Taktak National Park Enumerators Training for HTNP PAMB members
    January 7,1999, Hinulugang Taktak, Antipolo Rizal

18. Training on Estimating Appropriate Fees for Protected Areas for PAWB Desk Officers
    January 27-30, 1999, Holiday Inn Hotel, Mimosa Clarkfield, Pampanga

19. Workshop on Draft Fee System Guidelines for NIPAP Staff, CPPAP Staff, PAWB and PPSO counterparts
February 1, 1999, PAWB Conference Rm., NAPWNC, North Ave., Quezon City

20. Training on Blackland Grass, ARC view and EPIC for ENRAP Staff
February 21-22, 1999, Splash Island, Los Baños, Laguna

21. 2nd Forest Products Price Monitoring System Workshop for FMB
March 3-5, 1999, Crown Peak, Subic

22. Consultation-Workshop on the Proposed Environmental User Fees (EUF) system for EMB, PPSO counterparts, LGUs of Bulacan and DENR Region III
March 9-12, 1999, Oasis Hotel, Angeles, Pampanga

23. ENRAP-Sarangani Component Assessment of Progress for ENRAP-Sarangani counterparts
March 10-12, 1999, Gen. Santos City

24. Environmental Users' Fee System Workshop for EMB counterparts
March 12-13, 1999, Oasis Hotel, Angeles City, Pampanga

25. Training of Enumerators for Mt. Arayat National Park
March 25, 1999, MANP, Pampanga

26. Workshop on Globalization and Environmental Issues for all DENR counterparts
April 7-8, 1999, Hotel Rembrandt, Tomas Morato Ave., Quezon City

27. Training on Fee System Guidelines for Luzon PASUs
May 17-21,1999, Lagos del Sol, Caliraya, Cavinti, Laguna

28. Environmental Accounting Training Workshop for all DENR forestry counterparts
May 17-23, 1999, AIM Conference Center, Baguio City

29. Writeshop on Forest Accounts Update for all DENR forestry counterparts
June 14-18, 1999, Lake Island Resort, Binangonan, Rizal

30. ENRAP-SHELF CD-ROM Alpha Release Usability Workshop for all DENR Bureau counterparts
July 11-14, 1999, Crown Peak Hotel, Subic Bay, Zambales

31. Visayas-Mindanao PASUs Training on Estimating Appropriate Fees for Protected Areas
July 19-23, 1999, Chali Beach Resort, Cugman, Cagayan de Oro City

32. Minerals Workshop for MGB counterparts
July 19-23, 1999, Monte Vista Resort, Los Baños, Laguna

33. ENRAP Assessment Workshop for all DENR Bureau counterparts
September 6, 1999, Celebrity Sports Plaza, Quezon City

34. Training on Statistical Analysis for EMB, PPSO counterparts
September 20-21,1999, ENRAP Library, DENR Compound, Visayas Ave., Diliman, Quezon City

35. Workshop on Environmental Damages for FMB counterparts
October 26, 1999, HRD, DENR, Visayas Ave., Diliman, Quezon City

36. Writeshop on Forest Accounts for all DENR forestry counterparts
November 3-5, 1999, Residence Inn, Tagaytay City

37. Training on Environmental Economics and Policy Development for EMB counterparts
November 24-26, 1999, Ann Raquel's Resort Hotel Subic, Zambales

38. Market Based Instruments Workshop for all DENR Bureau counterparts
December 3-4, 1999, Club Estancia, Tagaytay City

Appendix 4
DISCUSSION OF ENRAP/PEENRA DISCUSSION SERIES

Discussions on ENRA applications were organized by ENRAP in collaboration with the Department of Environment and Natural Resources (DENR). These sessions provided a venue for the counterparts to present research outputs and enhance their public presentation skills. In the process, researchers were able to solicit comments and suggestions from experts to improve research outputs. These sessions also increased awareness about ENRA applications among the concerned public.

1st DENR-ENRAP Discussion Series (18 September 1998)

"Government Share in IFMA"
"Economic Rent of Grazing Lands"

2nd DENR-ENRAP Discussion Series (29 October 1998)

"Environmental Accounting Systems: Focus on ENRAP and SEA Frameworks"

3rd DENR-ENRAP Discussion Series (12 November 1998)

"Formulation of Market-Based Instruments for Protected Areas"

4th DENR-ENRAP Discussion Series (10 December 1998)

"Pollution Charge System: Pilot Implementation in the Marilao River, Bulacan"
"Land Valuation/Appraisal System: Davao City Case Study Update"

5th DENR-ENRAP Discussion Series (18 February 1999)

"Negative Rents in the Mining Sector"
"Basic Estimation Tools and Methodologies"

6th DENR-ENRAP Discussion Series (22 April 1999)

"SUSDEV Information Systems"
"ENRAP Sarangani Progress Report and Related Activities"
"Concept of ENRAP Database"

7th DENR-ENRAP Discussion Series (16 June 1999)

"The Australian Experience on Solid Waste Management and Incineration"
"ENRAP Inputs to the Clean Air Act"

8th DENR-ENRAP Discussion Series (7 September 1999)

"Impact of ENRAP Studies on the State of the Gulf"
"Ecological Waste Management Program of Marilao"

ENRAP Consultants likewise provided inputs to various discussions on current natural resources and environmental issues:

- Forum on "Increasing the Competitiveness of Philippine Commercial Fishery
  July 31, 1998, Shangri-la EDSA Hotel, Mandaluyong City

- Round Table Discussion on RA 8435 on Forestry
  August 6, 1998, Forest Development Center, Los Baños, Laguna

- International Training on Integrated coastal Resource Management
  September 10, 1998, Great Eastern Hotel, Quezon city

- Round Table Discussion on Conflict in Forest Land Area Statistics
  September 28, 1998, Forest Management Bureau Conference Rm. DENR, Quezon City

- Round Table Discussion on Clean Air Act
  January 22, 1999, The Sulo Hotel, Quezon City

- Discussion on Proposed Log Ban
  January 29, 1999, ENRAP Office, Quezon City

- Discussion on Various Linkages
  February 8, 1999, Cravings Restaurant, Quezon City

- A Discussion on Clean Air Act Related Issues
  March 18, 1999, Manila Diamond Hotel, Manila

- Discussions on Forestry Bills
  March 23, 1999, NRMP Conference Room, DENR Compound, Quezon City

- Legal Discussion on Environmental User's Fee Draft- Implementing Rules and Regulations
  March 24, 1999, EMB Conference Rm., Topas Bldg., Kamias Rd., Quezon City

- Panel reactions to Clean Air Act proposals, Congress House PCCPD
  March 24, 1999, House Speaker's Conf. Rm.,House of Representatives, Batasan Hills, Q.C.

- Discussion on the Proposed Bill Creating a Department of Fisheries & Aquatic Resources
  May 6, 1999, PAWB Conference Rm. North Ave., Elliptical Rd. Q.C.

- "Agri-Kapihan" Panel Discussion on Food Security and Agricultural Research and Development Agenda"
  October 7, 1999, ACCI Auditurium, Up Los Baños, Laguna

- Congressional Committee on Means and Ways Hearing on House Bill No. 8621
  Re: Excise tax on the extraction of groundwater
  December 7, 1999, Hotel Rembrandt, Quezon City

Appendix 5
TRAININGS PROVIDED INPUTS AND ATTENDED BY ENRAP

1997

1. Current Directions in GOLD Environment Protocol Technical Assistance for Governance and Local Democracy (GOLD) Project
   January 30, 1997, CEC, Los Baños, Laguna

2. Seminar-Workshop on Market-Based Instruments: Planning for MBI Formulation to Promote the Sustainable Use of Environmental and Natural Resources, Bureaus with IEMSD-DENR
   January 31 to February 1, 1997, SEAMEO-INNOTECH, Diliman, Quezon City

3. Training on Environmental Course of Department of Interior and Local Government personnel
   February 6, 1997, Imus Sports Complex, Imus, Cavite

4. 58th National Convention of PIChE (Theme: the Chemical Engineer and Sustainable Development) for Philippine Institute of Chemical Engineers (PIChE)
   February 7, 1997, Grand MenSeng Hotel, Davao City

5. Top Level Dialogue to Protect Gold Triangle and its Seas for Earth Savers Movement
   February 7, 1997, Apo View Hotel, Davao City

6. Training-Workshop organized by the DSM Project, DOE and Environmental Defense Fund: On ELFIN (Electric Utility Production Cost and Financial Model)
   February 16, 1997, Dusit Manila Garden Hotel, Makati City

7. 41st PAEDA Annual Convention (Theme: Sustainable Agricultural Development strategies for the 21st Century)
   February 27, 1997, PCARRD, Los Baños, Laguna

8. Provincial Environmental Congress for Bulacan Provincial personnel
   March 4, 1997, Hiyas Bulacan Convention Center, Bulacan

9. Trainor's Training on Sustainable Development: Tools and Values for Localization for Batangas, Cavite, and Mindoro, by Earth Savers
   March 19, 1997, Capitol Training Center, Hilltop, Batangas City

10. Workshop on Strategic Objective 2 for Department of Energy
    August 20-23, 1997, Meralco Headquarters, Pasig City

11. DENR National Workshop for all DENR Offices
    October 22-24, 1997, Villa La Maja, Baguio City

12. Growth, Economic Inequality, and Poverty: What Happened to Mang Pandoy? For NEDA, DSWD, PIDS, UPSE, and Congress/ Senate Staffs
    December 10, 1997, Shangri-La Edsa Plaza Hotel, Pasig City

1998

13. Participation of ENRAP in Organizing the Philippine Association of Environmental and Resource Economics for Resources, Environment and Economics Center for Studies (REECS) with Economy and Environment Program for Southeast Asia (EEPSEA), January 21, 1998, Byron Hotel, Mandaluyong City

14. Governance and Local Democracy Project (GOLD) Conference
    January 27-29, 1998, Heritage Hotel, Pasay City

15. International Toxic and Hazardous Waste Congress,
    February 4-5, 1998, Philippine International Convention Center, Manila

16. Water Series Forum
    February 6, 1998, Innotech Bldg., Quezon City

17. Forest Resources Management Project (FRMP) Workshop
February 11-14, 1998, Cebu City

18. Presentation at the Workshop on Indigenous Knowledge Systems on Biodiversity Management and Conservation
March 4-6, 1998, Park Place Hotel, Cebu City

19. National Workshop on Coastal Zone Accounting and Resource Economics
March 31, 1998, Sulo Hotel, Quezon City

20. Training on Integrated Coastal Resource Management for CRMP/USAID to Local Government Units
June 22-23,1998, Dumaguete City

21. Second Program Policy Advisory Group of COE-CRM
July 16-17, 1998, Siliman University, Dumaguete City

22. Training on Integrated Coastal Resource Management for CRMP/USAID to Local Government Units
September 1998, Sarangani, Gen. Santos City

23. Lecture on Market Based Instruments (MBIs) in the Forestry Sector
September 21-22, 1998, Isabela State University, Cabagan, Isabela

24. Lecture on Valuation Methodologies and Cost-Benefit Analysis Framework
September 24-25, 1998, San Fernando, La Union

25. Lecture on ENRA and Resource Economics for IIRR International Training
September 28, 1998, Cavite City

26. PEENRA Institutionalization Workshop
September 29-30, 1998, EDSA Byron Hotel, Mandaluyong City

27. Environmental Strategy Workshop for United States Agency for International Development (USAID) Project Implementers, DENR and DA Offices
October 21-23, 1998, Plantation Bay Hotel, Cebu City

28. Environmental and Natural Resource Accounting (ENRA) Presentation to DTI-BOI
October 28, 1998, AVR Penthouse, Bureau of Investments, Makati City

29. Training on Integrated Coastal Resource Management for CRMP/USAID to Local Government Units
November 3-4, 1998, El Oriente Resort, Panglao Island, Bohol

30. Presentation of Philippine Economic-Environmental and natural Resources Accounting (PEENRA) to DENR Regional Directors and Control Office Personnel
November 27, 1998, Legaspi City, Albay

31. Symposium on Land Valuation Approach of Land Management Bureau for Private and Government Appraisers
November 27, 1998, Bayview Hotel, Roxas Blvd., Manila

32. NSCB/ Philippine Statistical Association: National Convention of Statisticians
December 3, 1998, Palawan Room, EDSA Shangri-la Plaza Hotel, Pasig City

33. Regional Technical Directors Conference on Lands Management Sector for LMS Regional Technical Directors
December 3-5, 1998, Puerto Princesa, Palawan

34. PIDS Training on Accounting for Sustainable and Social Development: Methods and Applications for Policy Analysis with Special Reference to Asia, for 30 management level officials in the government
December 11, 1998, Asian Institute of Management Conference Room, Makati City

35. Symposium on Biodiversity Conservation in the Philippines: Six Years After the Convention on Biological Diversity for Officials From Various Biodiversity Projects and Funding Agencies
December 28, 1998, Soil Museum, Bureau of Soils and Water Management, Elliptical Road, Quezon City

1999

36. 3rd Philippine International Toxic and Hazardous Waste Congress
    January 27-28, 1999, Holiday Inn Hotel, Makati City

37. Workshop on the Samar Island Biodiversity Project
    February 17-19, 1999, Tacloban City, Leyte

38. Training on Integrated Coastal Resource Management for CRMP/USAID to Local Government Units
    March 9, 1999, Carmen, Cebu

39. Natural Resources Management Program (NRMP) Workshop on Community Based Forestry Management Office (CBFMO)
    March 19, 1999, Hyatt Regency Hotel, Manila

40. Presented ENRAP highlights and lessons learned during the Institute of Small Scale Enterprises (ISSE) Workshop
    April 19, 1999, Cebu Plaza Hotel, Lahug, Cebu City

41. Participation in the National Consultation on Market-Based Instruments Workshop of Philippine Climate Change Mitigation Program (PCCMP)
    April 28-29, 1999, Lubang Ballroom, EDSA Plaza Hotel, Mandaluyong City

42. National Coastal Mayors' Conference
    May 27-28, 1999, Manila Midtown Hotel, Padre Faura St., Malate, Manila

43. Philippine Institute for Development Studies (PIDS) Workshop on Fuelwood
    June 8, 1999, Rm. 208, PIDS, NEDA sa Makati, Makati City

44. Metropolitan Environmental Improvement Project (MEIP) Final Workshop
    June 18, 1999, Via Mare Penthouse, Tektite tower, Pasig City

45. Forest Development Center (FDC) Annual Workshop
    June 29, 1999, FDC Office, Los Baños, Laguna

46. National Statistical Coordination Board (NSCB) Workshop
    July 20, 1999, EDSA Shangri-la Plaza Hotel, Mandaluyong City

47. Lecture on Environmental Natural Resource Accounting (ENRA)
    Aug. 11, 1999, De La Salle University, Taft Ave., Manila

48. Presentation of ENRA to the Annual Convention of the Society of Filipino Foresters, Inc.
    Aug. 27, 1999, Waterfront Hotel, Lahug, Cebu City

49. Training on Application Modeling and Simulation for Land Resources Productivity Prediction and Valuation to Ecosystem Research and Development Bureau (RDB) Staff
    September 27, 1999, ERDB Auditorium, Los Baños, Laguna

50. National Statistical Coordination Board Input-Output Accounts Forum
    Oct. 5, 1999, ACCEED Conference Center, Makati City

51. Agri-Kapihan Panel Discussion on Food Security and Agricultural Research and Development Agenda
    Oct. 7, 1999, ACCI Auditorium, UP Los Baños, Laguna

52. Training Course on Environmental Management in Development Planning for Orient Integrated Development Consultants, Inc. (OIDCI)
    October 19-22, 1999, CEC, Los Baños, Laguna

53. 4th Annual Seminar on Mini-Hydro Development for Various Agencies
    November 25-27, 1999, Philippine Village Hotel, Pasay City

Appendix 6
LIST OF INTERNATIONAL CONFERENCES

Paper Presentations

ASEAN – ENRA Team Leaders Meeting
Economy and Environment Program for Southeast Asia (EEPSEA/IDRC)
May 24-25, 1997, Hotel Grand Continental, Kuala Lumpur, Malaysia

International Symposium on "The Progress in Environment and Resource Accounting Approach – A Principle to the Global Environment Issues"
October 13-15, 1997, Shimane University, Matsue, Shimane, Japan.

ENRA " Presentation on ENRA during the Conference on East Asian Environmental and Resource Economic Policy" by Economy and Environment Program for Southeast Asia (EEPSEA/IDRC)
March 2-4, 1998, Institute of Economics, Academia Sinica, Taipei, Taiwan

9th Pacific Science Inter-Congress
November 16-17, 1998, 2/F, Academic Activity Center, Academia Sinica, Taipei, Taiwan

a. Full Accounting for Environmental Services: Contrasting the SEEA and ENRAP Approaches
b. Environmental and Natural Resources Accounting: Future Directions for ASEAN Countries
c. Fishery Resources Accounting in the Philippines: National and Local Applications
d. Soil Resources Depreciation and Deforestation: Philippines Case Studies

ENRAP presentations during The Economy and Environment Program for Southeast Asia (EEPSEA/IDRC) Biannual meeting
May 11-15, 1999, Ana Hotel, Singapore

a. Accounting for Environmental Services: Contrasting the SEEA and ENRAP Approaches
b. Analysis of Management Options: The Fisheries of Lingayen Gulf, Philippines
c. Design and Analysis of a Pollution Charge System for Industrial Water Pollution in the Philippines (Preliminary Report)

Participation

International Toxic and Hazardous Waste Water Congress by Asian Expo.
February 4-5, 1998, Philippine International Convention Center, Manila

Conference on Tropical Forests and Climate Change for UP Los Baños College of Forestry
October 19-22, 1998, AIM ACCESS bldg., Makati city

Conference on Forest Management Devolution and Decentralization of Forest Management in Asia and the Pacific by Natural Resources Management Project (NRMP)
December 1-5, 1998, Davao City

3rd Philippine International Toxic and Hazardous Waste Congress by Asian Expo.
January 27-28,1999, Holiday Inn Hotel, Makati City

8th International Philippine Water '99 Conference by Asian Expo
October 5-8, 1999, Holiday Inn Resort, Angeles Pampanga

World Wildlife Fund for Nature Training/Workshop
July 26-30, 1999, Kunming, China

Appendix 7
ENRAP TEAM

1. PROJECT MANAGEMENT, IRG

DR. MARIAN S. DELOS ANGELES
Project Leader
International Resources Group, Ltd. (IRG)

DR. JOSE PADILLA
Deputy Project Leader
Resources, Environment and Economics Center for Studies, Inc. (REECS)

MR. JUAN SÉVE
Project Supervisor
International Resources Group, Ltd. (IRG)

MS. GENE LUNA
Administrative Associate
International Resources Group, Ltd. (IRG)

2. DR. HENRY PESKIN, **Project Advisor**
Edgevale Associates (EA)

3. CONSULTANTS, REECS

DR. PORFIRIO ALIÑO
MS. MA. EUGENE BENNAGEN
ENGR. ROGELIO M. FAMINIALAGAO
DR. HERMINIA FRANCISCO
ENG. FLORENCIO F. LAZAGA
MS. NOELA LASMARIAS
DR. ROSARIO MANASAN
DR. LIANA T. MCMANUS
DR. ERLINDA MEDALLA
DR. MARIE ANTOINETTE J. MEÑEZ
MR. EMMANUEL MIRAFLORES
ATTY. ROBERTO OLIVA
MS. ELVIRA ORBETA
DR. NICOS PEREZ
MS. LORETA RUFO
ENGR. CARLITO RUFO, JR.
DR. TEODORO SANTOS

4. Research Support, REECS

MS. LEONORA CASTRO, Research Associate
MR. JOSE ALVIN CATALAN, Research Associate
DR. LEAH CUYNO, Executive Associate
DR. ARLENE INOCENCIO, Research Associate
MR. BENEDICT JULIANO, Research Associate
MR. ALVIN MORALES, Research Associate
MS. RINA MARIA P. ROSALES, Research Associate

MS. MARY GRACE ALINDOGAN, Research Assistant
MS. JANET ARLENE AMPONIN, Research Assistant
MR. ALVARO CALARA, Research Assistant

MS. ADELE CASORLA, Research Assistant
MR. JAYSON CASORLA, Research Assistant
MS. DONNA TERESA RAMIREZ, Research Assistant
MS. VENUS ROXAS, Research Assistant
MR. AURELIO CALIENTE, JR., Data Encoder

5. Administrative Support, REECS & IRG

MR. BERNARDO BATAYOLA
MS. MARIE SANDRA BENITO
MR. JOSELITO CORRO
MR. BIENVENIDO DOTILLOS
MS. SHIRLEY LLAGAS
MR. VICTOR ORTIZ
MS. GIRLITA RUTA

5. Foundation for Rural Institutions, Economics and Development (FRIEND) Inc.

DR. FERMIN D. ADRIANO
Project Coordinator

DR. JOSE M. YOROBE, JR.
Deputy Project leader

Staff

MR.DAVID LLORITO
MR. ALLAN BORRA
MS. ROSALIA AZUCENA
MS. NOEMI BATANGANTANG
MR. JOEL ADRIANO
MS. CRISTINE DIZON
MS. MARY ANN REYES
MS. MARINA FRIAS

Appendix 8
LIST OF ALL REPORTS, PHASES I - III

Phase I (1991-1992):

Published

Main Report
Executive Summary

Unpublished
Technical Reports

Dipterocarp Forest Resources Accounting
by: T. Balangue

Mangrove Forest Resources Accounting
by: E. Bennagen and D. Cabahug, Jr.

Natural Pine Forest Resources Accounting
by: A. Carandang, I. Pabuayon and N. Manalo

Plantation Forest Resources Accounting
by: A. Carandang, I. Pabuayon and N. Manalo

Rattan Resources Accounting
by: I. Pabuayon

Economic Aspects of Forest Policies
by: M. delos Angeles and E. Bennagen

Natural Resources Accounting Information Systems (NRAIS)
by: E. Benigno and W. Cabezon

Natural Resources Accounting and the System of National Accounts
by. G. de Guzman

Valuation Framework for Natural Resources
by. H. Francisco

Valuation Methodologies for Philippine Wildlife and Protected Areas
by: I. Pabuayon

Bamboo Resources Accounting
by. E. Bennagen

Phase II (1992-1994):

Published

ENRAP II: Main Report
Executive Summary
Proceedings – International Workshop on the Contribution to Policy of Environmental and Natural Resource Accounting

Technical Appendices

Estimation of Direct Environmental Waste Disposal Services
by: E. Orbeta

Estimation of Environmental Damages
by: M. C. Ebarvia

Estimation of Philippine Direct Nature Services
by: L. Ygrubay

Fishery Resources Accounting in the Philippines: Small Pelagics Fishery
by: J. Padilla and F. de Guzman

Upland Soil Resources: Resource Assessment and Accounting
by: H. Francisco

Depletion Concepts and Application to the Copper and Gold Industries
by: T. Santos

Input-Output Modeling
by: M. N. Mendoza

An Assessment of Land Resources and Land Use
by: C. Cabrido, Jr. and E. Samar

Economic Framework for Land Use Decision-Making: Cost-Benefit Analysis
by: C. Carbrido, Jr. and E. Samar

Economic Framework for Land Use Decision-Making: Linear Programming
by: J. Padilla and M. delos Angeles

Towards Institutionalization of Environmental and Natural Resources Accounting
(A Five Year Period Project Proposal)
by: National Statistical Coordination Board

Phase III (1994-1996)

Published

ENRAP III: Main Report
IRG, USAID, EA, REECS and DENR

Unpublished (Technical Reports)

Policy Studies (Volume I)

Input-Output Modeling
by: Ma. N. Mendoza

Costs. Benefits and Efficiency: An Economic Analysis of Gasoline-Lead Reduction in the Philippines
by: J. Logarta, Jr.

Implications of a "Collapse" in the Philippine Small Pelagic Fisheries
by: J. Padilla and A. Cortez

Exploring the Environmental Impacts of Attaining Rice Self-sufficiency
by: C. Reyes and R Barba

Pollution in the Philippine Piggery Industry
by: E. Orbeta and A. Calara

Trade and Environment Linkages
by: E. Medalla and P. Intal, Jr.

Exploring Economic Instruments for Improving Environmental and Natural Resource Management
by: R. Manasan

A Linear Programming Exercise for Exploring Land Use and Environmental Concerns
by: M. delos Angeles and J. Padilla

Sectoral Studies (Volume II)

ENRAP Sectoral and Regional Studies on Pollution (Integrative Report)
by: E. Bennagen and Research Staff

Pollution from Integrated Livestock and Poultry Products Industry
by: A. Calara and E. Orbeta

The Metallic Mining Industry
by: A. Indab

The Tuna Canning Industry
by: A. Indab

The Coconut Oil Refining Industry
by: Y. Yacat

The Rice and Corn Milling Industry
by: Y. Yacat

The Flour Milling and Bakery Industries
by: Y. Yacat

The Sugar Milling Industry
by: A. Indab

The Desiccated Coconut Industry
by: J. B. Chupungco

The Beer Industry
by: R. C. Barba

The Leather Tanning Industry
by: J. B. Chupungco

The Wood and Wood Products Industry
by: J. B. Chupungco

The Pulp and Paper Industry
by: J. B. Chupungco

The Fertilizer and Pesticide Industries
by: Y. Yacat

The Paint and Varnish Industry
by: Ma. D. Baulita

The Portland Cement Industry
by: A. M. Buenaventura

Pollution from the Household Sector
by: A. Calara and E. Orbeta

Regional Studies (Volume III)

Air Pollution Dispersion Modeling for Metro Cebu
by: E. Anglo

Pollution Loads and Impacts Estimation at the Local Level (Metro Cebu)
by: J. Logarta, Jr. and A. Buenaventura

Estimation of Groundwater Resource Depreciation in Metro Cebu's Coastal Aquifer
by: J. Logarta, Jr.

Region XI Policy Simulation Study: Application of ENRA Framework
by: E. Orbeta, A. Cortez and A. Calara

Refinement of Accounts (Volume IV)

The Estimation of Environmental Protection Costs
by: H. Peskin

Depreciation of Environmental Assets
by: H. Peskin

Valuation of Direct EWDS (Refinement of 1988 Estimates and 1992 Update)
by: E. Orbeta and A. Indab

Health Damages from Air and Water Pollution (A Re-estimation)
by: A. Cortez, J. Logarta, Jr. and E. Bennagen

Environmental Damages from Water Pollution:1988 Refinements and 1992 Estimates
by: A. Buenaventura, Ma. C. Ebarvia and A. Meñez

Biomass Energy in Environmental and Natural Resources Accounting: Adjustment to Earlier Estimates
by: J. Logarta, Jr.

Mineral Depreciation in the Philippines: An Update
by: J. Logarta, Jr., Z. Abenoja and Y. Yacat

Appendix Table 9
The ENRAP Conference on Resource Accounting and Policy

PRESENTOR/SPEAKER	DESIGNATION	TOPIC
Usec. Ramon Paje	Undersecretary for Policy and Technical Services Department of Environment and Natural Resources, (DENR) PHILIPPINES	Welcome and Opening Remarks
Dr. Patricia K. Buckles	Mission Director United State for International Development (USAID) USA	Message
PLENARY SESSION Day 1 (Morning Session)		
Dr. Henry M. Peskin	Project Supervisor, ENRAP President, Edgevale Associates, USA	Environmental Accounting: The Theoretical Foundations of ENRAP
Dr. Kimio Uno	Dean Faculty of Policy Management Keio University, Fujisawa, JAPAN	Discussant
(Afternoon Session)		
Dr. John M. Hartwick	Professor Department of Economics Queens University, Ontario, CANADA	Deforestation and Economic Development
Dr. Piyasena Abeygunawardena	Sr. Economist for Environment Energy Division, (East) Asian Development Bank, PHILIPPINES	Discussant
Mr. Juan E. Séve	Project Supervisor, ENRAP Sr. Manager, Environment and Natural Resources International Resources Group, Ltd. (IRG) USA	Discussant
PANEL DISCUSSION		
Dr. David McCauley	Director for Asian Region International Resource Group, Ltd. (IRG) East West Center (EWC), Hawaii, USA	Moderator
Dr. Joy Hecht	Coordinator, Green Accounting Initiative International Union for the Conservation of Nature (IUCN) World Conservation Union, Washington, D.C, USA	ENRA Experience: Lessons from Various Initiatives
Dr. Khalid Abdul Rahim	Associate Professor Department of Natural Resource Economics Universiti Putra Malaysia, Selangor, MALAYSIA	ASEAN ENRA Application/Experience
PLENARY SESSION Day 2 (Morning Session)		
Dr. Marian S. delos Angeles	Project Leader, ENRAP International Resources Group. Ltd. (IRG) USA	Overview of ENRAP Applications

CONCURRENT SESSIONS

Session I	***Environmental Management Bureau, DENR,***	***Brown Environmental Resources: Air and Water***
Engr. Peter Anthony A. Abaya	Director Environmental Management Bureau (EMB), DENR PHULIPPINES	Session Chair
Engr. Nicanor E. Mendoza	Chief, Water Quality Management Section Environmental Management Bureau (EMB), DENR	Proposed Wastewater Discharge Fees
Dr. Noel O. Padilla	Chief, Planning and Policy Studies Office Department of Environmental and Natural Resources (DENR)	Air Pollution from Motor Vehicles: Control Options
Engr. Cesar S. Siador, Jr.	Project Director Air Quality Improvement Sector Environmental Management Bureau (EMB), DENR	Air Pollution from Motor Vehicles: Control Options
Mr. Rogelio U. Uranza	Asst. General Manager for Operations Metropolitan Manila Development Authority (MMDA) PHILIPPINES	Discussant
Atty. Sylvia Correa	International Lead Program Manager Office of Environmental Activities U.S. Environmental Protection Agency (US-EPA), USA	Discussant
Session II	***1. Protected Areas and Wildlife Bureau (PAWB), DENR*** ***2. Ecosystems Research and Development Bureau (ERDB), DENR***	**Green Fees: Grassland and National Parks**
For. Reynaldo C. Bayabos	Director Protected Areas and Wildlife Bureau (PAWB), DENR	Session Chair
Dr. Ma. Theresa Mundita S. Lim	Assistant Director Protected Areas and Wildlife Bureau (PAWB), DENR	Formulation of Economic Instruments for the Management of Protected Areas in the Philippines
Ms. Angelita P. Meniado	OIC, Biodiversity Division Protected Areas and Wildlife Bureau (PAWB), DENR	Formulation of Economic Instruments for the Management of Protected Areas in the Philippines
Ms. Teresita T. Blastique	Sr. Supervising Ecosystem Management Specialist Protected Areas and Wildlife Bureau (PAWB), DENR	Formulation of Economic Instruments for the Management of Protected Areas in the Philippines
Dr. Supachit Manopimoke	Faculty of Economics Thammasat University, Bangkok, THAILAND	Discussant
For. Celso P. Diaz	OIC- Director Ecosystems Research and Development Bureau (ERDB) DENR	Session Chair

Ms. Merlyn N. Rivera	Sr. Research Specialist Ecosystems Research and Development Bureau (ERDB)	Pricing of Grassland resources in the Philippines: Rent, Grassland Degradation and Rehabilitation and Alternative Land Uses
Mr. Moises K. Espinosa, jr.	Secretary Masbate Cattle Raisers Association of the Philippines	Discussant
Session III	***1. Forest Management Bureau (FMB), DNER*** ***2. Mines and Geo-sciences Bureau (MGB)***	***Accounts Development: Selected Works***
For. Al-Rashid H. Ishmael, Al Hadj	Director Forest Management Bureau (FMB), DENR	Session Chair
For. Mayumi Ma. Quintos	Chief, Forest Management Specialist Forest Management Division, FMB, DENR	Forest Resources Accounting and Options Analysis
Ms. Moonyeen S. Manrique	Project Development Officer Natural Resource Management Program- Program Support Office, DENR	Forest Resources Accounting and Options Analysis
Engr. Edwin Domingo	Assistant Director Mines and Geo-sciences Bureau (MGB) DENR	Session Chair
Engr. Benjamin M. de Vera	Chief, Mineral Economics, Information and Publication Mines and Geo-sciences Bureau (MGB)	Mineral Accounts
Dr. Jose E. Padilla	Deputy Project Leader, ENRAP Resources, Environmental and Economics Center for Studies (REECS), PHILIPPINES	Sub-National Accounting: Studies on Lingayen Gulf
PLEANRY SESSION Day 2 (Afternoon Session)		
Mr. Sabado T. Batcagan	Asst. Secretary for Planning and Policy Studies Department of Environment and Natural Resources (DENR) PHILIPPINES	Session Chair
Dr. Marian S. delos Angeles	Project Leader, ENRAP International Resources Group. Ltd. (IRG) USA	The Philippine Experience in Retrospect
Dr. Michael J. Yates	Chief, Office of Environmental Management United States for International Development Agency (USAID), USA	Perspective on ENRAP
Dr. Romulo A. Virola	Secretary-General National Statistical Coordination Board, NEDA PHILIPPINES	Perspective on ENRAP
Usec. Ramon Paje	Undersecretary for Policy and Technical Services Department of Environment and Natural Resources, (DENR) PHILIPPINES	Presentation of Draft Executive Order and Legislation on PEENRA and Resource Pricing to top government officials and representatives from Congress
Cong. Loreta Ann Rosales	Congresswoman, AKBAYAN Member, Committee on Local Government Member, Committee on Electoral Reforms	Acceptance Speech
Cong. Nerius Acosta	Congressman, LAMP Chairman, Committee on Environment	Acceptance Speech

Note: The conference were also featured PEENRA/ENRAP's accounts development and institutionalization outputs through displays/poster presentations.

Appendix Table 10
ENRAP INVENTORY OF OFFICE FURNITURES/NON-EXPENDABLE EQUIPMENT
As of February 29, 2000

Qty	Description	Code No.	Date Purchased	Unit Cost	Total Cost	Supplier	Turnover to: (Units)	
COMPUTERS/EQUIPMENTS								
11							9	DENR
2	IBM Desktop 486K	CE-D-001-002			-		2	DENR
4	Dell Desktop Pentium 1, 133Mhz	CE-D-003-006	06-Aug-96	67,750.00	271,000.00	Optimum Technology	3	DENR
							1	ENRAP Lib/SAMBIO
1	Dell Desktop Pentium 1, 133Mhz	CE-D-007	01-Oct-96	67,750.00	67,750.00	Optimum Technology	1	DENR
2	Micron Desktop Pentium 1, 166 Mhz	CE-D-008-010	31-Oct-97	79,500.00	159,000.00	Tri-Smart Computers	2	DENR
1	Micron Desktop Pentium 1, 166 Mhz w/ 4 GB HD	CE-D-008-010	31-Oct-97	79,500.00	79,500.00	Tri-Smart Computers	1	SAMBIO
1	Dell Optiplex G1L 300 Mhz w/ext. modem	CE-D-011	26-Sep-98	76,370.00	76,370.00	Accent Micro Technologies	1	SAMBIO
	Notebook Computer							
1	Texas Inst. Notebook Pentium 1, 133 Mhz	CE-N-001	22-Jun-98	55,000.00	55,000.00	Entry Data Point	1	USAID
1	Toshiba Notebook, Pentium 1, 200 Mhz	CE-N-002	22-Jun-98	120,000.00	120,000.00	Tri-Smart Computers	1	SAMBIO
1	Toshiba Notebook, Pentium 1, 233 Mhz	CE-N-003	Jun-98		$3,416.98	PC Zone	1	SAMBIO/REECS
	Printers						3	DENR
1	HP Laserjet 6L Printer	CE-P-001	13-Jun-97	14,500.00	14,500.00	ABC Computer Co.	1	DENR
1	HP Laserjet 5P Printer	CE-P-002	17-Jul-96	28,000.00	28,000.00	Royal Erb, Inc.	1	DENR
1	HP Deskjet 850C Printer	CE-P-003	07-Aug-96	16,000.00	16,000.00	Royal Erb, Inc.	1	DENR
	AVR						3	DENR
4	AVR Knight 500W, Micropac	CE-AVR-001-004	07-Nov-97	650.00	2,600.00	Tri-Smart Computers	1	DENR
3	AVR Knight 500W, Ultra Sleek	CE-AVR-005-007	15-Oct-96	700.00	2,100.00	ABC Computer Co.	1	DENR
1	AVR Power Grid	CE-AVR-008	12-Sep-97	670.00	670.00	Archos	1	DENR
	Scanner						1	DENR
1	Microtek Scanner	CE-S-001	13-Jun-97	10,000.00	10,000.00	ABC Computer Co.	1	DENR
	Network						9	SAMBIO
1	3 COM 12 Port Stackable Hub	CE-NW-001	03-Nov-98	17,500.00	17,500.00	c/o D. dela Cruz	1	SAMBIO
8	3COM Ethernet LAN Card TPO (PCI)	CE-NW-002-009	03-Nov-98	3,200.00	25,600.00	c/o D. dela Cruz	1	SAMBIO
	Softwares						1	DENR
1	LIMDEP Version 7.0/W PC Single User		16-Mar-98	$695	$695	Econometric Software, Inc.	1	SAMBIO
1	NLOGIT Version 2.0/W PC Single User		16-Mar-98	$229	$229	Econometric Software, Inc.	1	SAMBIO
1	SPSS for Windows Base 7.5		08-May-98	81,000.00	81,000.00	ACRE	1	SAMBIO
1	SPSS for Windows Dvanced Statistics 7.5		08-May-98	51,810.00	51,810.00	ACRE	1	SAMBIO
1	MS Office 97		21-Jun-98	23,500.00	23,500.00	Electroworld	1	DENR
1	Blackland Grass		27-Jul-98	$500	$500	Texas Agricultural Exp.	1	SAMBIO
1	MS Frontpage 98		21-Apr-99	6,890.00	6,890.00	Microphase	1	SAMBIO
1	MS97 PRO Upgrade to Developer Edition		04-May-99	22,420.00	22,420.00	Microphase	1	SAMBIO
1	Visual Basic PRO 610 WIN 32 English		28-Jun-99	21,400.00	21,400.00	Microphase	1	SARANGANI
	Hardware						2	DENR
1	Philips CD Rom Drive	CE-Oth-001	13-Jun-97	3,500.00	3,500.00	ABC Computer Co.	1	DENR
1	Zip Drive Parafel	CE-Oth-002	15-Oct-96	6,150.00	6,150.00	Silicon Valley	1	SAMBIO
1	Modem	CE-Oth-003	03-Jun-96	9,138.38	9,138.38	Singapore	1	not functioning
1	Pdisk #Millenium		31-Jul-99	$109.95	$109.95	PC Connection, Inc.	1	SAMBIO
1	HP Surestore CD Writer Plus 8100I		21-Apr-99	17,200.00	17,200.00	Microphase	1	DENR
1	HP Surestore CD Writer Plus 8200I		Dec 99	12,980.00	12,980.00	Microphase	1	SAMBIO
	Video/Communications Equipment						2	DENR
1	Multimedia Projector	VCE-P-001	19-Jun-98	310,650.00	310,650.00	Juneau Industrial	1	DENR
1	Fax Machine	VCE-FM-001	13-Aug-97	17,500.00	17,500.00	Jade Philippines	1	DENR
	Other Equipments						2	DENR
1	Bindermax	OE-001	24-Jun-98	16,500.00	16,500.00	OfficeA1Superstore	1	DENR
1	Fire Extinguisher	OE-002	12-Sep-96	2,157.00	2,157.00	Fyrelin Industries	1	DENR

Qty	Description	Code No.	Date Purchased	Unit Cost	Total Cost	Supplier	Turnover to: (Unit/s)	
FURNITURES							40	DENR
1	Executive Desk	OF-ED-001	11-Jun-96	3,060.00	3,060.00	Abenson	1	SAMBIO
5	Office Desk	OF-OD-001-005	26-Jul-96	1,800.00	9,000.00	Abenson	5	DENR
9	Office Desk	OF-OD-005-014	11-Jun-96	1,800.00	16,200.00	Abenson	5	DENR
							4	SAMBIO
24	Blue office chairs	OF-RC-001-024	11-Jun-96	919.00	22,056.00	Abenson	5	SAMBIO
							19	DENR
1	Blue office chair with arm	OF-RC-025	11-Jun-96	1,855.00	1,855.00	Abenson	1	SAMBIO
3	Computer Tables	OF-CT-001-003	05-Nov-97	2,995.00	8,985.00	Shoe Mart	3	SAMBIO
2	Computer Tables	OF-CT-004-005	05-Nov-97	3,000.00	6,000.00	Great Lakes	2	DENR
1	Computer Table	OF-CT-006	01-Apr-98	2,975.00	2,975.00	Accent Micro	1	DENR
2	Computer Table	OF-CT-007-008	17-Aug-98	3,100.00	6,200.00	Microstation	2	DENR
14	Grey, metal Shelves	OF-S-001-014	25-Jul-96	1,780.00	24,920.00	EDSA Furnitures	7	DENR
							7	SAMBIO
3	Grey, metal Shelves	OF-S-015-017	20-Feb-98	2,000.00	6,000.00	EDSA Furnitures	3	DENR
3	Wooden bookshelves						3	SAMBIO
2	4 drawer steel filing cabinet	OF-FC4-001-002	05-Aug-96	2,430.85	4,861.69	ACME Steel	2	SAMBIO
1	4 drawer steel filing cabinet	OF-FC4-003	16-Aug-97	3,100.00	3,100.00	Sogo	1	DENR
1	2 drawer steel filing cabinet	OF-FC2-001	27-Apr-98	3,200.00	3,200.00	Automatic Center	1	SAMBIO
1	4 drawer steel filing cabinet	OF-FC4-004	21-Nov-96	2,430.84	2,430.84	ACME Steel	1	DENR
1	4 drawer steel filing cabinet	OF-FC4-005	14-Feb-97	2,430.85	2,430.85	ACME Steel	1	DENR
1	4 drawer steel filing cabinet	OF-FC4-006	08-Jan-99	2,899.00	2,899.00	ACME Steel	1	DENR
1	2 drawer movable filing cabinet	OF-FC2-002	08-Nov-97	2,950.00	2,950.00	EDSA Furnitures	1	DENR
10	Soliya chairs	OF-WC-001-010	25-Jul-96	420.00	4,200.00	EDSA Furnitures	10	SAMBIO
							7	SARANGANI
SARANGGANI OFFICE							2	SARANGANI
2	Office Desk		13-Oct-98	5,390.00	10,780.00	Progress	2	SARANGANI
2	Clerical Chair		13-Oct-98	2,900.00	5,800.00	Progress	1	SARANGANI
1	Open Storage Unit		13-Oct-98	3,613.00	3,613.00	Progress	1	SARANGANI
1	Cabinet with Sliding Door		13-Oct-99	4,934.00	4,934.00	Progress	1	SARANGANI
1	Kickplate		13-Oct-99	734.00	734.00	Progress		

84