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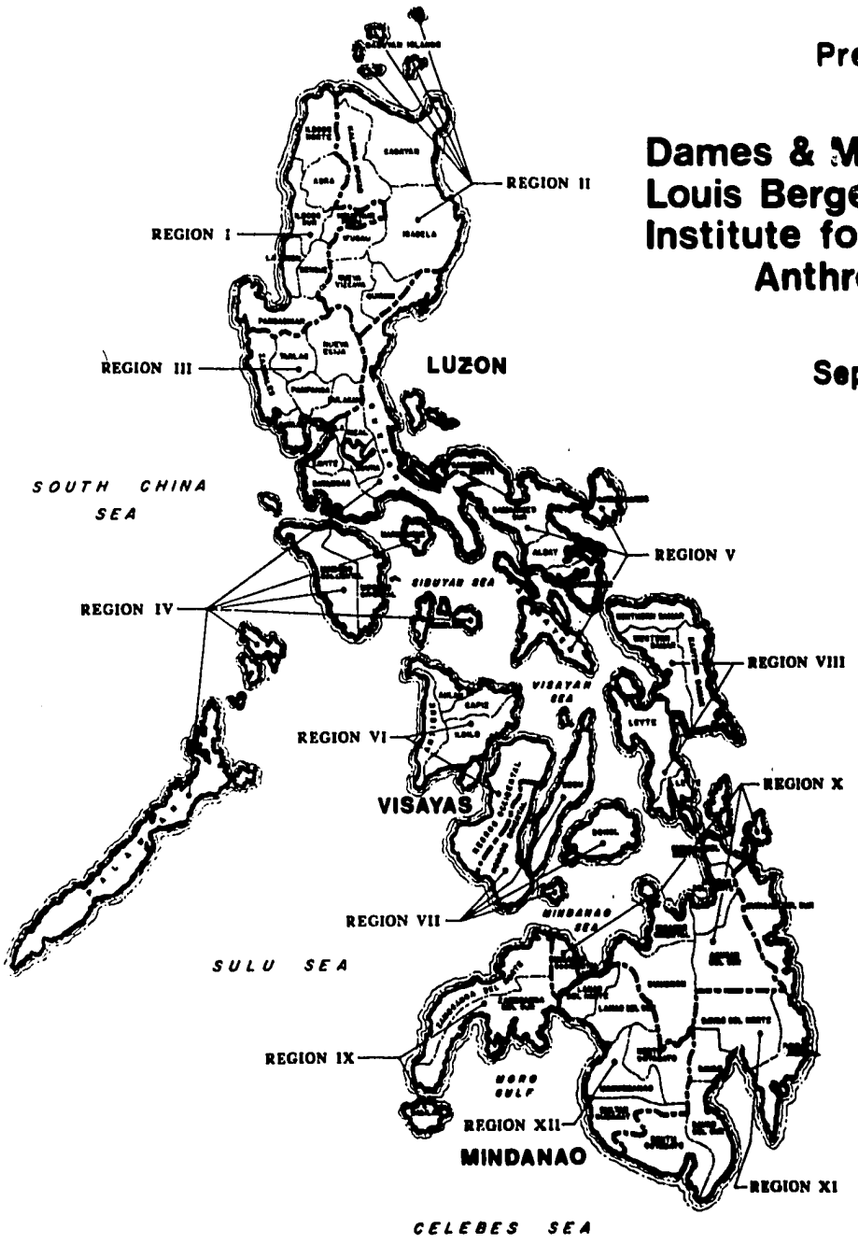
SUSTAINABLE NATURAL RESOURCES ASSESSMENT - PHILIPPINES



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Dames & Moore International
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Institute for Development Anthropology

September 1989

United States Agency for International Development
Manila, Philippines

SUSTAINABLE NATURAL RESOURCES ASSESSMENT - PHILIPPINES

A review of the present status with recommendations for future directions

September 1989

Prepared for:

United States Agency for International Development
Manila, Philippines

Prepared by:

A Joint Venture of Dames & Moore International (Lead Firm)/
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Filipinos, both on their own and with foreign assistance, have already developed many policies, institutions and plans and initiated actions in the areas of sound environmental management and sustainable natural resources development. This is, therefore, not so much a task of selecting between lighting candles or cursing the darkness. Rather, it is a matter of overcoming the dire shortage of matches, wax and string needed to spread the existing flickers of light into a generally brighter future.

This report is dedicated to the memory of **Dr. Thomas B. Scanland**, our friend, colleague, and Team Leader, who died at the end of the assessment. His concern for the Philippines, its people and environment guided the team and, together with his professionalism, are conveyed throughout this report.

PREFACE

The Government of the Philippines (GOP) has recognized within its existing policies the relationship among sustainable development, poverty alleviation and sound environmental management, as well as the importance of maintaining its remaining biodiversity [1,2]. These issues were recently reiterated in President Aquino's July 24, 1989 State of the Nation Address [3].

The relationships among the environment, sustainable natural resources development and biodiversity maintenance have also been recognized and formulated into policy by USAID [4]. The USAID Mission to the Philippines has developed as significant strategy areas for assistance: (1) decentralization of public sector planning, decision making and implementation, especially for rural sector assistance and poverty alleviation; (2) diversification of employment, particularly toward assisting in generating additional and alternate rural employment opportunities; and, (3) improved management of natural resources to halt and reverse the growing tide of increasing rural poverty and environmental degradation [5,6,7]. These strategy areas are all compatible with priority Philippine Government initiatives [3].

At the donor coordination Consultative Group Meeting for the Philippines held in Tokyo on July 3-5, 1989, the importance of more effective natural resource management and conservation were among key themes included in the presentations on the Multilateral Assistance Initiative/ Philippine Assistance Program (MAI/PAP) [8,9,10]. In order to more effectively assist in channelling MAI/PAP funds for the natural resources sector, USAID formulated a scope of work and contracted for a summary status review and recommendations for future directions in sustainable natural resources development and biodiversity maintenance in the Philippines.

This report is a product of that contract. It represents the results of a brief (four weeks for most team members) and intensive overview of a very broad subject area. Included as central subjects in keeping with our terms of reference are the potentially renewable natural resources of public and private land's, forestry, sustainable upland and lowlands agriculture, soils, coastal zone resources (including coastal fisheries, aquaculture, and mangroves) and general biodiversity.

These natural resource areas are not only strongly internally linked, they are governed by an array of externalities which, though not explicitly within our terms of reference, nonetheless require consideration due to the magnitude of their influence on the core subject area. Foremost among these are population size and growth, water quality/quantity management and the broad area of environmental assessment, planning and management.

These are areas of intensive current interest to both Philippine institutions and donor organizations. As such, they are areas of active and overlapping research and of active change both in the availability of new data and the initiation of new activities. This report offers a snapshot. A voluminous array of reports, programs and data has been sifted and combined with extensive interviews with people in the Philippine public sector, non-government organizations (NGO's) and private sector and with donor and multinational NGO organizations. There is much more that we have not seen and new work is on going.

Although multiple source checking has provided some measure of corroboration of some of the data base, very little is well verified and much is not verifiable given currently available data (e.g., the latest population census data are from 1980). We have source referenced the data used and provided our subjective evaluations of their reliability where a basis for judgement was available. The need for reliable monitoring data is a theme woven through many of our recommendations.

The report is organized into four distinct parts. This context setting preface material is followed by an Executive Summary. The table of contents and body of the report follows next. The final section is comprised of the annexes, most of which are the individual investigator's sectoral reports. The body of the report is a synthesis of the separate sectoral reports; the Executive Summary is a distillation of that synthesis. The recommendations in the synthesis report have been prioritized largely by team concensus. Within each sectoral report, that sector's priorities are also expressed and the recommendations presented in greater detail.

The process by which the team arrived at its recommendations and the linkages between the sectors and inputs from the areas external to the core study are illustrated in Figure P-1. The team could not have arrived in such a short time at its recommendations without the considerable, patient and wholly open assistance of the

Figure P-1 Logical Framework for Philippine Natural Resources Assessment

Objective: Prepare recommendations for priority assistance to support sustainable natural resources development and maintenance of ecological stability.

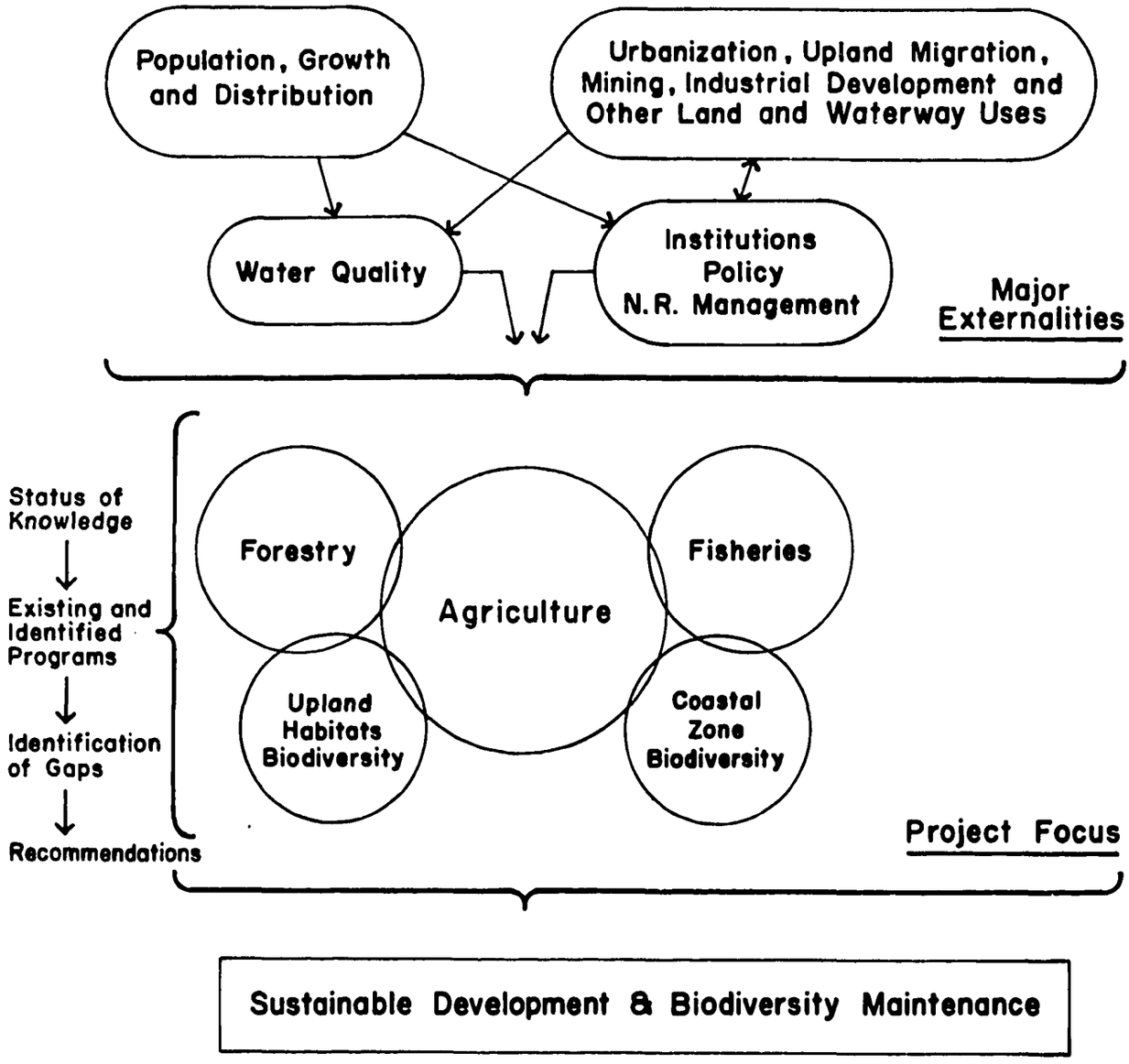


Figure P-1

numerous outstanding individuals who made their valuable time available to us throughout our term of contract. It is hoped that this report will help lead us all toward our common and critical goals.

EXECUTIVE SUMMARY

The sustainable natural resource base of the Philippines has become so depleted and degraded that the country is faced by the grim prospect of a decline in its agri-based economy and the weakening of its democratic institutions. Its once magnificent dipterocarp forests have been ravaged, its rivers are polluted with the silt and sediment of eroded soils, its coral reefs are being destroyed by blast fishing, and its mangrove forests have been decimated (see Figure 1). If the public and private sectors and the citizenry do not take action to deal with the most pressing problems and make the committment to address the less urgent (but no less serious) long-term threats to the nation's renewable resource base, it is entirely likely that the Philippines will experience increasing poverty and despair and a downward spiral into the ranks of the very poorest of nations.

Consider the following:

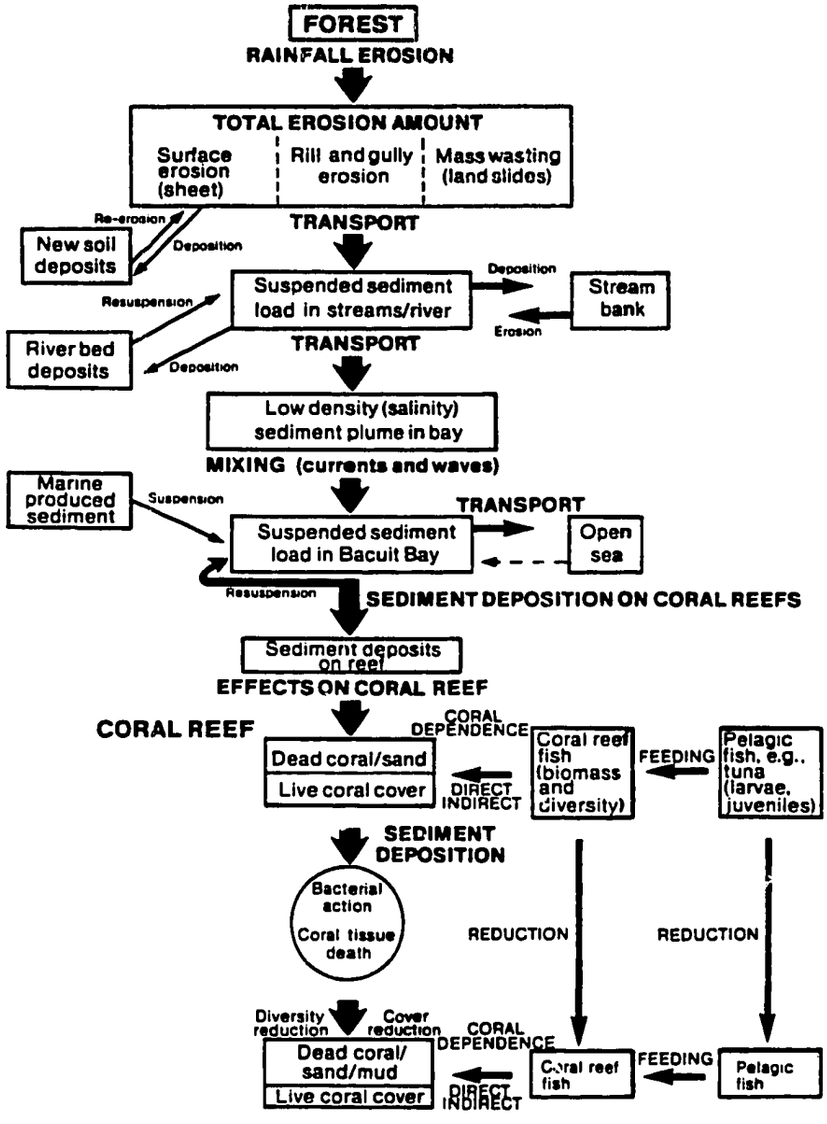
- The population of the Philippines in 1989 is estimated to be 60 million; population growth rates will result in an additional 60 to 80 million people by 2020;

- About 60 percent of the population resides in rural areas and is dependent on natural resources (agriculture, forestry, and fishing) for its livelihood;

- About one-fourth of the population resides on public lands; with the rural population increasing three times faster than the availability of freehold lands, pressure on the public domain will increase;

- There is only 700,000 to 900,000 ha of old growth dipterocarp forest remaining; at present rates of cutting, this will disappear within 7 to 12 years;

- Only one-fourth of the areas reportedly reforested actually contain trees;



Predicted pathway of soil eroded from the forest floor as it passes to the sea. Source: ref [19]

Figure 1

- The majority of coral reefs (70 percent) are in poor to marginal condition, the damage having largely been caused by the hand of man (i.e., blast fishing and sedimentation);

- Only 228,000 ha of mangroves existed in 1972 (a significant decline from the 450,000 ha thought to exist in 1918); by 1988, only 140,000 ha of mangroves remained, a further decline of 40 percent;

- Less than 10,000 ha of old growth mangroves have been identified;

- Probably 50 percent of the endemic forest flora of the Philippines is now gone; it is possible that the figure could be higher;

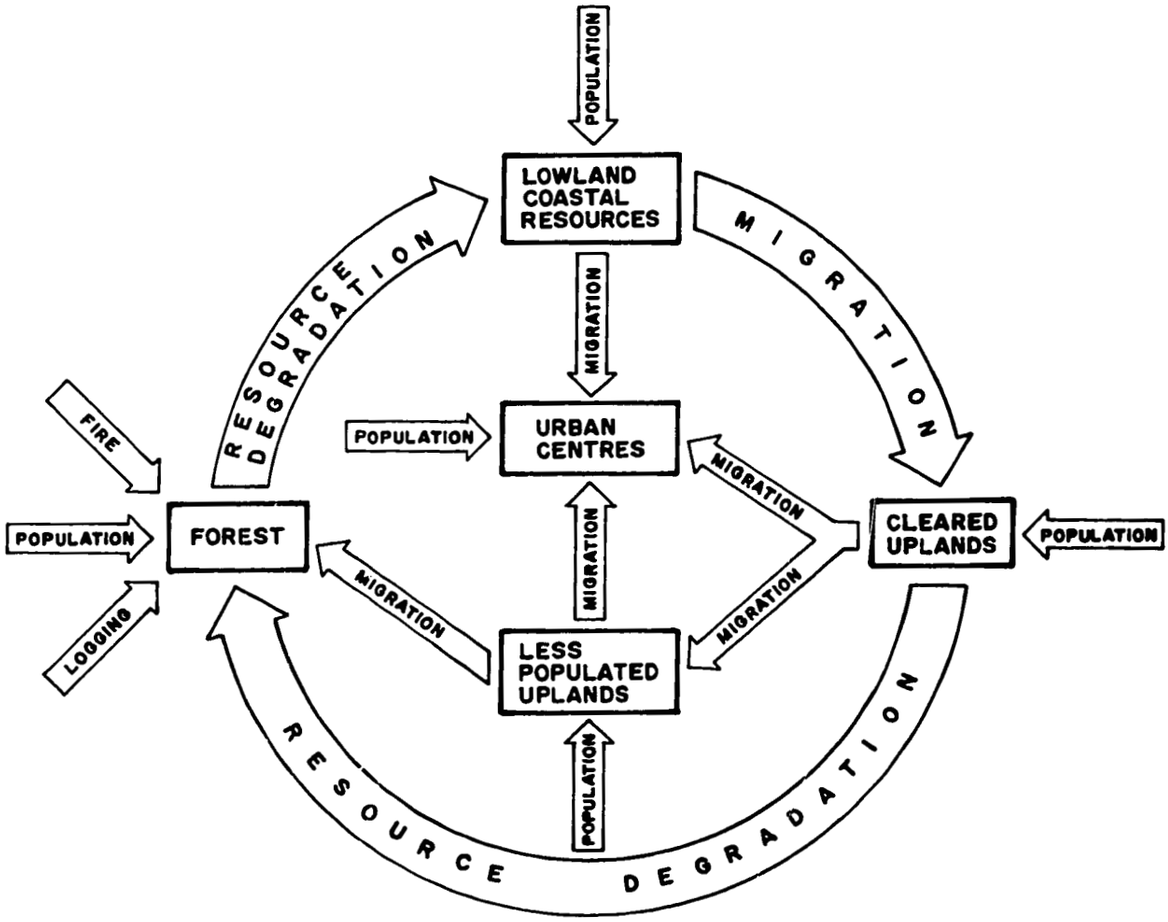
Population size and growth rate and the lack of a demonstrated capability to protect terrestial and aquatic ecosystems continue to be key constraints to the future of environmental and natural resources management. Nowhere are the direct effects of population dynamics and the failure to protect public lands more evident than in the impact on biodiversity. The sequence of rampant timber overcutting, followed by slash-and-burn shifting and settled agriculture is transforming much of the uplands into drab landscapes devoid of the immense diversity they once possessed. Abusive consumption of the mangroves and coral reefs is further diminishing species diversity and ecological stability in the coastal zones. These negative impacts have been preceded by the almost total transfiguration of most of the lowlands into monocrop agriculture, pasture, industry, and urban uses.

Much of the policy and institutional framework exists to address these most pressing and urgent problems, and the alleviation of rural poverty is among the highest of governmental priorities. However, there has only recently been a recognition of the role that environmental and natural resource management plays in sustaining economic development. Indeed, as Sr. Ma. Aida Velasquez has pointed out in 1988:

> "There is a growing number of Filipinos who realize that our most serious and insidious problem is the fact that government officials and the citizens, with very few exceptions, do not grasp that the unabated assault on the life-support systems of our land -- the forests, the soil, the sea, the life forms -- is central to all of our other problems, especially poverty, and will intensify them. There is very little understanding that economy and ecology are faces of one reality: that they are inseparable. What are perceived as economic advantages are usually exchanged for the unwarranted destruction of our natural resources."

The rhetoric of scientifically-based environmental management, first expressed in the mid to late 70's, has been re-echoed in the current mandates of government agencies and in the intentions of the academe. However, insufficient support, misdirection and disruptive, frequent reorganization in the early to mid 1980's -- have led to stagnation in the growth of environmental management technology, a loss of several critical years of development, and inadequate capability to operationalize rational and effective environmental planning. This is evidenced by pro forma environmental assessments of moderate to poor quality, and by rampant air, water and land pollution.

The environmental and natural resources problems confronting the Philippines are beyond the point that governmental institutions can undertake corrective actions alone. The magnitude and scope of the problems have simply grown too large for any approach not involving a coordinated public/private sector partnership to succeed. Graphic examples of the migration-degradation spiral and soil erosion pathways (see Figure 2) illustrate the complex and multi-faceted nature of problems in the natural resources sector. Unless government institutions, non-governmental organizations, the for-profit private sector, and the citizenry join forces to correct these problems, it is unlikely that any significant, widespread progress will be made.



THE DEGRADATION - MIGRATION SPIRAL

Figure 2

But, while the current situation seems bleak, there is a clear potential to arrest and reverse resource depletion. For this to be achieved, the highest priority for immediate action must be directed towards saving, by whatever means necessary, the dipterocarp forests that form the backbone of the major terrestial ecosystems of the country. Without steps taken immediately to preserve what little remains of these forests, they may be irretrievably lost.

Effective short to medium term measures applicable in lowland agriculture, forestry and sustainable upland development, appear to be well within reach. Straightforward mechanisms to achieve nearshore fisheries sustainability are on hand. Practical methods have been developed for maintaining coastal zone biodiversity and for mangrove reforestation and rehabilitation. In all these areas, successful models already exist (in the form of highly successfully field-trial approaches).

Marine endemism is estimated to be low and this implies that ocean currents from adjoining seas can carry replenishment/breeding stock to restore currently depleted species. Moreover, patches of relatively good quality reef among the existing wreckage provide refuges and islands of replenishment for recovery of habitants. Data that would support a hypothesis of recovery, renewal and replenishment is extensive but far from complete. In general, however, there is confidence that patches of relatively undamaged and "good" reef can act as center of supply to new artificial reefs and old ruin reefs if the healing process is allowed to occur.

On the landward edges of the coastal zone, the situation is depressing but far from hopeless. For all practical purposes, the old growth mangrove is gone. However, mangrove transplant technology is straightforward and well understood, and is being applied successfully. Replenishment at sustainable levels is a realistic target and many of the allied marine and estuarine species should become reestablished in the replanted beds.

Considerable help is needed, and if recognition of the problems in a major step, that at least has been accomplished. Nearly all major donors, non-government organizations, and private sector for-profit organizations are aware of the problems and have started to develop plans for providing assistance to address the sectoral needs.

There remains, however, an urgent need to promptly slow down and eventually arrest the continuing degradation of the natural resources "support systems" upon which so much of the Philippines' survival and future depends. The highest priorities for attention include:

- Preservation and rehabilitation of the remaining old growth tropical rain forest;
- Preparation and implementation of a coastal zone master plan;
- Preparation of a master plan for matching decentralization of administrative authority with provision of the necessary staff resources;
- Assistance in land tenure stabilization; o Development of alternative employment opportunities to relieve increasing pressure on the agriculture, forestry and fisheries sectors;
- Provision of agricultural extension services in the upland areas;
- Training programs for community-based, natural resource management organizations;
- Institutional strengthening of natural resources policy analysis capabilities; and,
- Establishment of a Philippine Center for Biodiversity that will serve as focal point for biodiversity maintenance activities.

Without substantial donor and private sector assistance, it is unlikely that the Philippine government will be able to translate stated policies into reality. While budgetary allocations for the natural resource sector have increased since 1986, only 5% of the public investments in 1989 are to be made in this sector. The competition for scarce budgetary resources is simply too great among too many worthy and urgent needs.

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LIST OF ABBREVIATIONS

AAC	Allowable Annual Cost
A&D	Alienable and Disposable
AAPP	Accelerated Agricultural Production Project
ADB	Asian Development Bank
AIDB	Australian International Development Assistance Bureau
BSWM	Bureau of Soil and Water Management
CBCP	Catholic Bishops Conference of the Philippines
CVRP	Central Visayas Regional Project
CSC	Certificate of Stewardship Contract
CAMP	Coastal Area Management Plan
CZM	Coastal Zone Management
CENRO	Community Environmental and Natural Resources Officer (DENR)
CARP	Comprehensive Agrarian Reform Program
CARL	Comprehensive Agrarian Reform Law
CO	Community Organizer
CDSS	Country Development Strategy Statement
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DENR	Department of Environmental and Natural Resources
DOTC	Department of Transportation and Communications
DPWH	Department of Public Works and Highways
DBM	Department of Budget and Management
DOST	Department of Science and Technology
DECS	Department of Education, Culture, and Sports
EEC	European Economic Community
EMB	Environmental Management Bureau (DENR)
ESF	Economic Support Fund (USAID)
ERDB	Ecosystems Research and Development Bureau (DENR)
EO	Executive Order
EIA	Environmental Impact Assessment
FASPO	Foreign Assisted and Special Projects Office (DENR)
FMB	Forest Management Bureau (DENR)
FAO	Food and Agriculture Organization (UN)
ffARM	Forestry, Fisheries, and Agricultural Resources Management (IBRD)
FRI	Forest Resources Inventory
GDP	Gross Domestic Product
GNP	Gross National Product
GVA	Gross Value Added
GOP	Government of the Philippines
GFI	Government Financial Institution
ISF	Integrated Social Forestry

1.0 GENERAL INFORMATION ON THE PHILIPPINES

The Philippines are located on the western margin of the central Pacific Ocean. They are bordered on the north by Taiwan, on the west by the Indo-China peninsula, and on the south by Indonesia. The more than 7100 islands of the Philippine archipelago stretch for about 1800 km, from about 21° N to 4° N latitude, and from about 117° E to 127° E longitude [11-16].

The Philippines comprises three broad groups of islands: Luzon, Visayas, and Mindanao. Total coastline estimates vary from 17,000 to 18,000 km and total land area is approximately 300,000 km^2, of which the 13 largest islands comprise 94% [11,14]. That leaves the more than 7000 remaining islands averaging about 2.5 km^2, or about 0.01% of the average of the 13 large islands. Luzon in the north and Mindanao in the south, at about 105,000 km^2 and 95,000 km^2 respectively, are the largest two islands, and each contains a large fresh water lake (Laguna Lake on Luzon at nearly 900 km^2 and Lake Lanao in Mindanao at more than 300 km^2) [11,15].

The archipelago is flanked by deep basins, troughs, and trenches on both the east and west, reaching to water depths in excess of 11,000 m [12]. Typical high island topography of central peaks, short rivers, and narrow coastal strips is common, but a few large islands also have large central plains and/or plateaus; low coral islets and sand cays are are also common [11-13]. The larger islands tend to have peaks above 2000 m, and Luzon and Mindanao account for all but one of the 14 peaks above 2500 m; none exceed 3000 m [15]. Hydropower accounts for about 10-11% of total energy consumption [17].

The climate of the Philippines is tropical and generally monsoonal [11,15]. Mean annual sea level air temperature is about $27^{o}C$ with little variation through the year [13,15]. Altitudinal temperature variation is greater

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than annual sea level variation (the minimum in Baguio, north of Manila at an elevation of 2200 m, may reach 13°C in January) [15].

Rainfall patterns are very complex, ranging from a typical southwest monsoon dominated rainfall (such as is found in Manila) with a dry season in the northern hemisphere winter and alternating with a wet season in the summer, to northern monsoon dominated heavy rainfalls from November to January and no dry season (such as is found in eastern Mindanao). Intermediate patterns include less pronounced seasons grading to even rainfall throughout the year [15]. Local rainfall patterns are highly variable, with ranges from about 1000 to 4000 mm/year [13]. Tropical storms and typhoons may account for as much as half of the annual total Philippine rainfall [15].

The geology of the Philippines is also complex [12]. It includes upraised sea bed, recent volcanic rock and older igneous rocks and basalts, recent coral reefs, raised older reefs, limestones and marble, metamorphic rocks, and sedimentary rocks including sandstones and shales [12]. Estimated metallic mineral reserves (1982) are dominated by copper, gold, nickel, and iron; oil and coal reserves are minimal; limestone, marble, and cement raw materials dominate the non-metallic mineral reserves [15]. The Philippines are seismically active, with at least 17 earthquakes in 1985 being of sufficient magnitude to be generally felt in the vicinity of the epicenter [12,15]. The region is also volcanically active, with more than 60 eruptions recorded in the Philippines since the turn of the century [15]. Resultant geothermal resources are being developed with about 8% of total energy consumption presently provided by geothermal power [16].

The present population of the Philippines is a mix of some 70 or more ethnic groups speaking 80 or more recognized dialects and languages [15]. This mix arises as a result of a long history of waves of immigration, invasion, and trade. The earliest human habitation in the Philippines may date

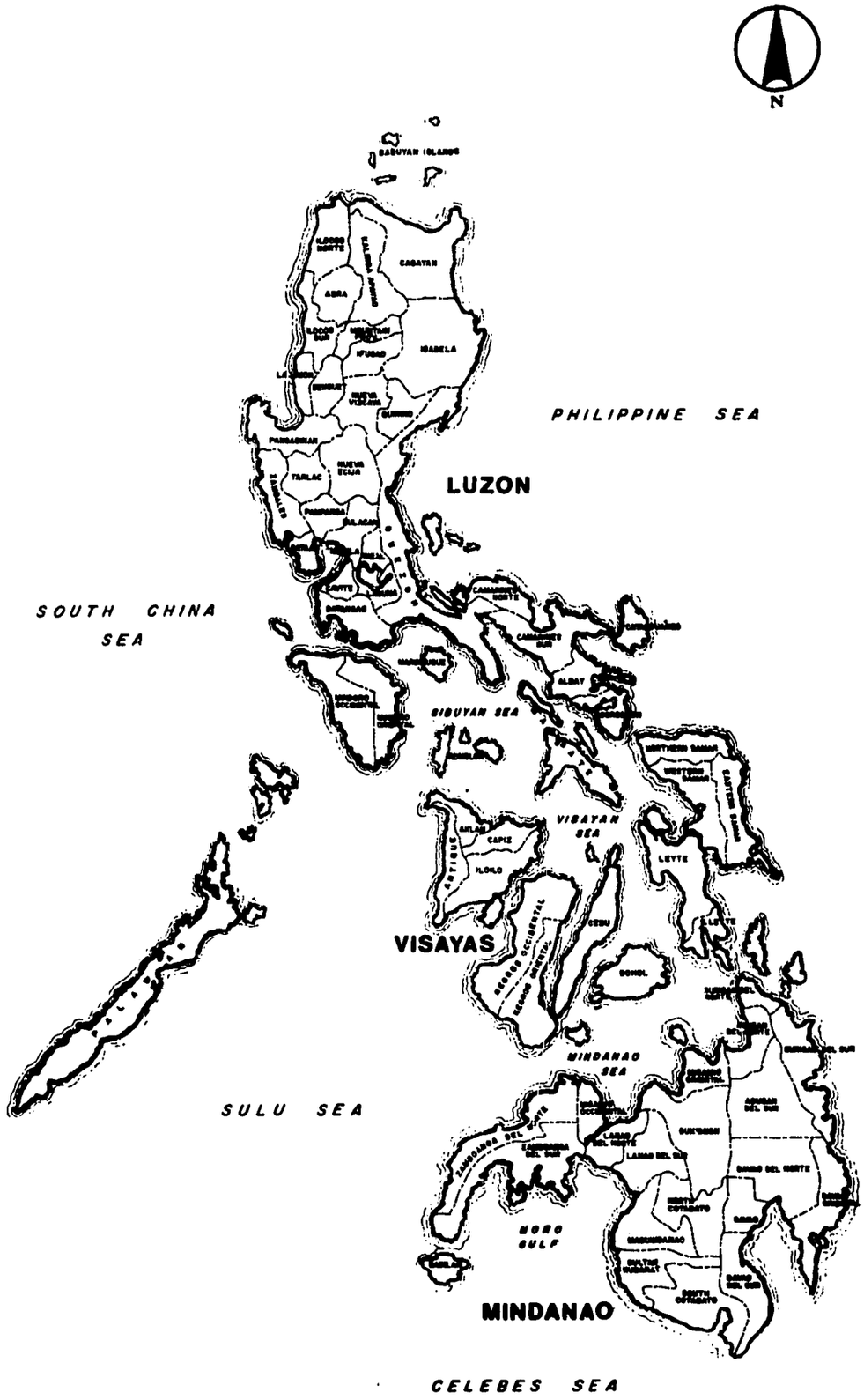
back 25,000 to 30,000 years. Other major migrations across land bridges or by boat occurred in the period about 12,000 to 15,000 years before present (YBP), about 7000 YBP, and about 3000 YBP. Malays began arriving about 2500 YBP, and continued to migrate to the Philippines until about the time of the arrival of the Spanish. Chinese trade had been initiated about 1200 YBP. [See ref 17].

Magellan arrived in the Philippines in 1521. Legaspi followed to establish Spanish settlements at Cebu in 1565, at Panay in 1569, and at Manila in 1571. In 1898 Spanish rule was ended through a combination of Filipino uprisings and American intervention, and U.S., territorial control of the Philippines was secured in 1901. The Philippines was changed from colonial to commonwealth status in 1935. [17].

In 1942, the Philippines came under Japanese control. The United States resumed control of the Philippines in 1945 and Philippine independence was achieved on July 4, 1946 [17]. The present government came into power in the 1986 revolution and has since established a new constitution and held general elections.

The country is organized into 12 administrative regions (Figure 1.0-1), plus the National Capital Region of Metro Manila and the Cordillera Area Region (the mountainous indigenous tribal area of north central Luzon). There are 73 provinces headed by Governors and 1848 municipalities headed by Mayors [14-16]. The municipalities do not fall under the direction of their respective provincial Governors [19]. The smallest political unit is the barangay, of which there are more than 41,000 [14].

The population size and growth rate are subject to considerable uncertainty [20], exacerbated by a lack of census data over a period of marked changes in both policy and implementation of family planning programs. Something approaching apparent consensus for the 1989 estimated population is 60,000,000 [14, 20-26], based on an annual growth rate of 2.4% [23, 25]. More precise numbers in use



Base Map of the Philippines

Figure 1.0-1

and presented as if measured [e.g., ref's 22, 24, 26] appear rather to be reflections of targets set in the 1987 Philippine Medium Term Development Plan [17].

Deviations from this neat package include the World Bank's ffARM study estimate of 61.5 million for mid-1987 population size [21], which would have required an average annual rate of increase in excess of 3% from the 1980 census figure of 48.3 million. The same report, however, includes the Government's estimated 2.4% rate of increase. The 61.5 million level is provided with more source information in a 1988 World Resources Institute (WRI) report [27] which gives a 1988 estimate of 63.8 million, continuing the greater than 3% growth rate projection. In light of rates in the 2.7-2.8% range in the 1970-1980 time frame, and reports of less than vigorous implementation of family planning assistance in the present administration [19], numbers as high as 3% appear more probable than 2.4% as the current population growth rate. For illustration purposes, the difference between a 2.4% and 2.8% growth rate is about 5 years in the doubling time (about 30 to 25 years), and from a 60 million population base in 1989 would mean about 16 million more people (125 vs. 141 million) in the year 2020. It is difficult to envision where another 60 to 80 million people will fit in the country.

1.1 Natural Resources

Within the context of this report, the term "natural resources" has been restricted to a subset of the renewable natural resources. Specifically included are the biological stocks of the fisheries, forestry and agricultural sectors including special subsectors that support the fiber, biopharmaceuticals, decorative, and charcoal and other fuel wood industries. Also included is the wide range of both exploited and unexploited genetic stocks of the Philippine

biodiversity. Considerable overt and underlying attention has also been addressed to soils as a critical renewable resource.

The two major renewable resources not included as focal points of this review are water and human resources. The quality and quantity and the effective utilization of both will ultimately control the long range sustainability of the natural resources that we have addressed. While they are beyond the scope of this already broad review, water and human resources issues are factored into most of our summaries and recommendations (see Chapters 2.0, 3.0 and 7.0). Detailed reviews of the resource areas central to this report are provided in Annexes A (Forestry), B (Agriculture), C (Fisheries and General Coastal Zone Resources), and D (Biodiversity). Overall natural resource economics and policy issues are discussed in Annex E.

The nonrenewable resources of the Philippines -- (resources whose use requires depletion of the original stock, such as coal, oil, and metallic minerals -- are also not included in this review. However, as Bob Goodland of the World Bank points out [28], there is nothing automatic about the renewability of renewable resources. They can be easily depleted and even exhausted. Indeed, it is the many striking signals of such depletion, and in some cases the near exhaustion of potentially renewable resources that has sparked the flood of current interest in this sector in the Philippines [e.g., 1, 2, 3, 21, 27, 29].

As can be seen in the Annexes and in Chapter 7.0 of this synthesis report, the team is generally optimistic about the potential to arrest and reverse the depletion of renewable natural resources in the Philippines, and particularly in the areas of sustainable coastal zone resource development and sustainable lowland agriculture. Coastal zone biodiversity is viewed to be more resilient (better species dispersal, lower endemism, and more patchy destruction) than lowland or upland biodiversity. Lowland primary forest is nearly exhausted and most of the upland

primary dipterocarp forest is gone. The team places its highest priority on salvaging as much of these remaining rich habitats as possible, but is not optimistic that it can be done in time (see Chapter 7.0 and Annexes A and D).

1.2 Economy of the Philippines

As discussed in Annex E, after several years of slow or negative real growth in the Gross Domestic Product (GDP), the Philippines has begun to experience more robust economic growth. In 1983, GDP was ₱ 99.92 billion (in constant 1972 prices) and declined to a low of ₱ 89.90 billion in 1985. By 1987, GDP had increased to ₱ 95.95 billion. Growth rates in 1988 have been estimated at about 8% and are forecast for 1989 at 5 to 6%.

In 1987, agriculture accounted for ₱ 22.05 billion (23%) of Gross Domestic Product (GDP), forestry contributed ₱ 0.65 billion (1%), and fisheries accounted for ₱ 4.64 billion (5%). Recently these sectors have not been as robust in terms of real growth as have other economic sectors. While the economy shrank in real terms in 1984 and 1985 and experienced very slow growth in 1986 (0.8%), the natural resources sector realized positive growth rates (2.3 to 3.7%). In 1987, sectoral growth became very sluggish and experienced growth of only 0.4% while the economy grew at 5.1%.

Per capita GDP (in 1972 constant prices) has declined since 1980 by 18% from ₱ 1,916 in 1980 to ₱ 1,673 in 1987. In 1987, the per capita GDP in current (i.e., inflated) terms was ₱ 12,406 (or US$620). In terms of income, the highest 20% of the population receives over 50% of the income, while the lowest 20% receives only 4% of income. Even after the significant improvements from the days of a very limited elite, a significant gap exists between rich and poor. The Philippine Government estimates that over half of the population lies below the poverty line. Exacerbating the problems confronting the economy is the

worsening debt situation and the effects of debt service. Between 1983 and 1986, total debt grew from US$24.1 billion (US$13.7 billion of which was long-term) to US$28.2 billion (of which US$21.6 billion was long-term).

While the Philippines is a net importer (in 1987, the trade deficit was US$1 billion), its principal exports have been products from the natural resource sector. Over 10% of its 1987 exports of US$5.72 billion were realized from exports of coconut oil, logs and lumber, sugar and copra.

The population (and thus the work force) of the Philippines is largely rural (over 60% of the population lives and works in rural areas). The natural resources sector in 1987 employed over 10 million persons, or about 50% of the total labor force. By 1988, however, employment in the sector had declined to 9.9 million while the size of the workforce had grown to 20.8 million. Rural unemployment has also grown, from 3.9% of the workforce in 1987 to 6.8% in 1988.

1.3 Unique Features

There are a few general characteristics unique, or at least regionally unique, to the Philippines [for instance ref 30,31]. What makes the country unique, however, is its assemblage of non-ordinary characteristics. We have compiled a listing of those we believe important in shaping the Philippines into the country it is today, and which will materially affect how it deals with its natural resources in the future. In the main this discussion relates our opinions; by necessity, these points are generalizations and exceptions exist for most of them.

- The Philippines suffers from an imbalance in the wrong direction between population size and its natural resource base. It ranks 14th in the world in population and 57th in land area [14].

- The country is under a new Government and a new Constitution, and is in the midst of a major

economic and confidence-in-government rebuilding program that is barely 3-1/2 years old.

- There is a strong sense of individual, family, and Provincial loyalties that supersede national loyalties in an ethnically rich and generally well integrated society.

- The people as a whole have very little basis in the past record for viewing Government as a friend.

- There appears to be a widely held belief that the commons, loosely encompassing unoccupied land and all water, is a God-given set of resources for the people to consume as much as is needed to meet individual needs. This exploitation has been encouraged by external demand that has not been very concerned about the method of supply.

- The Philippines is the only major Asian country with a dominant Catholic, Spanish-feudal heritage.

- A very strong, pervasive, and perhaps overly developed (or under regulated) laissez faire entrepreneurial spirit exists throughout the public and private sectors. Harnessed, it offers great hope for future development, especially in the generation of potential off-farm employment; poorly regulated, it fosters circumvention of the law and stimulates graft.

- An apparent tendency to view planning as a paper writing exercise entirely unrelated to implementation produces plans to go on shelves and demonstration projects as ends unto themselves.

- A growing sense exists that the country is falling behind its neighbors in competitiveness, standard of living and the general race for sustainable development. The education and training system, while it is extensive and produces a very thin stream of very capable graduates, is not and may not be capable of keeping up with emerging professional needs in science, technology, natural resources management, and development economics (and doubtless in other areas that we have not explored).

- Long distances separate the country from U.S. and European markets, and it has a reputation for not

producing high quality products in comparison with regional competitors. These are complicated by stagnating fishery and agricultural production and a rapidly declining forestry sector, and further hindered by inefficient internal and export transportation.

- Land holders tend to value land for itself rather than for potential, sustainable products. There is a history of announced and largely failed land reform programs. There is again hope but little implementation in sight. A strongly imbalanced distribution of wealth reflects very little improvement of the feudal societal structure.

- There is high potential, too frequently realized, for large scale natural disasters, including typhoons, earthquakes, volcanic eruptions and the kind of erosion associated with the natural shaping processes of geologically young land masses. These are greatly compounded by the indiscriminant and nearly total denudation of upland forest slopes, poor upland road building, lack of upland tenure, and resultant poor land use practices on public lands. There is a near total lack of enforcement of control measures. Inadequate flood control and slow, patchy, and often ineffective reforestation all lead to further erosion and flooding.

- There is an apparent set of blinders to the severity of the population growth rate at the highest levels of influence. Made worse by public lip service, it allows the Philippines to continue with the highest population growth rate in Asia at a time when every day brings a net new 4000 to 5000 people to compound the natural resources sustainability problems.

This summary of unique features has begun and ended with population, since we see both the promise of and threat to the future well-being of the country as being there. The delight, vigor, and general industriousness of the Filipino people, the remaining **potentially** renewable and extractable resources, and the assistance direction of significant donor aid still provide an opportunity to change this litany of unique problems to unique assets. However, our opinion is that considerable changing of plans and aspirations into reality must yet be done.

2.0 SUMMARY OF STATUS AND PROGRAMS IN NATURAL RESOURCES

The major natural resources sub-sectors within the context of this report (see Section 1.1) are agriculture, fisheries, forestry, and general biodiversity. The status and major ongoing programs in each area are summarized in this chapter. They are treated in further detail in Annexes A through E. Section 2.1 enlarges upon the economic overview presented in Chapter 1.0. Section 2.2 provides a synopsis of major ongoing and planned natural resources initiatives, with an emphasis on donor community inputs.

2.1 A Summary of the Present Status of Philippine Natural Resources

Major swings in attention into an area by both host country Government and the donor community usually imply problems of an acute nature. This study and parallel or overlapping efforts by virtually all the major donors [e.g., 7, 9, 10, 21, 29] and converging attention by the GOP and private sector [e.g., 1, 2, 3, 17, 27], indicate the extent of the problems in the Philippine natural resources arena. The problems are generally pervasive and critical. Some are nonreversible.

Agriculture

The general agriculture sector is in the best condition of the four natural resources sectors. It has shown sustained growth and there is room for sustainable expansion. (See Annexes B and E for sources and backup, except as cited).

The agriculture sector has maintained steady growth at about 4% per annum from 1970 to the present in both production and value added. It contributes about 30% of current Philippine GDP. A considerable part of the growth

in the 1970's and early 1980's was facilitated by bringing more land under cultivation. Little room is left for increases from that direction. For instance, rural population is increasing more than three times as fast as the availability of freehold land, and a quarter of the population is already estimated to be living on public lands [e.g., 7, 27].

Much of the growth in the agricultural sector has been in nontraditional crops, particularly mango, pineapple, rubber, coffee and vegetables. The livestock sector has by contrast been generally stagnant, with current cattle, pig, and goat numbers about the same as or lower than 30 years ago while human population has more than doubled. The Philippines, however, are near or at self sufficiency in food staple crops.

Agricultural yields are generally low, especially in rice and corn, so scope for sustainable expansion exists in both the lowlands and uplands. Major potentials for improvement are seen in sustainable upland yields, in use of cogon grasslands, in livestock production and in staple crop production. Generic constraints are considered further in Chapter 6.0. Specific major constraints in the agriculture sector include poor watershed management, lack of soil conservation, soils productivity, land use patterns, the need for effective land tenure instruments, the structure of incentives and effective agricultural supports and distribution logistics.

Fisheries

The fisheries sector grew dramatically from the 1950's until the early 1980's. Production rose from about 325,000 metric tons in the early 1950's to two million metric tons in 1983. However, it has since stagnated, with 1987 production essentially equal to 1983. Decline in the value of the peso has kept up with increases in price for fishery products over this same stagnant production period.

(See Annexes C and E for sources and backup, except as cited).

Catch per unit of effort has declined steadily from 1949, and has been especially problematic for small artisanal fishermen. Noncommercial returns in the main fishing regime have decreased at about 4% per annum on a per unit basis. Aquaculture production has risen slowly over the past 10 years to match the stagnant commercial catch. Combined, they about equal the static or declining measured artisanal catch totals.

Destructive fishing practices, loss of mangrove habitat, increasing population pressures (especially of the very poor), and the use of intensive harvest techniques are all likely to weaken the current holding pattern. Fishermen tend to be at the bottom of the economic ladder and prospects for improvement generally involve decreasing total production in order to recover catch per unit of effort.

Major constraints to sustainable fisheries development are similar to those of the agricultural sector, but are exacerbated by the resource being considered as part of the commons. Fish stocks, like the forests (see below), have been mined. Promising community level actions in mangrove reforestation, artificial reef construction, and reef tenure approaches to establishing "replenishment zones" offer hope for future sustainable fisheries practices.

Forestry

The dominant forest type of the Philippines was the moist tropical dipterocarp rain forest. It once may have covered over 20 million ha. About 4% remains as relatively uncut forest, essentially all in the upper elevation limits of its range. (See Annexes A and E for sources and backup, except as cited).

Production of logs peaked in the late 1960's at over 11 million m^3/year, dropped below 6 million m^3 in 1981 and is presently estimated at about 3.8 million m^3. These figures do not include fuelwood consumption which has been estimated at 70 to more than 90% of total Philippine wood consumption (See Annex A).

Exports of logs have changed even more dramatically. In 1960, exports accounted for less than half of log production, but as production rose 75% to its 1968 peak, exports climbed by more than 280%, and accounted for nearly 85% of log production by 1971. They have since crashed, with 1981 levels 10% of those in 1971. By 1986, log export value had dropped further to one third of 1981 values and nearly to zero in 1987 [22]. As log export value dropped in the late 1970's, lumber export values, plywood and veneers rose, but all have declined from their early 1980's peaks [22].

Mangrove forest, as a special subset of total forest resources has been treated similarly to upland and lowland dipterocarp forests. About 30% of the turn of the century mangrove hectarage remained in 1988 (about 140,000 ha), and less than 10% of that is old growth mangrove forest (see Annexes A and C). This multiple use resource has, however, proven much more straightforward to replant than dipterocarps, and community level programs may be very effective at reestablishing the mangrove forests when there are opportunities to do so.

Both forest in the public domain and forest classified as needed for forest purposes have been treated in the same destructive way as the common fisheries resources. While this may be normal behavior toward unregulated resources, much of the forest land was placed under systems to ensure sustained yields, making the depletion a betrayal of the public trust. Reliance on the natural forest for most forest production, whether common or under management, has continued to reduce the natural stock. Present estimates of uncut and relatively uncut dipterocarp forest are now less

than 1 million ha and may be nearer 700,000 ha. Past reforestation work, both by concessionaires and by government force account work, has been disappointing. Recent aerial photographic checks of areas reportedly reforested suggest that only about one quarter of the amount reported is actually growing trees. Major reforestation projects are being started under a system of contracts. An impressive number of family contracts has been let, but large scale community and corporate contracts are few in number. It will be 3 years before it is clear how well this approach to massive reforestation succeeds. Importantly, very little of the area planted or under contract is for reestablishing dipterocarp forest.

Principal constraints to sustained inland forestry development and to maintenance of some part of the remaining primary forest are pricing, tenure and incentives structures that all favor mining the primary forest over sustainable forestry practice. These are compounded by illegal cutting and overcutting, poor or absent supervision and management by Government and a lack of basic research on the biology of the principal tree species. As with the other sectors, population size and growth rate are underlying and critical constraints.

For mangroves, the principal constraint to sustainable development is the conversion of mangrove areas to aquaculture ponds (See Annex C). From 1980 to present the loss of mangrove hectarage has approximately equalled the gain in aquaculture pond hectarage.

There are a number of opportunities to promote sustainable forestry in the Philippines. These programs (see Chapter 7.0 and Annex A) offer not only support for using indigenous species for fuelwood, wood products and pulp and paper industries, but can help in the long term slowing of the severe problem of uplands erosion and biodiversity loss.

Biodiversity

The richness of the existing biodiversity (see Annex D for sources and backup, except as cited) of the Philippines is illustrated by the fact that in a single surveyed area at Mt. Makiling (near Los Baños, about an hour's drive south of Manila) there are more woody plant species than in the entire continental United States. The Philippines is also a major center of the radiation of tropical Pacific corals and fishes. While some aspects of the biota have begun to be catalogued, most still are not. Many species unique to Philippine forests when man first arrived are now gone. This particularly true of the dipterocarp family. In the Philippines the family has six genera with 56 species, only 15 of which also occur on Borneo and the Malay Peninsula.

The principal cause of this largely irretrievable loss of genetic resource is destruction of habitat. Moist dipterocarp rain forest once covered more than 75% of the Philippines. This forest type gave away to coastal forests at one fringe and to mossy forest at the higher elevations and to pine in the zones with a dry season. If we take a rough figure of 50% as the amount of land classified as alienable and disposable (A&D) (defined as, those lands not needed for public or forest purposes) and allow for 10% of the uplands to be above 900 m elevation, then about 9,000,000 ha of lands would once have been uncut dipterocarp rain forest. About 1,500 ha remains (less than 0.02%).

In the uplands, then, 12 million ha of uncut dipterocarp forest would once have been present. The current estimate of uncut or largely uncut upland dipterocarp forest is under 1 million and perhaps as low as 700,000 ha. Mangrove forest area has been reduced to about one-third of its turn of the century levels, with less than 3% of the original total as first growth forest. Destructive fishing techniques, coral mining, siltation and natural destruction have combined to reduce coral reefs in many locations to rubble; of more than 600 reefs surveyed around the

Philippines, 70% were found to have been reduced to poor to fair condition.

Endemism, the proportion of species entirely or largely unique to an area, is often high in island environments. The Philippines is no exception as indicated above for the dipterocarps. Although much of the biota is still unsurveyed, some trends are apparent. Endemism appears to generally increase away from the shoreline. For marine species perhaps 5% are endemics, among terrestrial plants 25% or more and among terrestrial vertebrates (amphibians, reptiles, birds, and mammals) perhaps as many as 50% are endemic.

Nowhere is the raw effect of population size and growth rate and the failure to protect public lands more evident than in the impact on biodiversity. The sequence of timber mining followed by slash and burn, shifting agriculture, and settled agriculture in the uplands is following the essentially total transfiguration of the lowlands to agriculture, pasture, mine, industry, and urban uses. The abusive consumption of mangroves and coral reefs are direct results.

Population size and growth rate and the lack of Government ability to protect its public lands continue to be the two key constraints to future sustainable biodiversity. Other significant constraints include a lack of basic knowledge of the biota, poorly developed inventory support institutions, and the pervasive lack of awareness among the populace of the value of the commons, in general, (and its biota in particular) as a critical part of its future heritage.

2.2 Ongoing Programs

There has been an increasing level of activity in the Philippines related to environment and natural resources management (see Annex E for sources and backup). These

activities include those funded by the Philippine Government and those which have received Official Development Assistance (ODA). In terms of ODA-funded activities, the principal multilateral and bilateral aid agencies involved in the sector are the Asian Development Bank (ADB), World Bank, USAID, Japan International Cooperation Agency (JICA), Overseas Economic Cooperation Fund of Japan (OECF), and United Nations agencies (see Table 2.2-1 for a listing of ongoing or recently completed projects concerned with environmental and natural resources management). Within the context of the 5-year Public Investment Program, the National Economic Development Administration (NEDA) has estimated investment requirements of the Department of Environment and Natural Resources to be ₱4.355 billion (or 2.5% of the total public investment) and those of the Department of Agriculture to be ₱4.553 billion (or 2.6%) between 1988 and 1992 -- a grossly low level to match the rhetoric and stated objectives.

The ADB has several initiatives in the area of natural resource management. A loan of US$140 million was recently made to assist in the fisheries sector (of this loan, US$70 million were ADB funds and the balance was Japanese). In addition, the ADB has executed a loan of US$120 million to DENR for assistance to the forestry sector (included in this was the provision of technical assistance to formulate, among other things, a Forestry Sector Master Plan). The ADB loan is supplemented by a fixed-rate loan from the OECF (Overseas Economic Cooperation Fund of Japan). Among other loans and technical assistance grants involving the sector include those for integrated area development, environmental education, environmental planning and management, integrated development for low-income upland communities, river revival, mangrove development, horticulture sector development, and small holder development.

The World Bank has provided funding for the Central Visayas Regional Program for several years. In addition, the World Bank undertook a study of forestry, fisheries and agricultural resource management (ffARM) that has served as

Table 2.2-1 Representative Ongoing and Recently Completed Natural Resource Management Programs/Projects

	Funding Source	Total Funding (US$ million)	External Assistance (US$ million)	Duration/Status
- Regular Watershed Rehabilitation Activity	GOP	2.94	-	ongoing
- Cotabato-Agusan River Basin Development Project	Special	0.03	-	ongoing
- ADB/OECF Forestry Sector Loan	ADB	240.00	240.00	ongoing
- RP/Japan Watershed Maintenance Project	Japan	9.44	4.75	1988-92
- Third Davao del Norte Irrigation Project	ADB	2.40	0.95	1982-88
- Regular Forest Protection Activity	GOP	2.24	-	ongoing
- Forest Fire Management Project	UN/FAO	0.33	0.14	1987-89
- Management of National Parks	GOP	6.66	-	ongoing
- Stockfarming of Calamian Deer	Special	0.05	-	ongoing
- Natural Resources Mgmt Development Project	Australia	17.31	14.57	1988-92
- Regular Reforestation Projects	GOP	50.15	-	ongoing
- ADB Fisheries Sector Loan	ADB	140.00	140.00	ongoing
- Bukidnon Industrial Tree Plantation Project	New Zealand	3.57	1.90	1989-92
- Ilocos Norte Forest Development Project	ADB	32.30	25.15	1984-92
- integrated Social Forestry	GOP	9.63	-	ongoing
- RP/German Cebu Upland Project	Germany	2.49	2.05	1986-92
- Dipterocarp Forest Management	Germany	2.23	0.97	1988-91
- Integrated Forest Protection Pilot Project	World Bank	3.99	1.24	1982-88
- Rainfed Resources Development Project	United States	9.22	6.89	1984-91
- ASEAN-US Watershed Management	United States	5.20	4.00	1984-89
- Crocodile Farming Institute	Japan	2.24	0.56	1988-92
- Strengthening of Integrated Social Forestry Program	UNDP	1.21	0.88	1988-90
- Magat Smallholders Agroforestry Pilot Project	World Bank	3.68	0.79	1982-88
- Bamboo Research and Development	UNDP/FAO	0.78	0.39	1987-92
- Palawan Integrated Area Development Plan				
a) Land Classification Project	EEC	0.96	0.96	1982-89
b) Upland Stabilization Project	ADB	2.01	1.21	1982-89
c) Strategic Environmental Plan	EEC	-	-	Complete
d) Land Surveys and Titling Project	ADB	3.00	1.13	1982-89
- Allah Valley Watershed Management	ADB	7.70	5.41	1979-89
- Forestry Development - Watershed Management	Japan	9.44	4.75	1988-92
- Seagrass Restoration Project	IDRC	0.62	0.62	1987-89

Source: NEDA, 1988. Mid-Term Public Investment Program
DENR, 1989. Briefing Papers

the basis for the Bank's offer of an environment and natural resource management sectoral adjustment loan.

USAID has been involved in the natural resource sector for some years; the Country Development Strategy Statement (CDSS) for the Philippines has focused on rural area development. Among the most significant undertaking directly related to natural resource management was the Rainfed Resources Development Project. Among new initiatives to be undertaken in the sector (other than those growing out of this project) include the Accelerated Agriculture Production Project and the Development of Agriculture and Natural Resources Strategy. It is expected that further assistance to the natural resource management sector will also be provided under the MAI/PAP.

JICA has had a long history of providing assistance for rural development projects in the Philippines. Among ongoing programs receiving JICA assistance are the Pantabangan Afforestation Project, Bohol Agriculture Promotion Center, Cagayan Integrated Agriculture Development, Matsuno River Development, Forest Information and Forest Management, Highland Agriculture Rural Integrated Development, and other projects in forestry, fishing and integrated rural development. Among the areas in which JICA has expressed strong interest in providing assistance are reforestation and pollution control. JICA is also undergoing a basic change in lending strategy from larger construction projects to smaller development projects.

Among other donors providing assistance to the environment and natural resource sectors are the UN agencies UNDP is providing funding for a workshop on human resource development and training needs for EMB, and is considering funding a multi-year human resources development project for EMB. WHO has provided assistance through its regional environmental planning organization (PEPAS) in examining various environmental issues. Discussions have begun between UNEP and DENR regarding technical assistance that UNEP could provide.

The Australian International Development Assistance Bureau has provided assistance under a Natural Resource Management project that has focused on land use, mapping, and cadastral surveys. This project may provide the critical link of accurate boundary setting needed for land reform.

The EEC (European Economic Community) has provided assistance in the formulation of the Strategic Environmental Plan for Palawan. This project serves at present as one model of rural integrated planning with a significant natural resources and environmental component. Federal Republic of Germany has provided technical assistance for the recently completed Natural Forest Resources Inventory that produced critically needed upgrading of forest inventory data and mapping. A new project, with many of the core forestry staff, is now working on the problems of dipterocarp management.

3.0 MAJOR ENVIRONMENTAL AND INSTITUTIONAL ISSUES

Environmental issues in the Philippines affecting the natural resources sector are covered in part in Annexes A through D. In Section 3.1 we have provided an overview of the country's environmental status, especially as it relates to natural resources and biodiversity. A comprehensive review of the status of the environment is beyond the scope of this study. Section 3.2 addresses institutional issues affecting natural resources. This subject is covered more fully in Annex E. Section 3.3 briefly addresses NGO's in the Philippines.

3.1 Major Environmental Issues in the Philippines

The 1987 Philippine Medium Term Development Plan [17] encapsulates this subject as follows: "Deforestation and soil erosion are the largest and most serious twin environmental problems in the country." The Plan also identifies as a major problem coastal resource depletion as a result of "... overexploitation and pollution, illegal and destructive fishing, as well as the destruction of mangrove and coral reef areas."

Efforts at cataloging the natural resources of the Philippines have been ongoing since the turn of the century [32], with significant recent initiatives from the mid to late 1970's up to the present [e.g., 33-36]. Identification of environmental problems associated with both urban and rural natural resources has been predominantly an effort of the last 15 years [e.g., 1, 7, 11, 13, 27, 29 and 37-40].

It is the team's view that the start made by the GOP toward environmental management in the mid to late 1970's and which is reconstituted in the mandate of DENR today [1], has --through lack of support, misdirection and relatively continual reorganization (see Section 3.2) in the early to

mid 1980's -- led to stagnation, a loss of environmental technology, a loss of several critical years of development, and a near disappearance of anything remotely approximating either effective environmental planning or management. The result is moderate to poor quality, and strictly proforma, environmental assessments and rampant air, water and land pollution.

The summary made by the Man and the Biosphere (MAB) Secretariat of major Philippine environmental problems in 1980 is still accurate or understated for today [13], to wit: "The major environmental problems of the Philippines are deforestation and soil erosion, water and air pollution in urban areas, and the loss of specialized habitats such as mangrove swamps and coral reefs." [13] Mine tailings management and rural industrial air and water pollution [e.g., 41], might now also deserve special mention. Underlying problems are population size, growth rates, related urban and upland migration, and rural poverty [e.g., 3, 17, 27].

Except for isolated cases, many now out of date, there is essentially no systematic, reliable ground level environmental status information. The experience of some of the team members, and of those with whom they have discussed the issue, is that where environmental monitoring data are available, close examination often shows them to be inaccurate or false. Satellite imagery recently available in the Philippines have shown, for example, that only about one-quarter of the reported reforestation hectarage exists. It has been remote sensing imagery that has brought home the reality of just how much primary forest has been cut (see Annex A).

Although not part of our terms or reference, we have (partly in response to concerns expressed by USAID) examined the present status of environmental management capability. From the bottom to the nearly top, we believe it is in extraordinarily poor condition. In the following section we address some of the institutional issues. In Chapter 6.0 we

discuss the constraining effect of this problem area. In Chapter 7.0 a number of our recommendations involve institutional/ physical support of this important aspect of the environmental and natural resources arena.

3.2 Environmental and Natural Resources Institutional Issues

A framework of institutional instruments exists in the Philippines that is sufficient to support much of the environmental and natural resources policies of the Philippine government (Chapter 4.0) and the recommendations offered by this team. (Chapter 7.0). The principal Government agencies for this sector are the Department of Environment and Natural Resources (DENR), and the Department of Agriculture (DA) (and within the specific area of lowlands, A&D lands, and tenure issues, the Department of Agrarian Reform, DAR). However, the list and complexity of overlapping jurisdictions is high (see Annex E). Similarly, the list of important legislation, decrees and regulations for the sector is nearly endless, with much of it outdated, moribund, and/or unenforced.

The institutional issues are generally not of establishing new instruments but of effectively and comprehensively applying the existing ones. One part of the reason for a lack of more effective or far reaching implementation has been the centralization of both authority and capability in Manila. Present GOP programs for decentralization are aimed in part at dealing with that problem. (See the Annexes for discussions of some regionalization/decentralization dilemmas). We view decentralization as a mixed blessing, and further discuss problems of decentralization below, largely with respect to the thinness of the available talent pool.

A second important institutional problem related to the lack of implementation of sound environmental and natural resource planning is the amount of reorganization

that has already afflicted this sector. Figure 3.2-1 illustrates the chain of fragmentation and amalgamations of the various elements of the major environment and natural resources organizations since the inception of the National Environmental Protection Commission (NEPC) and the National Pollution Control Commission (NPCC). It is little wonder that so much planning and so little implementation has been done. While we can see a number of ways that it could be yet again restructured, **we recommend, in the interest of promoting action, that DENR and DA be left in their present configuration for a long enough period of time to either get a good start on the work in front of them, or to allow an ample demonstration that they cannot.**

A third major difficulty has been in changing stated policy from paper policy to action on the ground on the part of the government. This includes official complicity in plundering the commons, inability to enforce even such laws and regulations as it might wish to implement and an enormous gulf between the human and physical resources needed to accomplish the stated objectives and those made available. If we view the prior government as one dedicated to and very effective at hijacking the natural wealth, it is easy to see why this as yet very young new government has needed to set its initial years' priorities on more critical areas. We are hopeful that the urgency of changing paper policies into action in the environment and natural resources sectors has come to this Government's attention in time for effective implementation to be of significant benefit and at a time when GOP can afford to pay this sector the attention it so sorely requires.

Fourth, within the area of present but effectively impotent institutions, we believe that there is ample evidence that existing prohibitions do not work: 70% of the country's coral reefs have half or more of their coral cover killed; virtually no first growth mangrove or lowlands dipterocarp forests remain, the richest part of the uplands forest have already been removed; and perhaps half of the endemic forest species are already lost. While enforcement

at more than the novelty level would help, we believe that innovative and objective criteria-oriented, positive incentives need to be developed across the board, if desired behaviors in the natural resources and environmental sectors are to be achieved. Some are proposed in Chapter 7.0. We are sufficiently dismayed, however, by the pervasiveness of destructive behaviors by all levels of Philippine society that **we also recommend that no incentive program be put into place without a thorough and difficult-to-circumvent independent monitoring component, with regularly rotated monitoring staffs.**

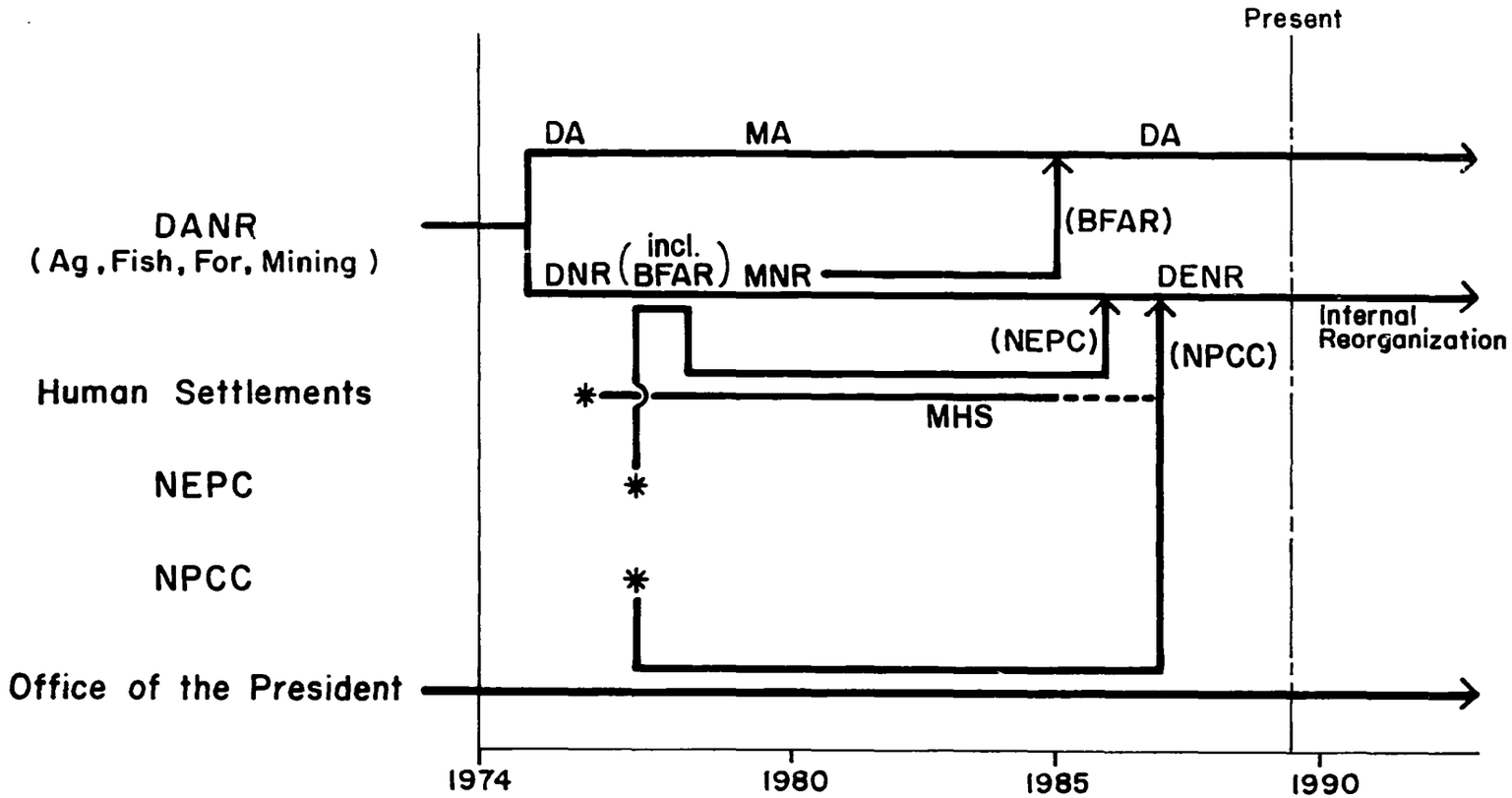
Finally, to complete the issues of non-implementation, we believe that USAID's view of the extent of the ills in this sector [7], and in particular its appreciation that there are no short-term cures, needs all the exposure it can get. Repairing the damage to the watersheds and coastal zones, to say nothing of the urban air and water quality, and doing so while lifting some significant portion of this nation's 50% poor (roughly those with per capita earnings under US$500/year) toward a more reasonable living standard is likely to be a 30- to 50-year process. The initiatives that GOP has already taken to improve general economic performance (see Annex E), and especially actions that will provide alternative and/or supplementary employment to agricultural workers, are important root-cause treatments. Two other long term initiatives are also needed: (1) raising the public awareness as to the value of the commons and desirable environmental and natural resource behaviors; and, (2) a close examination of science and social science curricula so that the literally hordes of public and private sector natural resources workers needed in public, NGO and private organizations in the next generation will have been properly prepared (see Chapter 7.0).

A relatively recent institutional development that has taken place in this sector is the devolution of environmental planning, monitoring, and enforcement to the a staff, rather than line, agency (EMB and the regional/provincial level staffs are approximately equivalent to the

old NPCC in Figure 3.2-1.) While the shifting of such responsibility and authority is in keeping with general GOP decentralization policies, it fails to deal with the lack of apparent capability to provide effective environmental planning (as opposed to proforma Environmental Impact Assessment (EIA) preparation) and monitoring.

The range of needs in these two areas is great. It includes basic field level water quality measuring instrumentation (for about 1850 municipalities and 73 provinces) and the training in how to use, to maintain and service, and to interpret the output of the instruments. At the next level is needed data base management training and computer hardware and software. Routine report formats for amalgamation upward and for "flag raising" at the local level are needed. Training of staff in environmental planning and support for enforcement of Compliance Certificates are needed. The experience required will take time, but it can not be obtained if the process is either not working at all, or if the EIA is used as a justification for decisions already taken and contrary to set standards [e.g., ref 41]. We have elaborated on this institutional shortcoming in Chapter 7.0.

There is considerable concern in the team (see especially Annexes C and D) as to whether DENR can manage a park, much less an effective park system. It has not been possible for us to distinguish between the presence of a latent and completely unsupported capacity and a total lack of both skills and will. By less than firm consensus **we recommend that the proposed Integrated Protected Areas System (IPAS; see Annex C) be at least in part if not wholly tried within the context of DENR's Protected Areas and Wildlife Bureau**. There is ample room and sufficient urgency for independent NGO and private sector initiative in this area which might be folded back under PAWB or some alternative government umbrella once something approaching stability of the protected areas has been achieved. The critical need is for rapid action, not for a debate on who should be in charge.



Principal Natural Resources Agency Reorganizations
(1975 – Present)

Figure 3.2-1

As a closing institutional consideration in this summary (see detailed items in Annexes A through E) we hold it as a most important element for the long term success of both environmental improvement and sustainable natural resources development that strong and effective coordination occur at all levels of DENR and DA. We believe that the desire for such coordination already exists at the upper management levels of these organizations. Practical sustained development requires that this be spread through every level.

3.3 The Role of NGO's and the Private Sector

The status of NGO/PVO capacity that can be effectively utilized in assisting GOP and/or donor organizations in developing and implementing sustainable natural resources and biodiversity maintenance programs/projects appears to be similar to that of the Government, i.e., the proven capacity is thin [42-44]. Local NGO's are numerous and those with direct or side interests in the natural resources sectors may exceed 500. The number with more than paper staffs and with useful prior experience may be as few as 10. We have suggested a program for better defining the capacity in Chapter 7.0.

The private sector role appears to be larger (see particularly Annexes A and B, Chapter 7.0), and open not only to a larger scale sustainable forestry and agriculture projects, but to sponsoring river cleanup programs such as the Tullahan project sponsored by San Miguel Corporation [45]. It is a general finding that nearly every problem area can and should be addressed by a number of different approaches. Thus we see a significant role for NGO's and the private sector in parallel or converging activities with GOP initiatives. For several areas, we see and have recommended master planning and/or objective and priority setting activities to precede significant applications of funds to splintered implementing instruments.

4.0 NATURAL RESOURCE POLICY AND ECONOMIC FRAMEWORK

The major natural resource economic and policy issues confronting the Philippines arise from a) continued and repeated failure of the government to enforce and/or implement its stated policies with regard to resource management and b) the nearly complete lack of data to support analytical efforts to understand the economic consequences associated with these policies. Correction of the latter will require more microeconomic evaluation of the costs and benefits of past, present, and future projects and macroeconomic analyses of the implications of sectoral and other policy actions. The following chapter is a synthesis of Annex 8 which describes the economic and policy framework for natural resource management.

4.1 Macro-Economic Policies

In the 1970's, the Philippine economy exhibited a high rate of growth, with the gross national product (GNP) expanding at over six percent annually. This success was achieved through programs and policies which proved to be unsustainable and structurally unbalanced. Government economic policy favored capital-intensive, import-substitution policies at the expense of the agricultural and export sectors. Government support of unsustainable industrial policies was financed increasingly through external borrowings as private savings levels remained low.

The pricing and trade policies of the 1970's encouraged industrial development at the expense of agriculture, and have a deleterious impact on the natural resources base. High import tariffs served to protect local industry, but raised the costs of agricultural inputs, lowered the competitiveness in international markets, and reduced farm incomes. Price controls and marketing monopolies also reduced the price received by producers. Because of these policies, many subsistence farmers or farm

laborers had need to search for supplemental income. Unlimited access to forests and coastal fishing grounds made them the most natural sources of this income.

In the early 1980's, the Philippine economy reached a crisis point, largely because of the structurally unbalanced government policies. These policies were compounded by several factors: the global economic recession, the declines in the world market prices of the primary Philippine exports, the decline in the volume of timber exports, and the steep rise in international interest rates. By 1983, the mounting debt burden precipitated a liquidity crisis in which the government was no longer able to meet foreign debt payments. This in turn led to the cessation of all foreign credit. In late 1984, a Stand-By Agreement was reached with the International Monetary Fund (IMF), a stabilization program was initiated and a series of Structural Adjustment Loans (SAL's) were arranged. Funds were dispersed conditionally upon the observance of performance criteria or structural reforms to be undertaken by the Philippine government. The structural reforms featured policies designed to achieve stability in prices, public finance, and balance of payments. This agreement will be examined in more detail in the following section.

Since the mid-1980's, the Philippine government has attempted to create an environment conducive to sustainable economic development. In the Stand-by Agreement arranged with the International Monetary Fund (IMF), foreign creditor banks agreed to reschedule debt repayment, as did multilateral and bilateral donors, and new private lending sources were identified[10]. In return, the Government agreed to implement structural economic adjustments designed to achieve price, public finance, and balance of payment stability and to reduce the level of government controls and interventions in the economy.

Among the reforms presently being undertaken (or under negotiation) are:

- Dismantling the coconut and sugar marketing monopolies;
- Lifting import restrictions on wheat, soybeans and fertilizers; and
- Lifting price controls on rice, corn, other feed-grains, poultry and pork [46].

The objective of these market liberalization measures is to increase allocative efficiency and market responsiveness to changing resource scarcity. While the impact of deregulation has not been studied in depth, farm prices of coconut, sugar cane, palay (rice seeds), and corn have risen since 1987.

Trade liberalization policies aim to promote exports and liberalize imports. The lifting of export taxes increases the competitiveness of Philippine products in foreign markets, which can lead to increased foreign exchange earnings. Import liberalization forces competition and encourages diversification. Since 1986, import tariffs have been removed or reduced for many products.

4.2 Sectoral Policies

In addition to the macro-economic policies, each of the natural resource sectors (agriculture, forestry, fisheries) has identifiable policy objectives. Although many structural reforms are being undertaken in the primary sectors, rarely are the objectives of the reforms addressed directly at sustainable natural resource management and use.

Agriculture

After years of neglect, agriculture has been given renewed priority by the Government. In the 1970's and early 1980's, Government policies promoted the industrial sector over the agricultural sector, even though agriculture

provided employment for more than half the working population.

The stated objectives of the government's agricultural policy are:

- To increase the real incomes of farmers and fishermen to above-poverty levels (economic growth);
- To provide adequate food for the country's growing population (food security); and
- To maintain low and stable food prices for consumers[47].

These objectives are somewhat conflicting. Low consumer food prices do not signify increased farmer incomes unless substantial subsidies are involved; and substantial consumer subsidies or farm price supports do not coincide with the conditions of the Structural Adjustment Loan (SAL) agreement. This agreement necessitates the removal of structural distortions that reduce incentives for agricultural production (export taxes and price controls) or reduce the efficiency of resource use (input subsidies).

The lack of adequate economic incentives to encourage improved management practices is the underlying cause for many of the natural resources related constraints in the agricultural sector.

Policies that reduce producer incentives (such as price controls, export taxes, and marketing monopolies) or serve as disincentives have an indirect effect on natural resource management and use. The reduced profitability of agriculture serves as a disincentive for farmers to invest in soil conservation and other long-term techniques.

The lack of secure tenure over land for many farmers is a strong disincentive for increasing land productivity and practicing sustainable methods. Lack of secure tenure prevents the use of land as collateral to obtain credit for investments in land improvements and biases crop choice

against tree crops. The economically rational alternative under these conditions is to minimize labor and inputs, and after the land resources are depleted shift to sites with higher fertility.

Underemployment and the lack of income generating activities outside the agricultural sector puts further pressure on natural resources, as often the only possible means for earning income is through the gathering of firewood, fishing, or charcoal production.

Since 1984, numerous structural reforms have been undertaken in agriculture in conjunction with IMF, World Bank, and USAID (ESF) loans or grants.

Recent agricultural economic policy reforms have the general objective of removing market distortions that reduce the profitability of agriculture and thus lower producer incentives. Input subsidies were also removed or lowered in order to reduce the overall agricultural budget and to promote a more efficient use of inputs. (See Annex E for a complete discussion of agricultural policy reforms and their impact on natural resource management.)

Forestry

The recent decline in the forestry sector is due in part to uncontrolled exploitation of forest resources by many timber companies, illegal cutters, and buyers of illegal logs (including some military units), and to the lack of enforcement of government policies. In addition, opening access to forest lands has attracted migrant farmers searching for cultivable land. The cultivation techniques practiced by these migrants has resulted in accelerated soil erosion and heavy siltation of streams and river systems. The conversion of mangroves to fishponds has also contributed to forest resource degradation.

The forest and wood industry played an important role in the Philippine economy in terms of GDP contribution from

the mid-1950's to mid-1970's. Declines in production and export earnings are due to depletion of the forest resources, world prices, government restrictions, and diminished supply.

Government policies that have encouraged the rapid depletion of forest resources include inappropriate timber pricing policies, incentive policies that encourage inefficient wood processing industries, and logging concession systems that hasten forest depletion.

Although the forestry sector produced considerable foreign exchange earnings, the government has failed to capture full economic rents for public forests. Economic rents can be defined as the difference between the value of the product and the production costs, including marketing costs and reasonable profit. It is estimated that the government captured only 16.5% of logging rents between 1979 and 1982. If the government had captured 50% of the potential rent during the 1979-1982 period, it would have provided over US$300 million annually. The excessive profits earned by timber concessionaires assisted in accelerating the process of forest degradation.

In the past, the government has inconsistently applied a variety of forest charges, license fees, sales and export and realty taxes, which never have amounted to more than 15% of actual rents.

A ban on log imports was legislated in 1976, primarily to promote the Philippine wood processing industry. and secondarily to conserve forest resources. The ban was not enforced but the possibility of a later ban increased the haste of logging concessionaires to maximize logging efforts.

The low government charges for fuelwood extracted from public lands encourage resource depletion and probably depresses market prices. This discourages the use of substitute fuels and makes private fuelwood production a not

very profitable affair. There is no incentive or reward for those who follow sound forest management practices. In this sense, it is a situation where the feeling is to get what can be taken as quickly as possible before someone else gets it. The ramifications can be found in the faulty enforcement structure.

Import prohibitions on pulp and a partial export prohibition on logs protects local wood processing industries. Both discourage industrial efficiency through lack of competition. Inefficiencies also raise costs of production and reduce profits.

The logging concession system has traditionally discouraged concessionaires from practicing sustained yield management. In the 1970's concessions were granted for periods from 1 to 10 years on a noncompetitive basis, and have since been granted for 25 years with a possible renewal of another 20 years. As the harvest cycle of many tropical species exceeds that time period, concessionaires do not practice long-term strategies, but try to maximize profits through short-term exploitation. There is no incentive to ensure long-term regeneration of forest resources.

Various policy reforms are presently being undertaken in the forestry sector. Annex E presents a discussion of present forestry policy reforms. Government policy, however, has often been inconsistent. In 1982, the government cancelled 53 timber licenses and started various forestry programs, including Integrated Social Forestry (ISF) and PROFEM, designed to improve forestry resource management. In the meantime, however, the status quo, that is, the usual timber management/logging instruments, remained in place. See Annex A for a discussion of these initiatives.

Fisheries

While the fisheries sector generates only a small percentage of the Gross Domestic Product (GDP) annually, it is of greater importance as fish and other seafood provide

more than half the total protein requirements for the average Filipino household. Per capita consumption is estimated at 35-40 kilograms per person per year, one of the highest consumption rates in the world, but is declining. Exports have increased steadily between 1974 (US$18.4 million) and 1987 (US$310 million).

The fisheries sector employs over one million people, or 5% of the total labor force. Municipal fishing engages the vast majority (75%), while commercial fishing and aquaculture employ 4 and 21%, respectively.

Municipal fishermen form a major poverty group in the Philippines as the catch per unit of artisanal fishing effort is too low and decreasing. Rises in the real price per kg of fish paid to municipal fisherman, which could compensate for the smaller catch per fisherman, have not occurred since 1982. In fact, the price has barely kept pace with the rate of inflation. See Annex C for more details.

The process of coastal degradation has been hastened by overfishing, mangrove clearing, and sedimentation from soil erosion. The costs of coastal resource degradation have not yet been quantified as the impacts of overfishing and coral reef destruction become more apparent in the long run. Nor has the cost of increased sedimentation on the coastal areas been quantitatively estimated.

Although fish production continued to increase during the past decades, the rate of increase in production growth has leveled off and stagnated since 1982. It is felt by many fisheries experts that the leveling of production is due to overfishing and that the total present actual catch is dangerously close to the estimated total potential catch. The gross value-added has stagnated between ₱ 4.3 and 4.4 billion since the early 1980's.

Government policies that support investment in capital-intensive fishing techniques have further exacer-

bated the situation, leading to the increased depletion of existing resources and of potential yields. Policies tend to favor large commercial fishing at the expense of the municipal fishing sector, a major poverty group. Research investment has been largely in capital-intensive, high technology fishing; loans have been available primarily to wealthier fishermen.

Failure to enforce government policies restricting coastal areas to municipal fishing has decreased the share of the total catch and profit earned by small-scale fishermen.

Two major issues comfront the fisheries sector. The first issue concerns the management of a renewable resource said to have reached or exceeded maximum biologically sustainable levels of production. The second issue concerns the increasing poverty experienced by municipal fishermen and the lack of alternative sources of employment.

While in the long run it is necessary to develop alternatives to fishing for subsistence level fishermen, in the short run, efforts to improve conditions among small-scale fishermen should be based on better enforcement of existing regulations that attempt to limit competition between trawlers and small-scale fishermen and allow small-scale fishermen a larger share of the catch. This will entail a reallocation of resources to small-scale fisherman from wealthier large-scale commercial interests, who often have influence both nationally and locally.

4.3 Cross-Sectoral Linkages

The impact of natural resource degradation is felt not solely within the resource sectors of the economy. Interrelationships and linkages between two or more sectors often have a greater impact on the natural resource base. These cross-sectoral linkages or externalities can be either

positive or negative; but here we are concerned with the negative externalities of natural resource degradation.

An example of a cross-sectoral linkage in the Philippines is the impact of soil erosion on coastal areas. Heavy siltation from deforestation and mining are cited as major causes of coral reef destruction and downstream watershed degradation. Pesticide use is supported by government subsidies and is another example of a cross-sectoral linkage. Agricultural runoff carries pesticides into streams and rivers where it can poison water supply and aquatic life. Cross sectoral linkages abound in natural resource degradation in the Philippines. The exploitation of forest lands by timber concessionaires and illegal cutters left lands denuded. These lands were then taken over by migrant farmers who were driven both by overpopulation in the lowlands and the need for land (due more to the inequitable distribution of land than to the absolute scarcity of land). These migrants, having no legal title to the land or economic incentive to do otherwise, have employed techniques of shifting cultivation and low input agriculture, which have tended to create high rates of erosion. High erosion rates have led to such downstream impacts as alternate floods and droughts and inefficient water use. In addition, heavy siltation from upstream has had a deleterious impact on biological diversity through pollution of streams and coral reefs. This is a very complex process, the exact economic cost of which cannot be quantitatively evaluated until the processes are sufficiently understood.

The study of cross-sectoral linkages and the possibility of negative externalities is important in the formulation of government natural resource policies. There is a need for both micro and macro level studies to be undertaken in the Philippines for decisionmakers to have appropriate information to formulate policies that will truly attain the Government's stated goals.

5.0 RESEARCH AND INFORMATION NEEDS

As mentioned in the preface, nearly all the information we digested (papers and interviews) in preparing this report is summary level and not "ground truthed" by us. Our general impression is that for most areas of concern (see Section 3.1) reliable, verified data do not exist. Thus we have begun this chapter with a section on what needs to be done prior to implementing most of our recommendations (Section 5.1). Section 5.2 covers "basic research" though all of our recommendations are anticipated to produce applied results. Section 5.3 addresses more proximally applied research and is the largest section. The final section (5.4) addresses institutional research areas. As with the preceding Chapters 2.0 through 4.0, this chapter is largely a distillation of the more detailed information provided in the annexes.

5.1 Pre-Programming Information Needs

Nearly every recommendation we have made (Chapter 7.0 and Annexes A through E) is based on a quick snapshot of the present situation as represented by existing reports, the impression of those working in these sectors in the Philippines and our own individual and collective experiences. Parts are certain to be incomplete, some inaccurate, and some already becoming out-of-date. This is inevitable. However, the situation is changing very fast at the moment, both in terms of the pace of escalation of the problems and in the numbers of organization that have joined into this set of partially integrated attempts at solution. By way of example, on the last day of general information collection while making another set of cross checks we learned about a UNDP major program for training related to environmental monitoring and management (see Section 2.2 and Annex E). In none of our several visits to and interviews with EMB staff had this program been mentioned.

Therefore, we recommend across the board that project specific verification be carried out on each of the Chapter 7.0 initiatives to be certain that (a) it is not already being done, and (b) that it is properly focused.

Most of our recommended initiatives are not presently location specific, and many would consume too many resources and overtax the support capacity if applied country-wide. Therefore we recommend for those initiatives that can reasonably be approached from a geographic prioritization basis, that criteria for ranking be developed and sufficient investigation be carried out to make sound decisions on which site(s) to start with. In Chapter 7.0 we have indicated our recommended selection criteria.

Due to the breadth of the task covered in this report and the time constraints on completing it (both of which we entirely endorse), nearly all the recommended initiatives need a lot of program/project design work to make certain they at least start out with a reasonable chance of success. Therefore, we recommend that the temptation to rush to spending on these initiatives be restrained long enough to adequately determine the man-power, logistics, and support requirements for each.

5.2 Basic Research Areas

The most salient basic research needs area we have identified is the almost total absence of information on the physiology and ecology of the highly prized tree species that formed the backbone of the last half century's forest plunder. The family of tress referred to as dipterocarps includes a wide range of species (see Annexes A and D) and related genera that occur in the mature dipterocarp forest. The peculiar needs of each and the relations among them must be understood for their replenishment to succeed. If that research assures such success, it will form the basis for a future sustainable harvest of far greater tangible and intangible value to the Philippines and to its tree farmers

than was the pillaging of the commons. (See particularly Annex A for more discussion of this need.)

At an even more basic level is the general lack of information as to what kinds, how many and how distributed are the plants and animals of the Philippines. We can be reasonably certain that before such an inventory can be organized and completed, more of them will be irretrievably lost. In parallel with such vital inventory work, studies of the properties and potential utilization of species needs to occur. For reasons that ought to baffle every retailer, governments seem to show no interest in and assign the lowest priority to taking inventories of their biodiversity stock. Thus we suggest tieing the connection to the "sales counter" potentials of that stock as early as possible to help boost the priority of this most basic and vital information (see Annex D).

5.3 Applied Research

There are a number of information needs and research areas with immediate applications to sustainable natural resources development. The following is a quick overview of the types of research needs we have identified. Annexes A through E provide further details.

- Enhanced regeneration of dipterocarp in the cogon grasslands -- trials to determine the degree to which remnant rootstock under the cogon grass could regenerate seed producing trees of the dipterocarp forest if the grasslands were protected from the burning used to keep them in low productivity pasture use.

- Importance of tenure to uplands (public lands) farmers -- This is a key in our incentive approach, as well as in virtually every other donor organization's approach to slowing the use of shifting agriculture in the uplands; as with other areas it needs field verification to determine if it is really a useful incentive. Upper level management in DENR is not certain of its value. A

well structured research project should be rapidly undertaken to resolve this key component of upland land use programming.

- Smallholder farmer time-utilization study -- both time use and the timing of activities need to be better understood to investigate effective ways to utilize alternative or supplemental employment hours and to optimize on farm time at critical timing points.

- Dipterocarp wildling propagation -- means of best handling (excavating, potting, moving, treatment, replanting) natural seedlings need to be developed to supplement the usually low and unpredictable seed production.

- Multiple uplands use planning -- for mixes of annual, perennial, and long maturity perennial species and for food crop, fuel wood, and plantation forestry objectives, studies of workable combinations that achieve erosion control, immediate provisioning and sustainable production objectives need to be carried out.

- Economic and ecologic monitoring -- as referenced above (Section 5.1), routine, basic environmental data need to be collected on a country-wide basis. Similarly (see Annex E) there appears to be a dearth of systematic, reliable rural economic data including production figures, inputs and their costs, transport routes and costs, market and middleman prices, smallholder credit sources and costs, and other basic agricultural data.

- Coral transplant research -- beginning work on which species of corals can be effectively transplanted to assist in reef rehabilitation has begun (Annex C); this research needs to be expanded to explore both transplant mechanisms and promising species.

5.4 Institutional Research Needs

Three key areas of institutional research needs are effective utilization of National Mapping and Resource Information Authority (NAMRIA), incentives formulation studies and a study of the cost/benefit of continuing to

orient the large scale coastal and pelagic fisheries toward exports.

NAMRIA appears to us to be the most well equipped remote sensing organization in the Philippines. Its potential for use in providing data upon which Provincial officers can plan (e.g., prioritizing upland areas with severe erosion problems), monitoring of implementation (both of industrial Compliance Certificate requirements and reforestation) and enforcement (illegal logging detection) needs both to be fully investigated and developed to meet natural resources development information support requirements. Software development, interpretation development and development of effective presentation approaches are all needed.

In our recommendations we have discussed the use of incentives as opposed to disincentives. The range of potential incentives needs to be more fully explored, and basic research into valuation of potential incentives by the target population needs to be carried out. Discovering an effective incentive for rural voluntary family size reduction will probably do more for Philippine development sustainability than any other single effort.

Finally, although the offshore fisheries were outside our scope of work, our survey has indicated (see Annex C) that large scale export oriented fisheries may be a principal cause of increasing pressure on inshore reef fishery resources. Who is benefiting from these large fisheries and at whose expense should be clearly identified so that policy in this area can be effectively reviewed.

6.0 CONSTRAINTS ON PRESENT AND FUTURE DEVELOPMENT

A continuing theme of this review has been the lack of implementation of existing stated policy, despite the presence in most instances of adequate regulatory and organizational structure. Part of the problem in making implementation happen at all, much less effectively, is the overwhelming maze of constraints.

In Table 6.0-1 we have provided a list of what we consider to be illustrative of the hurdles to be overcome to affect sustainable natural resources development and biodiversity maintenance. It is by no means a comprehensive list.

Our conclusion is that the issue of constraints is too often overlooked or simplified in order to try to get on with processing the money flow (though the money flow within the GOP is also a constraint). Handling constraints is a matter of effective forward planning. In the Philippines, we believe, planning is generally viewed as independent of implementation that is, a report is prepared to go on the shelf.

In Cebu (see Annex C) we observed an artificial reef construction program grind to a halt when the bamboo ran out. Other bamboo users were also put into shortage and the local price of bamboo went up as supplies reached zero. This occurred because the arithmetic of x pieces per unit times y units per year times z years had not been done and applied to the available supply with an adequate lead time to do something about the problem before it happened. It is a small example of a generic and a pervasive problem: **if effective forward planning is not made part of the fabric of all the programs and projects aimed at the natural resource sectors, the constraints in Table 6.0-1 will control the outcome.**

Table 6.0-1

Significant Constraints to Environmental and Natural Resource Mangement

Government Will	Land Tenure	Bureaucracy/Structure of:
Budget Limits	Land Mapping (Survey)	DENR
Government Priorities	Prior Degradation	DA
Popular Will	Ongoing Degradation	DAR
Staff Size (Central)	Lack of Status-Data	NEDA
Staff Size (Regional)	Lack of Monitoring	Civil Service
Basic School Curricula	Lags in Data Delivery	Budget & Management
Staff Training	Legislative Reform	Prior Reorganization of DENR (Settling-in Time)
Staff Experience	Inter Agency Cooperation	
Logistics Support	Disincentives	General Environmental Awareness/Education
Technical Staff Support	Incentives (lack of)	
Managerial Staff Support	Little Overhaul/Maint Capacity	Time Lags in Output from Upland Sust. Ag/For
Enforcement Structure	Corruption	
Enforcement Actuality	Landed Wealthy vs DAR	Lack of Integrated and Hierarchical Planning
Population Growth	Law and Order (General)	
Population Distribution	Insurgency	Centralized Decision Making
Land Availability (Access)	Demand for Hardwoods	Asia Regional Competition
Land Area Total	Size of Existing Debt	Poor Transport System
Suitable Land Area	Abuse of Prior Borrowings	Poor Communications

When reviewing the list it becomes apparent why implementation lags so far behind stated policy. Indeed it is remarkable than anything has been accomplished at all. In the following paragraphs we have selected a small subset for elaboration. Each of them is deserving of extensive analysis and treatment on its own, but that must await future efforts.

Of these the Government's will (or more accurately, its obvious expression and performance as outward signs of its will) must become the norm rather than the exception if popular will is to follow. For most sustainable natural resources development and biodiversity maintenance initiatives, we believe Government must lead. The public has already shown its desires with respect to the commons. Setting government's priorities and translating them to budget commitments should be an early expression of Government's real, as opposed to stated, commitment to improving the condition of its natural resources base. Current budgets in the natural resources sectors barely total 5% (Section 1.2) of the proposed public investment.

The capacity of Government to effectively improve the status of its renewable natural resources rests largely on the capacity (staff size, skills, experience, motivation, efficient utilization, and support) of the two cornerstone natural resources agencies, DA and DENR. We see constraints in all aspects of that capacity, but especially in skill levels at regional and subregional positions, in logistic support, and in inter-agency coordination. Linked to this is our general impression that the best laid new hardware supply plans usually run afoul of a nearly total lack of overhaul and maintenance capability, parts support, and concern on the part of operating personnel. (Recommendations to improve the capacity of these institutions are presented in Chapter 7.0).

Some of the constraints cannot be overcome (e.g., the total land area available, or that part suitable for productive resource development activities) and some are

controlled by forces outside Philippine control (e.g., demand for hardwoods). This Government has also inherited many problems not of its doing, but still its responsibility to overcome. Perhaps foremost of these is the size of the existing debt, followed closely by how little there is to show (or more accurately how much there is not to show) from the incursion of that debt. In part as a result of the plundering of the uplands and coastal resources during the prior administration, and not yet obviously under control by this one, there is a significant environmental quality debt to be overcome as well. Lack of any systematic or reliable data on the extent of water and air pollutants and solid wastes make even the establishment of priorities a guessing game. Meanwhile, degraded soils and water supply constrain upland, lowland, and coastal zone sustainable development.

Orderliness does not appear to be a part of the present Filipino culture. Lack of order adds to the constraints on development; its three dimensions are the insurgency, peace and order issues, and graft, both formal and of a kinship/favcr swapping sort. The insurgency prohibits effective civil development. Peace and order (or their absence) eats resources not only in thefts but in the need for armies of security forces. They in turn, along with many other branches of the enforcement bureaucracy, have traditionally supplemented their meagre wages by obtaining/extorting cash and other favors.

The team members have all seen such systems in place here and elsewhere. There is nothing unique about their presence in the Philippines. It may even be instructive to determine how much of this tradition was home grown and how much taught by the various external governors. But it exists, and is yet another piece of the disorder puzzle. The team may be able to conceive that it is so comfortable and well ingrained a process that recommending working within a formalized system of graft could be effective. However, such a recommendation is beyond us. As uphill and foreign an idea as it may be, we believe that breaking down the present system of formal and kinship/favor exchanges is

key to discouraging abuse of the commons. We see a lack of proper incentives as one of the keys (see Chapter 5.0) to unlocking this area of constraint.

As with other discussions it is appropriate to also end this review with an address to population. We have made no explicit recommendations in Chapter 7.0 on population control programs. That is only because they are beyond the scope of work, and too large an area to be undertaken as a side issue. Poverty alleviation, careful development of the commons, and sustainable natural resources development are all heavily constrained by the existing population. They will be further constrained, quite likely beyond absorptive capacity, by a much larger population. We are not confident that GOP wishes to recognize the seriousness of this constraint. **If every recommendation we have made were immediately and effectively implemented, it would still only be buying time --and not very much -- if effective population control is not rapidly put into place.**

It may be tempting for Government to view the laundry list of constraints presented here as an excuse for non-performance. Indeed we cannot distinguish in most areas between what GOP can't do and what it won't. However, we believe that if effective natural resources and bio-diversity management is not accomplished, not only will poverty and environmental degradation escalate, but the Filipino people will conclude that their Government chose not to be effective.

7.0 RECOMMENDED PROGRAMS AND PROJECTS

As we have tried to convey in the preceding chapters, there is a great deal to be done to slow the continuing degradation of the natural resources "support system" upon which so much of the Philippines' present survival and future well being require. In this chapter we have compiled in priority order the more important of our recommended initiatives. Each of these is treated in further detail in Annexes A-E.

Based upon the analyses presented in each of the supporting annexes, a comparison of the policy issues and actions recommended has been prepared (see Table 7.0-1). While the framework for natural resource management in the Philippines is extensive, there is considerable scope for improvement in the effectiveness of policies and programs. In setting priorities we considered the urgency of need, sequencing, and feasibility. Need is strictly subjective. Sequencing considers whether the recommended action is (or is nearly) ready to be implemented or if some pilot work must be carried out before the action can be effectively initiated. Feasibility considers a number of factors including scale relative to support capacity, acceptance, and our best guess as to the likelihood of success. We also considered the duration of the work and time lag from initiation of the work until visible results are forthcoming.

7.1 Preservation and Rehabilitation of Remaining Old-Growth Forest

Despite, or perhaps because of, the team's strong opinion that this action will not be accomplished, it was the unanimous selection as top priority. We are specifically referring to dipterocarp forest, and include any old-growth (A & D lands, TLA lands, indigenous people's lands, the remaining upland public lands, and other) stands

Table 7.0-1 NATURAL RESOURCE POLICY ISSUES AND RECOMMENDED ACTIONS

	Policy/Issue	Impact/Problem	Recommended Action
1.	Preservation of Remaining Old Growth Dipterocarp Forest	• At present cutting rates, remaining 700-900,000 ha will be eliminated in 7 to 12 years concommittent loss of irreplacable biological diversity	• Purchase of old growth forests as A&D land • Inclusion of old growth forest in IPAS • Strengthening of DENR monitoring and surveillance capabilities • Support to NGOs to establish preserves in indigenous lands • Selective retention of TLA holders and vigorous monitoring of their activities
2.	Sustainable Development and Conservation of Coastal Resources	• Stem conversion of mangroves to fish ponds • More orderly and integrated development of coastal resources -- idenfication of sensitive/critical areas to be protected	• Prepare Coastal Zone Master Plan - Strategic Plan - Master Plan • Training of Community Organizers

Table 7.0-1 cont'd.

	Policy/Issue	Impact/Problem	Recommended Action
		• Lack of personnel with technical and/ or community organization skills • Lack of experience in establishing/ operating multiple use coastal parks and reserves	• Training of technical specialists • Training of protected areas personnel • Demonstration of Coastal Area Planning on a Regional level • Creation of National Parks/ Reserves for Tourism • Ecosystem Park Demonstration
3.	Enhancement of Regionalization/ Decentralization of Environmental and Natural Resource Management Activities	• Inc tency bet ead- quar... and regional staff capabilities • Lack of trained at regional, provincial and community levels • Lack of identifiable career paths for regional, provincial and community technical personnel	• Develop a Rural Support Master Plan that will identify the numbers, location, and skills of personnel required to implement environmental and natural resources programs
4.	Support to Land Tenure Development and Application	• Lack of secure tenure inhibits long term investments necessary for sustainable development	• Development of tenure instruments to address tenure issues on lands being suitably managed cur-

Table 7.0-1 cont'd.

	Policy/Issue	Impact/Problem	Recommended Action
		• Inappropriate structure of incentives to natural resource management	- support policy dialogue among agencies and between agencies and donors • Conduct Natural Resources Rent/ Depreciation Study • Conduct analysis of economic returns from different incentive structures • Conduct economic analysis of regional farm transport system alternatives
10.	Overly complex and redundant legislation and regulation	• Legislation and regulatory framework is overly complex and redundant - hinders effective enforcement • Complex regulatory structure is poorly understood at decentralized levels of government	• Conduct regulatory rationalization study to streamline regulatory structure • Computerize rationalized regulations and disseminate to all levels of government
11.	Coordination between DENR and Department of Tourism over declaration of Tourism Zones	• No requirement to coordinate DOT declaration of Tourism Zones has resulted in areas considered environmentally critical being developed for tourism	• Review current practice and prepare legislation changes.

remaining. This is not strictly "virgin" rain forest. Little and perhaps none of that remains; we are addressing slightly cut or uncut, first growth dipterocarp forest (see Annex A).

We recommend a multipronged approach including purchase of any available A & D lands with old-growth dipterocarp forest by a Philippine NGO using as a model the Nature Conservancy. This could involve establishing a Philippine Chapter of the Conservancy. We caution that careful and deliberate consideration of Philippine land law needs to be carried out. The approaches of successful TLA concessionaires to controlling illegal cutting and settlement should also be used as a model.

As a second prong we suggest strong support of the Integrated Protected Area System as referenced in the World Bank ffARM study. We recommend that it be tried within the context of DENR so that useful institutional development occurs jointly with the primary purpose of forest preservation.

Thirdly, we recommend that DENR's surveillance and enforcement capability be greatly strengthened. For this specific objective such support requires purchase of or commitment of dedicated full time aircraft and aerial photography equipment, interpretive skills development, formulation of aggregative information and alarm report formats, and communications equipment. We suggest the assignment of a range of military and paramilitary units, rotated and dedicated to forest poaching interdiction. Finally, the clear support of the President is needed in prosecuting violators swiftly, publicly, and to the full measure of the law.

Fourthly, initiatives should begin through NGO's to explore legal and practical means of establishing reserves within indigenous lands. As with the A & D lands initiative, careful consideration of land law is needed. In

Table 7.0-1 cont'd.

	Policy/Issue	Impact/Problem	Recommended Action
		• Lack of functional protected areas system • Lack of consensus on conservation strategy	- National inventory of biological diversity - Conservation of critically endangered species • Conduct program of education and public outreach - Strengthening of Integrated Protected Areas System - Assistance in reading consensus on a National Conservation Strategy
8.	Strengthening of Upland Forest Resource Management	• Lack of sufficient community organizer and trainers to effectively propagate programs • Lack of support for Contract reforestation and lack of departmental resource to be effective • Lack of knowledge as to role that fuelwood has in overall fuel budget hampers forest resource planning	• Continue community-based work to stabilize uplands • Expand support for contract reforestation • Increase research to improve ecological soundness of moderately size industrial tree plantations • Prepare fuelwood budget

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Table 7.0-1 cont'd.

	Policy/Issue	Impact/Problem	Recommended Action
		• Extensive erosion from hillside roads • Lack of communications and firefighting equipment hamper protection of forest resources	• Support for planning and rehabilitation of grasslands • Prepare workshops and manuals to guide those designing and building hillside roads • Support for Dept of Agriculture's Tribal Program • Provide resources to improve/upgrade communications and fire fighting equipment
9.	Increase Efficiency of allocations to natural resource management	• Lack of policy analysis within governmental agencies results in inefficient allocations of resources (funds) to natural resource sector • Lack of much basic knowledge with regard to impact of policies on programs and vice versa • Need to strengthen institutional capacities to undertake analysis of natural resource policies	• Develop Natural Resource Policy and Planning Program - provide institutional support and long term training to NEDA and DENR - provide technical assistance in resource economics, policy and analysis, and data collection - support research to support policy analysis

Table 7.0-1 cont'd.

	Policy/Issue	Impact/Problem	Recommended Action
		• Inappropriate structure of incentives to natural resource management	- support policy dialogue among agencies and between agencies and donors • Conduct Natural Resources Rent/ Depreciation Study • Conduct analysis of economic returns from different incentive structures • Conduct economic analysis of regional farm transport system alternatives
10.	Overly complex and redundant legislation and regulation	• Legislation and regulatory framework is overly complex and redundant - hinders effective enforcement • Complex regulatory structure is poorly understood at decentralized levels of government	• Conduct regulatory rationalization study to streamline regulatory structure • Computerize rationalized regulations and disseminate to all levels of government
11.	Coordination between DENR and Department of Tourism over declaration of Tourism Zones	• No requirement to coordinate DOT declaration of Tourism Zones has resulted in areas considered environmentally critical being developed for tourism	• Review current practice and prepare legislation changes.

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As a second prong we suggest strong support of the Integrated Protected Area System as referenced in the World Bank ffARM study. We recommend that it be tried within the context of DENR so that useful institutional development occurs jointly with the primary purpose of forest preservation.

Thirdly, we recommend that DENR's surveillance and enforcement capability be greatly strengthened. For this specific objective such support requires purchase of or commitment of dedicated full time aircraft and aerial photography equipment, interpretive skills development, formulation of aggregative information and alarm report formats, and communications equipment. We suggest the assignment of a range of military and paramilitary units, rotated and dedicated to forest poaching interdiction. Finally, the clear support of the President is needed in prosecuting violators swiftly, publicly, and to the full measure of the law.

Fourthly, initiatives should begin through NGO's to explore legal and practical means of establishing reserves within indigenous lands. As with the A & D lands initiative, careful consideration of land law is needed. In

addition, examination of incentives systems monitoring and supervision will need to be carried out.

Finally, we recognize that holders of TLA concessions have been among the most effective forest protectors and also some of the worst offenders. Among the former are those who already have the knowledge and experience to preserve and sustainably develop forest lands. They know how to prevent illegal logging and settlement. There is ample evidence that when TLA's are cancelled, the situation often rapidly deteriorates. This leads to suggesting an approach that is both politically risky (setting the wolves to guard the sheep) and difficult to implement. However, we see the keys as (a) selection of the appropriate operators, (b) adequate independent, verifiable, and rotating monitoring, and (c) provision of effective incentives (see Annex A).

Overall, we see the only hope for success being the breadth of the approach. Even with such a multiple attack, we are not optimistic that the Government will overcome its old habits and conduct a serious effort to effect preservation of some of the remaining upland dipterocarp forest. Nonetheless, the importance of the objective requires that this target be set.

Lastly, let us make clear that we do not recommend a total logging ban. Responsible operators who have cared for their residual stands are more likely to keep their second growth in place than will the Government. Those who continue to practice responsible forest management should be rewarded with additional concessions and provided incentives for restoring understocked stands and expanding the area of dipterocarp forest.

7.2 Coastal Zone Master Plan

The team makes this action a high priority in part because of its need and in equal part because of its feasibility. The elements for coastal area rehabilitation,

sustainable coastal fisheries, mangrove utilization, and biodiversity maintenance are all in place in a few spots. The techniques have been tested, and are very amenable to local government unit solutions. What appears to be needed is an infusion of support, direction, training and organization. Most of the elements of a coastal zone master plan are on the shelf of the DENR/EMB library. Capable leadership, such as at the University of the Philippines Marine Science Institute, is available.

We see this as a program whose outside assistance is mainly in funding. We recommend that it be carried out through a combination of NGO and DA/DENR initiatives. Details of the approach are provided in Annex C.

7.3 Rural Support Staffing Master Plan

While devolution of authority and responsibility to the provincial level is an ongoing and active government policy, in many areas of natural resource management we do not think that the staffing implications have been fully thought out or planned. We recommend that NEDA/PIDS, in conjunction with strengthened DENR and DA Offices of Special Concerns, examine the provincial level needs for natural resources staff in terms of numbers, training, balance of experience, mixes of technical skills, career paths and incentives. The assessment should consider explicitly the needs of DENR and DA, but also other community services staff needs, such as community organizers, civil works planners and communications and education specialists. Once the needs are determined, a plan should be prepared detailing where the major shortfalls will occur, how they can be met in the interim and what kinds of training and curricula development are needed to meet the longer term needs. See Annexes A and E for more details.

7.4 Land Tenure Support

The team sees four general areas where support to land tenure development and application is needed: coastal commons lands, such as mangroves and coral reefs; A&D lands; upland agriculture development on variously held lands; and upland tree farm or agroforestry developments. We recognize that this is a very sensitive and legally difficult area. Protection from abuses and prevention of potentially catastrophic upland land rushes are necessary. Moreover, between an absence of sound survey data, a poor census base, conflicting legal and quasi-legal land claims, and a very modest ability to process tenure paperwork, it will not be a problem area easily resolved. Nonetheless, stable tenure for municipalities, barangays, and individuals, incorporating such concepts as "land to the tiller" where needed, appear to us to be a vital tool toward eliciting proper land (and area) protection behaviors. This appears to us to be a program that will largely involve DENR and DAR (see Annex B).

7.5 Upland Agricultural Support Services

As with the research into smallholder time utilization, this need is local and area specific. It involves development and training in sloping agriculture land techniques (SALT), upland corn production and intercropping support, implementation of garden polycultures, and training and support in water supply management. In general, we see this as an extension of RRDP and indeed we recommend that RRDP be continued. This is upland, but largely agricultural extension service work. Thus, we see it as a joint DENR/DA program (see Annexes A and B).

7.6 Community Organizer Training

The strong emphasis on local control and the evidence that community-based organizations are effective in both

coastal and uplands natural resource management indicate a rapidly escalating need for community organizers with technical skills. Item 7.5 addresses some of the technical skills needed for uplands agriculture, to which should be added fuelwood and charcoal tree plantation development, agroforestry approaches, and erosion control. For coastal locations skills are needed in mangrove reforestation, artificial reef construction, fisheries enhancement methods and alternative (non-fishing) livelihood development skills are needed. A program to train 1000 community organizers for the coastal zone over the next 5 years is presented in Annex C.

7.7 Natural Resources Policy and Planning Program

Many of the issues raised in natural resources involve policy reforms needed for improved natural resource management and use. Policy reform is a long painstaking process; it includes policy formulation, implementation, and impact evaluation. It can also include an analysis of reasons for the non-implementation of existing policies. A program of natural resource policy and planning is recommended. The goals are to strengthen the Philippine capacities to identify key policy areas in natural resource management and use, to analyze policies, and to recommend needed policy changes. The program will also build the consensus and develop the capacity for advancing various policy options. This will lead to increased efficiency in the allocation of natural resource funds. It is expected that NEDA, DENR, and DA will be the institutional targets for improvement of natural resources policy analytical skills.

7.8 Establishment of a Philippine Center for Biodiversity

This program involves a three part action plan including establishment of a center to act as a focal point for biodiversity activities, to plan and facilitate a national biological inventory including a rapid survey of

the remaining old-growth forest biota, and to prepare a Philippine National Conservation Strategy. This critical activity needs to be initiated as soon as possible, and for that reason we recommend that it be initiated through an NGO. As the center's planning and development moves toward implementation, it may be found more effective for it to be housed in and or operate through either a university (or consortium) or the National Museum. A detailed set of actions with timelines and approximate budgets is provided in Annex D.

7.9 Other Programs and Projects

In this section we have listed the remaining principal recommendations, indicated our suggested implementing institution, defined them as programs or projects, and indicated the Annex in which further information can be found.

- Hill Access Road Erosion Control (Project)
  NGO to coordinate with DENR/DPWH
  Annex A

- Cogon Reconversion Classification (Project)
  Private Sector and/or University
  Annex A

- Natural Resources Rent/Depreciation Study
  DENR
  Annex E

- Regional Coastal Zone Demonstrations (Program)
  DA
  Annex B

- National Biodiversity Education and Public Outreach (Program)
  NGO
  Annex D

- Upland Smallholder Sustainable Agriculture Inputs (Program)
  DA/DENR
  Annex B

- Environmental Assessment Training (Project)
  USAID
  Annex E

- Fuelwood Budget (Project)
  Jointly by three centers associated with the University of the Philippines at Los Banos
  Annex A

- Offsite Biodiversity Conservation (Program)
  University
  Annex E

- Training Needs in Natural Resource Economics (Project)
  University
  Annex E

- Upgrading of Environmental Monitoring Capability (Program)
  DENR/EMB
  Annex E

- DA/DENR Data Collection Methods Rationalization (Project)
  Consultant
  Annex E

- Workshop on EA as a Planning Tool (Project)
  Consultant
  Annex E

- Forestry College Curriculum Review (Project)
  US Forest Service/University
  Annex A

- National Botanic Garden Planning (Project)
  National Museum of the Philippines
  Annex D

- DENR Communications Upgrade (Program)
  DENR
  Annex A

Each of the annexes also contains lower priority programs and projects that should be reviewed to obtain a total picture of the scope of our recommendations. The above listing is intended only to provide an overview and to prioritize the more critical areas.

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ANNEX A

SUSTAINABLE MANAGEMENT OF FOREST RESOURCES

by

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APPENDICES

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1.0 INTRODUCTION

The land surface of the Philippine archipelago is given as 29.694 million hectares (ha). At the arrival of European settlers, the majority of the land surface -- probably 90 percent -- supported several forest biota, the most wide spread of which was the moist tropical rain forest characterized by the genera of the family Dipterocarpaceae. While other forest types, such as pine, beach, mangrove, swamp, and mossy existed, they were far less extensive and did not contain species that occur nowhere else in the world.[5]

The forests were originally cleared simply to expand the agricultural area beyond the fresh water swamps which were easily converted to rice culture. By 1932, the area of virgin dipterocarp forest was estimated to be 11 million ha.[14] In the period immediately following 1946, utilization began to accelerate. In the late 1960's and throughout the 1970's, these forests became the basis for a world renowned wood industry. The pace of cutting has slowed in the 1980's because of lower world prices, diminished supply, and more restrictive policies. Logging activity and settlers following in the wake of cutting have reduced the total size of the nation's forest estate to not more than 6.4 million ha of which between .7 million ha and .95 million ha are old-growth. The changes are shown in the table Change in Forest Land Area by Forest Type, 1934-1988.

The Mid-Term Development Plan perceptively states: "The country faces a dilemma on how to maximize the utilization of natural resources and apply new technologies to increase production while simultaneously conserving and preserving the natural environment to maintain a balanced ecosystem".[13] Nowhere is this dilemma more starkly evident than in sustaining production of the forests.

1.1 Definitions

Considerable care must be exercised when examining forest management issues because it is not uncommon for some terms to be used by different users to mean quite different things. Therefore, some definitions are offered now to make clear what is intended when the terms are used in the text that follows. It is not intended that these definitions comply with legal or statutory interpretations where, for example, it is possible to classify a field of brush as "forest land".

Table 1.0-1 Change in Forest Land Area by Forest Type, 1934 - 1988

Forest Type	1934a	1934b	1969a	1969b	1976	1980	1988
			(000,000 ha)				
Old growth dipterocarp	10.7	11.1	4.4	5.3	3.67	2.99	1.04
Seasonal molave	0.4						
Broad leaved	2.5						
Residual dipterocarp, 2nd growth	n.a.	2.5	3.4	3.3	n.a.	n.a.	3.36
Seasonal without molave	0.4						
Bamboo	0.03						
Mangrove	n.a.	0.3	0.2	0.3	n.a.	n.a.	-
Mid mountain	1.9						
Mossy, unproductive	0.7	2.6	1.7	1.8	n.a.	n.a.	1.68
Pine	0.5	0.5	0.3	0.2	n.a.	n.a	0.24
Total Forest Area	17.18	17.0	10.0	10.9	8.1	7.4	6.32
% of Total Country Area	57.3	56.7	33.3	36.3	27.0	24.7	21.1

1934a: Ganapin, Delfin. Based on official data of former Director of Forestry Arthur Fisher.

1934b: A.V. Revilla in Lennertz and Uebelhor (eds), 1988. Based of forest map.

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1969b: Extrapolated from data in Philippine Forestry Statistics.

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Reproduced from: Bautista, Germalino M. n.d. "The Forestry Crisis in the Philippines: Nature, Causes and Issues" (forthcoming publication in Journal of Developing Economics.)

A complete glossary is included at the end of the text.

Key terms are:

Virgin (specify) forest: a forest type that has been affected only by natural forces, i.e., not affected by logging or modern (as opposed to ancient tribal) slash and burn practices.

Old-growth (specify) forest: a forest predominantly stocked with mature trees; less than 25 percent of the mature stand volume having been removed by cutting.

Residual (specify) forest: a forest which remains after logging on the Philippine Selective Logging System.

Production forests: geographic areas of existing virgin, old-growth, and residual forest designated or set aside for timber production.

Alienable and disposable (A&D) lands: public domain lands which have been the subject of the present system of classification and declared as not needed for forest purposes.

Annual allowable cut: the volume of materials, whether of wood or other forest products, that is authorized to be cut regularly from a forest.

Agroforestry: a cultural system that combines agronomy with forestry in a multi-storied arrangement of trees, shrubs, row crops and/or ground cover.

Cutting cycle: the period, usually expressed in years, between major harvests from the same forested area.

Denuded land: areas that are devoid of ground cover or inhabited by sparse vegetation so that the strata formerly covered are exposed to movement by wind and/or water. It does not apply to cogon grasslands.

Tribal community: a community of indigenous Filipino people who have sprung from common ancestors.

Forest land: public domain lands that have not been declared as "alienable and disposable" and presumed to be needed for forest uses; in common usage the definition applies to all land within, or above, the so-called 18 percent slope line.

Forest: land that actually carries forest trees, usually more than 10 percent of the land covered with the canopies of the trees.

Forest reservation: an area of "forest land" that has been reserved by the President of the Philippines for a specific purpose(s).

Grassland: land covered with indigenous grass species with less than 10 percent tree canopy cover.

Industrial tree plantation: any alienable and disposable and/or forest land that is planted to tree crops primarily to supply the raw material requirements of existing or proposed wood processing plants and related industries.

Estate plantation: lands that have been planted to tree type crops, such as coconuts, abaca, citrus, and rubber.

Titled land: "alienable and disposable" land that has been taken through the patent process and to which title has been issued to a private entity.

Philippine Selective Logging System: the systematic removal of the mature, overmature and defective trees in such a manner as to leave adequate number and volume of healthy trees of the desired species on the site necessary to assure future crops of timber and adequate canopy for the protection of the soil.

Sustained yield forest management: practices that yield a flow of forest products equal in volume over time to the natural or accelerated growth of the forest where the products may include one, several, or all of the following: timber, water, forage,, wildlife, and recreation.

Uplands: a not well defined zone of largely rainfed area where agriculture and/or forestry is being practiced on rolling to steep land with slopes ranging upward from 15 percent although some land in the uplands are quite level and may even be irrigated.

One also has to use care with the term "dipterocarp". While the forest type is dominated by genera of the Dipterocarpaceae family, particularly in the emergent canopy, many of the specimens in the virgin stands are members of other genera from other families. As used here, the term "dipterocarp" means the whole collection of species in a given forest that does or did support a stand dominated by Dipterocarpaceae genera.

1.2 Objectives of the Forest Management Annex

Not all of the wood needs of the Philippines are or have ever been produced on what are now called forest lands. Forest products are grown on titled land and A&D land for consumption by the owner/occupant.

Factory operators do not distinguish whether the cellulose being processed comes from forest land, titled land, or even from the Philippines at all.

Therefore, the objective of Sustained Forest Resource Management is to take account of the total wood budget of the country and the policy and management framework necessary to balance it. For example, if the demand for certain wood products can be met through production from titled land, then the market, to the maximum degree possible, should make it possible for the production to be so allocated. It is true that some wood has higher market value than others. This is particularly so for the wood of many of the species in the dipterocarp forests. These species are usually lumped together as "common hardwoods".[1] The majority of the forestry literature produced for the country focuses on these species and those other dipterocarps and associated genera (classed as "Furniture and Commercial") because of the very high values assigned to the wood by the world market. As will be shown below, the amount of the high value dipterocarp forest remaining, whether measured by area or by volume, is now very small.

Just as the distinctions between titled land, A&D land, and forest land are blurred, so too are blurred the other inexorably intertwined aspects of resource use. For example, former forests are now being used for extensive livestock grazing. These grasslands become part of the forest equation when decisions are made about what should be returned to forest or declared A&D and used, say, to produce tree fodder from agroforestry systems. Similarly, the state of the forests figures in the quantity, quality, and periodicity of water discharged in streams or returned

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[1] The species normally counted as Common Hardwoods are: Almon, Bigtikan, Mayapis, Nato, Red Luan, Tanguile, White Luan, Others. It is a fault of the system that the complete list of species in the genera Dipterocarpaceae is never shown. For maintenance of the fuel production from any area, it would help to know which "Other" are included. [1 p.15]

to subsurface aquifers. Consequently, this Annex will include discussions of at least some of these aspects. In short, the consideration will not be limited to the issues affecting the major forest types in the country.

1.3 Sources Used

No new data have been generated in preparing this Annex. The primary source of data is the published literature. First priority was accorded to accessing the most recent studies and analyses made by Filipino and expatriate authorities.

There is an abundant literature. Several characteristics are striking. Firstly, much of the material is of very recent origin and the volume is increasing dramatically. Secondly, there are marked inconsistencies among the few historic data series available that impede the making of firm conclusions about trends. Thirdly, some data are contradictory. Fourth, the reliability of field reported data is not good.

The second source of data was the personal interview. Persons in both upper and lower levels of government agencies, academics/consultants, officers of non-governmental organizations, farmers, and businessmen were consulted. There were representatives of all classes in both Filipino, expatriate, and donor communities. A complete list of contacts made is shown in Section 9.2.

Finally, a field trip was made to Ayungon, Negros Oriental to see first hand the condition of the forest and plumb community attitudes toward it.

1.4 Organization of the Annex

The results of the data gathering and analysis, for which the author accepts full responsibility, are presented in eight sections. Section 2 deals with the current situation, Section 3 examines more closely the matter of managed forests, Section 4 introduces the matter of agroforestry and its role, Section 5 proceeds to industrial forestry for the future, Section 6 examines the programs currently in place to address the dipterocarp forest, agroforestry, and industrial issues, Section 7 extracts some lessons from the experience gained in implementing resource management programs, Section 8 is made up of the recommendations in priority order and Section 9 contains the

references, the contacts, a brief chronology, and acknowledgments.

1.5 Inter-relationships With Other Subject Areas

With a scope that transcends the dipterocarp forest, it is to be expected that there will be overlaps with other substantive areas that are important parts of this report. Some of the more important ones are:

- Biodiversity: clearly, in a country where the forest species are so dominant, any attempt to deal with the sustainability of biodiversity must address the maintenance of the forest biota. There is no inconsistency in the objectives of sustained forest management and the objectives of biodiversity.

- Coastal zone management: the mangrove forests are a key element in the management of coastal ecosystems. They are also a recognized forest type and are used as a forest product source by coastal inhabitants. It is possible to have sustained yield management regimes for mangrove forest products such that the forests continue to fulfill their place in coastal shoreline protection and contributions to the marine food chain.

- Extension of forestry into the multi-storied area of agricultural production makes it an integral part of any strategy for sustainable upland agriculture.

- The fact that the extensive cogon grasslands were once forest makes forestry an important consideration in proposals to increase the productivity of the grasslands -- whether as part of expanding agriculture or expanding the production forest base.

Consequently, each of the topics will be accorded some attention here, but the balance of the discussions of the above four areas will be found within texts of other Annexes in this report.

2.0 THE CURRENT SITUATION

2.1 Overview

In any review of current conditions facing forest management in the Philippines, major attention must be given to the condition of the dipterocarp forests. These forests are at the very core of the nation's wood production; but they are equally valuable for many other things. Among the values is the ability, evolved over eons, to stabilize soil on steep slopes and support a diverse fauna and flora that may contain species of immense value to man.

National information on the condition of the dipterocarp forests has depended on reports submitted by Timber License Agreement concessionaires and supervising forest officers. After 20 years of intensive logging, a national inventory was started, but abandoned when the preliminary results differed dramatically from the accepted figures. Two surveys of national scope have been completed in the past 18 months: the Republic of the Philippines-German Forest Resources Inventory and the World Bank sponsored Forestry, Fisheries, and Agriculture Resources Management Study. The data have been published. In addition, these data were analyzed by a team working on a segment of the Forestry Development Master Plan. It has been established beyond doubt that these data are technically correct.

There is general agreement that only something between 700,000 and 950,000 ha of old-growth dipterocarp forest remain. It is also reasonably certain that the residual, or second growth, forests have far less volume than was thought. If current trends continue, it is likely that the old growth forests, with many species found only in the Philippines as well as all of the stabilizing influences and genetic material they represent, will be gone and there will not be sufficient material to continue to operate the existing mill capacity of the country.

A third national study, the Land Resources Evaluation Project, has made on-the-ground surveys of, and published reports on, all Provinces. There are data on the extent of forests, but they have not been totalled for comparison with the two above mentioned studies. The Provincial studies, however, document the extent of severe soil erosion that is found in the country. In one Province, South Cotabato, 45 percent of the surface is classed as severely eroded.

Among the problems facing decision makers is the lack of consistency among categories in which data are collected and analyzed. Forest inventory data are useful for presenting the commercial wood picture, but lack information about the extent of species diversity and total volumes by species in the remaining old growth and residual stands. The Fisheries, Forestry, and Agriculture Resources Management Study analyses depend upon data drawn from satellite imagery. The analysts were interested in overall land use conditions. Thus, the forest categories used are not easily compared with those employed by the Forest Resources Inventory. Similarly, the categories used by the Land Resources Project do not agree with either the Forest Resources Inventory or Fisheries, Forestry, and Agriculture Resource Management categories. A management unit based system that will become standard and can be aggregated as the level of analysis is raised should be considered.

The Fisheries, Forestry, and Agriculture Resources Management inventory showed some 455,000 ha of plantations with and without associated cropland. Of this, about 35,000 ha are reported in the plantations of the Paper Industries Corporation of the Philippines. This figure does not compare well with a consultants report on Commercial and Industrial Tree Plantations actually planted to trees.

The Forest Resource Inventory has collected data about the amounts of material available for three minor forest species: rattan, bamboo, and palm. All are found in the dipterocarp forests, although some rattan has been grown in the Paper Industries Corporation of the Philippines plantations. There may be further discrepancies between the rattan inventory information which points to an impending shortage of furniture grade rattan, and the results of a consultant study of the rattan industry that finds adequate supplies.

There are painfully few data available about the production from farms, particularly the contribution of small farmers to the supply of fuelwood and charcoal. Even less is known about the availability and use of medicinal plants and other small or minor forest products.

The current crisis evolved from a frontier mind-set: the forest was to be used as a tool for development and removed as an impediment to agriculture. The Timber License Agreement (TLA) approach began in the colonial period and was continued by the Philippine government. The principal characteristics of the approach are: economic rent (stumpage) fees at give away levels, use of the revenue by

the general government rather than for administration of the TLA areas, and selection guidelines that served basically as cutting guides. The vicious cycle resulted in insufficient budgets to support even minimal government inventories, supervision, and enforcement to protect the public interest and, therefore, accountability only to the profit and loss statement of the companies. In general, with notable exceptions that prove the rule, the sequence has been destructive logging in which even the cutting guides were ignored, invasion of the site by secondary, illegal cutters, and finally conversion of the forest to brush, grass, or agriculture. The responsible TLA is the nub of conundrum: the operator who has followed the rules and has secondary forests in the concession ready for a third cutting expects that further cuttings will be possible on some sustained yield basis. This means that the operator has been able to keep settlers and other cutters or burners from interrupting his working circles. The direct financial incentive for sustained forest production makes his TLA a major force in maintaining dipterocarp forest cover. The current direction of forest policy can act to terminate even the good operators and open their productive lands to illegal cutting and settling. The major threat to forest sustainability today is population pressure and the desire of all Filipinos to have a plot of land to call his own. Inaccessibility and the sheer magnitudes of the virgin dipterocarp forests have been overcome for these largely landless people by the logging practices of the past four decades.

The principal threat to sustainability of forest resources in the Philippines is the perpetuation of the existing system of logging. The system needs to be fixed with respect to the pricing of the trees, tenure of the operators, methods of logging and recovery, government cooperation in protecting the legitimate operators from incursions by illegal cutters, and making more equitable the participation of the communities within and/or dependent upon the wood producing activities.

2.2 Inventories

Recent Resource Base Work

Forest Resources Inventory.

The first nationwide forest inventory was conducted from 1965 to 1969 [1]. The maps and tables of volumes served as the basis for regional and district forest officers to make decisions on timber permit applications.

The inventory was made because of the tremendous increase in the cutting and use of the natural forest and uncertainty about the effects on the forests of the Philippine Selective Logging System (PSLS) and the impact of logging practices in use. In the succeeding decade it was clear that utilization trends were accelerating -- driven in some cases by dire government needs for export earnings. [2] It is reliably reported that the 1969 inventory was never accepted as official because the area and volumes found were drastically below the figures being reported from the field. LANDSAT imagery was the basis for an inventory of status by the Natural Resources Development Corporation that also revealed there was far less area in dipterocarp forest than that officially recognized by the TLA's and certified by the District Foresters.

During the late 1970's, world concern began to recognize the serious global consequences likely to result from continuous conversion of climax rain forests to agriculture or waste. To gather global information as much as to provide decision-makers in what was the Bureau of Forest Development with accurate information on the extent and condition of Philippine rain forests, the Forest Department of the Food and Agriculture Organization of the United Nations (FAO), in conjunction with the United Nations Environmental Program Tropical Forest Assessment, launched a forest resources inventory in Regions X and XI (effectively northern and eastern Mindanao). The work, based on systematically distributed clusters of strip samples, was done between 1979 and 1983. The Government of the Federal Republic of Germany, acting through the German Agency for Technical Cooperation (GTZ) and using experts from the German Forest Service, agreed to assist the Government of the Philippines (GOP) extend the inventory coverage to the entire country. The GTZ Forest Resource Inventory (FRI) Project was launched in 1983 and completed in 1988.

ffARM Inventory.

In 1987, a group of Consultants was sent by the International Bank for Reconstruction and Development (World Bank) to study resource management conditions in the Philippines. Their data were compiled into the Forestry, Fisheries and Agricultural Resources Management Study (ffARM) report. In support of the study, "...a satellite reconnaissance and mapping of land uses in the Philippines ... was completed by the Swedish Space Corporation with the assistance of DENR's National Aerial Mapping and Resource

Information Agency." [3] The source of the imagery was the Swedish space satellite which is capable of providing regular, periodic coverage of the archipelago. The date of the imagery varies between March and mid-July of 1987 and between mid-September 1987 and February 1988. Ground verification was conducted between April and June 1987; U.S. LANDSAT imagery was a part of this exercise.

The primary interpretation of the imagery was visual, although some demonstration digital interpretation was done. Since the end of the project, however, personnel from the Swedish Space Corporation have written computer programs so that digital interpretation and manipulation of the existing imagery can be performed on a standard personal computer with 40 megabyte or more hard disk capacity. [4]

In the case of the FRI, the remote imagery used to compile the forest land statistics range in age from pre-1979 to 1987. The technical staff brought the data to a uniform 1988 status by comparing the findings of the first nationwide inventory and adjusting each datum by the annual rate of change times the years between the photograph and 1988. ffARM data simply assume a uniform date of imagery, which is reasonable since all images were recorded over a one year span.

Sustainable Forest Management Plan.

A special report on the natural dipterocarp forest has been produced by Consultants providing technical assistance leading to a Master Plan for Forestry Development as part of the Asian Development Bank's (ADB) Forestry Sector Program Loan [5]. The Consultants used both the ffARM and FRI data bases available within the National Mapping and Resource Information Authority (NAMRIA). The Consultants also carried out special analyses drawing on the ffARM and FRI data.[1/]

1/ Some of the software written by the technicians from the Swedish Space Corporation were used in the team's analyses. Some of the results are presented in Appendix IX of Part 3. The program has the capability of displaying the extent of forest by elevation and by degree of slope.

Land Resources Evaluation Project.

The objective of the Land Resources Evaluation Project (L/REP) is to map and evaluate the soil resources of each Province. The work started in the early 1980's and has progressed province-by-province until last year. Land use maps have been prepared from data gathered by teams working in the field for one year in each province. The scale of the maps is 1:50,000 (therefore comparable with the FRI maps).

A comment in the Bukidnon Section of the L/REP report reveals another problem with statistical series: "There may be some inconsistencies in the maps especially for the municipal boundaries which resulted in big discrepancies between the areas in hectares gathered from the Provincial profile with that of the areas measured by the land resources study." [6]

Of particular importance in the L/REP studies is the application of a four-level erosion index to specific areas in each Province.

Classifications

The land use units used in the L/REP Provincial Land Uses Evaluations are: Agricultural land, Grassland, Woodland, and Water Bodies. Interestingly, the Woodland unit for Bukidnon is subdivided into: "natural forest, falcata, pine tree, shrubs, ipil-ipil, kaingin, and bamboo." These categories are different from the inventory categories used in the FRI and ffARM studies. [6]

The classifications used for erosion are E_0: no apparent erosion; E_1: slight erosion; E_2: moderate erosion; and E_3: severe erosion. At the time of the survey in Bukidnon (not stated), about 259,178 hectares or 29 percent of the area surveyed is considered as severely eroded". [6] These findings are consistent with the data collected in South Cotabato where 218,083 ha, or 45.9 percent of the Province, were classified in 1983-1984 as severely eroded. [7] The FRI work was directed at management of forest resources within the legally designated forest land generally identified as the "certified forest". It is stated in the FRI report that there are 15.9 million ha of forest land, but the statement is qualified by pointing out that only 40 percent of the 15.9 million ha (6.35 million ha) is actually

covered with trees. While data have been collected for 11 classes of land cover and are available in statistical and map form (1:250,000), only six forest type classes, which are consistent with and comparable to the 1969 inventory, are displayed in the FRI Summary Report. (Definitions of the forest type classes and are found in Appendix A.A.) The forest type data are shown in the Table of Area and Proportions of the Main Forest Types (emphasis added).

In addition, the FRI inventoried land use and forest types in each of the administrative regions on "Certified A&D" land. Image interpretation showed that 1,500 ha, or .15 percent of the total, of old-growth dipterocarp forest remained on A&D land. The comparison of area in the forest land with the area on A&D is shown in Table 2.2-1.

Twenty three land use classifications and two marine classifications are put forward in the ffARM study. No distinction is made between the "certified" forest land, A&D land or titled land. The classification categories and the inventoried size of each are shown in Table 2.2-2. The forest categories are the only ones directly comparable with the FRI data. Comparisons are shown in Table 2.2-3. (The definitions of the classifications used in the ffARM Study are shown in Appendix A.B.)

The purpose of the comparison is not to point up technical discrepancies; rather, it is to indicate that agreement on the basic uses of the categories has not been agreed upon. The FRI series has a fairly clear objective: to be useful in forest management activities so "....the Philippines (may) maintain enough forest resources for timber production and environmental benefits." The members of the FRI team were also concerned with being consistent with the 1969 categories. On the other hand, the purpose of the ffARM study was "....to address the most significant issues of natural-resource management in the Philippines". The ffARM categories serve very well to identify, on a gross scale, the magnitude of problems without necessarily defining jurisdictional responsibility for action. Some are very useful: the grassland, eroded areas, and siltation patterns categories, are examples.

The problem is further compounded by other classifications used for official government forecasts. For example, the Mid-Term Plan projects forest land use between 1987 and 1992 according to: Production Forests, Protection Forests, and Non Forests. In this case, the formal definition of forest lands is used, but very few of the categories match those used in the other studies referred to

Table 2.2-1 The Area and Proportions of the Main Forest Types (hectares)

LAND USE/TYPE	RESERVE	A&D
Dipterocarp Old Growth Forest	986,800	1,500
Dipterocarp Residual Forest	3,332,800	80,000
Pine Forest, Closed	129,600	0
Pine Forest, Open	107,100	2,100
Submarginal Forest	535,700	8,500
Mossy Forest	1,134,200	3,200
Mangroves	125,700	13,400
TOTALS	6,351,900	108,700

SOURCE: Natural Forest Resources of the Philippines. 1988.

Table 2.2-2 Area by Land Uses in the ffARM Study Imagery

CATEGORY	HECTARES
Pine Forest	81,200
Mossy Forest	245,500
Dipterocarp Forest, closed canopy	2,434,500
Dipterocarp Forest, open canopy	4,194,000
Mangrove Vegetation	149,900
Cultivated and other open areas in forest	30,400
Grassland	1,812,900
Cultivated area mixed with brushland and grassland	10,114,300
Coconut Plantations	1,132,600
Other Plantations	90,800
Arable land, crops mainly cereals and sugar	4,392,300
Cropland mixed with coconut plantations	3,747,800
Cropland mixed with other plantations	365,200
Fishponds derived from mangrove	195,200
Other fishponds	10,100
Eroded areas	700
Quarries	8,600
Riverbeds	81,800
Other barren land	10,300
Built-up areas	131,400
Marshy areas	103,500
Lakes	205,400
TOTAL CLASSIFIED LAND AREA	29,537,900
(Unclassified Land Area)	546,200
Siltation patterns in lake or along the coast	28,400
Coral Reefs	352,700
CLASSIFIED AREA	29,919,100

Distribution in Percentage Among:

Forest land, classes Fp to Fm	25
Extensively cultivated land, classes Es to Ec	41
Intensively cultivated land, classes Ipc to Ifo	34

Source: Forestry, Fisheries and Agricultural Resource Management Study. 1989.

Table 2.2-3 Comparison of Forest Resource Inventory and Forestry, Fisheries, and Agriculture Resources Management Study Forest Data

CATEGORY/TYPE	FRI	ffARM
Pine Forest	238,800	81,200
Total Dipterocarp	4,401,100	6,628,500
Dipterocarp old/closed	3,412,800	4,194,000
Dipterocarp residual/open	988,300	2,434,500
Mossy Forest	1,137,400	245,500
Mangrove (vegetation)	139,100	149,400

SOURCE: Natural Forest Resources of the Philippines. 1988. Forestry, Fisheries and Agricultural Resources Management Study. 1989.

above. The basic data are shown to have originated in the Bureau of Forest Development of the Ministry of Natural Resources (now the Forest Management Bureau in the Department of Environment and Natural Resources). [13]

It is clear that the classifications used are defined by their use which is, by and large, national. What is needed is an operational land use classification system for forestry that applies to all classes of land -- A&D, titled and forest land alike.[2/] The categories chosen should be based upon the operational requirements of the Departments of Environment and Natural Resources (DENR) and Agriculture (DA). Provision should be made to input data from the Provincial level and aggregate to the regional and national levels and not the reverse. Examining the Land Resources inventories might be a starting point, e.g., they show area in falcata plantation. It would seem that the L/REP work might be a starting place.

Coverage

All three principal data series are national in scope. The FRI, while using imagery that has broader coverage, has focused on cover conditions in forest lands. Forest resources condition maps at 1:50,000 were prepared for all areas for which there were recent aerial photographs. These maps show all 11 forest strata defined above. The maps cover forest land in Regions I, II, III, X, XI and large parts of Regions IV and IX -- "about 50% of the total land area and 80% of the forested land."[1]

The SPOT imagery, on which the ffARM data is based, covers the entire country and some of the near-shore areas as well. Unfortunately, ffARM data do not distinguish between public land, A&D, and common resource areas let alone political boundaries.

The L/REP project provides a land resources inventory report, with maps, for every Province.

2/ Cf. Edwino Fernando has a classification system for forest land (a derivative of a UNESCO system) that is discussed in Annex D. Fernando also offers a useful description of factors affecting the range of pine forest.

Distribution

There is a copy of the FRI report and 1:50,000 map for each PENRO where the aerial photographic base was available. The report and tabular information have been distributed to all regional, PENRO, and CENRO offices.

ffARM resource data is severely limited in distribution and in understanding. Actual knowledge of what is available and how it can be used seems limited to NAMRIA.

The distribution and use of the land resource inventories, particularly by DENR personnel, is unknown.

2.3 General Condition

Old-Growth

The "Sustainable Forest Management Plan" (SFMP) [5] of the Master Plan for Forestry Development furnishes thorough analyses of a) the condition of the dipterocarp forests and b) the internal and external forces affecting their survival and possible use.

FRI data indicate that between 1969 and 1988 the dipterocarp old growth forest had declined to 988,300 ha from 4,656,600 ha or a decline of about 7.8 percent per year. Thus, if that trend line was maintained, by mid-year in 1989, there may be less than 888,000 ha. The SFMP staff estimates the annual cutting rate in old-growth to be "....at least 40 to 50,000 ha...." (less than the 19 year trend line).

Based on the comparison of imagery and estimates of the volume of illegal felling, informed specialists think it is possible that as little as 700,000 ha of old-growth forest remain. [19] At this rate the question is not whether all significant vestiges of this magnificent, diverse biota will be eliminated, but when. If prevailing trends continue, this tragic loss will occur within the next seven to 12 years.

The gross decrease, while startling enough, is not the whole story. The loss has been geographically uneven: Regions V, VII, and IX have virtually no old-growth dipterocarp forest left; the bulk of old-growth dipterocarp is in Region II, X, and XI.

Another dimension is the loss of species of Dipterocarpaceae family. The original virgin stands with the most diverse species composition of nearly pure dipterocarps, with a very limited number of non-dipterocarp stems, were found in the lowland rain forests (below 900 m). Transect studies in Mindanao clearly indicate that the number of dipterocarp species and the basal area of dipterocarps per hectare decreases with altitude.[7] Since the majority of the old growth inventories is above 800 m, it seems certain that some of the species in the original virgin stands have vanished. (See Annex D on Biodiversity)

[While not specifically noted in any of the inventories, a unique forest type occupied the lowland coastal margins: the Beach Forest. It was, and may still be, composed of Baringtonia asiatica, terminalia catappa, and Calophyllum inophyllum along with several species of Pandanus, Casuarina equisetifolia, Pongamia glabra and Thespesia populnea.]

Dipterocarp Residual Forest

The forest volume information currently (and historically) in use is difficult to interpret from a balanced perspective because of a predilection for commercial definitions. Second growth volumes are simplistically broken into a) "Common Hardwoods" -- which is entirely composed of dipterocarp species, b) "Construction and Furniture Woods" -- which include only one or two dipterocarp species, c) "Light Hardwoods", and d) "Softwoods".[1] Since 43 members of the dipterocarp family and 295 species of non-dipterocarp trees have been identified in the Philippines, the simplistic categories leave much to be desired. Utilization of the volumes reported also seems predicted upon the continued use of the same destructive logging methods used in the original cut. It is not surprising that the SFMP report concludes "....there is inadequate information about the forest on a management unit basis".[5]

The majority of the secondary growth is less than 25 years old.[8] The bulk of the residual species are not Dipterocarpaceae. The traditional role of these species, in the selective cutting mode, was to serve as nurse trees for dipterocarp reproduction (of both members of the Dipterocarpaceae and other families). The objective was to be able to return to a set-up area for a second cut 35 to 45 years following the initial removal. Unfortunately, the FRI does not indicate the gross volume by species group for

trees 55 cm diameter at breast height (dbh) and above, or for lesser diameter classes. FRI data only refer to clear bole volume (which means that tops and limbs are excluded). The objective was economic volumes at the mill rather than to state the existing gross volume by species. (See the table showing Volume Differences by Size and Commercial Type in Chapter 3.)

It appears from the data that secondary volume will not be sufficient to meet the domestic mill capacity let alone the gross demand for wood for all purposes. (See Appendix A.C for list of mills.) In addition, ffARM states that 70 percent of all wood cut in the Philippines is used for fuel, but there is no use category in the data reviewed that sets a m^3 consumption figure for fuelwood; neither do the data indicate projected demand.[3] Much more careful interpretation of the agreed upon data should be undertaken to match mill capacity and other in-country demand with the existing growing capacity of the forests. In calendar year 1988, 30,000 m^3 of raw logs were imported to supply feed stock to Philippine mills.[8] The recent waiving of the 10 percent import duty on imported logs represents government policy to make up the capacity short-fall with imported raw material and to reduce pressure on Philippine growing stock.

In addition, the SFMP reports: The data "....quite clearly show that in the residual forests it is the oldest logged-over forests that are or have been destroyed. It seems that deforestation seriously commences about year 11 after logging and by year 30 only about 15 percent of the origin (sic) forest is left. This leads one to conclude that as the average age of the logged-over forest is about 15 years we are presently in a very serious phase of logged-over forest transformation".

Plantations

The ffARM analysis revealed a total of 90,800 ha of plantations other than coconut plantation. Also reported were 365,200 ha of cropland mixed with plantations other than coconut. (See the table of Area by Land Use Classification shown in Appendix A.C.)

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[3] At least one estimate of the fuelwood demand has been made by Adolfo Revilla, Sr. Cf Revilla 1979. "Critical Issues in Forest Resource Management in the Philippines."[21]

A thumbnail case study of the Paper Industries Corporation of the Philippines is presented in the ffARM study report. According to the case study:

> "As of 1987, PICOP had about 35,000 ha of high density tree plantations, many on their second cycle, and planned to add 17,000 ha. Some 4,000 small tree farmers participate, with 15,000 ha planted mainly to falcata, a species used primarily for pulpwood, chips, and fuelwood. Growth rates of 30 cu m per year are being obtained on better sites with adequate maintenance".[3, p.14]

A study of commercial and industrial tree plantations conducted under an ADB technical assistance contract found "In April 1989, there were 84 ITP with a total area of 293,879 ha.... (but) only 55,968 ha of the ITPs are planted with trees."[10]

Farmer Production

There are along the roads in Cagayan de Oro many signs offering to buy falcata (*Albizzia falcataria*). From this, one can conclude that there are farmers growing trees for something more than on-farm consumption. This is born out by empirical evidence nationwide that upland farmers do cut small scale trees and branches as feed stock for charcoal production.

There are no data on the volumes of wood produced by farmers from any class of land.

Minor Forest Products

The FRI has compiled some data for three minor forest products: rattan, bamboo, and erect palms. The FRI provides data for two genera of climbing palms: *Calamus spp*. and *Daemonorops spp*. The FRI report shows that the total length of all rattan in the Philippine dipterocarp forests amount to 4,573 million linear meters (lm), with poles below 2 cm diameter accounting for 2,866 million lm and poles above 2 cm diameter accounting for 1,707 million lm. It is stated in the report:

"All species together represent 1,707 lm of poles above 2 cm diameter. Assuming a recovery rate of 60% (reduction for immature canes and parts left in the higher trees) and an average of 15 years to reach harvestible length, the sustainable yearly pole production is estimated at 68 million lm. The production figures of the rattan industry indicate a yearly pole input more than 100 million lm. Therefore, more rattan is presently harvested than the resource can sustain".[1, p.30)

Preliminary indications from the ADB financed technical assistance study of the rattan industry are that there is presently sufficient rattan to sustain the furniture industry. The assessment is based on the behavior of people in the industry: they are rejecting inferior stems and stems less than 2 cm diameter. Thus, there seems no shortage of material and the prognostication is that there will not be an industry threatening shortage.[38] Clearly, there will have to be some reconciling done before management options can be formulated.

The FRI inventory of bamboo in the dipterocarp forests examines the status of climbing bamboos (bikal and bikal-babgoi) and clustered bamboo (buho). The amount of climbing bamboos is shown to be 8,316 million lm, "....up to now, bikal has not been used commercially. Considering the dwindling rattan resources, bikal may be a substitute for furniture making." One problem with this is that the bamboo inventory is concentrated in Regions II, XII, VII, and IV.

The FRI also has data showing that there are 375 million palm stems of less than 2 m and 584.7 million palm stems of more than 2 m for a total of 959.7 million palm stems in the dipterocarp forests. The palms are concentrated in Regions VIII, XI, XII, IX, and X.

Neither FRI nor ffARM data have any indications about the volumes of material used for, or suitable for use as, fuelwood. Similarly, no data were found indicating the amounts of material collected, or the value of, medicinal herbs, honey, berries, animals, or other minor products found within and on the edges of uneven aged forest stands.

2.4 Principal Threats to Sustainability

The Sequence Leading to the Current Conditions[4]

In the pre-colonial period, the land and its natural resources were considered the property of local communities. Each tribal group recognized the territorial boundaries of other groups. Some tribes were hunters and gatherers and remained so until very recent times. Others were quite sedentary, content to live from the land at the margin of the sea. In between were the true kaingeros who practiced slash and burn agriculture over extensive areas. Pictures taken in pristine forest show open slashed and burned areas near ridge tops and dwellings built atop long poles along the ridge. Human ecologists and anthropologists can, in each case, suggest environmental reasons governing the behavior of such people.

It has been suggested that the fallow cycle practiced by tribal groups living in Palawan was eight to 12 years in 1980.[11] It was probably twice as long at the beginning of the Spanish period if Central American rain forest patterns are relevant. It is likely that this pattern of use was practiced for several centuries without endangering the viability of the bulk of the Philippine rain forest.

Spanish governors, however, introduced the Regalian Doctrine which held that all uninhabited and non-utilized (meaning unsettled areas) belong to the Crown. The features of this doctrine were common in most colonial areas, particularly where heavy forest growth occurred. The objective was to stimulate agricultural development which would result in increased revenues to the Crown.

As elsewhere in the world, population growth was slow during the Colonial period and the forest was viewed as an obstacle to developing sufficient local agriculture to feed the population.

This did not change significantly with the change in colonial administrations. However, world conditions began to make it clear that the forests of the Philippines

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[4] Much of this discussion is adopted from the Sustainable Forest Management Plan cited earlier. There is also an excellent treatment of the subject in Bautista, Germilino M. n.d. "The Forest Crisis in the Philippines: Nature, Causes, and Issues."[37]

represented great wealth if cut and transported -- processed or unprocessed -- to the industrialized countries. In keeping with the idea of using resources to promote development, a system of incentives evolved which, after 1946, became the Timber License Agreement (TLA). The principle is simple: an entity with the resources to invest in labor and equipment is given, at concessionary rates, the exclusive use of the state's land in return for exercising stewardship over that land so use could be retaken by the state at the end of a stipulated time period. In order for such a system to work to the benefit of society, the TLA holders must be governed by high principles or the state must have competent supervisors. The few examples of outstanding operators and dedicated forest officers provide the exceptions that prove that there was neither principle nor competence. Moreover, because of the huge financial values involved, the system, based very largely on the integrity of the operators, developed a momentum of its own that would tolerate no interference or slowing down.

In spite of marked changes in the world market, Philippine forest practices remained static.

- The operators were depended upon to provide the management plans and performance reports; the government field staff had no independent data on which to judge adequacy so the whole data base was dependent upon operator.

- The logging systems employed (truck winch, tractor skidder and high lead) were different only in the degree of destruction they caused.

- The PSLS had very little to do with selection of specimens to take out in the interest of maintaining an uneven forest: it simply set a cutting limit which was more honored in the breech than not.

- The standard pattern for any TLA was to start with a concession dominated by lowland dipterocarp forest and move in each succeeding year farther up the slope and valleys toward the watershed ridge line so that a 40-year line of progress could be plotted along the line of logging road access from the bottom, where some urban settlement exists, to open grassland under grazing lease, to forest occupant communities residing in areas where secondary dipterocarp forest had been cleared and burned, to the head of the watershed where active

Table 2.4-1 Number of Timber License Agreements (TLA) Annually Granted Since 1971 and Forest Area Under Concession, in Thousand of Hectares.

Year	No. of Agreements	Cumulative Area (in thousand ha)	Area	% of Forest Lands	Average Size per TLA (in ha)
Postwar Period to 1970	58		3,368	39.4	58,068.9
1971	5	203	3,571	40.6	56,682.5
1972	no data				
1973	57	1,681	5,252	58.8	29,491.2
1974	51	2,053	7,305	80.6	40,254.9
1975	-	-384	6,921	75.8	40,473.7
1976	48	1,084	8,005	86.4	36,552.5
1977	11	274	8,279	89.3	24,909.1
1978	-23	-1,219	7,060	75.9	34,106.3
1979	-9	-284	6,776	72.6	34,222.2
1980	-7	-276	6,500	70.0	34,031.4
1981	-7	39	6,539	60.4	35,538.0
1982	2	170	6,709	60.6	85,000.0
1983	-61	-1,317	5,392	51.5	43,136.0
1984	17	486	5,878	43.0	41,394.4
1985	6	215	6,093	43.5	41,168.9
1986	-6	-418	5,675	37.9	39,964.8
1987	-15	-270	5,405	36.0	42,559.1

Source: Bureau of Forestry, Philippine Forestry Statistics. (various years).

logging continues. Elsewhere, as Bautista demonstrates, TLA holders practiced short-term cut and get out policies wherein all the merchantable material was removed in 12 to 15 years whereupon the concession was abandoned.

- Income received by the government did not follow market-set values for the wood.

- The reforestation provisions in the TLA's were not honored and Government programs to reforest were ineffective. An FRI check of photographs revealed that only 26 percent of the area reported as reforested since 1970 have trees on it.[14]

In some places, for a variety of reasons, TLA's were cancelled. As the study by Fernandez et al clearly shows, the end result of removing the TLA opened the door for subsidized cutters and sometimes settlers.[12]

More people on the lowlands with relatively few opportunities and low productivity have flowed, and are flowing, along the logging access roads into the logged over areas. The only places free of such settlement by what are called forest occupants are a) the concessions of the conscientious TLA's who 30 or 40 years ago committed themselves to remaining in the wood production business, b) the few areas where active community action has maintained existing forest cover, and c) places that are completely inaccessible or so inhospitable that settlement is not possible.

Current Practices

Current forest management practices in the production forests are essentially unchanged from those practices described above. This is not to indicate that there is not momentum to change. It is just that the changes have not been moved through formal administrative or legislative channels.

Some examples are: bills in the Congress proposing to raise the stumpage fees to 20 percent of fair market value[6];

6/ Cf. de los Angeles, Marian. 1989. Economic Rental from the Sale of Logs in the Philippines. (Manila: Unpublished report prepared for the World Bank).

cancellation of additional TLA's, and the drafting of a comprehensive community-based forest resource management scheme. Other proposals have been tabled. One of the most controversial was debated during the Spring of 1989: a total logging ban. Policy pronouncements of these magnitudes, whether from the executive or legislative branch, should be based upon competent data and analysis of consequences -- both physical and financial. Unfortunately, data based on reports from the field have proven to be unreliable.

2.5 The Policy Framework

Official government pronouncements starting in 1982 recognized a growing crisis. The period saw the cancellation of 53 timber licenses and the start of the Integrated Social Forestry Program (ISF), the Program for Forest Eco-System Management (the famous PROFEM), and programs for Industrial Tree Plantations, and Communal Tree Farming.[13]

But not very much happened. For example, in spite of claims that there are 1,412 ISF projects covering 391,299 ha supporting 119,106 families, the ISF program has been plagued by lack of support in what was then the Bureau of Forest Development. And, as mentioned later (pages A-46 and A-50), a study of industrial tree plantations shows that the majority of the area covered by ITP permits has not been planted to trees.

Similarly, projects to develop and refine community/people approaches to forest management, assisted by the Ford Foundation, USAID, and World Bank, were started at the same time. Real movement did not appear until after 1986. Most important was the erection of a policy framework to encourage community-based resource management. Field experience gained in the Integrated Upland Center on Panay, the Central Visayas Regional Project, and the Rainfed Resources Development Project contributed significantly to the framework.

A common thread among the pioneering projects was that there was expected a linkage between what are now the DA and DENR. The linkage seldom developed. In the case of the DENR, there has been aggressive follow through with those examples that have been shown to work while in the DA there has not been a similar vigor in pursuing new upland initiatives, such as adopting the contract approach to having farm families plant trees.

The basic thrust of the DENR policies is to achieve national reforestation objectives through contracts with the private sector and non-governmental entities. Reforestation contracting is possible with individual families, communities, and larger private profit and non-profit organizations. The instruments, still being expanded and refined, include Small Holder Concession License, Community Timber Utilization Permit, and Community Woodlot Lease Agreement. The more aggressive stance of DENR in comparison with DA may be because of the obvious urgency to do a great deal with very few personnel; certainly the hierarchy of the department realize the seriousness of the forestry situation in the Philippines.

All of these new initiatives have been taking place while the former, and largely detrimental timber management/ logging instruments are sadly still in place. Among the policies in need of change are the focusing of DENR renewable natural resource expertise on those lands above the imaginary 18 percent slope line and its corellary the 40 percent forest cover goal, and the PSLS which dates to 1972. One major change mandated by the 1986 Constitution will become increasingly noticeable: existing TLA's will not be renewed when they expire. Thus, the physical and economic bases for harvesting the public's resources will be radically changed.

Other gaps in the Republic's resource policy fabric are appearing. The Mid-Term Development Plan concedes that, "Other forestry concerns, such as the rehabilitation of watershed, preservation of national parks, and rangeland management were apparently accorded low priority. Conflicts of jurisdiction or unclear delineation of responsibilities among government agencies involved in the management of these resources likewise contributed to the sector's unsatisfactory performance".[13, pp.115,116.]

3.0 MANAGED FORESTS

3.1 Overview

The volume of existing natural forests is badly distributed and continues to decline toward zero. The majority of the existing dipterocarp and pine forests have the bulk of their bole volumes in trees between 15 cm and 55 cm diameter at breast height (dbh). Even these volumes are misleading in that much of the remaining dipterocarp forest is located at the upper altitude limits of the family and/or on slopes in excess of 50 percent.

The annual reported log volumes do not reveal a complete story. Some investigations show that the volume taken from licensed concessionaires was 34 percent above the volumes reported. There is no reliable source of information about the volume taken from the remnant dipterocarp forests outside licensed areas. Reports have surfaced that the difference between the volume of logs formally exported to Japan and the scale of logs made by the Japanese authorities varies between 30 per cent and 100 percent. Much of the difference, it is alleged, can be accounted for by the very poor scaling techniques in the Philippines as opposed to those employed in Japan. The point is: no numbers are beyond suspicion.

Seventy five percent of the reported log harvest comes from natural forest with the remainder attributed to plantations of one sort or another. There are no reported amounts being grown on farmers lots. All of the natural forest produce and 40 percent of the plantation logs are converted into lumber, veneer, and plywood; the remaining 60 percent of plantation material is used for pulp and paper. It is uncertain what percentage of total Philippine paper demand is met from local production.

The Philippine Wood Products Association states that some 40 million m^3 of wood is used for fuel annually. This represents between 70 percent and 92 percent of the total wood cut in the country. An earlier attempt at dendro-thermal generation has not been followed up with case studies.

Since little is known about the ecology of the dipterocarp forests, it is difficult to say with certainty that any silvicultural system will assure the sustained development and harvest of dipterocarp wood. Extensive

distortions in the uneven age/size characteristics of the virgin forests have been caused by careless logging and ignoring the Philippine Selective Logging System. It is difficult to tell from the existing data the condition of some of the species of the dipterocarp family: the low volumes reported for some species signal the possibility that they may be threatened with extinction.

As the ffARM consultants point out, much of the remaining old-growth dipterocarp forest, such as those in Palawan and at upper elevations, do not have the good form found in the lower elevation Mindanao and Luzon forests. Therefore, volumes for planning purposes should probably be reduced to 70 m^3 per ha from the traditional 100 m^3 per ha.

Therefore, the priority action area is for the maintenance of the remaining virgin dipterocarp forest. First attention should be given to those remaining stands in the lowland and then to those stands that are on slopes in excess of 50 percent.

Research into the ecology and physiology of the dipterocarp forest is essential if the remaining fragments are to be expanded into viable forest communities.

The most serious constraint to sustained natural forest management is the economic and financial climate surrounding the forest industry. This involves pricing, tenure, and internal incentives to protect and manage forest areas for continuous flows of high value wood.

Another serious constraint is the nature of the operating system. It has caused a string of recognized problems: a) lack of supervision of logging operations that result in unnecessary and wasteful damage, overcutting, and poor statistical reporting; and, b) lack of a partnership relationship between government and private operators to curtail the threats from illegal loggers and squatters.

The third constraint is the demonstrated inability of the government to control illegal logging anywhere, including national parks.

The fourth constraint is the lack of a sound scientific base for the management of dipterocarp forests.

The last identified constraint is the failure to recognize the importance of self interest in the management and protection of the forest. This is true of communities as well as companies.

3.2 Volumes Available

It was shown in Chapter 2 that the available data make it very difficult to know the gross volume of wood that that is available from all sources let alone be able to predict how much will be made available in the market place in future years. What will be done here is examine the reported volumes by category from four sources: first from the conventional dipterocarp forests (remembering that a substantial volume, particularly in the residual forests is made up of non-dipterocarp species) and then by what is being produced outside of the dipterocarp forests.

The total bole volume for all trees in the dipterocarp forest with diameter of 15 cm and above at breast height (dbh), for all trees with diameter of 55 cm dbh and above and for dipterocarp old growth trees 55 cm dbh and above are shown in the the table Comparison of Volumes by Size and Commercial Type.

One can see that the largest volumes of material exist in stands less than 55 cm dbh. And the situation becomes more problematical when it is considered the majority of the remaining stands with the higher value common hardwoods and construction/furniture grades have been subjected to the logging process described in Chapter 2. This means that the remaining old-growth occur at the upper end of the dipterocarp range (900 m) where species diversity is low, on steep slopes, and where damage from high-lead and tractor setups has been the most severe.[17]

As Uebelhor points out, much of the species and volume distribution problems in the remaining stand result from very poor application of the Philippine Selective Logging System (PSLS). Selective management regimes are designed to create evenly distributed basal area among all species and age classes so that roughly even periodic flows of material can be removed from the forest over long periods of time. Included in the regime are regular timber stand improvement (TSI) operations that remove as interim crops those specimens that, for one reason or another, are mis-shapen, repressed, diseased, or causing repression of large numbers of faster growing younger trees.[1] The volumes cited above do not take into account those volumes on slopes

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[1] One difficulty found in some western applications is the favoring of single species at the expense of all other species such as in the western pines of the U.S.A.

greater than 50 percent which should remain as dedicated protection forests. Some experts who have recently examined the data and field conditions estimate that one-half of the volume of old-growth dipterocarp forests are so situated and ought not be available for cutting.[19]

The values shown in the table Comparison of Volumes by Size and Commercial Type make clear that the problems that relate to the dipterocarp forests also apply to the pines. The bulk of the volume in these stands is also in the lower age/diameter classes. Forest Resource Inventory (FRI) data exist for these forests, but the crisis in old-growth dipterocarp forests has tended dominate discussion and analysis. Nonetheless, as noted below, the pine forests are contributing a significant volume of material to meet wood demand in the Philippines. Their management problems should receive appropriate attention.

3.3 Volumes Produced and the Use Made of the Wood

The gross volume of logs produced in calendar year 1988 is reported as 3,809,196 m3.[32][2] All but 28,000 m^3 of pine and 544,000 m3 of falcata were from the dipterocarp forests.

Recorded Wood Products

Of the gross volume cut, 1,033,313 m^3 of finished lumber, 415,253 m^3 of plywood, and 85,194 m^3 of veneer were produced in the same calendar year. Of the finished lumber, 628,942 m^3 with a total FOAB value of US$156,485,000 were exported.[3] Presumably, the remaining 404,377 m^3 were used in the Philippines. These figures are confirmed by information provided by the Philippine Wood Products Association.[18] Of considerable importance is the "recovery factor" used by the President of the Association in calculating residual volumes consumed in the Philippines: 50 percent of log volumes. That means 50 percent of each log

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[2] The source does not cite an original source, but since the total agrees with other tabulations citing "Timber Licensees' Reports", it is assumed that the gross log volume figure is derived from the same reports.

Table 3.2-1 Comparison of Volumes by Size and Commercial Type (in thousand m^3)

Commercial Group	Total Bole Volume		
	All Trees		Dipterocarp Old Growth
	≥15 cm dbh	≥55 cm dbh	≥55 cm dbh
Common hardwoods	379,015	174,851	88,565
Construction & Furniture	231,368	54,612	20,685
Light hardwoods	11,008	3,046	885
Softwoods	36,761	9,384	2,233
Others	85,921	11,658	3,534
TOTALS	744,073	253,551	115,902

Source: GOP. 1988. Natural Forest Resources of the Philippines.

is lost in curf, slabs, cores and breakage in the mills, damage in yarding and hauling, and defects in the overmature logs. [18][3]

The ffARM research found that the forest and wood industries of the Philippines was an important sector of the economy. As a proportion of Gross Domestic Product (GDP), logging accounted for 2.5 percent in 1975, 2.2 percent in 1984, and 1.6 percent in 1986. The wood, furniture, and paper industries contributed only 0.9 percent of GDP and a very low 3.8 percent of manufacturing in 1986.[3]

In 1968, with timber production of more than 11 million m^3, the sector contributed nearly 33 percent of all foreign exchange earnings. By 1974 the corresponding levels were 7 million m^3 and 12 percent; by 1986 the levels were four million m^3 and five percent, respectively.

No mention is made about the export of a logs in the data reported in the several forestry sector studies. Some evidence is presented by the consultants in the SFMP that as much as 100 percent more than the volume reported as exported in Philippine statistics is actually received in Japan.[5] A PWPA spokesman contends that some of the difference can be explained by Philippine scaling practices which take place in the water as opposed to more precise Japanese methods. Even so, there is agreement that about 30 percent of more than the reported volumes were exported. Whether through methodological shortcomings or malfeasance, the Filipino people have been deprived of substantial income from the country's natural patrimony.

Since so little is said about log exports, it is surprising to find the following statement with respect to falcata exports:

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[3] The arithmetic is :

	3 million m^3 of hardwood logs
	+1 million m^3 of softwood logs
	4 million m^3 total log volume

With 50 percent recovery, it takes:

	1.32 million m^3 to export 660,000 m^3 of lumber
and	.42 million m^3 to export 210,000 m^3 of plywood
leaving	2.26 million m^3 less 50 percent or
	1.13 million m^3 for local consumption

" (There is a) continuing decline in the logging industry and (there is) gradual acceptance and increase of plantation species in the marketplace. Falcata, for example, is not only a substitute for dipterocarp wood in certain applications but is also a species finding its own niche especially in the export market (instead of bagras ...." [10]

Evidence to support this contention is shown in Table 3.3-1.

The Philippine Wood Products Association reports that about 600,000 m^3 of plantation grown wood is used annually in the paper industry and that 98 percent of that is used in the production of newsprint.

The primary source for these data is given as the "Plantation Timber Products Association." Further, data compiled from several sources and shown by the consultants indicate that in 1988 the export price per m^3 of falcata logs was US$53.36 compared with US$ 46.00 for dipterocarp logs.[10] The consultants also projected future export volumes of lumber, blockboard (strangely missing from the export statistics reported earlier), plywood, and falcata logs to the year 2000 when falcata log exports would reach 459 m^3. These data do not seem reasonable. Falcata has not replaced dipterocarp in local use; it is doubtful that falcata logs would equal the value of dipterocarp logs.

One of the problems with these figures is the existence of a sample study in a portion of Region X that showed that on the lands controlled by the Timber Licensees, the volume of logs actually -- and, therefore, illegally -- removed was 34 percent above the volume reported by the TLA's. This margin, if reasonably consistent nationwide, would account for another 1.295 million m^3 entering the market but there are no records indicating where this illegally cut wood was sold. The evidence strongly suggests that at least a volume equal to the reported cut is removed annually by non-TLA cutters some from on the concessions, but mostly from the remaining forests outside the TLA concessions. Obviously, there is no record of the use path of this material.

Fuelwood

One possible answer is fuelwood. A popular number often advanced is that 70 percent of all wood cut in the

Table 3.3-1 Historical Performance (falcata log exports)

Year	Volume m^3	Value US$ (FOB)
1982	76,932	2,538,756
1983	147,072	4,853,368
1984	157,836	5,542,242
1985	197,231	7,494,789
1986	111,321	4,452,843
1987	222,687	10,020,900
1988	136,112	7,262,437

Source: GOP. 1989b. A Comprehensive Scheme for the Promotion of Commercial and Industrial Tree Plantations in the Philippines.

Philippines is used for fuelwood -- either directly or as charcoal.

Information compiled and distributed by the Philippine Wood Products Association (PWPA) shows a staggering 90.9 percent of annual wood supply being used for fuelwood: some 40 million m^3. Anyone who has seen the present condition of the Bicol National Park will have little trouble believing that conversion of natural forests to fuelwood is very high. The wasteland within the park boundaries has been created not by the powerful and destructive high-lead systems of the well financed TLA, but by well equipped timber thieves who leave vast quantities of material to be converted into bales of fuelwood and sacks of charcoal.

If one adds to the official logged volume of 3,809,196 m^3 the estimated 5.2 million of illegally cut material and accepts the PWPA figure of 40 million m^3 burned, it may be that 81.6 percent of the wood cut is consumed as fuelwood. Studies by the Forestry Development Center of UPLB imply a per capita fuelwood consumption of 0.50 m^3 per year or 31 million m^3 or 77.5 percent. Applying Revilla's forecast of 47 million m^3 to the same gross cut yields 83.9 percent of all wood used as fuel wood.

No matter which number from the array is chosen, the fact is that a great deal of attention has been focused on that part of the wood industry that produces relatively high cash values, but very little attention has been paid to that use which consumes the vast bulk of the country's wood.

At one time there were great hopes that the goal of rural electrification could be met through dendro-thermal generation. Prices paid at the plant were to be high enough to entice farmers to produce on their farms, tree farms, and tree plantations sufficient volumes to fire the boilers. No ex post analyses of the four plants installed were uncovered during this short analysis. One or more case studies would be very helpful for mid-term policy making.

The figures may represent a false alarm. It could be, as in Pakistan, that 90 percent of the fuelwood comes from private farm land and that meeting the demand does not seriously impact the public forest land. But the facts do not seem to be known.

3.4 Silviculture

Sustained management of forest resources cannot take place without fundamental understanding of the ecology of the forests to be managed.

According to Ashton:

> "The mature structure of the mixed dipterocarp forest consists of three strata. The lowest stratum consists of saplings of species which reproduce in higher strata in mixture with small trees which characteristically flower and fruit in the shade of the forest. The greatest number of tree species occupy the middle stratum which often comprises the main canopy of the forest. These are species which will only flower after their crowns have grown into direct sunlight but whose crowns do not emerge far above those of their neighbors. Crowning the forest is the emergent stratum. This comprises species the main branches of whose mature crowns arise from the trunk at the level of or above the main canopy. Flowering is generally periodic, often supraannual, and intense".[19]

The Sustainable Forest Management Plan contains the following description:

> "Reproduction of the dipterocarps is not well known, The mechanics of stimulation for flowering is not understood, the mechanisms of seed dispersal are not well known although animals play an important part, seeds only last a few weeks at the most. Therefore efforts to establish dipterocarp plantations have singularly failed."
>
> "(The dipterocarps grow)...in harmony with thousands of other species of both flora and fauna in what is termed in virgin forest as a climax state."
>
> "The virgin dipterocarp forest therefore consists of a mosaic of patches of trees at different stages of maturity, from gaps, through small stands of small saplings and poles to mature high forest often topped with giant emergent

dipterocarp trees. In natural conditions, the physical structure of the forest is always maintained". [5] p. 4.)

The key characteristics to emerge from the data developed by the SFMP consultants are a) the seedlings of the dipterocarp species suffer from sun scald if exposed to direct sunlight, but require openings in the canopy in order to start growth toward emergent specimens, b) standard nursery and outplantings as dipterocarp plantations has not succeeded, and c) as with all moist evergreen forests, the majority of the nutrients in the system are held in the biomass and not the soil and that a complex and little understood web of mycorrhizae facilitate the shift of nutrients from decaying material into the vegetation.

One of the most significant of the conclusions drawn from the data and the experience of the consultants needs to be further examined. The DENR's Dipterocarp Research Center and several private companies have established dipterocarp plantations.

However, given that the majority of the ecology of the dipterocarp forest is not known, it is difficult to design a silvicultural system that will maintain the system in the face of utilization. The bottom line seems summed up by the following statement: "... we simply do not know enough to manipulate the dipterocarp forest biota with certainty that it will be sustained into the future".

3.5 Priority Zones for Action

To the maximum extent possible, the naturally functioning virgin dipterocarp forest must be maintained wherever it is located. Within this statement, the remaining forest on the lowlands would be of the most importance followed by forests occurring on slopes of 50 percent or more.

The second zone of consideration is the growing gap between the volume available (supply) and the mill capacity and volumes required for export earnings and internal development (demand). The zone for action should be those lands where it is possible to grow species, preferably indigenous, that have characteristics that will more rapidly and with more certainty increase the volume of material available to complement what can be yielded on a sustained basis from the dipterocarp forests.

Work has to go forward on the physiology and ecology of the dipterocarps to increase the level of sustainable production.

At the same time, there should be considerable work done on improving the performance of indigenous species of non-dipterocarp species, such as Anthocepalus chinensis, and Eucalyptus deglupta, to improve growth and form rather than rely upon exotic species that may prove prone to infestation and infection. Such improvements will add to the formal supply of material, but, equally important, widespread availability of planting stock for farmers in all locations would be an alternative source of the some 30 to 40 + million m^3 of wood consumed annually as fuel.

3.6 Problems and Constraints in Sustainable Natural Forest Management

The major constraint is the absence of a financial climate that favors long time management of natural forests for sustained flows of wood. This environment, like the forest itself, is a complex web that includes the very low stumpage fees paid by the loggers, the short tenure given to even the best and most conscientious of the logging companies, and lack of capital that has a long-term payback period. The capital problem is in not unique to the Philippines, but is exacerbated here because of the short term commitment to the operators.

The second constraint is the operating environment. There is no incentive or reward for those who follow sound forest management practices. In this sense, it is an economically atavistic situation where the feeling is to get what can be taken as quickly as possible or someone else will get it. The ramifications are exemplified by : a) a faulty enforcement structure where field forest officers do not have the mobility to enter a concession area without the help of the concessionaire; b) basic data being provided by the operators themselves without impartial, outside checking; c) conscientious operators are left without support in trying to combat the inroads of the illegal loggers and the settlers that follow the totally destructive pattern of the illegal cutters; d) the ability of the logging operators to operate in several small setups rather than in well defined compartments and working circles that can be monitored, e) the regular overcutting of annual allowable cuts by licensed operators; f) the flaunting of the PSLS; and, g) the continuation of the very damaging yarding techniques that feature the high-lead setups.

One consequence of such an operating environment is the erroneous, deliberate or otherwise, reporting of the area of successful planting mentioned in Chapter 2. Error is one thing, but missing by 74 percent is more than accident.

The third constraint is the lack of a scientific basis for the establishment of sustainable management systems in the natural forest.

The fourth constraint is the absolute inability of government to control illegal logging outside the concession areas. These illegal operators are well financed and organized in terms of equipment and contacts for the sale of the logs. It is much easier for settlers to succeed in areas that have been ravaged by such operators who have no interest beyond the day in which they do the cutting.

The fifth constraint is the failure to recognize that there has to be a sense of identity on the part of those who depend upon the forest for their livelihood. This includes the environment in which the concessionaire operates as well as the communities who now recognize the value of existing natural forests.

4.0 AGROFORESTRY POTENTIAL

4.1 Overview

Agroforestry is a cultural system that combines agronomy with forestry in a multi-storied arrangement of trees, shrubs, row crops and/or ground cover that may vary in composition over time. Agroforestry techniques can be used to meet a variety of objectives - - socio-economic as well as bio-physical.

One objective of agroforestry techniques has been stabilizing the cultural practice of upland farmers. In the forest lands portion of the uplands, agroforestry and community organization have been hallmarks of the Integrated Social Forestry Program. The approach is vigorously endorsed by the Department of Environment and Natural Resources.

The techniques practiced on forest land are equally applicable to titled or Alienable and Disposable uplands. Therefore, all the instruments available to Department of Environment and Natural Resources staff, such as community reforestation contracts, should also be part of the tool kit available for use by Department of Agriculture field staff. This would help invigorate the relatively dormant Department of Agriculture objective of stabilizing upland agriculture.

Another objective to which agroforestry techniques are well suited in the production of fuel and fodder. Very little is now known about the volumes of trees being grown on the land of smallholders, tenants, and forest occupants. It is reasonable to think that concentrated efforts to provide incentives for farmers to grow trees will, in aggregate, make significant contributions to the supply of fuelwood and meat products.

The potential area for application of intensified agroforestry techniques may be 17 to 18 million ha. In addition, some of the 4.88 million ha of existing coconut plantation lend themselves to extension of multi-tiered cropping patterns that can diversify the cash crops, contribute fuelwood, and increase coconut production.

Very little is known about the agroforestry potential of the 100,000 ha of existing plantations of rubber and other estate tree plantations.

From a bio-physical standpoint, the range of products flowing from application of agroforestry techniques is limitless. The critical dimension now lacking is the ability of field personnel to match favorable mixes of produce in the market place. Among other things, those practicing agroforestry today will have to keep abreast of developments in the fuelwood sector if agroforestry products are to significantly affect the supply and demand relationships for wood.

4.2 Objectives of Agroforestry Systems

It will first be useful to repeat the definition from the Introduction: agroforestry is a cultural system that combines agronomy with forestry in a multi-storied arrangement of trees, shrubs, row crops and/or ground cover that may vary in composition over time. It is often contended that agroforestry is somehow limited to farms or to social forestry -- some practitioners use the two terms interchangeably. The fact is that agroforestry techniques can be used to meet a variety of objectives. The choice of technique depends on both bio-physical and socio-economic constraints and opportunities.

A further note is in order: farmers in the moist tropics have been using agroforestry techniques for a long time. Nearly every farmstead has a multi-storied tree assemblage. The composition of the upper stories may be what can be changed to reflect market demands.

Dealing with Forest Occupants

One of the earliest governmentally recognized objectives for using agroforestry techniques in the Philippines was the Integrated Social Forestry Program. The reasoning is simple: more people are occupying areas within the forest land than can be removed and since they are practicing subsistance farming it is good public policy to convert poor farming practices to better ones. The land being farmed was, by and large, steep (18 percent to 45 percent slopes) and susceptible to severe erosion. Experience has shown that tree canopies break the force of rain hitting the ground. While a logical approach would be

reforestation, the residents required annual income of food or cash to feed their families.[1]

In addition, it was reasoned that making the groups of occupants more stable and being able to have them meet their wood needs from within the community would lessen the pressure on the remaining forest, usually up slope from the land being cropped - - sometimes with rows of corn going straight up and down the slopes.

Agroforestry seemed the ideal solution when coupled with community forests. Therefore, the then Bureau of Forest Development chose to make agroforestry a major theme in the emerging program of Certificate of Stewardship Contracts (CSC). Succeeding administrations chose to call the upland field locations in which community-based resource management under the Rainfed Resource Development Project (RRDP) were to be piloted "Agroforestry Projects." A great deal of effort was expended on installing Sloping Agricultural Land Technology (SALT) and much less on planting trees except as part of hedgerows in the SALT system.

Agroforestry continues to be an important concept in Department of Environment and Natural Resources (DENR) programs to stabilize those portions of the uplands under the administrative control of the department (i.e., on forest land).

Stabilizing Upland Agriculture

The upward "push" of migrants has not discriminated about whether the steep land being settled is forest land or A&D land. In fact, it is seldom possible to tell on the ground which is which. This segment of the upland population is theoretically served by the Department of Agriculture's (DA) extension network. The fact is, of course, that it is not. DA efforts are confined largely to the irrigated and some rainfed lowlands. Only in the past four to five years has the DA leadership come to the view that the department's field emphasis should be shifted.

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1 It is reported in the ffARM Study (3) that "... many of the immigrants ... (are) impoverished people ... with average per capita income of ₱2,168 in 1985 was well below the official poverty line ..."

The result has been a transfer of traditional agriculture extension methods to upland areas. The upland program has not been very dynamic and has been more concerned with raising the incomes of small holders and tenants on already stable rainfed areas rather than attacking the more seriously eroding uplands. For one reason or another, DA upland programs do not place much emphasis on agroforestry.[14]

But there are as many trees, sometimes used more imaginatively, on the freehold small upland farms than seen in the agroforestry sites elsewhere in the uplands. Mahogany is typically planted on the ridge tops and other species are used as nurse crops for coffee and black pepper, among others. Using agroforestry as lead techniques to stablilize upland classified Alienable and Disposable areas is as parts of in the forest lands of uplands. And all the instruments available to DENR staff should also be available to the DA field staff.

Meeting Fuel and Fodder Demands

As shown in Chapter 3, fuel consumption accounts for an estimated 40 million m^3 of wood per year. Some projections indicate that the figure is low and that 77.7 million m^3 will be demanded in 2000 and 127.1 million m^3 will be demanded in 2025.[21] Whether this straight correlation to population growth will occur depends a great deal on the comparative prices for alternative fuels. At the moment, it seems, consumers are choosing wood/charcoal as a fuel because it is cheaper than alternatives. As scarcity enters the picture, prices are likely to quickly change, which, depending somewhat on deep seated preferences, can change use of wood as energy.

Agroforestry techniques are admirably suited to helping smallholders -- lowland irrigated, lowland rainfed, upland A&D, upland forest land -- grow wood for the fuelwood market. Thus, combinations of objectives could be realized: meeting fuelwood requirements and lessening pressure on the old-growth and residual forests, raising income possibilities for smallholders, and stabilizing the uplands.

Existing analyses of fuelwood discuss the effect of market prices in influencing decisions to plant industrial fuelwood plantations [3, 10]. It is possible to conceive that a majority of smallholders will be able to meet family requirements for fuel and have some surplus to put on the

market. There are now no estimates of how much of the huge demand might be met by the aggregate contributions of many smallholders.

There is very little information about the use of tree fodder to stall feed livestock. It is noted in the Sustainable Agriculture Annex that livestock production is terribly small and growth is dormant. Expansion will come not through extensive cattle ranching, but from intensive feed-lot style production in back yards. The trend toward stall feeding ought to be continued. There was nothing conceptually wrong with the ideas advanced in the Program for Forest Ecosystem Management (PROFEM) days: nitrogen fixing trees can fix nitrogen in the soil directly or through green manure, grow rapidly enough so that sufficient volumes can be cut for cash sale as fuelwood, and produce high nutrient leaves and pods that, mixed with other media, such as rice husks, can be used as feed to supplement other fodder.

Therefore, another major objective that can be set for the use of agroforestry is fodder production. And it should not be a large formal enterprise as was associated with conversion of Ipil Ipil leaf into pellet feed in the early 1980's.

4.3 Potential Area

Uplands

The analysis of SPOT imagery for the ffARM Study shows that the uplands, defined as: "....the more steeply-sloped areas (above 18%) ....", comprise about 16.8 million ha. Further, more than one-half, or some 7 to 8 million ha are devoid of any relatively closed forest. The study also estimates that within the forest land, there are "....nearly six million ha of open lands, grasslands, or crop lands".

From the existing analyses, it is not clear how much of the uplands is actually under some form of cultivation -- including agroforestry.

The population of the uplands is estimated (1987-88) at about 18 million people. A census of the number of families and persons occupying the forest land portion of the uplands is to be completed during the summer of 1989 with final data released in late 1990 or early 1991. [22] Until the Inventory of Forest Occupants (IFO) is completed,

the best estimate for the number of occupants in the forest land portion of the uplands is four to six million (say 5 million in 1988) leaving 13 million persons in the balance of the uplands. This number is expected to increase by another 6 million persons by 2000 [3] resulting in further decline of forest and increase in area where social objectives may be met through agroforestry techniques.

Of the persons residing in the uplands, some are settled in villages and farm the areas immediately around them; some are settled in villages and commute to the steep fields above the settlement,[2] and some practice some form of shifting agriculture. But as the land available per family decreases, the periods of fallow in the shifting agriculture system are dramatically shortened and there is less and less distinction between settled and shifting agriculture.

Nearly all of this upland area has potential for growing forest products using agroforestry techniques. But these techniques will have to be more intensively applied to all tree planting right now if the several objectives listed are to be met.

For example, "community forests" are being planted under community reforestation contracts financed by the National Reforestation Program. There is no reason why each of these relatively small plantations should not use agroforestry techniques. There are many instances where plantations with the objective of producing fuelwood or pulpwood in the future were also planted with crops, such as corn or pineapple, which were harvested in the first year after planting. Two other crops can be harvested before the canopy closes. Thereafter, wood crops can be taken from prunings and thinnings for local fuelwood or small construction use pending the final harvest when the cycle is repeated. Productivity for each community's use would be enhanced.

Large industrial tree plantations using exotic or improved local species can use the same techniques. Paper Industries Corporation of the Philippines (PICOP) already includes coffee in the understory of the Corporation's plantations.

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[2] It is not possible to say how much of this is preference -- available community water supply, for example -- or from unstable peace and order conditions.

Coconut Areas

The interpretation of SPOT imagery has revealed that about 4.88 million ha of land supports coconut plantations with and without associated cropping [3]. The very open canopies of the coconut plantations make them ideal for multi-storied culture. About 37.5 million ha (see the table of Area by Land Use Classifications Used in the ffARM Study in Chapter 2) of coconut already has some cropping associated with it, most of which is pineapple, black pepper and corn, agroforestry techniques may point toward installation of a two or three tiered canopy with fast growing fuel and fodder species in the secondary canopy under the coconut, shade tolerant berry shrubs in the tertiary canopy above the coffee and black pepper.[3] The objective is to take advantage of the relatively stable coconut areas to increase production of fuel and fodder by resident smallholders and/or lessees.

Estate Forestry

Very little is offered in the literature about multi-storied cropping in such areas as the rubber plantations. However, some interesting examples are found in the Philippines, such as vanilla, chili peppers, and taro under rubber. Rubber production, and the economics of the crop, hinge upon world commodity prices. Some cushion for those fluctuations might be possible with more intensive under-story production. Some form of wood and fodder production is possible from the roughly 100,000 ha of plantations other than coconut reported.

4.4 Range of Forest Products

The range of products that can be produced from agroforestry techniques is limitless. Rattan is a multi-storied product of the dipterocarp forest. Given multi-storied considerations, it would be possible to have bamboo, fuelwood, fruit and nut bearing trees and shrubs growing over cereal, nut and berry crops.

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[3] It is possible that nitrogen fixing species in the under-stories can improve coconut production with little or no additional inputs.

The critical dimension lacking in the ability of field personnel to prescribe the most favorable mix of stories, species and crops is their understanding of microeconomics and local market intelligence.[14] Farmer production usually shifts very rapidly in response to shifts in market prices. Thus, the those practicing agroforestry will have to keep abreast of developments in the fuelwood and other sectors if agroforestry techniques are to fully contribute to sustained management of forest resources.

5.0 INDUSTRIAL FORESTRY

5.1 Overview

Checchi and Company define industrial tree plantations as tracts of land on which tree crops have been established for the purpose of providing wood raw material for industrial uses. [10]

Industrial forestry has a limited connotation in the Philippines. With few exceptions, one cannot perceive a deliberate, direct connection between growth of cellulose for production and the continuous operation of a mill that processes the cellulose into some form of marketable product. The nature of forest land policies and attitudes toward the forest and population density have probably precluded any chance that there will be a land use pattern similar to the Southern pineries in the U.S.A. and the spruce forests of Finland where large corporate enterprises take full responsibility for the maintenance of thrifty stands which produce materials that are fed into their mills. But new government-private sector mechanisms can approximate the industrial profit motive and infuse the social features needed to respond to Philippine conditions. A blending of commercial objectives and social conscience must emerge if there is to be sustainable management of forest resources.

The wood industry of the Philippines has been driven by the availability of, and the prices for, dipterocarp wood. From the analyses shown in Chapters 2 and 3, all but a few existing mills will shortly run out of Philippine-grown raw material. Two missing links to sustained production are: the area that can produce dipterocarp forest crops and the efficiencies of the mills. Mill investment depends on stability of supply and stability of the investment environment.

Maintaining the flow of dipterocarp material has three aspects: maintaining what is left of the area supporting dipterocarp forest, increasing the volume/sustainable yield from that forest, and expanding the area on which dipterocarp forest grows.

One of the most obvious ways to address the three aspects is through those private sector entities with proven resource and business management ability in partnership with the Government. A major constraint for increasing yields

and expanding the areas under dipterocarp forest is the limited knowledge about the ecology and physiology of the family.

Two encouraging aspects for expanding dipterocarp forest are a) substantial numbers of woody species remain in the cogon grasslands which by simple means can be encouraged to overtop the grass which is intolerant to shade and b) simple techniques to use dipterocarp wildlings for propagation are available. The first, which is being called Assisted Natural Regeneration, has at least two major unknowns associated with it: a) uncertainty about recovery in open grassland repeatedly burned for long periods of time and b) the nature of the resistant species that will form the first wave of succession. Heavy emphasis on making breakthroughs in the culture of the Philippine dipterocarps has promise of bright economic returns in the future if opportunities are seized now.

There will also be major institutional problems associated with industrial dipterocarp plantations. Among them will be the definition of viable integrated management units that account for protecting old-growth stands, increasing the output of secondary forests, expanding the area of new forest, and involving the associated communities in the benefits.

The Paper Industries Corporation of the Philippines example is often cited as a model for commercial and industrial tree plantations. But the model has not been emulated on a wide-scale. The model includes planting on a major tract of land, classified as alienable and disposable, plus an Industrial Tree Plantation lease and a large number of cooperating farmers. The total extent of lease activity in the Industrial Tree Plantation area is shown in the data on successful and unsuccessful Industrial Tree Plantations in the Philippines. Only 55,968 ha of plantation is in the ground of which, apparently, 35,000 to 52,000 ha are in the Paper Industries Corporation of the Philippines operation. Rapid expansion of the area covered will be governed more by market and pricing conditions than by government support.

The extensive plantations made up of the exotic species falcata are now under threat of widespread infection from a gall disease which may sharply affect plantation policies and practices. Urgent work is needed to adapt indigenous species to the faster growing requirements of the industrial plantation.

Widespread participation by small holders in producing material for pulping will be limited by transportation costs, particularly inter-island transport.

5.2 Replanting the Dipterocarp Forest

Dipterocarp Forest and Mill Capacity

As both size and volume figures cited in Chapters 2 and 3 show, the wood industry of the Philippines has been driven by the dipterocarp forests. It seems from the analyses presented here that the mill capacity far outstrips the volumes of material from the dipterocarp forests in the short-run, and, given current trends, all but a few may run out of feed stock completely. (See Appendix A.C for a list of wood processing plants).

The missing links are the extent of area that can produce dipterocarps and the efficiencies of the mills to capture as much return from the available cellulose as possible.

Modern mills can recover up to 85 percent of the material arriving on the deck. But there will be no investment to achieve such efficiencies unless there is some assurance that there will be sufficient material over the next 50 year planning horizon and there is stability in the investment and political environments.

Maintaining the productive flow of dipterocarp material has three aspects: a) maintaining what is left of the dipterocarp forest, b) increasing its sustainable yield, and c) increasing the amount of area on which dipterocarp forest is grown.

The judgement arrived at here is that it will take an extraordinary set of circumstances to prevent further substantial loss of hectarage and volume of old-growth dipterocarp forest. One hope is for those private sector entities with proven resource and business management ability that have sufficient volumes of second growth under reasonable management and protection to be given an opportunity to enter into partnerships with the government to expand the extent of the dipterocarp forest.

Inadequate Knowledge

A major constraint is the amount of knowledge and experience with propagating the 43 dipterocarp species. The general response to questions about nursery practices, planting techniques, and survival rates is that the dipterocarps fruit at odd times and there is no reliable seed source. However, both reputable research scientists and farmers are aware that the forest floor is often a mass of wildlings.[23, 24] Knowledge about methods of using these young trees in reforestation attempts is not very widespread.

This is indicative of a startling lack of basic scientific knowledge about the family, as reported above. The scientific community does not deny the paucity of knowledge/research, but blames the poor definition of importance by the national government for the lack of financial resources to do research.[25]

Promising Approaches

There are two encouraging aspects to the ability to establish new dipterocarp plantations. The first is that there is evidence that a substantial number of residual specimens remain in the midst of the cogon grasslands. As Roberto V. Dalmacio confirms, this should be no surprise: cogon has always figured in the rapid invasion of open and bare sites and natural succession continued until a mature forest again occupied the site.[23] Only continued burning maintains the cogon grasslands. This process has been further documented from secondary sources.[26] This was first realized by Sajise whose pioneering work demonstrated that with adequate protection from fire, the cogon would give way to woody species.[25] Two observers agree that there are residual dipterocarps showing in moist swales and creek bottoms in cogon areas that have been under a burning regimen for centuries.[23, 27]

In a field examination of results, Jensen and Pfeifer found:

> "Implementation of ANR (Assisted Natural Regeneration) was attempted by the team and local staff at the RRDP site at Bamban, Tarlac. In an area of cogonal grassland, over 20 broadleaf species, most of which were trees, were identified. In the designated ANR sample area, approximately 250 m^2, 14 individuals of 3 tree

species were found within the grass layer. This corresponds to a woody plant density of 560 plants per hectare, within the suggested range of density of 200 - 800 plants per hectare for ANR reforestation (Dalmacio, 1987)." [1] [26].

There are two unknown elements in the literature cited. Firstly, there is no species list of the woody stems found; secondly, there is no time line to see the relationship of the length of time an area is burned to the number of specimens by species found in the grass. Roberto Dalmacio was of the opinion that the most fire resistant of the species in the dipterocarp forest is a non-dipterocarp: Alibangbang (Piliostigma malabaricum).

The point is that the use of natural regeneration techniques may be appropriate for restocking designated critical areas with trees but may not be appropriate for re-establishing sufficient dipterocarp forest to enable the Philippine wood industry to compete in the future world market for tropical hardwoods. The approach is too promising to be ignored because the country that can make this break- through will be dominant in the not distant future, according to Ashton.

Similarly, the consultant report on large industrial tree plantations recommends "....the planting of dipterocarps and other native species in their plantations established by contract reforestation and support more research on dipterocarp regeneration."[10]

The Operating Unit

Not only will there be bio-physical obstacles to industrial dipterocarp plantations, there will be institutional ones as well. Among them will be the ability to make financially viable management units from areas with existing residual forest, grasslands and forest/brushlands stocked at 0 to 10 percent with dipterocarp regeneration, and a processing facility. Integral to this resource management thrust will be concerns for the communities that

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[1] Dalmacio, R.V. 1987. "Assisted Natural Regeneration: A Strategy for Cheap, Fast, and Effective Regeneration of Denuded Forest Lands." (Tacloban City: Manuscript, Department of Environment and Natural Resources, Region VIII).

are now part of the resource management areas and how they will be made to feel that the maintenance and expansion of the forest is in their best interest.

These are all difficult problems, but the future rewards for making the public/private linkage for commercial dipterocarp forests will be worth the present cost in time, effort, and money.

5.3 Large Scale Plantations for Pulp and Paper

PICOP Success

The discussion immediately above is directed at avoiding the major large-scale industrial tree plantation model: Paper Industries Corporation of the Philippines (PICOP). In the PICOP case, it was concluded that the residual forests were not producing adequate volumes for mill capacity. The decision was made to leave dipterocarp management and convert the seriously degraded stands to plantations composed largely of exotic species. The two initial species were falcata (*Albizia falcataria*), an exotic, and bagras (*Eucalyptus deglupta*), an indigenous. "As of 1987, PICOP had about 35,000 ha of high density tree plantations, many on their second cycle, and planned to add 17,000 ha. Some 4,000 small tree farmers participate, with 15,000 ha planted to falcata, a species used primarily for pulpwood, wood chips, and fuelwood".[3]

The same report contains the observation that: "Most of farmers are making good profits from their tree farms".

This contradicts some of the figures cited above pertaining to the export of falcata logs. But the export of logs is consistent with some forecasts of the future Asian markets for chips and pulp where some volume of Philippine grown wood chips would enter that market at a profit.

According to data collected by Checchi & Company, there were, in April 1989, 84 industrial tree plantations in the Philippines with a total area of 293,870 ha. But only 55,968 ha were reported to have been planted (or 19 percent).[10] The table Status of the ITP Program as of April, 1989 shows that Regions X and XI account for most of the activity.

The table Examples of Successful and Unsuccessful ITP's in the Philippines shows some of the problems blocking economically viable industrial tree plantations.

Table 5.3-1 Status of the ITP Program as of April, 1989

Region No.	Available ITP Areas	Pending Applications		Existing Leases		Leases Evaluated		
	(ha)	No.	Area	No.	Area	No.	Area Developed	% Developed
1	13,200	2	1,432	6	8,508	1	62.00	0.73
2	-	8	27,995	8	19,600	2	2,614.15	8.69
3	13,300	3	2,181	5	9,721	-	-	0.00
4	18,075	8	22,074	13	28,216	1	913.30	3.24
5	-	2	2,188	11	12,740	-	-	0.00
6	12,616	4	4,563	6	8,348	1	40.00	0.45
7	6,340	2	2,018	5	4,419	-	-	0.00
8	-	1	1,000	4	8,440	-	-	0.00
9	-	1	1,000	7	24,317	5	3,604.38	18.67
10	31,300	1	123,000	13	83,002	9	9,348.95	11.31
11	51,254	11	24,752	5	86,459	4	39,341.00	45.51
12	-	1	1,266	1	100	1	44.00	44.00
TOTAL	146,085	94	213,469	84	293,870	24	55,967.78	19.04

Source: Forest Land Uses Division, FMB

Table 5.3-2 Examples of Successful and Unsuccessful ITPs in the Philippines

Organization	Location	Species	Remarks
Successful			
PICOP	Surigao del Sur	Albizzia, eucalyptus	
Aras-Asan	Surigao del Sur	Albizzia	
Nasipit	Agusan del Norte	Albizzia, Baelina Narra, Teak, Pines	
Manila Seedling Bank	Rizal, Bataan	Albizzia, A. mangiun, Pines, Narra	
Mindanao Estate	Zamboanga del Norte	Albizzia, Guelina	
Provident Tree Farm	Agusan del Sur	Anthocephalus, Albizzia, Guelina, A. mangiun	
Talakag Timber Inc.	Bukidnon	Albizzia, Guelina, Teak, Mahogany	
Southeast Aquatic	Misamis Oriental	Albizzia	
Isabela Sierra	Isabela	Guelina, Narra Teak	Albizzia and mahogany damaged by typhoon
Mayantoc Re-forestation Project	Tarlac	E. camaldulencis	Good growth only on better soils
Unsuccessful			
Private Company	Misamis Oriental	Ipil-ipil	Psyllid infestation
Large Planta-tion Co.	Mindoro	Subas, A. mangiun	Typhoon and fire damage
Mining Company	Cebu City	Guelina	Poor site

Table 5.3-2 Cont'd.

Organization	Location	Species	Remarks
Private Owner	Marinduque	Ipil-ipil, Gmelina, Albizzia	Poor site
Agricultural Corp.	Mindoro	Giant Ipil-ipil	Typhoon damage
Private Owner	Albay	Giant Ipil-ipil	Typhoon damage
Private Owner	Albay	Giant Ipil-ipil	Typhoon damage
Abra Pine Project	Abra	Pinus keysia	Fire damage, tip moth, stem borer

Problems: Lack of Adoption

There is concern on the part of many why more area is not being planted when public policy seems so favorable for establishing commercial and industrial tree plantations, and the demand for fuelwood is so high. The ffARM team speculates that it is a matter of the low domestic demand for pulp which keeps prices down and therefore makes investment in plantations unattractive. The ffARM study also suggests that very low prices for fuelwood, because of the virtually free good being harvested and moved to market, makes it difficult for a plantation operation to make money. Other sources point out that pulpwood always occupies a low price position and suggest that multiple use plantations are an appropriate approach. This is not in conflict with dipterocarp plantations or agroforestry.

Until these issues are resolved, the rapid expansion of tree plantations is not likely. Some progress toward achieving the success expected by government is possible as long as costs are subsidized with the proceeds of loans and the cost is deemed justified from a social benefit point of view. Therefore the forecast that the "....initial ADB-supported ITP program that 140,000 ha of new plantations will be established by new leases over the 11-year period [10] seems remote.

Danger from Monoculture

Unfortunately the concept of tree plantations is confused with monoculture. A very serious problem with extensive monocultures is the danger of large-scale losses from infestations and/or infections. The population explosion of the insect attacking Ipil-Ipil changed attitudes about the species from a miracle tree to one that is seldom mentioned for any purpose in the Philippines (in spite of what seems to have been a high level of recovery in the countryside).[2] The risk is multiplied in the case of exotics that may not be adjusted to local conditions.

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[2] The direction of the forestry community now seems directed at replacing Ipil-Ipil with another exotic from Indonesia (coliandra) rather than concentrating some resources on improving the growing qualities of indigenous species.

There are now confirmed reports of a serious infection of falcata in Mindanao which may threaten major parts of the tree plantations there. Investigating scientists have recommended that all nursery seedlings be destroyed in an attempt to limit the spread of what is described as an epidemic. [27]

Accumulating Volumes

The previously mentioned example of advertisements offering to buy falcata is limited to Mindanao, and within 75 km of the PICOP mill. Even if farmers or others on other islands chose to devote some fraction of their output to species preferred for chipping and conversion to pulp, either in the Philippines or exported as chips, there would be relatively low volumes at any one place. The logistics of chipping the produce of many small growers, accumulating it at transfer points, and moving the material by water to a mill are enormous.

6.0 FORESTRY PROGRAMS

6.1 Overview

The Department of Environment and Natural Resources is entrusted with the majority of the responsibility of sustainable forest management. In the uplands, where forest management issues are most severe, the operations of at least the Departments of Agriculture and Agrarian Reform and the National Development Corporation also figure in sustainable forest management. Three entities have primary responsibility in the lowlands. Department of Environment and Natural Resources personnel must interface with these agencies as well as national policy and investment priority staffs.

The Department of Environment and Natural Resources in present form began on June 10, 1987. Presidential Order 192 mandated a fairly conventional line and staff organization extending from the Secretary to Regional Executive Directors, Provincial Environment and Natural Resource Officers, and Community Environment and Natural Resource Officers. The staff functions in headquarters are grouped under four Undersecretaries.

To improve responsiveness and efficiency, the managers of the department are committed to regionalization of the department. Responsibility and accountability and commensurate authority have been delegated to Regional Executive Directors who have, in turn, delegated similar powers to Provincial Environment and Natural Resource Officers and Community Environment and Natural Resource Officers.

However, six stresses affect the practical operation of the theoretic structure. Firstly, the professional staff is not accustomed to operating with independent authority and responsibility. Secondly, there is a shortage of capable staff people to support all levels of the organization leaving the Provincial Environment and Natural Resources Officers and Community Environment and Natural Resources Officers pretty much alone. Thirdly, the limited experience in Manila with the actions needed to make a regionalized line and staff operation functioning. Fourth, very little support is available to develop and support initiatives taken to the national councils such as Group A Cabinet Cluster "A", National Economic Development Authority, and the Department of Budget and Management. Fifth, management of the research apparatus is in disarray.

Sixth, there is little appreciation for the role of small area planning that can be aggregated into larger units as a basis for field management.

Not only is the Department of Environment and Natural Resources regionalizing, it is trying to adjust to national policies to decentralize to at least the Provincial level. The idea is to have Provincial Environment and Natural Resource Officers and Provincial Agriculture Officers report directly to Provincial Governors. How this move will affect their place in the line hierarchy is not clear nor is the regional Economic Development Authority Officers relation to Provincial Planning staffs. Also in matters of coastal zone management, the municipality is recognized as a key unit. But Mayors and other municipal officials are not subservient to Governors.

6.2 Current Administration

The majority, but not all, of the jurisdictional responsibility for sustainable forest resource management is vested in the Department of Environment and Natural Resources (DENR). It has been repeatedly pointed out that the nature of the country's forest management problems transcend the DENR's scope. The majority of the land surface is in the uplands and the focus of sustainable forest management will be in those areas. But even here, the involvement of the Departments of Agriculture (DA) and Agrarian Reform (DAR) are both necessary and inescapable. Increasing wood production in the lowlands will be entirely a DA/DAR proposition. In addition, none of the line agencies operate in a vacuum. They must interface on matters of policy and investment priorities with the staffs of the National Economic Development Authority (NEDA), Department of Budget and Management (DBM), and Presidential Management Staff (PMS).

Department of Environment and Natural Resources

The DENR was created in a reorganization of the Ministry of Natural Resources in 1987 (Presidential Order 192). Several formerly autonomous bodies were also merged into the new department. The Presidential Order mandated a complete change from a collection of line agencies that were coordinated only at ministerial level to an integrated line and staff organization. The line of authority and accountability passes from the Secretary through the Undersecretary/Operations to Regional Executive Directors

(RED) to Provincial Environment and Natural Resource Officers (PENRO) to Community Environment and Natural Resource Officers (CENRO).[1]

At headquarters the staff functions are grouped in the charge of Undersecretaries for Policy, Planning and Project Management, Environmental Management and Research, and Natural Resources plus a Director for Legal Affairs and Management.

In each Regional Environment and Natural Resource Office (RENRO), the Regional Technical Directors for Forest Management, Land Management, Environmental Management and Research, and Mines were, by and large, formerly regional directors of their former agency; i.e., a regional forester became a Regional Technical Director for Forest Management.

Regionalization

The reorganization was a precursor to a determined move to regionalize the agency. Hence, major decision making authority was delegated to the RED's. This represents good management if it reduces the endless delays entailed in deferring all decisions to Manila.

The move toward regionalization included the delegation of authority and responsibility to the PENRO's and CENRO's. If working well, there would be a two-way flow of policy: that which originates at the operating levels below the CENRO's and moves upward for review and decision making and that which starts at the top and moves down through the system. In theory, the decision maker at each operating level would be advised by the staff experts available to him. At least six forces still affect the manner in which the theoretic construct functions. The most important is that the whole operating style is different from that which the majority of the staff is accustomed: it will take more time for people at the middle, let alone the bottom, to begin to initiate and move rather than wait for detailed instructions from Manila. Secondly, the number of technically capable staff people means moderately good staffing to the regional level, but real deficiencies below that, e.g., there are seldom Land Management or Mines

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[1] The term "community" has a very broad meaning. It is easy to think of a Community Environment and Natural Resource Officer (CENRO) as the equivalent of a DA Municipal Agricultural Officer (MAO). They are not. There are only 177 CENRO's in place in the country.

personnel in the CENRO's let alone Environmental Management personnel.[2] Thirdly, there is a minimal amount of experience at the department level to coordinate and make functional a regionalized line and staff organization. Fourth, there is no well developed staff capability at the Manila or RENRO levels to interface with the socio-economic oriented central agencies, particularly NEDA. Fifth, the management of research has been seriously disturbed. Sixth, the lower levels of the organization have little understanding of, ability to do, or desire for, planning as a basis for requesting money, manpower, and material.

It is important that this organization have a chance to settle in, work out the kinks, and progressively adjust to the gaps and shortcomings that experience is bound to reveal.

Decentralization

The regionalization thrust is to improve the efficiency and effectiveness of a line agency. Superimposed on this thrust has been a determined government policy to decentralize. The decentralization focus is increasingly on the Provincial governments. [14, 28] The pressure for the PENRO's to become planners and intergovernmental coordinators is growing and will become critical if they do, in fact, become the chief natural resources staff advisors to the Provincial Governors.

One issue that does not seem to have been addressed is the matter of the relationship between the Governors and the Mayors and other officials of the municipalities. The municipalities are headed by elected officials, but the units of government have been created by the sole sovereign authority: the national government. Thus, there is no hierarchy from local to Provincial to national levels. Nonetheless, in current decentralization descriptions, the Governors are to become major forces in allocating not

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2 An example of this is the presumption that the majority of field foresters have been trained in the College of Forestry, UPLB. The real situation seems to be that the UPLB people are concentrated in Los Baños, the logging concessionaires, and the schools and institutes in Los Baños. The field staff, for the most part, comes from the remote forestry schools scattered throughout the country. [23]

only those discretionary resources left to them by local revenue acts, but for the national resources allocated to PENRO's, PAO's, CENRO's and Municipal Agriculture Officers (MAO). This dimension may be quite important in matters of coastal zone management which includes management of the mangroves as well as the near shore fisheries and coastal land use controls.

Because of the reorganization, description of managing forest resources includes the secretariat as well as the Forest Management Bureau (FMB).

The Secretariat

The raw force driving the current policy direction in Philippine forest management is coming from the Secretariat.[3]

By its own admission, the Secretariat is becoming bogged down by the weight of administrative detail and there is little time to think about the long run or to do strategic planning. [29, 30]

The Secretariat seems to operate collegially. There is a critical need for current, accurate data and dispassionate analysis of facts with cogent statements of likely options and consequences to guide the members. The evidence indicates that this crucial staff function is being filled by a group of confidants from both within and outside government.

From the standpoint of forest resource management, defining the various types of "agroforestry"/reforestation contracts, policies on terminating Timber License Agreements (TLA's), and acceptance of assisted natural regeneration (ANG) have been done, or been stimulated, by members of this group of confidants. In its favor, it is doing a better

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[3] For this discussion, the "Secretariat" refers to the Secretary, the four undersecretaries, the Assistant Secretary/Operations for Luzon, the Director of Special Concerns, and the Officer in Charge (OIC) of Legal Affairs and Management.

job of bringing innovative approaches into play than anything that has gone on before. However, the data base is limited to the personal experience of the members of the group of confidants.

It is encouraging that personnel of the Undersecretary rank are making determined efforts to interface with the field staffs. [14, 33] This is beyond the more formal and (on paper) more cumbersome machinery under the charge of the Undersecretary for Planning, Policy, and Project Management.

At one time, a Forest Development Center was established to function in conjunction with the College of Forestry, University of the Philippines at Los Baños (UPLB). It was to be a "natural resources think tank".[32] It is clearly not filling that role today. There is no director and the remaining staff is not asked to contribute substantive studies to help evaluate natural resource policy options.

In addition, an examination of the DENR organization chart results in identification of four units, besides the Center, in which socio-economic and/or policy research is to take place. Apparently this research is not of sufficient quality for use by the Secretariat in policy making, hence the influence of the confidant group. Nor is the research sufficient to avoid having the Philippine Institute for Development Studies (PID) cast about for capacity to do the economic studies (presumably for the benefit of NEDA) that should be done within DENR. The unit that should be examined for strengthening is the one closest to the Secretary, and can replicate or complement the role of the informal confidant group.

Forest Management Bureau

The Forest Management Bureau (FMB) is administered by a Director. There are six divisions in the headquarters. The divisions are: Reforestation, Natural Forest Management, Forest Land Uses, Social Forestry, Forest Economics, and

Legal. These divisions are not necessarily repeated at the regional level.[4] Nor is it necessarily followed in the CENRO's.[5]

This organization does not reflect the current forest situation in the country. Suffice to say that major plantation management should now rank with natural forest management and it is impossible to other reforest or manage without practicing social forestry.[6]

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4 Under the Regional X Technical Director for Forest Management, there are Divisions of Forest Development and Forest Management; under Forest Development, there are Integrated Social Forestry and Watershed Management Sections; under Forest Management, there are Utilization and Reforestation Sections. [10]

5 In the Ayungon CENRO, there are under a Forest Supervisor I, Officers in Charge (OIC) of: Social Forestry Unit, Reforestation and Afforestation/Natural Forest Unit, Range Management Unit, Watershed Management Unit, and an Assistant for Forest Protection.

6 This point received major attention in the evaluation of the Rainfed Resources Development Project [14]. In brief, no matter who has a reforestation project, there will be resident people with whom the contractor must deal. Therefore, the criteria for success should not be the meeting of hectare planting targets in three years since experience shows that it takes up to four years to organize a community that will sustain itself; and that access will attract more people and exacerbate the situation the reforestation is intended to alleviate. This is exactly what is happening with a first class contract reforestation job in Tarlac. To meet planting targets for both the nursery stock and for assisted natural regeneration within the allowable budgets the contractor has no time to organize the community of some 80 families. The access road is causing severe erosion and additional families have located in the area since the beginning of the project. At the end of three years, the contractor will leave and there will be the required number of trees in the ground, but no effective way of maintaining them. [34]

It is as though the more than seven years of experimenting with assistance from the Ford Foundation, the World Bank in the Central Visayas Regional Project,[7] and USAID in the Rainfed Resources Development Project is of no consequence. The organization shows business as it was before. Someone needs to clearly determine how the field is going to operate: through Social Forestry Technicians/ Officers at entry level in each community; teams of organizers supported by NGO's and universities in the short-run and PENRO's in the long-run; or through small watersheds.

6.3 Status of Programs in Place

A recent tabulation of Foreign Assisted Projects complied by the Foreign Assisted and Special Projects Office (FASPO) of the DENR, lists four forestry related projects that were completed during 1988 and early 1989, five similar projects that are due to be completed in 1989, and nine projects that will continue beyond 1989. The list is shown in Appendix A.D.

Other programs in place that are of interest are the continuing Ford Foundation program to train and support high caliber Social Forestry Technicians/Officers[8]; the World Wildlife Fund-assisted Haribon Foundation work with community protection approaches in the Mt. Isarog National Park (see Annex D on Biodiversity for a more complete description); the five technical assistance studies funded by the Asian Development Bank (ADB) in support of the Forestry Sector Program Loan; and the Japanese government's

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7 There is an additional proposal coming from the Central Visayas experience: organize the services of the CENRO using the small watershed as a planning and unifying unit.

8 Cf. Bayabos, Reynaldo C. 1989. "Upland Development Program: Philosophy, Accomplishments and Proposed Activities" for a more complete treatment of the ISF approach.[36]

continuing work in the Pantabangan watershed.[9] And there is not included mention of the Overseas Economic Cooperation Fund loan of US$120 million to supplement the ADB Forestry Sector Program Loan.

In addition, there are programs/projects in the DA which bear directly upon performance in the forestry sector, such as the USAID-assisted Accelerated Agricultural Production Project and the Tribal Agricultural Support Services Program. The complementary, supplementary, or conflicting projects being used to support the DAR mission is outside the scope of this Annex.

With respect to the five technical assistance programs being financed by the ADB, the report on commercial and industrial tree plantations has been completed [10]; the Forest Management Master Plan has produced a significant interim plan for sustained forest management [5], but the final master plan will not be completed until some time in 1990; the monitoring and evaluation system report has been completed and the National Forestation staff has prepared a training manual and has begun to train trainers [35]; the study of the rattan industry is nearly finished (due in September); and the study of the wood industry is just beginning.

The goals and targets of the projects and programs vary widely. The stated targets for those projects and programs that are available and the statement of present progress are contained in the following table on the Status of the Forestry Projects. It is clear from the data in that table that each project has a set of goals and key indicators that relate poorly to any other project. Just trying to compare activities is a chore.

Another significant statistic is the number of family, community, and corporate reforestation contracts that have been processed and signed. Those data are shown in the table Family, Community, and Corporate Contracts.

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9 Apropos the discussion of natural forest management in preceding sections, the Japanese-supported project proposes to: " .....determine germination rates of dipterocarp seeds and seedlings under different cultural treatments ... and study the effects of different cultural treatment on the survival of dipterocarp wildling in the nursery".

Table 6.3-1 Status of Forestry Projects

PROJECT	COMMUNITY FOREST	AGROFORESTRY (ha)	ACTIVITIES CSC's (No)	TREE FARMS (ha)	TERRACES (M2/)	PATENTS (no)	REFORESTATION (ha)	ROADS (km)
Palawan Integrated Area Development		440	244		560,013			
Upland Stabilization						18,378		
Land Survey's Titling								
Lake Bato Watershed				1,521				
Allah Valley Watershed		5,171					8,524	a/
Third Davao Irrigation		817					367	
Muleta-Manupil Watershed				4,550			7,681	50.00
Philippine Forestry Dev.	40	109					5,688	77.50
Cebu Upland Projectb/								
Carranglan Watershed							200 150 160	5.20
Bukidnon Industrial Tree Plantation							21	3.18
Integrated Forest Prot.			243				2,300	13.00
Magat Agroforestry		269	194				131c/	5.40

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a/ No quantity given

b/ Data completely incompatible

c/ Number - no size given

Table 6.3-2 Summary of Contract Reforestation, June 1989

Unit	FAMILY			COMMUNITY			CORPORATE			TOTALS		
	ADBa/	Regular	OECFb/	ADB	Regular	OECF	ADB	Regular	OECF	ADB	Regular	OECF
Number	3,749	93	197	180	1	10	22	1	0	3,951	95	207
Hectare	10,465	212	1,013	13,041	50	582	2,721	15	0	25,227	277	1,595
Pesos	171,365,639	2,118,344	15,437,021	168,842,452	236,230	9,713,718	56,247.089	268,949	0	396,455,500	2,387,293	25,150,739

Source: Department of Environment and Natural Resources

a/ Asian Development Bank
b/ Overseas Economic Cooperation Fund of Japan

Another major initiative is the proposed environment and natural resources sector adjustment loan from the World Bank. In late May it was assumed that the level of funding would approximate US$200 million. The thrusts were to coincide with the recommendations of the preparatory mission that acted on the ffARM Study.

The terms of both the loan and the nature of the institutional adjustments and the actual work to be done are under active discussion within the Government of the Philippines and the status of both the loan and the description of actual projects in the forestry sector is not known.

6.4 Characteristics of Successful Approaches

There seems general agreement that the approaches to community-based resource management pioneered by the early Ford Foundation work in Panay in the hills above Antique will work, but that the approach requires time, skills not generally available, and patience. The basic approach has been expanded upon in the Central Visayas Regional Project (CVRP)[10] and the Rainfed Resources Development Project (RRDP). Integrated Social Forestry Program (ISF) work in three communities has been supported by the Ford Foundation; the Undersecretary/Operations is sufficiently supportive that the support is now operational in an additional 13 areas.

The conflict with significance for the DENR between CVRP and RRDP with ISF is in the level of the field personnel. It was vigorously contended by DENR personnel during the evaluation of the RRDP that non-DENR personnel had been hired specifically to avoid the low wage structure binding the entry level ISF staffs. And there was a perceived shortage of them even at higher salaries.[14]

However the structure finally comes out, the success stories hinge on the use of a committed staff that is willing to take up residence with the communities to be served. Three or four persons with different resource

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[10] The valuable lessons learned from this series of projects, particularly the forestry side, are being documented by Patrick C. Dugan. The work is currently in manuscript and should be available shortly.

skills seems to be a desirable initial group. They enter the village only after an initial rapid rural appraisal is performed with assistance from persons with social science backgrounds. The objective of the resident group is to establish rapport with the community and to recognize the indigenous organizations of small groups traditionally found in rural societies and use these groups to perform functions of extended families. They use the appraisal as an initial guide for interventions that will tend to gain acceptance by the community.

It is the analysis of groups at this level that form the basic planning unit for natural resource planning. Things are no longer so generalized that they are abstractions.

It is the community, if motivated by economic self interest, that will protect remaining forest, resist the intrusion of new families, and install the technologies required to deal with the forest management problems now recognized on a grand scale.

Important aspects of success are the rates of adoption. From the existing record, the success in organizing communities is very good and the organizations seem viable and have staying power. However, adoption of conventional agricultural practices, usually referred to as SALT, has not been good. There are probably good reasons for this, but some constraints often mentioned are tenure and credit. The two go together in the uplands. The Certificate of Stewardship Contract is usually not sufficient collateral for land banks and the upland farmers on A&D areas are more often tenants than not. Neither group is able to secure credit for conventional farming practices. When the requirements for forestry practices are included, even under the best of agroforestry techniques, credit is very hard to come by.

There are no successful approaches demonstrated in the natural forest management area. Speculation about community protection/management is based on very limited, but encouraging, experience. Workable approaches with the private forestry companies for sustainable forest resource management is very limited and in the case of the all important dipterocarp forest only a few companies have demonstrated that sustained yield forestry is biologically and economically viable.

The PICOP experience, however, has some instructive lessons for future industrial tree plantations. Nonetheless, as in the case of upland agriculture, the rate of adoption has not been as overwhelming as the paper profit and loss statement would indicate. Thus, due caution is in order.

6.5 Characteristics of Unsuccessful Approaches

The most significant characteristic of the unsuccessful approaches is top down management on the basis of poor or non-existent data. Under such an approach, it is judged that the farmer/occupant is ignorant with absolutely nothing of value to say. It also leads to the setting of absolutely irrelevant physical targets that are forced on field staffs.

One indicator of the unsuccessful approach is the use of unrealistic units of measure; the above cited experience with using area planted rather than viable community organizations established is a case in point. Another indicator is reliance on the movement of money as the sole measure of success. In an environment where slow, patient organization of communities to be self-reliant is so important, capital intensive activities, such as road construction, are frequently self defeating. It should be noted that nearly every road of all descriptions built with project money under the name of upland improvement and stability are causing large amounts of erosion as well as an unwelcome conduit of additional people into the hills.

6.6 USAID Involvement in Forest Resource Development

At one time, a major sector for USAID investment was forestry. Many of the degrees held by faculty in the College of Forestry have been financed by USAID. This support dwindled about 17 years ago.

In recent years, the RRDP has been the only major project initiative in the forestry sector by USAID. The pioneering work done in the project in the field of contracts for reforestation in both the uplands and in the mangroves is the basis upon which DENR now proposes to meet the major targets set for itself.

7.0 LESSONS LEARNED FROM SUCCESS STORIES

7.1 Overview

Sustainable here is equated with the stability of the soil. There is no universal cookbook for upland community development. The blend of practices that will increase production and stability will vary from community to community. It is seldom possible to know in advance what will be the culturally satisfying priorities of a community or the financial imperatives of the individual members of the community.

It is possible that some pre-conceived hillside practices will compete for scarce labor at critical times. The community-based resource advisor(s) will be well advised to keep track of family time budgets while choosing possible interventions to be offered.

Philippine experience with community-based resource development has proven that the approach works in steep, resource poor situations. It is time to apply these social forestry techniques to dipterocarp forests and the national parks and equivalent reserves.

The success of community forests, as in Mandungao, can be enhanced by more intensive agroforestry techniques. Thus, provisions for government support for the use of agroforestry in community reforestation contracts is warranted.

Intensification of agroforestry to enhance economic returns through increased product flow should be encouraged across-the-board. The few places where such practices have taken place have been successful. Criticisms that tree crops are no better than row crops in furthering sustainability can be muted by planting on the contour. Since intensifying of successful practices is a function of staff capability, training in ways to evaluate the viability of new products from the agroforestry mix in essential.

A marriage of the managerial talents and field location of TLA concessionaires and the social conscience of government is a major hope that there can be sustainable dipterocarp forest production. To be successful, there has to be a major overhaul of the existing system. One key is the modernization of the Philippine industry. To do so will require an understanding of why there has been so little

incentive to invest in a capital mill facilities. Social and economic research will be necessary to derive the knowledge to create an adequate system of incentives and disincentives. One such incentive to perform the conditions of wise stewardship is a performance bond. The level of the bond should by set at a sufficiently high level so there is a strong incentive to perform all aspects of sustainable forest management rather than forfeit the bond.

A portion of the timber stumpage fee (economic rent) should be earmarked for use in a revolving fund supporting research in dipterocarp ecology and physiology.

7.2 Use Locally Driven Objectives

Mix of Systems to Increase Production and Stability

The lesson here is that the mix of development practices will vary from community to community: There is no universal cookbook. The community organizers must be able to understand that they have to mix the social objectives of stability and sustainability with the short-term reality of the people they are serving. It is seldom possible to know in advance of arrival in a place what will be the culturally satisfying priorities. Outsiders are often forced to pry very hard to discover the deep seated community agenda. It has been pointed out elsewhere in this Annex that it is possible that some farmers/occupants face situations that dictate their choice to ignore SALT and go directly to some form of perennial cropping.[14]

The prescribed combination of individual and community actions requires a sensitive mixing of the bio-physical capacity of the site and the socio-economic factors constraining adoption of sustainable practices. All facets of the knowledge needed to organize a community and advise individual farmers are difficult to encapsulate in one person. It is essential that a support line for both technician and for farmers be in place so that they can explore the feasibility of new techniques and practices.

On Farm vs Off Farm Income

The RRDP evaluation team contended that a possible constraint, indicated by a few scattered research results, was the competition by off-farm cash earnings for labor at critical times. This possibility was again raised in the

field in Ayungon where occupants were able to gain employment in the sugar mills at peak processing times. If plantation planting or establishment of terraces conflicted with those times of employment, obviously, the families opt for the cash incomes. The lure of cash income was also evident in the same community when the opportunity to earn money from the cutting and sale of forest products was offered: they virtually abandoned their farms in favor of cutting.

The field officers will have to pay particular attention to time budgets for the members of their communities. Since much of the prescriptive work will involve agroforestry techniques, the need will probably be as acute in the field of sustainable agriculture as in forest production.

7.3 Expansion of Social Forestry

Application to Old Growth Forests/Reserves

The lessons learned in community-based resource management are social forestry lessons. They indicate success. Thus, the successful examples of social forestry should be used to attack the severe problems facing the old growth forests and the existing units of the national park system. The idea that the ISF units are the only ones dealing with forest occupants is outmoded. Examples have been given elsewhere in the text of the promising progress made in applying what, for short hand simplicity, can be called social forestry to protecting old growth forest and the remnants of the reserves. The communities must be assured and believe that it is in their real financial interest to participate through profit sharing or whatever for the approach to succeed.

Community Forestry

In both the forest lands and the A&D lands, there are opportunities for communities to capitalize on the looming wood shortage by planting community forests. The community organization in Magdungao has demonstrated that the people of a community are capable of erecting mechanisms that regulate the removal of material from the forest and equitably distribute the proceeds. It is very important that the community be able to see financial returns from the community endeavor in the first one or two years.

Therefore, the application of agroforestry techniques seems mandatory. Such provision can also be incorporated into the reforestation contracts as well as a means of encouraging community acceptance and support for planting and managing the forest. It is important to recognize that a portion of the benefits from such community forests redound to society as a whole. On this basis, it is reasonable for government to partially subsidize early establishment costs with a view that properly managed community forests can produce a stream of revenues over time that can be used to finance community activities.

Agroforestry Systems

The intensity with which agroforestry is practiced in the country must be improved. Spacing is often too wide, there are no provisions for early thinnings and prunings to reach the intended crown density, and more than one tier of culture is seldom seen. There are vast areas in which one of more forms of agroforestry can and should be practiced. The mix of crops and products in the various stories is nearly unlimited. It should be noted that in all agroforestry practices in the uplands that contour planting in accordance with the steepness of the slopes is important.

The intensification of agroforestry requires not only improvement of the bio-physical systems, but the socio-economic systems as well. Therefore, there should be increased training for field staff ways to evaluate the viability of unusual new products from the agroforestry mix.

7.4 Industrial Forestry

The major clear lesson from the past 30 years is that the present system doesn't work. It has to be fixed even if there is only a very slim chance that anything will be left even after the changes are made and investments in enforcement are made.

The major option seems to be the effective joining of the private sector logging operators with the public sector to effect protection, expanded area, and management of the dipterocarp forests. One of the joint concerns of both the operators and the government is to control the proliferation of illegal cutting. Some of the major loggers have contended that they have received much in the way of support from government when they have acted to interdict illegal logging activity. In whatever partnership can be

arranged (an approach is suggested in the Sustained Forest Management Plan [5]), full government support is fully merited for those companies concerned with long-term sustained wood production in protecting forest from over cutting.

Restructure Incentives and Disincentives

The analysis of the past logging history by the consultant team that prepared the ffARM study has shown clearly that the nearly zero cost of the nation's forest wealth has been a major contributor to the rapid depletion of that wealth. Also identified is the relatively short time frame for the concession leases that discouraged reinvestment in the forest and modern milling facilities.[1] (It is incredible that no Philippine mill is able to use chips and slabs either for making chip/partial board or cogenerating power for the mill or sale to the local power grids.)

Each of these issues will have to be faced in two stages: the immediate matter of what to do with the recommendation to cause all cutting in old growth forests to cease and desist, and the longer term problems of taking actions to bring up sustainable levels, and to effect equitable distributions to the people directly involved. These are appropriate roles for the private sector. For the second, longer term stage, a full understanding of the necessary incentives and disincentives will be critical. Work on gaining this understanding should begin immediately.

Revolving Research Funds

There was general agreement in the scientific community contacted that the deplorable state of knowledge key dipterocarp forests was due to a lack of available finances. One way to alleviate the problem for the mid-term would be to establish a revolving fund to support credible research in maintaining the natural forests. The initial funding could come from interested donors and additional funds could be derived from dedicating to the research revolving fund a share of the increased revenue from making more realistic the timber sales prices.

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1 Bautista's evidence that many TLA operators abandoned their concession sites in less than 25 years raises serious questions about whether tenure is the root cause of the failure to invest in processing capacity.

8.0 RECOMMENDATIONS

8.1 Overview

The objective of the recommendations is to provide quick responses to the two most serious issues in sustained forest resource management: protect the vestiges of the original forest cover of the Philippines (the dipterocarp forests and the unique beach and swamp forests) and arrest the accelerated erosion afflicting large areas of the country. The recommendations are listed in the order of priority, but some of the small, easily done pieces can be shifted upward in time.

All of the actions recommended are directed at sustainable forest management in the long run. Quick action is needed to keep intact the remaining virgin dipterocarp forests. Actions commensurate with three general situations should be taken. When there are old-growth dipterocarp forests on land classified as Alienable and Disposable, the action should be through a local Non-Government Organization linked with The Nature Conservancy. When the old-growth forest is within an existing Timber License Agreement concession, the action should be through a joint public/private effort. When the old-growth forest is neither on land classified as Alienable and Disposable or within a Timber License Agreement concession, a comprehensive community-based resource management approach is the only proven way to proceed.

To support action in all three situations, the DENR will require augmented aerial surveillance capability, a strike force of specially designated military personnel, and prompt initiation of a management oriented ecological research program.

In order to strengthen the DENR ability to conduct critical policy oriented research, the Office of Special Concerns should be given financial and technical support for the conduct of socio-economic research related to revising the operating mode of the Timber License Agreement framework to make possible the public/private blend that is critical to the protection of the remaining old-growth forests. Successful conclusion of such studies within DENR, with collaboration from the Philippine Institute for Development Studies, should set a style for policy leadership by the department vis a vis the central economic and planning agencies of the government.

If the community-based initiative is to be successful, prompt provision of the means for providing business and resource management capability to the involved communities will be crucial. A major effort to provide the support on a wide scale is recommended.

The positive work to stabilize the uplands should be accelerated through a modified version of the Rainfed Resources Development Project. It is suggested that the modifications be made to promote the joining of forces between the field staffs of the Departments of Agriculture and Environment and Natural Resources particularly at the Provincial and Municipal levels. Also needed is a clear-cut definition of the staffing, skill levels, and mode of operations for community-based resource management work in the future. The way the melding of the strengths of the two departments is done would be an appropriate task for the newly formed National Secretariat for Upland Development.

Longer term consideration of environmental and natural resource issues is needed to complement the short term view suggested above for the Office of Special Concerns. The existing shell of the Forestry Development Center could be used as the starting point for an Environment and Natural Resources Policy Development Center. Such a center could put both financial and technical resources to very good use. The most logical of the technical linkages would be with the World Resources Institute.

There is little doubt that the reforestation needs of the country merit further investment. The sole limit is the demonstrated capacity of the contract reforestation system to move the financial resources to the ground. And, there is strong evidence that to follow the successful community-based examples, the existing contract framework needs to be revised so that the contractors can take due advantage of the strengths offered by working with and through the local communities. Three years is simply not long enough.

There are three areas of high priority that can be looked at in the longer term. They are: a) setting up a fuels budget in which wood fuel is accorded its due weight, b) beginning a planned conversion of the extensive cogon dominated grasslands to more productive uses including dipterocarp forest which may be linked with the public/private instrument being forged to deal with old-growth forest management, and c) putting together a comprehensive, long-term strategy for environment and natural resources training.

Other important issues that should be considered include: attacking the problem of hill access road erosion, supporting the Department of Agriculture's Tribal Services Program, improving the Department of Environment and Natural Resources voice communications network, and improving the department's fire fighting capacity.

8.2 Act Immediately to Hold the Remaining Old-Growth Dipterocarp

There are three distinct situations in which the remaining old-growth dipterocarp forests may be found: a) fragments found on land classified as Alienable and Disposable (A&E), b) stands remaining within the concession limits of holders of existing Timber License Agreements (TLA), and c) stands and fragments that are elsewhere, e.g., patches remaining in cancelled TLA areas and in national parks. Each situation requires a different approach.

Three elements are essential for all three situations: a) providing the Department of Environment and Natural Resources (DENR) with the necessary resources to perform intensive surveillance of the areas where old-growth dipterocarp forests are thought to remain, b) assuring sufficient striking power to ensure that DENR orders are followed, and c) begin the essential research necessary for the Philippines to establish a leadership role in sustainable management of the dipterocarp forests.

Aerial Surveillance

The first element can be provided by programming funds to the National Mapping and Resource Information Authority (NAMRIA). The program could include:

- Funds to engage contract aircraft and equipment to make overflights at approximately one month intervals of all old-growth stands on pre-determined flight paths to take black and white and true color photographs capable of forming stereoscopic pairs at a scale of at least 1:10,000.

- Additional equipment, personnel and training to further NAMRIA's existing capacity to rapidly process the aerial photographs, prepare mosaics, interpret the pairs, and make crisp briefing presentations to the DENR Secretariat. It would be useful to have the field personnel directly

supervising the areas photographed assist in the interpretation of the photos and be able to take with them copies when they return to the field.

Strike Force

Arrangement must be made for a special body of military personnel to act without delay on the Secretary's request for assistance. The combat team(s) could be dispatched by air to those areas where, from the aerial surveillance data, there is active felling of old-growth in violation of the Secretary's ban. Their assignment would be to make sure that the illegal logging was stopped by confiscating logs and equipment. The assignment of crack units to this work should be rotated among military commands at approximately quarterly intervals.

It seems logical that the arrangements for the aerial surveillance and the strike force should be made by the Economic Intelligence and Investigation Bureau.

Ecological Research

Initiate a program of accelerated ecological research that will attract high research scientists from both the Philippines and the ASEAN region with the objective of establishing the ecological basis for the sustained regeneration and use of the Dipterocarpaceae.

Old Growth Forests On Land Classified as A&D

The Forest Resources Inventory (FRI) (see Chapter 2) interpretation of existing data reported about 1,500 ha of old growth dipterocarp forest on land classified as A&D. These areas may or may not be on forest land. Therefore, special urgent action is required, as follows:

1. Negotiate an agreement with The Nature Conservancy (TNC), a major U.S. non-governmental conservation organization to:

   - Post to the Philippines a cadre of TNC personnel experienced in the organization's land acquisition and management activities;

- Organize and incorporate a Philippine affiliate and train counterpart personnel in approaches and practices for acquiring and managing nature reserves paying due attention to engaging Filipino lawyers skilled in the practice of land law;

- Use all existing means, especially FRI facilities, to identify and delineate the location of the already identified 1,500 ha of old-growth dipterocarp forest that are reported to be on land classified as A&D or titled, and through purchase, lease, filing of claims, or other means, obtain sufficient control to be legally able to protect and manage these irreplaceable, diverse, genetic resources;

- Engage a combination of reserve forces of local militia and community organizers to mount patrols and conduct community education activities to ensure survival of the forest biota as nature reserves until such time that the Government of the Philippines (GOP) is able to assume protection and management as part of an Integrated Protected Areas System (IPAS).

A concomitant of acting in this situation is that all areas supporting old-growth natural forest communities be excluded from the purview of the Comprehensive Agrarian Reform Program.

2. Provide program funds to assist the Philippine affiliate over the longer term to identify other threatened forest biota, such as the Beach Forest and the Swamp Forest, and perform the same operations to ensure the survival of those remnant communities. This will likely mesh with the biodiversity inventory.

Areas Within Existing Timber License Agreement Concessions

While it may seem esoteric, it is deadly serious. Conscientious TLA's have, during the past 40 years, been an effective force in keeping trees on forest land. If they are simply cancelled out, the areas that they abandon could well fall prey to the destructive succession described for the run of the mill logging scenario described in Chapters 2, 3 and 5. The question to be resolved is: how can government enlist the profit driven private sector to act as its proxy in sustaining, over time, the flow of high value

forest products to the mills and remain within the confines of the Constitution.

Substance and Process of Policy Making

For such a practical public/private relationship to thrive, some very delicate policy negotiations by the DENR Secretariat will be necessary. To support these negotiations, substantial donor assistance would:

1. Make possible the examination by the Office of the Director Special Concerns specific issues related to the phasing out of the present TLA concession mode. Some of the actions are:

   - Institute economic and financial studies of the industry in collaboration with the Philippine Institute for Development Studies (PIDS). The objectives would be to provide sound action/consequences information for policy making and to establish a leadership role for DENR in advancing well supported and documented proposals to the administration [National Economic Development Authority (NEDA) and the Cabinet "Cluster A"] and Congress.1

   - Determine the resource base necessary to exercise proper planning and management of the areas under TLA in the public interest. The objectives of the action would be to focus the technical capacity of the support staff bureaus on specific problems and devise prescriptions that can be filled internally or packaged for external support. One of the major players in this work would be NAMRIA. The test here should be to give agency personnel the opportunity to participate with top management of the agency in devising solutions to a pressing and complicated problem, demonstrating existing capacity, and gaining understanding of what is needed in order to provide accurate, timely management information.

1/ A similar activity worthy of consideration but beyond the scope of the recommendations in the Annex is support for the House and Senate Committees whose legislative and oversight responsibilities include environment and natural resources.

- As part of private/public action, should the ₱10,000 ha deposit be a) raised to a level equal to or more than the per hectare cost of reforestation (₱14,000 to ₱20,000 per ha) or be replaced with a surety bonding system that would extract treble charges in case of non-performance. Once again aerial photography can aid in monitoring performance. The shameful performance of only 26 percent of the area reported as reforested actually supporting trees must not be repeated.

Assistance from donors can greatly facilitate the program's progress by proving long-term expatriate staff to collaborate with the existing or augmented Filipino staff. Some skills that should be useful are: policy oriented resource economist, resource planner, and intergovernmental relations specialist.

Areas Outside the TLA Concession Areas

The major hope in this area is found in continuing and expanding the existing community-based resource management programs in the following ways:

Add a project that seeks to find ways to facilitate the operation of the limited number of upland communities that can or should be granted some form of instrument to comprehensively manage their resources. The major determinant is the proximity to some form of natural forest; the second determinant is the proximity of threat (settlement or road). It is proposed that the DENR consolidate a number of existing contract and permit instruments, such as the Certificate of Stewardship Contract, the Community Woodlot Lease Agreement, and the Community Timber Utilization Permit, into a single contractual document. Under the arrangement, DENR would cede to the community the management responsibility for the forest: protection against fire, cutters and settlers; removal of dead material for local use; conduct of timber stand improvement (TSI); planting for plantations (indigenous or exotic) and enrichment of the natural forest; harvest, removal and sale of forest products; and retention of some fraction of the gross receipts of the products sold.

These communities very quickly will be in need of a wide range of help. They will need help in the biological and physical aspects of resource management and they will need help of the financial aspects as well, such as how to perform all the functions of a moderate sized firm. This is

a considerable expansion from the normal work of community organizers in the three pioneering projects which have set the tone for community-based resource management. [The team understands that ground work has been done by DENR staff and consultants so that one community area is ready to start once formal orders are issued. The contention here is that much more will have to be done quickly if those areas of old-growth outside the TLA concessions are to receive long-term protection.]

Making such support available, possibly through specially recruited and trained NGO's, will be critical to seeing whether the local communities, well supported and with a high degree of self-interest provided, can, in fact, maintain the bits and pieces of secondary forest scattered about the country.

8.3 Continue Community-based Work to Stabilize the Uplands

The best way to proceed would be by modifying the present Rainfed Resources Development Project as a continuing program.

Here the emphasis should be upon making the Provincial government the place where the expertise and manpower of the DENR and the DA are merged to stabilize the uplands and increase the growth of perennial crops, most noticeably wood. Elements of the program would include release of some money to the departments through the Provincial Offices of Planning. The basis for Provincial planning will be the existing land resources inventories made by the DA. The upland and coastal municipalities will be analyzed and annual work plans made for the agency with the majority jurisdiction in the locales selected for priority action. Personnel in each agency would follow jointly accepted community organization procedures to work with the upland farmers. Therefore, some DENR personnel may be working in A&D areas and some DA personnel may be working within the forest reserves. This also means that the contracting mechanisms for reforestation now used by the DENR must also be available to the DA, e.g., ability to contract with communities for reforestation work.[2]

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2 This may seem inappropriate for A&D areas, but the community forest planted in the Magdungao community is on the land covered by one family's Certificate of Stewardship Contract. The community did the work and the community worked out the distribution of the Certificate products and the income derived from the forest products.

These same approaches would be used for coastal communities. For those communities where mangrove rehabilitation and management form a major part of the work, DENR personnel would have the lead role; in the communities where nearshore fisheries form the major work, DA personnel would have the lead. In any case, it is important to note that the mangrove forests can be managed for sustained flows of products without impairing their value as coastal stabilizers and major contributors to the food chain for marine fisheries.

A necessary modification is a clear-cut approach to the uplands that supersedes the Integrated Social Forestry Program (ISF) terminology of the Central Visayas Regional Project (CVRP) and the RRDP. There could be Community Development Units in the PENRO's and PAO's. The officers could detail mid-level management personnel to the working areas or contract with NGO's for the required services. All work in the units should be planned by the unit personnel with the community. The matter of awarding Certificates of Stewardship Contracts or pressing for some areas to be demarcated as A&D will be initiated by the community plan, but the paper work would be administered by the Lands Staff in the CENRO. Technical support and advice on the design of a Rapid Rural Appraisal and/or market survey would be requested from the cognizant CENRO and MAO who, if unable to provide the requested expertise, will pass it on the Provincial level.

Some of this work would be very appropriate for the newly created National Secretariat for Upland Development where a master plan for the uplands is to be prepared.

8.4 Environment and Natural Resource Policy Development Center

The Forest Development Center was established to provide "think tank" capability for the dominant agency of the old Ministry: Forest Development. Such a narrow focus is no longer appropriate for an agency with the scope of the DENR. An institution that performed a "think tank" function would be of great value in helping the Secretariat address some of the longer term policy issues facing the country.

It is possible to convert the existing Forest Development Center into a policy development center. This would link with some of the skill development in the Secretariat described above.

In the formative years, it would be useful to have a linkage with an expatriate NGO that has solid experience in both international affairs and in policy analyses for decision makers. Under such a linkage, substantial expatriate staff would join with Filipino staff to jointly develop an institution that will quickly and adequately respond to both the short term policy issues perceived in the Office of Special Concerns and the long-term issues perceived by the staff of the Center and the Office of Plans and Policy. The expatriate staff would sharply decline after the first two years, but a resident presence would be maintained for seven to ten years. Thereafter, expatriate support would be available on a reciprocal staff exchange basis.

One prime candidate for the linkage would be the World Resources Institute.

Some issues amenable to consideration by such a center are:

- Examining ways to structure DENR operations in the face of increasing Provincial autonomy.
- Organizing Secretariat level training and team building so that top management is aware of the abilities and limitations of technology and set examples for other levels for team building and collaborative decision-making.
- Determine policies for the maintenance, expansion, and use of the second growth dipterocarp forests.

8.5 Expanded Support for Contract Reforestation

There is every reason for all donors to support financially the contract reforestation programs of the DENR to the extent that the money can effectively reach the ground. Priority should be given to the research necessary to improve the ecological soundness of moderately sized Industrial Tree Plantations. This emphasis should immediately increase in the event that the research recommended elsewhere provides a breakthrough that will permit the more rapid and successful use of dipterocarps in industrial plantations.

8.6 Priority Long-Term

There are two areas of high priority for forest resource management that can be looked at in the longer term. They are a) setting up a fuels budget in which wood fuel is a major factor and b) beginning to start the planned conversion of the extensive cogon dominated grasslands to more productive uses.

Fuel Budget

It has been noted above that estimates of current fuelwood consumption vary from 70 percent to 90 percent of the wood cut in the Philippines. At the present time, rough projections made some time ago by the Forestry Development Center of the College of Forestry, University of the Philippines at Los Baños, provide the only estimates of the volumes or areas that will be needed to meet future fuelwood demands. Very little is reported in the literature about the fuelwood market. For example, how much wood is burned or in industry converted to charcoal; what are price substitutability ranges, household preferences, costs, prices, and transport limits. It has been suggested that there are very large opportunities for the Philippines to utilize extensive biological resources to substitute for imported petroleum products. Policy issues may very well emerge from the work that will lead to an energy budget. One such issue may well be market adjustments to create incentives for the sugar and the wood industries to modernize plants for generation or co-generation of power through combustion of waste products.

Case studies of the once high visibility dendro-thermal electric generating scheme would be an appropriate part of this fuel budget work.

Grassland

The ffARM study and the analysis of Sustainable Agriculture (Annex B) correctly identify the extensive areas of cogon grass as lands that can contribute significantly to the productivity of the country. This is of interest to those interested in forest resource management for three reasons: firstly, any action that tends to divert people from the forest land reduces the risks to the productive flow of forest products and to the remaining old-growth forests. Secondly, the majority of the grasslands are within the administrative scope of the DENR and will have to be

considered as part of any and all area-wide multiple use plans. Thirdly, these areas were all once forest that have been turned into relatively low producing cover through the behavior of DENR's predecessors.

In the rehabilitation of the grasslands, one should not loose sight of the fact that in the moist swales and creek bottoms there are or may be residual dipterocarps. The genetic material in these specimens may be very useful in developing more hardy and fire resistant new varieties. Therefore, land use plans for the grasslands should recognize the sound principles of leaving the stream and creek areas in woody vegetation. Also, those grasslands with steep slopes might also be candidates for rehabilitation to dipterocarp forest. The point is: the conversion should proceed with due caution at the outset.

Training Strategy for the Department of Environment and Natural Resources

There is a need for training of personnel and human resource development systems throughout the DENR. [14] It is a sad commentary that the DENR Training Center is given over to other uses instead of being a dynamic hub of activity supporting the Secretary's innovative new programs. There are three segments to the training program.

Firstly, there is the need to upgrade the performance of the personnel in the line of command. That is, the Secretariat, the Regional Executive Directors (RED) and their planning staffs, and the PENROs and CENROs. The training conducted in four Regions by the DENR's RRDP technical assistance contractor and by the DA's RRDP technical assistance contractor has demonstrated the viability of hands-on training techniques for middle management and field staffs. It has also demonstrated that a structured in-service training program serves as an excellent two-way communications medium. New policies and methods that the top administrators wish to have implemented in the field are best understood through free wheeling training sessions. These training sessions provide feedback to management about field realities that may cause modifications to be made. Also, when high level administrators meet with their field staffs, they find the interchange to be practical and valuable -- part of their learning process.

This type of training in all aspects of the management cycle (goal and objective setting, planning, implementing,

monitoring, and evaluating) should be expanded to all regions as rapidly as possible.

Since comparable training programs have been developed in the DA DENR, it seems possible that the two programs could be examined with a view to merging them and issuing inter-department training manuals and courses, particularly at the Provincial level. Again, the work could be done under the aegis of the National Secretariat for Upland Development.

Secondly, technical forestry training is needed. Some very effective methods for this sort of training have also been demonstrated by the RRDP technical assistance contractor. The process of transferring new technology in the management of the second growth forest must be shifted from research results to the field practitioner as rapidly as possible. This is likely to be a joint endeavor between the academic community, the Forest Management Bureau, and the Ecosystems Research and Development Bureau. The academic community may include personnel from several of the regionally significant forest resource management colleges.

Thirdly, there must be a number of high quality professional technicians available to fill resource management posts in the DENR and the DA, the operators of the industrial forests, the NGO's, and the reforestation contractors. The number of forestry schools in the country is too great to be supported at a high level. It is quite clear that not only is there a need to upgrade the College of Forestry, UPLB in terms of social forestry content in the curriculum, but also to upgrade the number and quality of the research/teaching staff. This college, together with prominent businessmen and members of the Society of Filipino Foresters, should establish minimum standards by which the regional forestry schools can be judged. Only those who can meet the standards should be accredited and eligible for public (including donor) support. And the faculties should have joint status so that it is possible for them to spend one out of every four or five years in Los Baños while a College of Forestry faculty member assumes visiting status as faculty in the regional school.

These same regional natural resource schools would be the ones to assist in the training programs of the DENR and serve as links to the regional agriculture and forest resources research consortia organized under the auspices of the Philippine Council on Agricultural, Forestry, and Natural Resources Research and Development (PCARRD).

8.7 Other Important Directions

Attack the Hill Road Erosion Problem

The Land Resources Inventory Project (L/REP), that was described in Chapter 2, has generated hard data on the extent of erosion emanating from trails and roads in the uplands. Many of the offending roads were built as part of projects designed to stabilize (reduce erosion in) the uplands and new ones are contemplated in several donor-assisted GOP projects. The problem is much more serious than has been realized. Prompt action is recommended as follows:

- Engage a consultant to do a thorough literature review to locate the best relevant manuals and training materials.

- Convene a National Workshop on Hill Access Road Construction. The consultant and recognized international experts with experience in hill road access construction and maintenance should organize and lead the workshop. Participants should include major donors as well as policy personnel from DENR and Department of Public Works and Highways. Objectives: Agree on the nature and magnitude of the problem; select the standards to be followed in designing and constructing hill access roads, particularly those that are donor assisted; and set training schedules for introducing the selected standards/manuals to Provincial road department personnel.

- Make a project grant to DENR to produce and distribute the manuals and conduct the training.

- Make a program grant to DENR to enable PENRO's to take full responsibility for inspecting new hill road construction for compliance and existing roads for re-construction to correct design flaws.

- Assist DENR to design a program for the re-construction of those roads that do not meet the accepted design standards.

Support for the Department of Agriculture's Tribal Program

The DA has in place a Tribal Agricultural Support Service Program. As noted in Chapter 2, throughout the history of the Philippines there has been a recognition of the territorial rights of indigenous tribal groups. These rights have been upheld by the Supreme Court. Many think that the tribal issue is primarily a matter of land tenure.

Surely other matters are also important. For example, there are special characteristics demonstrated by tribal groups that are not exhibited by other rural farming societies. Their problems require special treatment by people with skills beyond that of the conventional extension agent.

Therefore, cadre a special of personnel with anthropological training and a training program for tribal groups ought to be included as a special concern in the uplands.

Communications

There is very little doubt that the DENR's field operations are handicapped by a lack of a universal voice communications link. Recommendations made by a UNDP specialist call for upgrading voice links between the Secretariat and the RENRO's followed by a network to enhance protection and intra-regional networks. Each of the three pieces will involve hardware acquisition and installation, and training of base station facilities that do not shut down at the end of the business day.

Fire Fighting Equipment

Fire protection has occupied a low priority in the past. Only under very unusual circumstances did the dipterocarp forest burn. With the passing of the forest, the accepted management practice for the cogon grasslands is rotation burning.

However, with the advent of Industrial Tree Plantations, often composed of closely spaced exotic species, fires will become a more common problem. Also, in those areas where attempts will be made to reconvert the cogon to forest using natural regeneration methods (augmented or not), stopping fires will be important. Thus, increasing attention should be given to all aspects of fire

protection (prevention, pre-suppression and suppression). The attention can be initially limited to those areas where specific forest management activities are being carried out rather than applying some level of fire protection to all forest lands.

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Full responsibility for omissions, commissions and faulty judgement, is of course, the author's.

GLOSSARY

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aforestation	the act of converting bare or openland into a forest particularly that which has never supported forest vegetation in the past.
agro-forestry	a cultural system that combines agronomy with forestry in a multi-storied arrangement of trees, shrubs, row crops and/or ground cover over time.
alienable and disposable lands	public domain land which have been the subject of the present system of classification and declared as not needed for forest purposes.
annual allowable cut	the volume of materials whether of wood or other forest products, that is authorized to be cut regularly from a forest. It can also be used to refer to a maximum area to be cut annually.
carrying capacity	the level of use that an ecosystem can support without change
cutting cycle	the period, usually expressed in years, between major harvests from the same forested area.
denuded land	areas that are devoid of ground cover or are inhabited by sparce vegetation so the strata formerly covered are exposed to movement by wind and/or water.
ecosystem	a bio-physical community considered as a unit.
endangered or threatened	species whose survival potential is low because its habitat is being converted.
estate plantation	lands that have been planted to tree type crops, such as coconuts, abaca, citrus and rubber.

forest	area of one hectare or more land on which an actual stand of trees grow which is at least 10 percent stocked with forest trees (including seedlings and saplings), wild palm, or bamboo.
dipterocarp forest	forest stand dominated by trees of the dipterocarp family such as Red and White lauan, Tanguile, Tiaong, Almon, Bagtikan and Mayapis of the Philippine mahogany group, and the whole collection of species in a forest that does or did support a stand dominated by Dipterocarpaceae.
forest land	public domain land which has not been declared as "alienable and disposable" and presumed needed for forest uses; in common usage the definition applies to all land within or above the so-called 18 percent slope line, the forest reserves, forest reservations, timber-lands, grazing lands and game refuge, and bird santuaries.
mossy forest	a forest type found principally on high mid-mountain and very rough mountainous regions characterized by steep ridges rising to peaks whose sides cut into smaller ridges and because of elevation remain very moist. The trees are mostly dwarf with stems and branches usually covered by moss.
pine forest	a forest type composed primarily of the native pine species as Benquet Pine (Pinus Kesiya) in Mountain Province and the Mindoro Pine (Pinus merkusii) in the Province of Mindoro.
reservation forest	an area of "forest land" which have been reserved by the President of the Philippines for a specific purpose(s).
grassland	land covered with indigenous species with less than 10 percent tree cover.

high-lead yarding	a cable system using a spar tree or pole which extracts logs from the forest and hauls them along the ground with one end in the air (high lead) to a central point.
industrial tree plantation	any alienable and disposable and/or forest land that is planted to tree crops primarily to supply the raw material requirements of existing or proposed wood processing plants and related industries.
infiltration	the absorption of liquid water by the soil, either when it falls as rain, or when applied as irrigation or from a stream flowing over the ground.
lease	a privilege granted by the State to a person to occupy and possess, in consideration of a specified rental, forest land of the public domain in order to undertake any authorized activity therein.
license	is a privilege granted by the State to a person to utilize forest resources in any forest land, without any right of occupation and possession over the same, to the exclusion of others, or establish and operate a wood processing plant, or conduct any activity involving the utilization of any forest resources.
license agreement	a privilege granted by the State to a person to utilize forest resources within any forest land with the right of possession and occupation thereof to the exclusion of others, except the government, but with the corresponding obligation to develop, protect and rehabilitate the same in accordance with the terms and conditions set forth in said agreement.
multiple use	the harmonized utilization of the numerous beneficial uses of the land soil, water, wildlife, recreation forage and timber of forest lands.

national park	refers to a forest land or marine reservation essentially of primitive or wilderness character which has been withdrawn from settlement or occupancy and set aside as such exclusively to preserve the scenery, the natural and historic objects and the wild animals or plants therein, and to provide enjoyment of these features in such a manner as will leave them unimpaired for future generations.
old-growth	forest predominantly stocked with mature trees; less than 25 percent of the mature stand volume removed by cutting.
permit	a short-term privilege or authority granted by the State to a person to utilized any limited forest resources or undertake a limited activity within any forest land without any right of occupation and possession therein.
production forests	areas of residual forests, scattered fragments of old-growth forests and grassland or brushland to be especially set aside for timber production.
recharge	flow to groundwater storage from precipitation, infiltration from surface streams, and other sources. It may refer to the process of replenishment on the quantity of such water.
reforestation	the act of planting trees on bare of openland which used to be covered with forest growth.
residual forest	a forest which remains after logging on a selective logging system.
run-off	portion of total precipitation over an area, that finds its way into streams as surface flow; remaining portion of precipitation is absorbed by deep strata until utilized by vegetation or lost by evaporation.

Selective Logging System	the systematic removal of the mature overmature and defective trees in such a manner as to leave on the site an adequate number and volume of healthy residual trees of the desired species necessary to assure a future crops of timber and adequate forest canopy for the protection of the soil.
set-up	an area in which a yarding machine can collect logs from without being moved (10-20 ha).
silviculture	the establishment, development and care of forest trees.
skyline logging	a cable system similar to high lead logging, the difference being that the logs are fully supported in the air and not dragged along the ground.
sustained-yield management forest	practices that yield a flow of forest products equal in volume over in a working time to the natural or accelerated growth of the forest where products may include one, several, or all of the following: timber, water, forage, wildlife, and recreation.
timber stand improvement	periodic removal of either residual mature individuals (thinning from above) or stems that are too dense, repressed, or misshapen (thinning from below) and removal of limbs and branches (pruning) to improve the growth rate and form of the remaining trees.
titled land	"alienable and disposable" land that has been taken through the patenting process and to which title has been issued to a private entity.
tribal community	a community of indigenous Filipino people who have sprung from common ancestors.
underbrushing	removal of small trees and saplings and vines under the canopy of the forest.

uplands	the zone of largely rainfed area where agriculture and/or forestry is being forest practiced on rolling to steep land with slopes ranging upward from 18 percent although some lands in the uplands are quite level and may even be irrigated.
virgin forest	forest that has been affected only by natural forces, i.e., not affected by logging or modern (as opposed to ancient tribal) slash and burn practices.
watershed	a land area drained by a stream or fixed body of water and its tributaries having a common outlet for surface run-off.

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
BSWM	Bureau of Soil and Water Management
CARP	Comprehensive Agrarian Reform Program (DAR)
CENRO	Community Environment and Natural Resource Office(r) (DENR)
CVRP	Central Visayas Regional Project
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DENR	Department of Environment and Natural Resources
DPWH	Department of Public Works and Highways
EMB	Environmental Management Bureau (DENR)
ERDB	Ecosystems Research and Development Bureau (DENR) (formerly FORI)
FASPO	Foreign Assisted and Special Projects Office (DENR)
FMB	Forest Management Bureau (DENR, formerly Bureau of Forest Development)
GOP	Government of the Philippines
IPAS	Integrated Protected Areas System
ISF	Integrated Social Forestry Program (DENR)
JICA	Japan International Cooperation Agency
LMB	Land Management Bureau (DENR)
MAO	Municipal Agriculture Officer (DA)
MPFD	Master Plan for Forestry Development
NAMRIA	National Mapping and Resources Information Authority

NEDA	National Economic Development Authority
NEPC	National Environmental Protection Council
NRDC	Natural Resources Development Corporation
NGO	Non-Governmental Organization
OECF	Overseas Economic Cooperation Fund (Japan)
PAO	Provincial Agriculture Officer (DA)
PAWB	Protected Areas and Wildlife Bureau (DENR)
PCARRD	Philippine Council for Agriculture Foresty and Natural Resources Research and Development
PENRO	Provincial Environment and Natural Resource Office(r) (DENR)
PROFEM	Program for Forest Ecosystem Management
RRDP	Rainfed Resources Development Project
SFMP	Sustainable Forest Management Plan (ADB/DENR)
UNDP	United Nations Development Program
UPD	University of the Philippines at Diliman
UPLB	University of the Philippines at Los Baños
USAID	United States Agency for International Development
WRI	World Resources Institute, Washington, D.C.
World Bank	International Bank for Reconstruction and Development
AAC	Annual Allowable Cut in (in cubic meters or hectares of forest)
A&D	Alienable and Disposable (non-forest land)
cm	centimeter
dbh	diameter at breast height
EIA	Environmental Impact Assessment

EO	Executive Order
FAO	Food and Agriculture Organization of the United Nations
ffARM	Forestry, Fisheries, and Agriculture Resources Management
GDP	Gross Domestic Product
ha	hectare(s)
ITP	Industrial Tree Plantation
m	meter
PNCS	Philippine National Conservation Strategy
PSLS	Philippine Selective Logging System
PVO	Private Voluntary Organization
RED	Regional Executive Director (DENR)
SALT	Sloping Agriculture Land Technology
SFMS	Sustainable Forest Management System
TLA	Timber License Agreement (holder)
TSI	Timber Stand Improvement
US$	United States Dollar

ANNEX B

SUSTAINABLE MANAGEMENT OF AGRICULTURAL RESOURCES

by

JOHN D. FARGHER
Sustainable Agriculture Specialist

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1.0 IMPORTANCE OF AGRICULTURE IN PHILIPPINE ECONOMY

1.1 Overview: General Description of Philippine Agriculture

Philippine agriculture is composed of three general systems: upland rainfed hill farming and forestry, lowland cropping (both rainfed and irrigated) and plantations, and coastal fisheries including aquaculture, artisanal and commercial fishing. Table 1.1-1 shows the changing structure of agricultural growth between 1970 and 1986 [4]. Table 1.1-2 shows land use by major crops, 1950-85.

The impressive performance in "other crops" includes mango and pineapple (about 30% of "other crop" growth); treecrops - mainly rubber and coffee (about 20%); root crops (13%); and vegetables (13%). Rice, corn and coconuts occupy about 80% of the country's cropped area in almost equal proportions, yet together produce less than 50% of the total crop value.

In 1986, agriculture contributed 30% of Philippine GDP, compared with 30.6% for Industry and 39.4% for Services.

About 60% of the Philippine population is rural [1], and the agricultural sector accounts for most of the Filipino families living in poverty. In the rural areas, the absolute number of poor have increased despite a national decrease in the incidence of poverty [4]. This reflects a combination of circumstances: a continuing high population growth rate, an increasing scarcity of land, and a failure of the economy to provide sufficient employment opportunities outside agriculture. Unless agricultural systems which are environmentally and economically sustainable are used, land degradation and further impoverishment of agricultural families will exacerbate the problem of rural poverty and urban immigration in the Philippines.

One of the notable features of Philippine agriculture is the poor development of the livestock subsector. For example cattle, pig and goat numbers have remained static or declined slightly in the last thirty years [7]. Poultry numbers have increased but the further development of the poultry industry is limited by feed and cost constraints. Backyard production of goats, cattle and pigs is more important to the sector than extensive cattle and other livestock systems.

Table 1.1-1: Changing Structure of Agricultural Growth
1970 - 1986

Commodity	% Share GVA 1970	1986	Growth Rate 1970-1986 (%)	Projected Growth Rate 1986-92 (%)	Contribution to Growth 1970-86 (%)
Coconuts	5.3	6.2	4.8	0.5	7.3
Rice	18.9	18.3	3.7	3.3	17.7
Corn	6.1	6.8	4.4	5.0	7.3
Sugar	6.7	2.9	-1.4	3.8	- 0.8
Bananas	5.0	3.5	1.4	1.0	1.8
Other Crops	10.7	25.3	9.5	7.7	41.9
Total Crops	52.8	63.0	5.0	4.3	75.0
Livestock	12.0	8.4	1.5	2.5	4.0
Poultry	4.2	9.4	9.3	7.0	15.3
Fisheries	17.6	16.8	3.6	5.0	16.1
Forestry	13.4	2.4	-6.7	- 4.1	-10.4
Total GVA	100.00	100.00	3.9	4.2	100.00

Note : GVA is Gross Value Added
Source: World Bank, 1987, Agricultural Sector Strategy Review.

Table 1.1-2: Land Use By Major Crops, 1950-85

	Area harvested (1000 ha)					Percentage of total				
	1950	1960	1970	1980	1987	1950	1960	1970	1980	1986
Crops										
Rice	2,214	3,306	3,113	3,637	3,256	43.6	43.5	34.8	30.0	27.8
Rainfed	1,816	(2,526)	(1,767)	2,031	1,364	(35.8)	(33.2)	(19.8)	16.7	12.3
Irrigated	398	(780)	(1,346)	1,606	1,892	(7.8)	(10.3)	(15.0)	13.3	15.5
Corn	909	1,846	2,420	3,201	3,683	17.9	24.3	27.0	26.4	29.0
Total	3,123	5,152	5,533	6,838	6,939	61.5	67.8	61.8	56.4	56.8
Tree Crops (Excluding Fruits)										
Coconut	985	1,059	1,884	3,126	3,261	19.4	13.9	21.0	25.7	26.6
Coffee	10	30	54	102	150	0.2	0.4	0.6	1.0	1.2
Rubber	3	5	22	54	75	0.1	0.1	0.2	0.4	0.6
Cacao	4	7	8	5	17	0.1	0.1	0.1	0.0	0.1
Total	1,002	1,101	1,968	3,287	3,499	19.7	14.5	22.0	27.1	28.6
Major Fruits and Vegetables										
Banana	98	161	235	318	324	1.9	2.1	2.6	2.6	2.7
Pineapple	15	23	29	63	60	0.3	0.3	0.3	0.5	0.5
Mango	33	52	46	39	49	0.7	0.7	0.5	0.3	0.4
Citrus	17	23	21	25	29	0.3	0.3	0.2	0.2	0.2
Major Vegetables	20	81	63	69	64	0.4	1.1	0.7	0.6	0.5
Peanuts	21	24	33	55	55	0.4	0.3	0.4	0.5	0.4
Total	204	364	428	569	569	4.0	4.8	4.7	4.7	4.7
Root Crops	186	289	262	486	423	3.7	3.8	2.8	4.0	3.5
Sugar Cane	130	242	366	424	356	2.6	3.2	4.1	3.5	2.9
Other Crops	431	448	399	529	429	8.5	5.9	4.6	4.3	3.5
GRAND TOTAL	5,076	7,596	8,946	12,133	12,237	100.0	100.00	100.00	100.00	100.00

Sources: Statistical Yearbook, 1988. Data on irrigated rice are from various sources; the rainfed area is derived as a residual.

1.2 Past Performance

Since 1970, agricultural production in the Philippines has grown at an average rate of almost 4% per annum, or a little faster than GDP as a whole [4]. This performance has been good considering that the Government incentive structure was sharply biased against agriculture in favor of industry. Since 1982, agriculture has shown much more resilience than other sectors and was the only part of the economy which maintained some momentum of development during the economic crisis.

Increased agricultural production in the 1970's and early 1980's was facilitated by expansion of the total land available for cultivation and by increased cropping intensity, including irrigation. The scarcity of land now means that increased production must come from improved productivity, and that farmers must produce from smaller holdings due to increasing population densities - a fact which also constrains growth of rural per capita income and, thus, has an impact on rural poverty. (For example, between 1970 and 1984 rural population increased by 50% and agricultural employment increased by 36% but availability of freehold land increased by only 15% [4]). Such pressure on agricultural resources requires skilled management in order to prevent significant degradation. These issues are discussed further in Chapter 2 below.

Agricultural yields are generally low especially for rice and corn staples. Sustainable technologies appropriate to the Philippines do exist which can increase the productivity of existing agricultural systems, especially the less intensive ones. Commodity prices on international markets went from historically high levels in the 1970's to historically low levels in the mid 1980's. This has affected rural incomes, agricultural growth and agricultural diversification in the Philippines.

Smallholder farmers are the largest group of private sector entrepeneurs in the Philippines but government plays an important role in providing infrastructure and support services. It is probable that the agricultural sector would have performed better in the past if it had had more support from the government - especially in terms of research and extension support to small farmers.

1.3 Role of Agriculture in Future Growth of Economy

Role of Agriculture in 1987-92 Plan

The most recent six year plan [5] expects the agricultural sector to play a major role in the development of the economy between 1987 and 1992. Government macro-economic projections assume a 5.2% annual growth in agricultural value added and a 4.7% annual growth rate in agricultural employment. World Bank projections [4] expect a lower overall growth rate of 4% annual growth because of resource constraints (lack of land, lack of capital for inputs on marginal lands and inadequate infrastructure) as well as poor international commodity markets for traditional exports.

The implications of the structural growth of the economy assumed in the Plan give cause for concern, especially their likely impact on employment, incomes and poverty trends. The Plan projects that the proportion of the labor force employed in agriculture will increase by 4.7%. This would increase pressure on land and other natural resources and make it difficult to reduce rural poverty. For instance, agricultural income is likely to decline if agricultural employment increases by 4.7% and agricultural growth increases by only 4%.

Prospects for Accelerating Agricultural Development

Because of low world prices, partly because of international market forces and partly because of USA and EEC cereal export subsidies; rice, corn, coconut products, bananas, pineapples and other fruit and vegetable crops are not considered viable export products in the near future. Sugar prices, however, are increasing and so the Philippines may be able to increase sugar exports profitably. Forestry and fisheries are unlikely to contribute significantly to export income. The World Bank [4] believes that the best prospects for agricultural export growth is with tree crops. These crops can be produced in an environmentally sustainable way and are suitable for the uplands so they may offer some opportunities.

The key advantages that Philippine agriculture enjoys include low-cost labor; geographic proximity to significant agricultural markets (e.g. Singapore, Hong Kong, Taiwan, Malaysia, China); and a relatively well educated and industrious work force. There are opportunities for inter-

cropping in coconut plantations, intensifying rainfed cropping, and development of intensive, sustainable, polyculture in upland areas which would help reduce environmental degradation and alleviate rural poverty. A recent study by the International Food Policy Research Institute (IFPRI) [6], suggests that other export crops with potential in the Philippines include tobacco, garlic, onions and abaca (Manila Hemp - Musa textilis). However, achieving the World Bank's target 4% annual growth rate will depend on what happens to rice, corn and livestock production (especially pigs and poultry) since other crops have a small impact on the sector's overall performance.

One of the other ways to improve rural prosperity is to provide alternative employment strategies, in the industrial and service sectors, to relieve population pressure on land and reduce the number of people between whom rural value added must be shared. In this way the Government may realize its objective of increasing production while increasing the real income of poorer agriculture households.

Constraints to Further Growth

The future growth of Philippine agriculture is ultimately dependant on the preservation and sustainable use of the natural resource base upon which agricultural production relies. Unless land use strategies, in all sectors of the economy, ensure that natural resources are managed sustainably, the production base will decay further and exacerbate the already extreme pressures on agricultural resources. Key issues in this respect include watershed management, soil conservation, reforestation, land tenure, population control, and development of sustainable employment outside agriculture. Strategies addressing these issues are detailed in Chapter 3 below.

2.0 FACTORS AFFECTING AGRICULTURAL SUSTAINABILITY IN THE PHILIPPINES

2.1 Overview

Agricultural sustainability in the Philippines is affected by several interrelated factors of which population, land availability and tenure, and employment outside agriculture are the key issues. Related to these factors are land degradation, availability of credit and infrastructure for rural development, and influence of world prices and government policy on the economic environment in which farmers must operate, and public sector investment.

Rapid population growth is a major force in the increased use and degradation of the natural resource base in the Philippines. The upland areas have born the brunt of the population pressure as forest land was cleared and thus made available, unintentionally, to migrant farmers. Poor farming practices in these areas result in upland erosion which contributes to further degradation of lowland and near shore resources, increasing the pressure on the migratory push to the uplands, thus completing the vicious resource degradation - migration cycle (see Figure 2.1-1).

Lack of secure land tenure in upland areas means that upland farmers have no incentive to invest in sustainable land use strategies in the uplands. CSC's and CFL's have limited tenure value as they are not clearly heritable, renewable or transferable. Until tenure more secure than CSC's or Community Forestry Leases is available, many of the upland degradation problems will continue. Among the other significant constraints to upland rainfed farming are the general poverty of the population, lack of cash savings and lack of collateral for borrowing.

Farmers need technical support at the barangay and municipal level as well as a policy environment conducive to rural investment to encourage the adoption of sustainable agricultural production strategies. Related issues such as availability of infrastructure, access to markets and credit are integral to the profitable development of sustainable agriculture in the Philippines.

External issues which effect the development of sustainable agriculture include a need for community organization; a lack of road, market and communication infrastructure; a very expensive interisland transport system

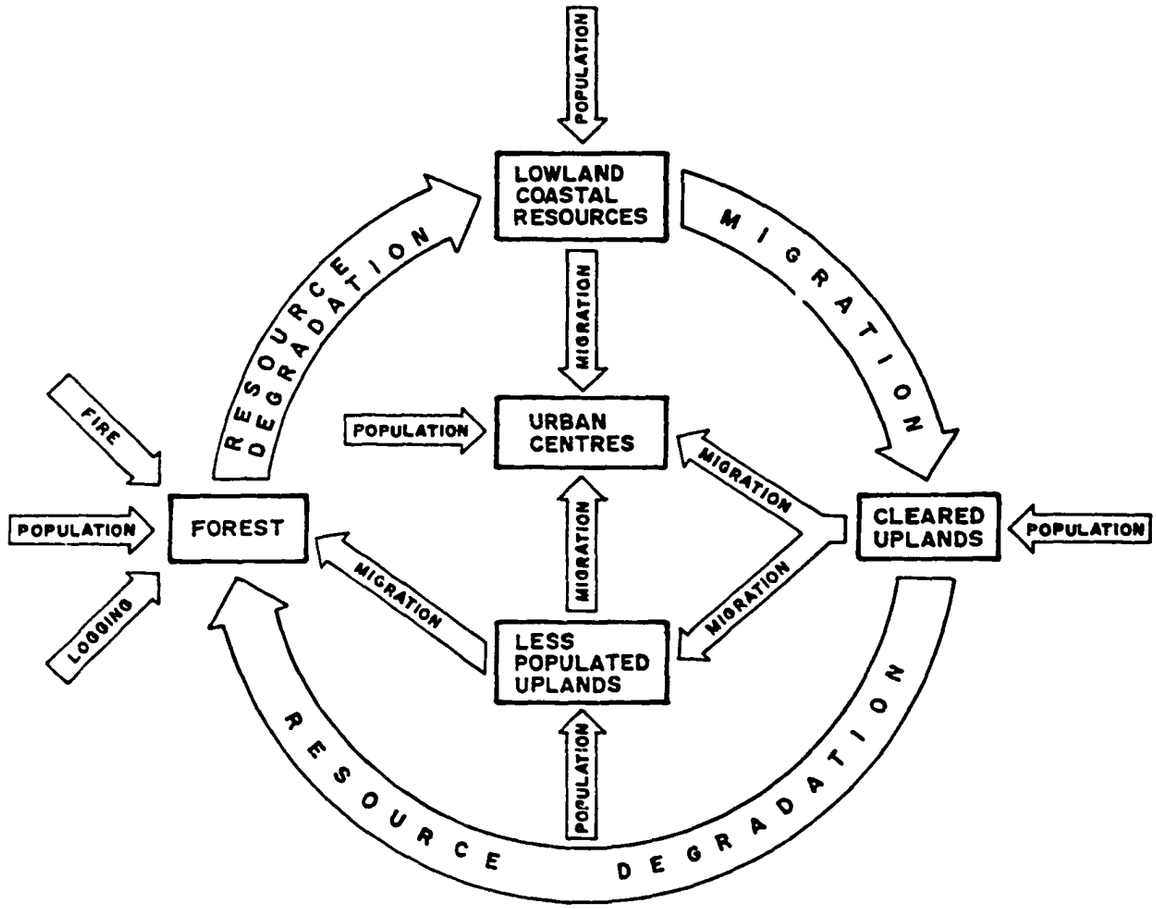

Figure 2.1-1

THE DEGRADATION - MIGRATION SPIRAL

which needs deregulating; and a lack of effective support mechanisms for smallholders in the field.

It should be remembered that in tropical areas ecological sustainability and soil conservation are a function of biomass. Nutrients are stored as biomass, especially vegetative biomass such as trees, rather than in soil resources. Cleared areas in the tropics thus have very low nutrient storing capacity and low soil nutrient levels are rapidly depleted by leaching and agriculture. Sustainable land use in the tropics relies on nutrient cycling and maximization of biomass.

2.2 Population

The 1987 population of the Philippines was estimated to be 61.5 million, increasing naturally at a 2.4% annual rate which, if maintained, would double population in less than 25 years [1]. A population census is planned for 1990 which should provide an indication of the actual population growth rate since the last census in 1980. About 60% of the 1987 population is considered rural.

Rapid population growth since 1945 resulted in the increased use and degradation of Philippine agricultural, forest land, and marine resources. This population pressure and the resulting diminution of unoccupied lowland arable land, as well as inequitable land distribution and landlessness creates a pressure for migration which is exacerbated by general impoverishment. The availability of semi-cleared land in the uplands, left by logging activities on public land where immigrants can create a better livelihood, has meant that the direction of migration is to the uplands, as well as urban areas. As a result, about 18 million people, almost one third of the population, live in upland areas, of which perhaps 8-10 million are farming on forest land [1]. Population pressure on land has brought about the impoverishment of a large part of the rural sector [2]. The farming systems employed by migrant shifting agriculturalists in the uplands are not sustainable and result in very high rates of erosion which effects lowland water resources and coastal ecosystems. The high population growth rate thus entails high social costs.

2.3 Land Availability and Tenure

In the Philippines about half the land is classified as Alienable and Disposable (A&D) which may be privately

owned, and about half is classified as public forest land. The latter classification may not be privately owned and is mostly land above 18% slope. With population growth, the availability of unowned A&D land has decreased to a point where many agriculturalists do not have access to land. This has led to the urban and upland migration described above. Although A&D land is a limited resource, owners do have security of tenure so long as their holdings conform to the Government policies implemented in the Comprehensive Agrarian Reform Program (CARP). In the upland Forest Lands, land users do not have security of tenure. In some cases, Pasture Leases, Certificates of Stewardship Contracts (CSC), and Community Forestry Leases (CFL) are issued which give the holders limited leasehold rights to land use but no security of tenure.

Upland farmers (both migrants and indigenes) who have no lease agreements substitute "free" land for labor and other agricultural inputs and adopt shifting agricultural practices. Where land availability is such that shifting agriculturalists can operate long fallows in each rotation it is likely that sustainable production is possible. However, because they lack secure tenure and titles, and land is a limited resource, shifting agriculturalists in the Philippines have no incentive for land improvement or nutrient maintenance. Nor do they have access to credit to procure such inputs. Until security of tenure, with enforceable conditions or covenants of title, is made available to upland farmers, land degradation will continue in the upland areas with its associated consequences for lowland and coastal natural resources, and continued migration in search of productive land. This issue is addressed in more detail in section 3.5.

If population growth continues, the pressure on arable land will increase until unsustainable population densities of more than 280 persons/km^2 exist in rural areas. Land tenure through secure titles with covenants is a tool available to the Government to try and manage the agricultural use of land. Without security of tenure natural resource degradation will continue, placing increasing pressure on urban areas as rural areas become unable to sustain their populations.

Studies show that where upland population densities are high (for example in Central and Western Visayas with densities of 280 and 167 persons/km^2 respectively [1]) significant outmigrations occur. Thus there is at present a population redistribution taking place with areas having large forest lands available for occupancy (such as Northern

Mindanao) attracting people from densely populated and, in most cases, degraded upland in other areas.

2.4 Land Degradation

Land degradation is a complex issue because it is inextricably related to population and poverty problems in the Philippines as well as the problem of unequal access to resources, especially land. The following are some of the major agricultural components of land degradation in the Philippines.

Forest and Fuelwood Harvesting

Until now, access to public forest resources in the Philippines has been underpriced, resulting in unsustainable harvesting of timber. The depletion of forest resources has been exacerbated by fuelwood harvesting. As forests are cleared, the open land and logging roads provide access to migrant shifting agriculturalists and others, whose land use strategies cause rapid degradation of soil and nutrient resources.

In the upstream areas of watersheds, erosion leads to direct loss of soil and nutrients, abandonment of cultivation, and compensatory conversion of further forest land to cultivation. Downstream, erosion contributes to siltation of water courses and dams, increasing costs of irrigation systems (higher maintenance costs, lower life expectancy of capital works) and deterioration of coastal ecosystems.

Fuelwood is thought to account for 70% of all wood used in the Philippines and about one third of all commercial or non-commercial energy consumed (or roughly equivalent to total oil consumption) [1]. In the face of declining forest resources, meeting future fuelwood needs sustainably is a considerable challenge.

Key issues to be addressed include sustainable timber and fuelwood production, pricing of fuelwood and its alternatives, Government rental charges for forestry concessions and the role of the private sector in reforestation programmes.

Some strategies for addressing these problems are outlined in section 3.7 below and in Annex A.

Intensive Irrigation

The development of irrigation infrastructure in the Philippines during the last two decades has been impressive [4]. In 1968 the irrigated area was approximately 702,000 ha. This expanded to about 1.5 million ha today, most of which is planted to rice. Irrigated production enabled the Philippines to achieve self sufficiency in rice, the nation's staple food commodity. Per capita consumption of rice is about 95 kg annually, which is low compared with other Asian countries such as Thailand (207 kg) and Indonesia (170 kg) [1].

Irrigation in the Philippines is generally categorized into three systems: National Systems are reservoir or river gravity fed schemes maintained and operated by the National Irrigation Administration (NIA); Communal Systems are small gravity, mostly river systems owned and operated by farmers; and Pump Systems which may be publicly or privately owned systems taking water from rivers with pumps. Table 2.4-1 below outlines the status of irrigation development as of 1986.

Economic internal rates of return (IRR) for investments in rehabilitation of irrigated agriculture are very sensitive to declines in cropping intensity. For example, a 10% decline in the wet and dry season irrigated area reduce the IRR for rehabilitation to 10% with export parity pricing. Investments in new irrigation works are more sensitive to declines in yield and rice prices [4]. The economic analysis of investment in new systems indicated that communal systems have the best net returns in general [6]. Both these scenarios mean that the agricultural sustainability of irrigated systems has an important influence on the economic viability of the systems. The current NIA development plan concentrates on investment in rehabilitation and management of existing irrigation areas. It is unlikely, therefore, that new irrigation schemes will be initiated in the medium term.

Tables 2.4-2 and 2.4-3 below respectively outline projected rice demand and supply to 2000 [4]. These data are, again, very sensitive to yield and area projections placing added importance on the sustainability of irrigated systems. If yields or irrigable area decline, the Philippines may no longer be self sufficient for rice.

Current irrigated rice production relies heavily on intensive monocultures and high levels of fertilizer and chemical inputs (see section 3.4). These maintain yields at

Table 2.4-1 Status of Irrigation Development, 1986

Region	Potential irrigable area (ha)	National	Communal	Pumps	Total	% Irrigation Development
1	309,810	46,082	130,149	5,520	181,751	58.67
2	539,710	142,939	82,134	36,593	261,666	48.48
3	482,220	173,181	87,017	22,946	283,144	58.72
4	263,590	52,568	63,506	27,948	144,022	54.64
5	239,650	16,209	76,195	16,943	109,065	45.51
6	197,250	53,461	29,309	21,677	104,447	52.95
7	50,740	-	16,660	2,481	19,141	37.72
8	84,380	16,860	41,232	2,176	60,268	71.42
9	76,500	12,449	19,999	2,804	35,252	46.08
10	230,150	20,108	44,426	2,045	66,579	28.93
11	290,250	34,711	57,950	6,872	99,533	34.29
12	362,080	26,691	61,432	4,123	92,246	25.48
Total	3,126,330	595,259	710,009	152,128	1,457,396	46.62

Source: World Bank. 1987. Agricultural Sector Strategy Review

Table 2.4-2 Rice Demand Projections 1985-2000 - (Base Case)

	1986	1990	1995	2000
Population Growth /a	2.9	2.6	2.4	2.2
Population (millions)	56.1	62.2	70.0	78.0
National Income Growth /a	--	5.1	5.5	5.5
Per Capita Income Growth /a	--	2.5	3.1	3.3
Income Elasticity of Demand	0.1	0.1	0.1	0.1
Per Capita Rice Consumption Growth (% p.a.)	--	0.25	0.31	0.33
Per Capita Rice Consumption (kg)	94	95	97	98
Total Rice Consumption (1000 MT)	5,273	5,917	6,766	7,669

/a % p.a. over the past five years.

Source: World Bank. 1987. Agricultural Sector Strategy Review

a level which enables farmers to repay their borrowings for inputs and irrigation costs and which provides the returns necessary to justify Government investment in public irrigation schemes. Monocultures are ecologically unnatural and unsustainable because of their lack of diversity and susceptability to pest outbreaks and other perturbations. Data from IRRI suggest that, when poorly managed, such systems are economically unsustainable also. For instance in the Philippines since the introduction of the "Green Revolution", the area of double cropped rice has increased by 150%, the yield of rice has increased by 50% but farm incomes have declined by 50%.

Irrigated rice culture relies on soil puddling to reduce water consumption and this destroys soil profiles and makes future rainfed cropping on the same site difficult. Poorly managed use of soluble fertilizers and broad spectrum pesticides causes eutrofication of surface water supplies and unbalancing pest predator relationships in the crop environment respectively. Longer term, detrimental environmental effects also occur. Unfortunately, intensive irrigated agriculture is necessary in order to feed dense concentrations of population. However, the long term productivity of such systems can only be ensured with sustainable management practices designed to maintain soil productivity and the health of the crop environment. Such practices include crop rotation, use of resistant cultivars, integrated pest management, and use of mineral fertilizers.

Key issues to be addressed include crop rotations, intensification of rainfed cropping with mixed cropping, integrated pest management and use of mineral fertilizers. Some strategies for addressing these problems are outlined in Section 3.4 below.

Upland Shifting Agriculture

Aside from the impact of logging, deforestation in the uplands and associated environmental degradation are mainly due to recent migration of large numbers of lowland farmers displaced by shortages of arable land and degradation of lowland natural resources. If population and land degradation pressures continue, there will be a gradual distribution of the affected population to unoccupied or less densely occupied upland areas, and urban centers. If upland resources are not carefully managed, the resulting degradation will increase the migratory push to urban centers, placing extreme pressure on already overexploited urban resources.

Table 2.4-3 Rice Supply Projections 1986-2000 (Base Case)

	1986	1990	1995	2000
Area (1,000 ha)				
Irrigated WS	1,141	1,335	1,596	1,665
DS	772	895	1,050	1,123
Lowland Rainfed /a	1,264	1,070	850	740
Upland Rainfed	156	156	156	156
Yield (MT/ha)				
Irrigated WS	3.3	3.5	3.7	3.9
DS	3.4	3.6	3.8	4.0
Lowland Rainfed	1.9	2.0	2.1	2.1
Upland Rainfed	1.0	1.1	1.1	1.2
Production (1,000 MT)	9,139	10,230	11,764	12,720
Less:				
Seed, Feed, Waste (10.5%)	959	1,074	1,235	1,336
Palay available for Consumption	8,180	9,156	10,529	11,385
Milling Recovery Ratio	0.66	0.66	0.66	0.67
Total Rice Supply	5,399	6,043	6,949	7,628
Total Rice Demand (from Table 2.4-2)	5,273	5,917	6,766	7,669
Surplus/Deficit (1,000 MT)	126	126	183	-41

/a Does not take into account possible improvements in rainfed cropping intensity

Source: World Bank. 1987. Agricultural Sector Strategy Review

As outlined above, degradation of the uplands has a direct impact on the sustainable use of lowland and coastal resources. It is thus the upland areas which require the most urgent attention in order to break the natural resource degradation part of the degradation - migration spiral (see Figure 2.1-1). The other part of the spiral which needs urgent attention is the growth in population.

The key issues to address include soil erosion, watershed management, sustainable productivity and income generation, security of land tenure and provision of credit and extension services to upland farmers.

Some strategies for addressing these problems are outlined in section 3.5 below.

Mangrove Clearing

The decline in the mangrove area can be attributed to the harvesting of mangroves for charcoal and fuelwood production, followed by clearing for fishpond establishment. Unsustainable harvesting of mangrove contributes to soil erosion and reduces the buffer effect which protects coastal reefs and lagoons from the full consequences of silt loads in water courses originating in eroding upland watersheds. This may produce changes in inter-tidal soil composition for example replacement of muddy - clay mangrove soils with sandy coastal soils, making regeneration difficult. [1]. Mangroves are resilient plants which respond quickly to rehabilitation or replanting. Sustainable management practices are proven in the Philippines and should be more widely adopted. The best incentive to encourage adoption is security of tenure or usufruct rights over mangrove areas.

The impact of mangrove degradation on coastal ecosystems and the fishing industry are discussed in Annex C. Some strategies for addressing these problems are outlined in Section 3.2 below.

Upland Livestock Ranching

Pasture Leases are issued for some areas of public Forest Land in the uplands. The leases usually relate to deforested land which has been colonized by rough, unpalatable grasses of which cogon (*Imperata cylindrica*) and bagocboc (*Themeda triandra*) are the most common species in the Philippines. These grasses provide some protection to

soil but their thick topsoil rootmat inhibits rainfall infiltration and thus increases runoff during rainfall.

Rough grasses such as cogon have low nutritive value for livestock and have a carrying capacity lower than 0.25 Tropical Livestock Unit (TLU) per hectare (about 0.3 cattle/ha). Cogon's nutritive value declines rapidly after early growth and becomes unsuitable for grazing, so stockmen burn the cogon pastures towards the end of the dry season to encourage early growth when the rains come. These fires frequently get out of control and enter forest and regrowth areas. They also kill off any coppice or seedling regrowth in the cogon grassland. Most importantly, dry season burning exposes the soil to water erosion once the rains start. These grazing practices are, therefore, unsustainable and should be banned immediately. Cattle production from the uplands is of minor importance to the Philippines agricultural economy and the social cost of the fires and erosion from burnt areas greatly exceeds the benefits of livestock production in this manner. (For example, 3 ha per 1 cow valued at US$200 to the farmer versus soil loss estimated at 100t per ha. per year or 300t/cow area with social cost estimated at $150/cow area in annual nutrient loss costs alone [1]. No allowance has been made for downstream losses due to silting of dams, degradation of coastal ecosystems etc.)

Sustainable alternatives to extensive grazing of livestock on upland grasslands are suggested in Section 3.6 below.

2.5 Credit

Institutional credit for agriculture is offered by a variety of government and privately owned entities whose lending operations often have well defined emphasis in terms of loan amount (large or small loans), duration (long or short term), recipients (commercial operations, agrarian reform beneficiaries, etc.), commodities (sugar, coconut etc.) and activity (production, marketing or processing). Noninstitutional credit is offered by private moneylenders, traders, relatives, friends and landlords. It tends to be short term, often requiring no collateral but at interest rates higher than those for institutional credit. [4].

Rural Banks, of which there are more than 1000 in the Philippines, are the most important component of the rural financial market. However, many of these banks are experiencing financial difficulty and the survival of many

is in doubt. In 1987, the government consolidated all government run loan funds into a single fund - the Consolidated Agricultural Loan Fund. A lack of collateral has kept most smallholders out of the formal credit system, meaning that they either avoid capital driven development or become indebted to informal lenders as a result of high interest rates. Secure titles would overcome the collateral problem. Extension and training coupled with community organization could help promote appropriate packages for smallholder investment.

The private sector provides smallholders with credit to produce raw materials required for their processing enterprises. For example, the San Miguel Corporation provides credit to smallholders to help them establish fruit (mango, passionfruit, citrus) orchards and at the same time guarantees the producers a market for their produce. Repayments are deducted from grower returns once plantation production commences. San Miguel and Pure Foods have similar schemes for poultry production. The Paper Industries Corporation of the Philippines (PICOP) uses similar techniques with smallholder outgrowers supplying their pulp and timber mills at Bislig, Mindanao. The Nestle Company operates a similar scheme for smallholders producing soybeans. This outgrower model is well proven in the Philippines - with a product user organizing smallholders, supplying inputs (seeds, fertilizer, technical assistance), credit where necessary, and providing a market for products.

The Land Bank of the Philippines is also helping provide credit to smallholders. With Land Bank support, a number of commodity exporters/processors (e.g. onions, peanuts, squash) are providing credit to smallholders in order to overcome supply problems which are limiting their business. For example, Best Foods is having to import peanuts and cucumbers to overcome domestic supply deficiencies for their peanut product and pickle enterprises respectively. Making credit available through producer groups or processors helps reduce loan administration costs and, thus, minimizes the cost of credit to smallholders. The Land Bank has also been instrumental in organizing cooperatives and other community organizations to manage credit and take advantage of economies of scale. Examples are the United Cotton Growers of Mindanao, the Lucban Federation of Farmers Association (Passion Fruit Development), and the Virginia Tobacco Credit Cooperative of Ilocos Norte. The Land Bank also plays a key role in the DA's Livelihood Enhancement for Agricultural Development (LEAD) Program.

Effective credit mechanisms are an important component of agricultural development in the Philippines. If smallholders have security of tenure and access to reasonably priced credit, they are able to invest in technical packages which are financially attractive to them and economically attractive to the Philippines. In order to provide the incentives that are required to mobilize these resources in an optimal way, Government policy should be conducive to sustainable agricultural investment and technical support should be forthcoming from the Departments of Agriculture and Environment and Natural Resources.

2.6 International Markets

The performance of the agricultural sector since 1970 has been affected by international price fluctuations. The five major commodities grown in the Philippines (rice, corn, coconuts, sugar and bananas) have all suffered major international price declines. After accounting for other factors such as climate, domestic policy and infrastructure, it appears that world market price movements had a pronounced influence on agricultural performance, either directly as in the case of major export crops, or more indirectly as in the case of grains. On the positive side, it is likely that some of the progress in diversifying the agriculture sector was linked to these trends in the prices of traditional products.

The Philippines has comparative advantages in the domestic production of rice and corn as import substitutes at current world prices [7]. If international rice and corn prices rise further, however, the domestic resource cost of domestic production of these commodities will decrease, providing an opportunity for export if domestic production remains efficient. Soybeans and cotton are highly protected in the Philippines but the effects of this protection, on a very small sector of production, is in fact a tax on livestock production and textile industries respectively.

Crops with high export potential based on world prices, financial net farm income and domestic resource cost criteria include tobacco, garlic, onions and abaca.[6]. Stringbeans, snowpeas, tomatoes, watermelon, turnips and pineapple also demonstrate high net financial profits on farm.

The World Bank expects international sugar prices to remain buoyant for the next 3-4 seasons and there are opportunities for sugar producers in Philippines to increase sustainable production.

Tree crops products (cocoa, coffee, coconut, oilpalm, rubber) are very sensitive to international price fluctuations and exchange rate changes because of small domestic demand. Oilpalm, coconut oil and rubber prices are expected to remain buoyant and present opportunities for agroforestry and mixed farming enterprises for smallholders as long as collection and processing components are organized. Domestic fuelwood and other small-timber products such as charcoal, building panels and poles are not affected by international prices but the price of alternatives will have an affect if domestic supply declines due to natural resource depletion.

2.7 Private Sector Investment

Agricultural production in the Philippines is almost entirely in the hands of the private sector. Some large private sector corporations such as San Miguel and Best Foods, as well as parastatals such as PICOP actively develop relationships with smallholders to supply products to meet the raw material needs of their agro-industries. Smallholder farmers are the largest group of private sector entrepeneurs in the Philippines.

The private sector in the Philippines is very reactive to economic signals - both incentives and disincentives, as evidenced by rapid changes in crop production to changing prices or input costs. For instance, the rice production model prepared by IFPRI [6] as part of an ADB food policy study, indicates that rice production is very sensitive to changes in price. If rice prices remain constant at about 20% above 1985/86 world prices, moderate increases in imports (400,000 tons by year 2000) are required to meet demand [6]. An additional 20% support to domestic prices results in substantial exportable surpluses of rice, according to the IFPRI model, which would be expensive to dispose of on international markets. In addition, artificially high cereal prices effectively tax growth in livestock production. By comparison, the model predicts that large changes in fertilizer prices have a very small impact (less than 5%) on total rice or corn production. Thus, government investment in infrastructure and research is more likely to return reasonable returns through stimulated private sector activity, than subsidizing certain inputs.

The IFPRI suggests that aggregate production growth rate for the base scenario of the rice, corn and livestock subsectors combined is less than 3%. The aggregate growth rate that these somewhat optimistic assumptions generate is probably not sufficient to lead economic recovery. It is only through more rapid rates of technological change that a higher aggregate growth rate can be achieved.[6]

The private sector will further invest in agriculture so long as the economic environment is attractive to do so. The dilema is to maintain prices of rice and corn at levels which attract further private investment but do not weaken domestic demand. Allowing domestic cereal prices to fall as rapid productivity increases (created by earlier investment at higher prices) outstrip population and income growth provides a means for tapping latent domestic demand [6]. Increasing world rice and corn prices would destroy the effectiveness of such an approach and create problems for domestic consumers because of higher prices.

2.8 Public Sector Investment

The government plays an important role in providing infrastructure and support services and has a major role in helping to unlock the potential of smallholder agriculture. The Philippines agricultural sector would have performed better in the past, and could be better placed to perform well in the future, had it received more support from government in the past [4].

Apart from the policy environment, three aspects of government support have affected previous agricultural performance. First, until recently the share of resources going to agriculture has tended to fall in real terms, with adverse consequences for new investments, the provision of farm related services, and the level of expenditure for operation and maintenance. Second, the allocation of resources within the sector has not always been effective - for example, important programs in agrarian reform and research and rural infrastructure have been underfunded in the past.[4] Public sector investment in agriculture in the past has been strongly biased towards irrigated rice and corn production. By focusing on these two areas in the most favored regions, the majority of farmers received little or no benefits while a few received substantial benefits. Table 2.8-1 shows research fund allocation in relation to crop importance.

Table 2.8-1 Research Fund Allocation in Relation to Crop Importance

	Area		Production		Value		Research budget allocation		Indicative /b research budget to crop value ratio
	1985	1986	1985	1986	1985	1986	1986	1987	
	---('000 ha)--		('000 tonnes)		(P million)		---(P'000)----		
Rice (Palay)	3,222	3,403	8,200	9,097	24,969	27,983	11,006	8,229	0.36
Corn	3,315	3,545	3,439	3,922	9,543	9,842	1,833	2,595	0.22
Coconut	3,275	3,261	2,964	3,162	12,629	4,496	8,611	14,305	1.33
Root Crops	422	423	2,453	2,668	3,430	3,916	11,456	13,216	3.35
Sugarcane	407	356	2,748	2,135	9,278	7,663	195	3,193	0.19
Banana	328	330	3,698	3,820	4,255	4,885	582	42	0.06
Abaca	169	162	84	83	680	441	3,317	992	3.84
Coffee	145	148	133	137	3,590	3,882	540	826	0.18
Vegetables	134	137	760	790	3,397	3,695	4,442	4,780	1.30
Rubber	72	75	146	154	786	499	283	671	0.71
Pineapple	54	60	1,449	1,601	2,182	3,424	99	104	0.03
Tobacco	51	57	47	55	714	763	2,921	16,323	13.02
Beans and peas	51	50	41	38	421	407	8,145/a	7,917/a	9.77
Groundnuts	50	50	45	44	384	431	-	-	
Mango	45	49	384	296	3,109	2,995	764	308	0.17
Citrus	25	26	123	132	548	619	-	-	-
Cacao	13	15	5	6	162	189	398	264	1.88
Cotton	5	4	6	4	38	28	609	1,961	3.89

/a Includes vegetable legumes and groundnuts.
/b Simple averages of 1986 and 1987 research budget allocation (P'000) to Average Crop Values (P million).
Source: World Bank. 1987. Agricultural Sector Strategy Review

Public sector investment is necessary to create an economic environment which provides incentives for private sector investment in agricultural and rural based enterprises. Infrastructure and institutional support, access to credit and security of tenure are some of the issues which need to be addressed in order to create an attractive investment environment. In the current medium term plan [5], the government's objective is to increase production while increasing the real income of poorer agricultural households. Regional holistic rather commodity specific projects are now favored. Some strategies for addressing these problems are outlined in Annex E.

2.9 Alternative Sources of Employment

One of the ways to reduce the increasing demand for finite natural resources (perhaps decreasing natural resources if degradation and possible effects of global warming are taken into account) is to create alternative sources of livelihood outside agriculture. There are many alternative sources of livelihood available in urban areas, and this has contributed to urban migration and its related problems. The challenge is to find sustainable livelihood systems which are based in rural areas and which, ideally, add value to primary products. In this way wealth is generated and retained in rural areas.

There are a number of examples of such livelihood systems in the Philippines. Rattan furniture, tourism, various cottage industries, and processing industries are examples. In order that these enterprises be sustainable it is important that, amongst other things, the raw materials be sustainably produced or harvested. For example, it appears that rattan furniture production, which earned almost US$60 million in export income in 1985 and directly employs over 10,000 workers [9], is exploiting a diminishing rattan resource. Already, a lack of adequate and reliable supply of rattan poles (*Calamos* spp. and *Daemonorops* spp.) has caused some manufacturers to operate below their capacity and resulted in their not being able to meet market commitments. The Indonesian rattan industry, with a larger natural rattan resource to exploit than the Philippines, is rapidly replacing some Philippine producers in the international market. Some Cebuana rattan specialists have been recruited by Indonesian rattan industry companies. The forthcoming ADB rattan study will provide details of the current state of the industry.

Rattan can be grown as a plantation crop and experimental plantations have been established successfully by the Ecosystems Research and Development Bureau (ERDB) and at Surigao del Sur by PICOP-NDCPI. Sustainable development of non-timber forest products such as rattan is discussed further in Annex A.

Other sustainable, non agricultural, rural livelihoods capable of further development include managed charcoal production; bamboo products manufacture - in particular building panels and utility products such as baskets; nurseries; and honey production.

World Bank analysis [4] suggests that if growth in non agricultural sectors can increase by 8.3%, compared with the estimated growth of almost 7% between 1987 and 1992 [7], it would be possible to slightly increase value added per worker in agriculture in real terms, while simultaneously reducing unemployment. It is clear that an acceleration in the production and employment generated by the industrial and service sectors would do more than anything else to increase farm incomes and reduce rural poverty [4]. To be sustainable, such developments should be economically viable, rurally based rather than urban based, and dependant on raw materials which are sustainably produced.

3.0 SUSTAINABILITY OF PHILIPPINE AGRICULTURE

In essence agricultural development implies a necessary threat to ecological succession, in which costly energy subsidies replace natural processes. Sustainability, in this primary sense, is not only endangered by ecologically unwise agricultural practices, it is endangered by all agriculture [10]. Given the reality that the Philippines must feed and finance a growing population, the development goal should be to increase production in a sustainable way. Sustainability refers to the use of renewable natural resources in such a way that economic and product yields do not decline with continued utilization of the resource and that sufficient resilience is left in the resource to withstand both continued use and economic or environmental perturbations. Because Philippine agriculture is largely undertaken by private smallholders, many of whom are very poor, it is essential that sustainability be considered in economic as well as environmental terms. Unless natural resource management strategies include incentives for desirable environmental behavior by agricultural smallholders, there will be very little progress towards sustainable agricultural development without significant external support in the form of grants and subsidies - neither of which are economically sustainable in the long term.

The following sections briefly examine the sustainability of current terrestrial natural resource use in the Philippines and suggests alternative strategies where appropriate.

3.1 Overview

Much of the more productive components of Philippine agriculture are based on economically and environmentally unsustainable systems. The evidence for this is quite tangible in the form of increasing rural poverty and land degradation. However, in the last 10 years the Philippine Government and the bilateral and multilateral agencies have implemented a number of programs to try to improve the unsustainable aspects of Philippine agriculture. Most of the technologies needed to increase local agricultural sustainability are already known in the Philippines and many of these have been adapted to local conditions.

The resilience of mangrove and near shore areas is demonstrated by their quick response to replanting and reha-

bilitation which, with sustainable management, creates livelihoods for many coastal communities. Tree crops plantations, especially coconuts but also rubber and oil palm, are generally sustainably managed but their productivity could be sustainably increased with intensification of management by inter-cropping and integration of livestock and leguminous pastures into the system.

Rainfed farming systems, both upland and lowland, are generally unsustainable with less than optional productivity. For example, upland areas are eroding significantly and soils are losing nutrients, while lowland areas are economically fragile, especially plantations, and yields are particularly low. More productive, sustainable systems have been successfully demonstrated on some projects in the Philippines as well as in localized indigenous systems throughout Southeast Asia including the Philippines. The promotion by extension & training of smallholder polycultures including ITP, agroforestry, livestock, cereal production and vegetables is desirable. The exact mixture of species and systems will depend on social and environmental circumstances in each area. The important thing to promote is the concept of sustainable polyculture including soil and water conservation techniques. Secure land tenure must be an integral part of any agricultural development on rainfed farms.

Irrigated rice production is the most intensive agricultural land use system in the Philippines and is unsustainable economically and environmentally in its conventional form. The rapid adoption and significant success of integrated pest management (IPM) in Philippines and other Asian countries is a very important development in the sustainability of intensive irrigated rice production.

The current use of upland grasslands is unsustainable. Pasture Lease conversion to alternative land uses such as ITP, forest regeneration and sustainable rainfed farming is more appropriate. Upland tree plantations are an important component of a sustainable land use strategy for upland grasslands.

The development of more sustainable agricultural systems in the Philippines will be achieved through providing private farmers with incentives which encourage them to adopt such systems. The economic sustainability of ecologically sound agricultural systems relies on strong barangay and municipal level technical and credit support to farmers, availability of efficient infrastructure and a

macroeconomic policy environment which is conducive to private investment in sustainable agriculture.

3.2 Mangroves

The area of quality mangrove ecosystem in the Philippines has decreased from about 450,000 ha in 1918 to about 149,000 ha in 1988 [1, 3]. Such significant reduction of the mangrove area because of fishpond construction and unsustainable harvesting could have been avoided if more sustainable mangrove utilization strategies had been used. According to the SPOT survey [3], about 95% of the 205,000 ha of present fishpond area was derived from mangrove. World Bank estimates [1] suggest that the sustainable management of 1 ha of mature mangrove could provide a person with 12 months livelihood/year compared with only one month livelihood/year for 1 ha of poorly managed fish ponds on the same site.

Mangroves are relatively easy to replant and manage although young propagules are susceptible to competition by invasive ferns (Acrostichyum sp.), problems caused by attaching organisms such as oysters and barnacles, and destruction by some crab species. Replanting should include a mixture of native species with a bias towards the more economically valuable types such as Rhizophora mucronata (bakawan) and Sonneratia caseolaris (pagatpat). Current replanting efforts tend to concentrate on monocultures of the former species and it is arguable that some species mixture, say 80% Rhizophora and 20% Sonneratia, would be more sustainable. This is a minor point, however, compared to the need to encourage further replanting of mangroves.

Because sustainably managed fishponds in mangrove areas are likely to produce more fish/ha than pure mangrove, it seems unlikely that reconversion of sustainable fishponds to mangrove would have a major positive impact on coastal fisheries [1]. For example, World Bank estimates suggest 1 ha of mangroves would sustainably yield 100kg fish p.a. directly and 400kg fish p.a. indirectly as well as about 70 kg crustacean p.a. directly. This compares with a sustainably managed fish pond production of about 2,000 kg p.a.

Thus a sustainable mangrove area management strategy is to:

- Rehabilitate and improve management of existing sustainable fishponds;

- Replant unsustainable fishponds with mangrove to be managed for sustainable yields of mangrove and marine products;

- Manage existing mangrove for sustainable wood and marine product harvests where they are already exploited; and,

- Preserve selected virgin mangrove for biodiversity conservation and fisheries replenishment purposes with minimal human interference.

3.3 Lowland Plantations and Rainfed Farms

Most lowland farming areas (here assumed to be farms on land below the 18% slope line) in the Philippines are rainfed, relying largely on perennial species for dry season production.

Lowland Plantations

The Philippines is the world's largest producer and exporter of coconut products. Coconut production, often from plantations, is an important component of lowland agriculture with about a third of total farmland area planted to this crop.

Recent declines in world prices for copra and coconut oil have induced most coconut producers to reduce inputs with consequent reductions in yield. There is a need to increase productivity through diversification and intensification by intercropping with animals and perennials. Where plantations are owned and managed by smallholders, much diversification has already taken place. But where tenant smallholders manage plantations owned by others, there is little incentive for diversification. This is likely to change as agrarian reform transfers title to smallholders and restores the incentive for diversification.

While conventional coconut plantation production is reasonably sustainable, there are a number of strategies, which could increase area productivity and smallholder income, which are more sustainable. For example Leguminous pastures and forage plants (*Pueraria phaseoloides*, *Centrosema pubescens*, *Stylosanthes guanensis*, *Glycine javanica* and *Cajanus cajan*, etc.) could be planted beneath palms and grazed by tethered cattle, goats or pigs. The livestock/legume understory contributes significantly to

soil fertility and produces meat and other livestock products. It is estimated that one cow, 6 pigs or 6 goats could be sustainably carried under each hectare of improved plantation with an incremental net income to the smallholder of about ₱1,500-2,000/ha/year.

Alternatively, other tree crops such as cocoa or coffee could be grown where soils were appropriate; or annual crops such as vegetables or pepper could be grown. If soil type and water availability were adequate, certain citrus species (such as Kalamansi - Citrus mandurensis) could also be grown under the coconut palms. In any case, there are opportunities for coconut plantation owners to broaden their production and income base by intercropping or integrating livestock with the coconut palms. By becoming less dependant on world coconut commodity markets for their income they will become economically sustainable. The exact technical strategy adopted will depend on local markets, personal preference and local conditions, but there are a host of more sustainable strategies than poor grasses under palms. These are equally applicable to other tree crop plantations such as oilpalm or rubber.

Sugar used to be a major plantation crop in the Philippines accounting for an average of 12% of the total value of merchandise exports between 1973 and 1982. However, world sugar prices dropped sharply in 1984 and the Philippines could not export sugar profitably at the prices which prevailed between 1984 and 1987. Accordingly, the sugar sector has adjusted abruptly and this has entailed high economic and social costs. Serious unemployment, disuse of some sugar land, sugar mills operating well below capacity, and crop loan arrears are some of the problems now facing the sugar sector. Sugar prices have risen in 1988 and 1989 and there are signs that the sugar market will remain buoyant until about 1993 [8]. Thus, increased sugar production is conceivable in the Philippines.

There are many sustainable sugar intercropping systems which have been successfully trialled in the Philippines, the most successful incorporating long term rotations and strip cropping with leguminous annuals or green manure crops of economic value. Examples of such systems are available from the DA and PCCARD [14].

Sustainable plantation management strategies include:

- Intensification of tree crop plantations by interplanting and full utilization of the special environment beneath the plantation canopy

- Use of integrated pest management strategies including biological control of rhinoceros beetle (Oryctes rhinoceros), in young coconut plantations, with green muscardine fungus and control of various lepidopteran pests with Bacillus thuringiensis where necessary;

- Rotational cropping of sugar (a four cycle system is best with new planting, first rattoon, second rattoon, leguminous crop/pasture areas rotating) on large areas and intercropping of sugar with other row crops on smallholdings; and,

- Adoption of similar techniques for other tree crops plantations such as for oilpalm and rubber.

Rainfed Farms

Rainfed lowland farms are often small and intensively cultivated because of population pressure and the longer history of lowland cultivation. Most farmers produce cereals (principally rice and corn) and vegetables during the wet season and rely on perennials and stored cereals for subsistance during the dry season. Surplus vegetables, fruits and animal products are sold in local markets. Lowland farms often use carabao for draft power and may pool labor resources during times of community labor shortage such as planting and harvesting time. Many lowland farms are not as intensively or creatively cultivated as sustainably possible. There are many reasons for this but shortage of capital and inputs are not normally given as reasons by farmers who are more restrained by time and technical constraints. Thus there would seem to be opportunities to demonstrate appropriate sustainable strategies to communities where such techniques are not already widely used. The principle components of sustainable rainfed lowland smallholder farming are similar to those of smallholder farmers in the uplands. Spatial and temporal mixtures of species, plant forms (herbs, shrubs, trees), and plant uses (forage, cereal, vegetable, utility, fruit or fibre) should be considered. In this way maximum use is made of three dimensional space, both above ground and in the root zone. Such diversity is sustainable ecologically and economically. Choice of species and management practices will depend on agro-climatic factors, markets and tradition, but successful garden polycultures are common in the Philippines and other Asian countries so extension and demonstration is not difficult. Credit or assistance may be required for new inputs (seedlings, tools, trellis

materials) but chemical fertilizer and pesticides should not be needed in well planned and managed systems. Examples from the Philippines [15, 16], Indonesia [17], Bangladesh [18], and Sri Lanka [19] demonstrate the success of such strategies.

Polyculture gardens, woodlots and integrated livestock systems should be encouraged throughout the Philippines. Access to technical support, credit, markets and planting material is essential to success and there are opportunities for both the private and the public sector to contribute to these needs. The intensification of lowland rainfed farming in the Philippines could contribute significantly to the task of maintaining self sufficiency for a growing population. The presence of reasonable infrastructure in the lowlands should increase the incentives for farmers to adopt intensified sustainable production technologies there.

Lowland rainfed farming in the tropics can be successfully carried out in a sustainable way and this should be the objective of Government of Philippines lowland agricultural programs.

Sustainable development strategies for lowland rainfed farms should include:

- Training of farmers and DA/DENR technical staff to promote intensive sustainable smallholder polycultures;
- Community organization to develop support networks at the barangay level for credit management, input purchase and product marketing;
- Provision of new inputs such as planting materials, mineral fertilizers and special tools;
- Promotion of linkages between smallholder groups and agro-industries such as fruit juice processors, fruit dryers, furniture component manufacturers, bamboo processors and fibre makers; and,
- Development of direct linkages between smallholder groups and produce markets to minimize the market chain and maximize returns to smallholders.

3.4 Lowland Irrigated Farms

In 1986, nearly 1.5 million hectares or about 12% of the agricultural land in the Philippines was irrigated, almost all of it for rice production. Intensive rice production is a vital component in Philippines agriculture. Improved technology and the use of high yielding varieties of rice have strengthened the agricultural sector's economic importance by increasing yields and, for a time, even making the country rice self sufficient. Improved crop production has also resulted from improved pest management practices.

Irrigated farms in the Philippines use disproportionately high levels of fertilizer and pesticide inputs to maintain high yields in what amounts to an almost continuous monoculture. Forty six percent of all insecticides used in the Philippines are applied to rice [12], mostly to irrigated crops. There is much evidence that application of broad spectrum organo-phosphates reduce rice yields and destabilize the agro-ecosystem [23,24]. There also is increasing evidence that use of these chemicals has a significant impact on poor health amongst rice farmers [13].

There are more sustainable irrigated cereal production systems, often relying on rotating rice with leguminous and other non cereal crops to break pest cycles, but such systems are unlikely to be economically sustainable on irrigated areas in the medium term because of the Philippine's need to maintain cereal production growth with population growth. Further development of sustainable cereal production in the rainfed areas would reduce the pressure on lowland irrigated farms to produce the nation's staple food supply. Sustainable, rainfed cereal production systems are well proven in Asia, especially northern Thailand, and have been developed to a stage where pesticide and artificial fertilizer inputs are minimal. Such sustainable systems are elaborated in Section 3.5 below.

Integrated Pest Management (IPM) systems, the use of *Azolla* sp. with blue-green algae (*Anabaena azollae*) to fix atmospheric nitrogen, and the use of pest resistant cultivars and specific cultural practices to manage the irrigated rice ecosystem are existing strategies available to irrigated rice farmers now. As rainfed rice production increases they will be able to use more sustainable cropping systems with rotations and green manure crops. Such diversity is not only more sustainable environmentally but provides the farmer with a more diverse income base which is more economically sustainable as well. The FAO Inter-Country Programme for Integrated Pest Control in Rice has

successfully trained more than 90,000 farmers and extension workers in the Philippines and offers an opportunity to further refine IRRI work to meet the specific needs of rice farmers in various parts of the Philippines.

It is important that IPM technology be adapted to Philippine conditions. PCARRD and the DA could consult with major chemical companies for sponsorship of the program and work closely with IRRI researchers and FAO technicians for IPM strategies which require adaptation to various Philippine conditions. Irrigated rice production should receive highest IPM priority because it accounts for the highest proportion of insecticide used by any crop in the Philippines [12]. Following that should be intensive corn production, plantation fruit and vegetable production and finally upland cereal production.

The FAO IPM program in Southeast Asia has had a significant impact on the use of pesticides in irrigated rice and the management of rice crops. Its major area of activity has been in Indonesia where, since 1986, insecticide applications have fallen from an average of 4.5/season to 0.5/season in 1988 as a result of IPM techniques. Government subsidies on insecticides have been drastically reduced and so the IPM program in Indonesia has significantly reduced rice production costs to farmers and Government. Rice yields, on the other hand, have increased in the same period from 6t/ha in 1986 when an average of 4.5 insecticide applications were made per season to 7.3t/ha in 1988 when an average of 0.5 insecticide applications were made per season.

President Aquino adopted IPM as national policy in May 1986 and subsequently reduced pesticide subsidies. The need now is to adapt the highly successful Indonesian mass IPM farmer training and extension program to the Philippines. In this way chemical technology will be replaced with knowledge technology and farmers would be able to make IPM decisions. IPM does more than reduce use of pesticides. It causes farmers to react in a completely different way to their farming tasks. They become informed decision makers, observant and more proactive managers.

It should be noted that a number of indigenous pest control systems exist in the Philippines, most of which have been replaced by the artificial chemical practices of the "Green Revolution". Whilst many of the indigenous practices are at best dubious, some make great sense scientifically, particularly the use of extracts from "tubli" (*Derris elliptica*) and "tabaco" (*Nicotiana tabacum*) which contain

alkaloids with commercially exploited insecticidal properties. The use of fine wood ash on rainwet leaves to counteract fungal outbreaks is also rational, especially in soils deficient in potassium. Some research has been done on the use of botanical insecticides in the Philippines [20, 21, 22], but it is important to continue this work while the generation of farmers active before WW II is still alive. Many of the species with real insecticidal properties are now rare because of over exploitation [22] or destruction of habitat. However, species such as Derris elliptica could be propagated as industrial crops much as pyrethrum daisies (Chrysanthemum sp.) are produced in Kenya. This happens to a very limited extent already in some areas of the Philippines. The use of botanical pesticides should still be governed by IPM technology since, for example, "tubli" kills predators as well as pests like other broad spectrum chemicals.

3.5 Upland Rainfed Farms

Because of its capacity to provide subsistance and cash income, annual cropping will continue to be a major source of livelihood for upland populations. Shifting agricultural systems used in the Philippine uplands are no longer sustainable because of decreased rotations caused by population pressure and shortages of land. Sustainable, sedentary farming systems appropriate to the upland areas already cleared of primary and secondary forest have been successfully demonstrated in the Philippines. Accordingly the long term objective should be to promote settled upland agriculture using agroforestry and polyculture garden techniques which are economically and ecologically sustainable. In the short term, adaptation of proven techniques to social and agro-ecosystem circumstances throughout the uplands and their extension to upland farmers should be a high priority. Emphasis should be placed on techniques adaptable with minimal subsidy, because of profitability to the farmer, and on widespread adoption.

Agroforestry, especially combining multipurpose trees with annual crops, is conceptually acceptable to most upland farmers and is a sustainable land use system well proven in most of the Philippines. However, until farmers have security of tenure and access to cheap credit, many of the time and capital investments required for sustainable upland agriculture (such as contour banks, strip planting, check dams and seedlings) will not be made by upland farmers. Except where specific projects support such development, sustainable upland agriculture is not widely practiced in

the Philippines because of land tenure and credit problems as well as a lack of government support in the form of extension or training since DENR has not traditionally been involved in such developmental activities. There is clearly an opportunity for DENR and DA to collaborate in this area to avoid the duplication of field level resources between the DENR and DA.

The integration of agroforestry ecosystems with crops and other land uses also creates opportunities for off-farm employment since its products may be used as raw materials for many small scale industries. This includes bamboo processing for housing panels, baskets and other utensils, wood processing for furniture and cabinet making components, medicines, and craft activities. This aspect is likely to become more important as population pressure increases the demand for off-farm employment in rural areas.

Upland smallholder farms could be sustainably intensified to produce significant quantities of cereals, fruits, vegetables, timber products and livestock. If the estimated 8,550,500 ha [1] of land suitable for agriculture in the uplands was intensively cultivated in 3 to 6 ha parcels, about 1.8 million families could be settled sustainably. If 30% of the farm areas were planted to industrial tree plantations, 30% to rice or corn crops and 40% to agroforestry systems including fruit, forage and fuel trees over vegetables and other crops, the upland farms could conservatively produce each year: 2 million tonnes of paddy; 1 million tonnes of corn; 38 million tonnes of industrial wood products (fuelwood, charcoal, poles, bamboo, rattan, lumber etc.); 5.4 million tonnes of vegetable and root crops; 6.5 million tonnes of tree products including fruit, edible leaves, gums and seeds, and 180,000 T meat.[1] These yields would make a significant contribution to the national food supply and would yield some products to which value could be added (for example fruit juices, dried fruit, timber, and bamboo products) for domestic as well as export markets.

In order to realize the considerable potential of the uplands in a sustainable manner, the following issues must be addressed:

1 Based on estimated yields of 1.7 t/ha for paddy, 0.8 t/ha for corn, mean annual increment of 15 t/ha pa for ITP, vegetable mixed yield average of 3.5 t/ha and livestock yield of 100 kg dressed carcass pa

- Land Tenure,
- Technical and credit support to farmers at Barangay and Municipal level; and,
- Development of economic environment which is conducive to investment in agriculture.

Land Tenure

Farmers will not invest in long term sustainable agricultural practices unless they have secure tenure over their land. Land over 18% slope is largely public land by definition in the Philippines but this distinction is legal and bureaucratic not biogeographic and currently restricts the sustainable development of the upland areas. Certificates of Stewardship Contract (CSC) and similar tenurial instruments such as Community Forestry Leases for ITP operated by communities provide vague security of tenure for 25 years with an option for renewal for another 25 years. CSC's are not heritable, renewable or transferable and thus do not provide their holders with collateral against which capital may be borrowed to develop the land. There is no process whereby the holder of a CSC can be rewarded for improving the land which he or she works. There is, thus, no incentive to invest in the sustainable development of the land. There are disincentives for not meeting certain conservation oriented soil management, land use restrictions, however. Development of a new tenurial instrument for public land or revision of the CSC and CFL would ensure that the contract document has substantial value in the eyes of recipients.

It is desirable that arable land with slopes between 18% and 30% be declared suitable for agriculture if effective erosion control and other sustainable practices are employed. This should provide for reclassification as Alienable and Disposable, public lands which are suitable for sustainable agricultural production. Titles for such lands would be subject to conservation - oriented land use restrictions. Presidential Decree No. 1998 (1985) provides a somewhat dubious legal precedent, although it applies only to Cebu and Benguet Provinces and has not yet been implemented [1].

The 1987 Constitution allows titling only of "agricultural land" in the public domain. Although DENR classifications permit hardly any of the upland areas at issue to be classified as "agricultural land", reclassification and

thus potential titling of occupants may still be within the powers of the Executive Branch. However, the Constitution restricts leaseholds on public land to terms of 25 years renewable up to 50 years. This situation provides little incentive for upland farmers to invest in the land which they currently work.

It is suggested that a possible solution to this impass would be the issuance of a transferable, leasehold title to upland farmers who have occupied and worked their site continuously for 12 months or more at the time of announcing the upland tenure policy. The titles would have strong covenants restricting holders to sustainable, conservation oriented farming practices to be monitored by municipal and provincial officers of DA and DENR. The land under title could not be rented or subdivided but the leasehold could be transferred or inherited. Transfer rights give the title holder two critical advantages over the CSC type of instrument. Firstly, it gives the holder collateral with which to borrow capital for development. The collateral reduces the lenders risk and so the cost of capital. It also enables longer term loans to be made which enable tree based investments to be financed. Secondly, and most importantly, transferability gives the title holder a strong incentive to improve the property, knowing that hardwork and careful development will increase the value of the land. The leasehold period should be set at 45 years (about the working life of a person and the maturity of longer term timber and fruit tree investments) renewable in perpetuity as long as land use covenants are met. Accumulation of land in the Philippines is already disallowed under existing legislation and the Constitution.

Reappraisal of the upland tenure system is critical to the sustainable management of upland natural resources.

Technical and Credit Support to Farmers

Upland farmers seek support from the DA and DENR in their efforts to manage what they generally recognize to be a degraded and vulnerable resource. Extension officers, trainers and providers of rural credit need to be encouraged at barangay and municipal levels to work with farmers in their fields - to help organize communities and extend research information from regional researchers to farmers. Farm based, training by doing extension programs work. To be successful, trainers need to have their skills revitalized to include soil conservation, watershed management, agroforestry in its broadest meaning, integrated pest

management and social development. Extension workers need resources - both financial and technical in order to accomplish their tasks enthusiastically. Current conditions are generally miserable resulting in poor performance and low morale. The potential of the extension workers at the barangay and provincial level is realized when one works with them on projects where they have resources. Unleashed from their constraints these men and women are enthusiastic, innovative and very hard working.

In areas where land use conversion has occurred and where sustainable agriculture is possible, the objective is to induce adoption of sustainable and conservation oriented farming techniques. The present extension effort in the uplands is characterized by a small but relatively complete program led by DA, mainly among communities of indigenes, and a larger ISF program led by DENR but focused mainly on issue of CSCs. However, one of the greatest shares of experience in upland extension is found amongst NGOs active in the uplands [31]. Because upland developmental tasks cover activities of DA, DENR and DAR, it is important that they collaborate and pool their resources into a single task force to provide unified and efficient support to upland farmers.

Regions 7, 10, 6, 2 and 12, ordered in priority based on % upland area suitable for agriculture (18-30% slope), and total population in the forest zone appear to have the greatest need for technical support at the barangay and municipal level.

Implementation of Economic Policy

In the long term government policy should aim to create an economic environment which provides incentives for farmers to invest in their land and increase the sustainable productivity of their farms. Such policies need to be accompanied by appropriate infrastructure, markets and support services to optimize the realization of changes in farm productivity.

Development of policy strategies for implementation within the next 5 years which encourage sustainable investment in agriculture will help to ensure that the farmers are rewarded for their efforts and not penalized by the power of urban constituents.

The sustainable development of rainfed upland farms is dependent upon:

- Security of tenure;
- Availability of technical support and credit at the barangay and municipal levels;
- Overall economic climate which is conducive to agricultural investment; and,
- Promotion of ITP and polyculture systems aimed at sustainable subsistance farming with surplus products to which value can be added locally in order to provide off-farm employment opportunities.

3.6 Upland Grasslands

As discussed in Section 2.4 above, many upland grassland areas are used for extensive cattle production on Pasture Leases. This is an unsustainable land use system with social costs in terms of soil erosion, fires, and grazing of forest regrowth exceeding the benefits of livestock production. Pasture Leases in parks, reserves, critical watersheds and slopes over 50% are particularly unsustainable.

If Pasture Leases were not renewed when they expire and no new leases issued, pasture lands could be used for more sustainable enterprises. Much of the upland cattle population could be accommodated in coconut plantation areas developed with leguminous pasture species as discussed in Section 3.3 above.

Cogon areas could be sustainably developed into upland farms as discussed in Section 3.5 above, or as tree plantations for industrial or timber purposes. Where cogon areas are close to secondary or primary forests, pioneer tree plantations of fast growing leguminous trees such as Gmelina arborea (Yemane) or Albizzia falcataria (Falcata) could be established to replace the cogon before encouraging dipterocarp forest regeneration with seedling plants interplanted into the ITP. As a land use strategy for cogon areas this type of approach is economically and ecologically sustainable and should be actively encouraged with technical support from DENR. Where land capability is such that sustainable agriculture or plantation forestry is feasible, the land should be redesignated to provide farmers with security of tenure and an incentive to develop the land.

3.7 Upland Tree Plantations

There are a number of tree plantation systems available for the uplands including industrial tree plantations (ITP), tree crops (oilpalm, cocoa, coffee and rubber), fuelwood plantations and tropical hardwood plantations. Most of these strategies are economically sustainable so long as some farm of smallholder organization is used to achieve the critical production mass required for economies of scale where processing of product is required (for example oilpalm or pulpwood plantations). Because the products of many of these tree plantations are international commodities which the Philippine would export, producers are subject to international price fluctuations. Accordingly appropriate product mix is a sensible buffer against adverse price movements. This is more sustainable environmentally also since it avoids monocultures.

Upland tree plantations should be polycultures wherever possible with pure tree plantations at high planting densities (possibly including nurse species and climax species) to be thinned as trees mature or mixed tree plantations at planting densities which enable understory production of other crops. For instance, much attention has been given to ITP's for pulpwood production following the success of the PICOP plantations in Mindanao and given the very buoyant international market for pulpwood [8]. Many of the existing plantations are monocultures which, whilst they are sustainable systems from a soil management point of view, are unsustainable ecologically and, often, economically. The recent devastation of some ipil ipil (*Leucaena leucocephala*) plantations by psyllids and the current fungal disease outbreak in falcata plantations are examples of this. There are many species suited to various upland conditions in the Philippines which have proven growth rates and paper making characteristics. Thus polycultures of species with similar growth rates mixed together would make a sustainable ITP for pulpwood. Suitable species include: *Albizzia falcataria* (Falcata), *Acacia mangium*, *A. auriculiformis*, *Eucalyptus deglupta* (Bagras), *Gmelina arborea* (Yemane), and *Leucaena leucocephala* (ipil ipil). All of these species are leguminous except for Bagras. Appropriate mixtures are not only more sustainable but also provide a mixed habitat for insects and birds which contribute to pest control on neighboring smallholder garden plots and farms. The species above also produce honey which could be harvested by apiarists. While ITP and agroforestry techniques are being adopted there will also be an increasing demand for seed and propagating material which could be met by seed harvesters from the smallholder community. Thus a

mixed pulpwood ITP may provide secondary sources of livelihood in the upland community, increasing the incentives for local people to protect their plantations from fire, fuelwood poachers and grazing animals.

Other plantation species with proven potential in the Philippines include bamboo (particularly Schizostachyum lumampas and Bambusa blumeana) which supports a growing handicraft and construction industry. Where community ITP is appropriate, the Taungya system could be employed. This is a method of planting plantations with local labor which is paid for by rights to subsistance farming amongst the ITP until the canopy closes. Taungya originated in Burma in the 1850's where it was used as a means of replanting teak on badly degraded land. The system has since been successfully adapted to plantation projects in Africa and Asia.

Sustainable ITP systems for the tropics are well documented and several examples already exist in the Philippines [27,29]. Thus it is innovative extension and implementation plus adaptation of proven systems to local needs and conditions which is now required. This task should be shared by the DA, DENR and private sector users of ITP products.

4.0 RECOMMENDED STRATEGIES FOR INTERVENTION

4.1 Overview

In terms of national comparative advantage, the agricultural sector has been shown to be a more efficient earner and saver of foreign exchange than the industrial sector [1].

In its Report of the Joint Panel on Sustainable Agriculture, BIFAD (the Board for International Food and Agriculture Development) recommends that "a significantly greater and more balanced effort should be undertaken by USAID to make production on marginal lands sustainable over a long time frame within the economic resources of the local farmer." [26].

The constraints identified in this report, and the programs recommended to overcome them, are largely aimed at the marginal agricultural components of the Philippine agricultural sector, especially upland smallholder farmers. The major reasons for this direction are that the upland farming areas are a badly managed resource capable of sustainably producing significant quantities of food and other primary products which will reduce pressure on lowland areas. In this way, the lowland degradation - upland migration cycle (see Figure 2.1-1) can start to be broken. Table 4.1-1 summarizes the relationship between uplands and lowlands. With its better infrastructure and longer history of production as well as its security of tenure and wealthier farmers, the lowlands are more likely to be developed rapidly without major public sector investment than the uplands.

Part of the problem is the bureaucratic confusion which surrounds agricultural production in Forest Lands. DENR, the responsible authority, does not have significant extension or agricultural staff resources at municipal and provincial levels to support upland farmers. DA has the skill and resource bases to contribute to the sustainable development of upland smallholders but currently has neither the jurisdiction nor the determination to work in the uplands. There is clearly an opportunity for increased collaboration between DENR and DA to implement sustainable development programs in the upland agricultural areas.

Table 4.1-1 : Relationship Between Uplands and Lowlands

	LOWLANDS	AGRICULTURAL UPLANDS	STEEP UPLANDS
Total Area [1]	15.1 million ha	9.2 million ha	6.6 million ha
Area suitable for Agriculture	14.1 million ha	8.5 million ha [2]	0
Rainfed Cropped Area [4]	4.5 million ha	2.8 million ha [3]	0
Irrigated Area [5]	1.5 million ha	0	0
Plantation & Intercropped Area [4]	7.5 million ha	1.2 million ha	0
Pasture Land [1]	0.6 million ha	4.5 million ha	3.0 million ha
Rural Population 1980 [6]	14.5 million	10 million	4.4 million
Estimated 1988 Rural Population [7]	27 million	12.5 million [8]	5.3 million
Pseudo Density (persons/km^2)	179	136	80

1 World Bank, 1989, [1] and ADB, 1989, [33] Table 2 pg. 141
2 Ibid pg 156
3 RRDP Evaluation, Appendix E pg. 1
4 Ibid and World Bank [1] pg. 115
5 Table 2.4-1
6 Derived from National Statistics, World Bank [1] pg 156 and ADB [33] pg 141
7 ADB, 1989 [33] Table 23, pg. 160. (Lowland Rural Population is 60% residual).
8 Estimated split.

Significant agricultural sector interventions are required in the areas of land tenure, farmer support services and agricultural policy. Recommended interventions are discussed below.

4.2 Land Tenure

The importance of land tenure to the sustainable development of upland areas been discussed in some detail in Section 3.5 above. Security of tenure is vital if rural households are to consider such long term investments as soil conservation works or tree plantations [28]. Security of tenure also provides an incentive to improve quality of natural resources. Such incentives are essential to the adoption of sustainable agricultural practices.

The Philippine Government has embarked on a Comprehensive Agrarian Reform Program (CARP) to address some of the land tenure issues which face it. On the approximately 50% of the Philippines which is covered by A&D lands, security of the tenure issues are being resolved with CARP. Land tenure in the uplands is more difficult and has been partially addressed with Certificates of Stewardship Contracts (CSC) and similar tenurial instruments. There are a number of legal and constitutional issues which would need to be addressed before more meaningful tenure could be given to farmers managing agricultural land in the upland areas.

It is recommended that a LAND TENURE SUPPORT PROGRAM be initiated. The purpose of the program would be to provide resources to DAR to facilitate the titling of land in areas where natural resources are threatened by unsustainable resource use. The program would be primarily aimed at upland agricultural areas and mangrove/intertidal zone areas and could develop from the USAID financed Agrarian Reform Program.

Because of the danger of a land rush to unoccupied or less densely occupied areas of the uplands and coastal zone (an event which is inevitable if current population growth and migration trends continue), it is recommended that the current Upland Population Census be used as a baseline for allocation of titles. To further safeguard against a land rush, it is recommended that the Government's intentions be made known and that it be clearly stated that only those who have continuously occupied and worked land for more than 12 months at the time of the announcement will be issued with titles.

It is proposed that the Land Tenure Support Program (LTSP) be implemented in two parts, and that implementation of the second part be dependant on the successful implementation of the first part.

Part 1 - Titling of Sustainably Managed Land

It is proposed that the first part of the LTSP would address land tenure on public land that is being sustainably managed or is capable of sustainable production with minor changes to management practices. Three areas are identified for inclusion in Part 1 - Forest Land which has been sustainably managed for some time, Indigenous Land which is occupied and managed sustainably by indigenes, and mangrove areas which are sustainably managed or are being rehabilitated. These three areas should have priority in public land agrarian reform because they are generally occupied by stable communities and are the least vulnerable of the public natural resource base. Funding of Part 1 of the program should be conditional on an announcement to phase out Pasture Leases in the Philippines (see Section 3.6).

Three tenurial instruments are recommended:

- A & D Freehold Title - on land which is clearly capable of sustainable agricultural use and has been used in this way for some time. The allocation of A&D titles on some Forest Lands has already started to a limited extent. The process should be enhanced with resources from the proposed Land Tenure Support Program (LTSP). It is recommended that sustainable land use covenants enforceable by significant fines be included for A&D titles.

- Indigenous Leasehold Title - on lands which clearly belong to indigenes, has been sustainably used by them in history, and is currently occupied by them. ILTs would be similar to Community Forestry Leases but should be issued in perpetuity in recognition of indigenous land rights. ILTs should not be transferable or subdivisable, should include sustainable land use covenants enforceable by cancellation of the title, and should be issued to the indigenes in perpetuity. Land tenure for indigenes is already being addressed by DAR, DA and DENR and the LTSP should enhance this activity.

- Mangrove Area Title - on intertidal areas supporting rehabilitated and sustainably uses mangrove forest. Titles should be A&D and subject to management covenants enforceable by significant fines. Because the issue of MATs would greatly increase incentives to coastal populations to rehabilitate degraded mangrove and unproductive fish pond areas, it is highly likely that MATs would be a significant contribution to the mangrove and inshore fisheries development program in the Philippines.

Part 2 - Titling of Upland Agriculture Land

As shown in Table 4.1-1 and described by the World Bank [1], over 50% of the Forest Land area is capable of supporting sustainable agricultural production. Subject to the successful implementation of Part 1, it is recommended that program funds be used to establish leasehold titles for sustainable agriculture and industrial tree plantations (ITP) in appropriate areas of the uplands.

Two tenurial instruments are recommended:

- Sustainable Agriculture Leasehold Title - on lands which are capable of sustaining conservation agriculture, agroforestry and garden polycultures. SALTs should be transferable and heritable but not subdivisable or rentable. They should be renewable, subject to review at least every 5 years and have a lease period of at least 45 years. The SALT should have clear sustainable land use covenants enforceable by cancellation of the title. The SALT would effectively replace CSC's with a transferable tenurial instrument.

  It is recommended that the bulk of the LTSP assistance be diverted towards the issue and monitoring of SALT to migrant upland smallholders who have occupied and worked their lands continuously for more than 12 months.

- Sustainable ITP Leasehold Title - on lands unsuited to sustainable agriculture technology but capable of supporting sustainable industrial tree plantations (ITP). The title would be essentially the same as SALT described above but would have covenants applying to ITP management (see Section 3.7) and soil conservation on steeper slopes. It

may be that SITPLT cause some agriculturalists to move down slope to SALT areas because of subsistence requirements. However, it is more likely that ITP farmers will do better financially than smallholder mixed farmers on SALT [27,29], so long as they have access to credit at real rates of interest. The SITPLT should assist with this.

The LTSP is a program which would accelerate existing programs within the Government of the Philippines which enjoy popular support and political prominance. It is recommended that support through the LSTP be conditional upon establishment of stronger title instruments for appropriate areas in the uplands and phasing out of Pasture Leases over the next 5 years and conversion of these cogon areas to SALT, SITPLT and Forest Land as appropriate.

It is recommended that the LTSP be supported by small technical assistance projects in the areas of land law and its implementation, and land administration. Technicians should be familiar with Torrens Titling systems as well as other cadastral administration systems. The LTSP should be implemented through the DAR but the Program Management Group would include representatives of DAR, CARP, DA and DENR.

DAR and ADB Land Titling project experience to date suggests that establishing titles, conducting cadastral surveys, erecting survey movements and administering the agrarian reform program requires about US$30 (₱600) for each ha titled. Thus it is estimated that Part 1 would require about US$10 million and Part 2 up to US$35 million over a 5 year and 15 year period, respectively.

4.3 Upland Smallholder Support Program

It is the many small natural resource managers - the farmers, fishers and forest people - who really hold the long term sustainable management of the Philippine natural resource base in their hands. They are the target which must be reached if natural resources are to be used sustainably, improved not degraded, for their benefit as well as the future generations of Filipino society.

It is recommended that a series of farmer support services programs and projects be implemented in the Philippines under an umbrella entitled the UPLAND SMALLHOLDER SUPPORT PROGRAM (USSP). Some of the proposals outlined below could be accommodated by existing USAID activities such as AAPP or RRDP.

The USSP would provide technical, and community organization support to smallholders in the uplands. The amount of work needed to fully support upland smallholders at the barangay and municipal level is immense and beyond the level of assistance that one donor could provide. Some of the interventions required are best implemented as projects rather than programs. However, it is recommended that USAID play an innovative and catalytic role by addressing some institutional issues which are initial bottlenecks in the provision of appropriate support services to upland smallholders.

It is recommended that the USSP be funded in such a way that the collaboration of DA and DENR is initiated in the provision of technical support services (extension, farmer training, community organization) at the barangay and municipal level to upland smallholders. This is probably best achieved by directing funds at the provincial level for coordinated disbursement by DA and DENR. It is recommended that USAID commission program definition studies as a matter of priority to prepare an implementation strategy, with the DA and DENR, for the USSP. Agreement between DA and DENR on protocol for collaboration in the provision of support services to upland smallholders would be required before funds would be allocated to the USSP.

The following are summaries of projects and programs which could be financed under the USSP.

A - Upland Extension Workers Training Program

Resources would be allocated to DA and DENR to conduct joint training programs for agricultural production technicians (APTs), community technical officers, municipal and provincial technical staff from DA and DENR. The resources would be used to pay travel and per diem costs to bring relevant DA and DENR staff together for training at provincial training centers.

The training program would also provide resources, to be disbursed by DENR, to pay appropriate trainer from State Colleges, Universities and the private sector.

The objective of the training program would be to equip DA and DENR staff to work with upland smallholders on technical issues relating to: agroforestry; sloping agricultural land technology (SALT); contour bank layout and construction; smallholder polycultures; soil conservation techniques (including check dams, small water impounding

structures, contour cropping and mulching), and tree propagation, planting and management.

The training program is an immediate need and would become a medium term program lasting up to 5 years. Initial efforts should be targeted at areas where the needs are greatest such as upland provinces in Regions 7, 10, 6, 2 and 12 (see Section 3.5).

B - Upland Extension Manual Preparation Program

It is proposed that DA be allocated resources to finance, in close collaboration with DENR, the preparation of an Upland Extension Manual. The manual would be prepared by a panel of key Filipino technicians, NGO's, project managers and academics concerned with technical issues relevant to upland development. The manual would be discussed at a two day inception workshop and its contents prepared by contributors over a two month period.

Contributions would be circulated amongst contributors and discussed at a two day debriefing workshop. Final contents would then be edited, translated from English into 4 appropriate regional languages and printed. It is proposed that a ring binder with pamphlet style "information sheets" be the format for the manual. In this way updated and new information can be easily added. DA and DENR have the technical, organizational and printing facilities to implement the program. The need is for resources to finance the implementation.

C - Input Supply for Implementation Program

This program would provide resources to DENR for procurement of key inputs needed to implement sustainable agricultural development in the uplands. Inputs would be provided through the program to farmers at subsidized cost as an incentive for them to participate in sustainable development works on their land. In order that this program is itself sustainable, only non-recurrent inputs would be subsidized by this program. These would include tree seedlings; specific tools such as shovels or hoes; planting material for contour bank stabilization (Vetiveria, Napier grass, Glericidia etc.); community labor for building check dams, road runoff control structures or nurseries; and hire of mechanical equipment where necessary.

DENR would disburse program funds from provincial offices where PENROs would be responsible for accounting for funds used. NGOs could support DENR with community organization and input distribution where necessary.

D - National Sustainable Agriculture Curriculum Development Project

This project would prepare the broad outline for a national sustainable agriculture curriculum for implementation by State Colleges of Agriculture and University. The project would complement the Forestry Curriculum Development Project detailed in Annex A. Resources would be made available to the Department of Education to implement a national curriculum development workshop targeted at training field technicians in sustainable natural resource management.

Curricula recommendations would be general rather than specific to enable colleges to develop detailed curricula appropriate to the special needs of the provinces which they serve. Key topics would be: agro-ecosystem analysis; soil conservation; integrated pest control; ITP planning, implementation and management; community organization; sustainable agriculture; agroforestry; adding value to rural produce, and marketing farm products.

E - Cogon Rehabilitation Program

The cogon rehabilitation program detailed in Annex A could be included under the USSP umbrella, especially in areas where cogon grasslands could be converted to smallholder sustainable agriculture.

F - Agricultural Research Reorientation Program

This program would provide resources to DA to reorient research planning from a commodity orientation to one of applied, agricultural systems research based on agroecological development zones. The basis of this process has been initiated by the Bureau of Agricultural Research (BAR) in its National Research and Extension Agenda. [34]. The programme would support the implementation of that agenda, particularly those aspects of it which relate to uplands and coastal areas. The program would include a small amount for BAR to work with PCARRD and PCAMRD to enable these councils to include agroecological development zones in their research planning process.

This program could complement the Research Outreach Subprogramme of the USAID-supported AAPP.

G - Improved Corn Seed Distribution Programme

This program would provide resources to DA for the implementation of an improved corn seed distribution system. There is a role for the private sector in this program and the DA should be encouraged to make use of private sector seed multipliers and distributors wherever possible.

Improved lines of open pollinated, yellow corn have been trialled in the Philippines and types appropriate to several regions have been identified. It is currently estimated [4] that between 10 and 15% of all corn produced in the Philippines is from improved varieties. With existing cultural practices it is possible to yield more than 300 kg/ha above conventional variety yields by using improved open pollinated, yellow corn varieties. Many farmers are aware of the benefits of new corn varieties but are unable to obtain seed. One of the major bottlenecks appears to be the corn seed distribution system, especially to upland smallholders.

DA has a number of corn seed distribution strategies to which the program could provide resources. The potential benefits of such a program not only include increased corn production and farmer incomes but also increased supply of yellow corn for livestock feed milling. By substituting for imports the program would therefore contribute to the improvement of the Philippines' balance of trade.

The benefits of an USSP would be seen in improved upland smallholder productivity, improved sustainability of upland natural resource management and reduced natural resource degradation in the uplands. Upland agricultural land is estimated at about 8.5 million ha compared to about 1.5 million ha irrigated lowland farms and 12 million lowland rainfed farms and plantations. Thus the upland resource has a vital role to play in maintaining Philippine self sufficiency in staple foods. Upland farmers need technical extension and community organization support from DA and DENR if the productivity of the uplands is to be harnessed sustainably.

The technology for sustainable production on the agricultural land in the uplands is already proven in the Philippines. Philippine agriculture is in the hands of private sector farmers who react quickly and positively to

economic incentives so long as the linkage with markets, transport, credit and technical support at barangay and municipal levels exist. The proposed USSP is an innovative way to fund a program which supports: the largest group of private sector entrepeneurs in the Philippines (small farmers); the sustainable use of natural resources and the economic development of one of the poorest sections of the Philippine population.

4.4 Integrated Pest Management Farmer Training Program

The FAO Integrated Pest Control Programme for Rice in South and Southeast Asia is well known to USAID which is a significant supporter of the program's activities in Indonesia, amongst other places. IPM systems work. The dramatic results from 4 years of work in Indonesia demonstrate very high economic returns, drastic reductions in pesticide use and slight increases in rice yields [23,24]. The FAO program has its headquarters in Manila and has implemented limited training activities in the Philippines [23]. The cost-benefit ratio of IPM training in the Philippines is estimated to be 6 [24] and the IRR of the Regional Programme to be 24.6 [23]. The social and economic benefits of IPM are well documented as are the dangers of pesticide mismanagement [13]. The US Congress, particularly through the efforts of the Hon. David R. Obey [30], is aware of the FAO Program. IPM farmer training in the Philippines has not continued significantly since 1987 because of a lack of resources. Because of the obvious success of the FAO program, USAID's existing support to the program in Indonesia, the GOP commitment to IPM and the need to reduce the domestic resource cost of rice production in the Philippines, it is recommended that USAID support a 5 year IPM Farmer Training Program in the Philippines (IPMFTP).

It is estimated that the IPMFTP would require US$2 million/year for 5 years in order to introduce IPM techniques to all irrigated rice farmers and extension workers (APT's) in the Philippines as well as a significant number of rainfed rice and corn farmers. The management and infrastructure needs of the IPMFTP already exist in Manila through FAO and DA and so the program funds would be used entirely for program coordination and implementation.

It is recommended that, as a matter of high priority, USAID Commission a program definition study to work with Dr. Peter Kenmore and his staff at FAO to prepare a detailed IPM farmer training program proposal for approval by GOP and DA. It is estimated that this would require inputs from three

people for a total of 8 staff weeks. Subject to successful preparation of the program document, it is recommended that USAID allocate US$10 million to DA (Operations Secretariat) for the program, to be disbursed to FAO in annual tranches of US$2 million for up to 5 years. The program should include a monitoring and evaluation component to collect and analyze data which would be used to monitor the progress of the IPMFTP and modify it as necessary during implementation.

4.5 Agricultural Sector Policy Implementation Program

The key to the Agricultural Sector Policy Implementation Program is to create a macroeconomic environment which is conducive to sustainable private sector investment in agriculture, ITP and agroforestry. Implementation of prudent macroeconomic policies are as essential to sustainable development as are a well managed resource base, broad participation in the benefits of development and environmental quality commensurate with economic prosperity [25].

The serious degradation of the natural resource base in the Philippines stems not primarily from large projects but from the cumulative effects of many small agricultural operations which cannot be reached by environmental impact assessments or regulation. Remedies, therefore, must include changes in economic policies to create incentives for sustainable resource use by large and small natural resource users [28].

It is recommended, therefore, that the third program in the sustainable agriculture development task, address the implementation of agricultural sector policies which create incentives for desirable behaviour. The Agricultural Sector Policy Implementation Program (ASPPI) is discussed further in Annex E.

4.6 Rural Employment Development Program

As discussed in section 2.9, off farm employment and diversification of on farm income are important components of any strategy to reduce rural poverty. Under the REDP umbrella, the following projects are proposed:

A - Rattan Plantation Development Project

As part of its current study into the Philippine rattan industry, the ADB study team believes that there are

considerable opportunities to develop sustainable rattan plantations in secondary forest areas of the uplands. It is likely that the ADB will consider financing a rattan development project in the Philippines but there is an opportunity for other agencies to either cofinance such a project or finance one of their own definition.

Rattan is an important natural resource for several regions of the Philippines. A project which developed a replicable rattan plantation system would contribute to the sustainability of an industry which directly employs more than 10,000 people and earns about US$60 million pa in export income. In addition, a successful rattan plantation system would provide an incentive for secondary forest growth to be maintained as the over storey for rattan plantations - something which has several beneficial natural resource management implications.

It is proposed that the project be implemented by PICOP and major rattan industry groups through DENR.

B - Coconut-Livestock Development Program

Coconut plantations are a significant component of Philippine agricultural land use (see Table 1.1-2). As agrarian reform increases the number of owner-managers, there will be increasing interest in intercropping and diversification. This will be particularly so if world copra and coconut oil prices continue to be low.

It is proposed that DA be provided with resources to develop a smallholder livestock industry amongst coconut plantations. The program would provide leguminous pasture and forage bush seeds and technical services to smallholders to enable them to establish leguminous pasture and forage understory in the coconut plantations. Credit for livestock purchase would be provided by Land Bank, the DA LEAD program and similar sources. Cattle, pig, and goat production would be the main focus of the program. Plantations near suitable markets and with appropriate climates could be developed to produce milk from tropical dairy breeds such as Buffalo or Australian Friesian Sahiwal.

The program would be implemented by DA with inputs from NGO's and the private sector as appropriate.

4.7 Other Interventions

There are many areas of need in the sustainable development of Philippine natural resources, and most of them are being addressed, at least in part, by the Government with assistance from bilateral and multilateral agencies. Some areas where USAID could contribute small, specially targeted, resources to sustainable agricultural development are considered below.

A - Water Harvesting Workshop

As discussed above, rainfed agriculture supports the vast majority of rural Filipinos and there is sense in storing water in low cost, on-farm storages to provide supplemental irrigation at minimal cost. IRRI is testing the capability of on-farm earth dam technology in Central Luzon and the DA is implementing a Small Water Impounding Project (SWIP), also in Central Luzon.

It is proposed that USAID sponsor a workshop in Central Visayas or Mindanao regions to explore the potential for small earth dams. The workshop would result in the preparation of a pictorial field guide to construction of such structures. Labor intensive construction techniques would be recommended and community organization strategies discussed in the workshop.

B - Rainwater Tank Construction Project

Water is a key constraint in many upland areas, both for domestic and field use. The collection of drinking water occupies a considerable amount of household time and energy on a daily basis and it is suggested that a more time efficient domestic water supply system would release labor for natural resource management tasks such as tree planting, or terrace and check dam maintenance. The cost of reticulated water supplies would be prohibitive and uneconomic. However, an alternative strategy is the construction of simple corrugated steel rainwater tanks with a catchment system to provide the daily water needs of families. Apart from reducing time allocated to water collection, rainwater tanks contribute to health and sanitation by providing clean water for drinking and washing.

Much of the Philippines, especially the densely populated Visayas and Mindanao regions, have well distri-

buted rainfall patterns with 2-4 dry months per year. With an efficient catchment area of about 80 m^2 the household could catch 800 l with a 10mm rainfall event-enough for 8 days consumption assuming 20 l per person per day in a 5 person household. During the rainy season such a catchment area would rapidly fill a 20,000 l tank which would be sufficient to store water for a family during a 2-4 month dry season. Rainwater tanks could be produced locally and thus create a livelihood for roofwrights and tank builders. The cost of a 20,000 l tank plus catchment roof is estimated to be about ₱10,000 with a life expectancy of 30 years or ₱ 340/year. With day labor rates at ₱50/day, the "cost" of a tank is about 1 week's work a year - much less than the time saved by installing a tank for water collection.

C - Time Allocation in Upland Farming

Ways in which donors can reduce the unproductive time burdens of upland farm life are worth examining further. It is recommended that a series of small time allocation studies be commissioned by USAID. In order that local skills be developed further and promising students be encouraged to become active in the development of upland areas, it is suggested that these studies be conducted by Filipino post graduate students under the supervision of key people who can act as mentors to the students, as well as project supervisions.

It is proposed that three studies be commissioned; one in Luzon, one in Visayas and one in Mindanao. The studies should be designed to complement existing data held by USAID, other donors and GOP. In Luzon, it is recommended that Dr. Percy Sajise of UPLB and Mr. Lope Calanog of ERDB, Los Baños be asked to implement the study with their post graduate agriculture and social forestry students. In Visayas, it is commended that Dr. Romy Raros of VISCA and Harold Olofson of University San Carlos, Cebu City be asked to implement the study with their students. A similar study in Mindanao could focus on SALT areas near Davao del Sur and a control area. Each study should compare time allocation for family members in farming families using sustainable agricultural techniques with families using unsustainable techniques. It is anticipated that such studies would require 6 months each to complete and cost in the region of US$30,000 each.

These studies would enable Government and donors to better understand the constraints to smallholder adoption of sustainable natural resource technologies. The results may identify opportunities for incentives for adoption.

D - Incentives for Participation

Where particular activities have a finite period of implementation (such as tree planting or constructing check dams and access tracks) there are opportunities to directly provide incentives for participation in the activity without creating unsustainable development. One source of incentive is money. Because the potential rewards of corrupt behavior are still very high and staffing and procedures in field operations have undergone few changes, it is recommended that money not be used as in incentive. Alternative incentives include certain farm inputs for which there is a finite need (e.g. tree seedlings, small tools, rocks for check dam construction etc.). Another incentive would be food. Food for work programs have been very successful in some countries and have the advantage of being a resource which is difficult for corrupt people to accumulate. The attraction of a food for work program for upland development is that it releases time and energy pressure from key household members so that they can contribute to community activities. For example, if a microwatershed of 200 ha and 30 families is to be developed for sustainable agricultural production, the community could be organized for a 6 month work program during which time their staple food needs (corn, rice, meat) would be provided by the project as payment for work. The organized community would work with DENR and DA staff to develop an expression of needs which would then be modified into work plans. The community would construct nurseries and grow the tree seedlings necessary for contour planting, contract access tracks and small earth dams, mark out contours for planting, construct check dams and diversion swales and generally work together to transform their watershed into a sustainable production system.

Food for work not only releases many in the community from subsistance tasks during the development phase but ensures that workers are adequately fed and therefore more productive and committed to the tasks than poorly fed people. This approach to development also helps instill a sense of community in local natural resource management which has repercussions for management of the commons as well as leasehold or private land.

It is recommended that USAID fund a study to explore this idea further and prepare a pilot project for implementation in the Visayas or Mindanao areas. This is a new concept in the Philippines and provides an opportunity for USAID to be innovative in the development of sustainable natural resource management at the community level.

Such a strategy is sustainable because the direct inputs cover a finite period for a specific task, which when completed enables the beneficiaries to be sustainably self sufficient.

E - Economic Returns from Different Incentives

It is generally agreed that one of the most expedient ways to effect behavioral change in the private sector is to provide economic incentives which encourage certain behavior - for example sustainable natural resource management. Within the agricultural sector, there are a number of incentive groups which are available to affect such change. These include land tenure, input price subsidies, commodity price subsidies, etc. Each group has benefits and costs relative to other options as, does nothing base case.

It is recommended that USAID commission an agricultural economist to conduct an empirical study of the costs and benefits to the Philippines of different incentives structures. Such a study could be carried out by local economists such as Dr. Marianne de los Angeles of PIDS and Dr. Leon Gonzales of IRRI with assistance from post graduate students from UP Diliman and other institutions. Alternatively, as suggested by Dr. delos Angeles, there is also an opportunity for USA post graduate students to work on this task as part of their PhD or other studies. This is an opportunity for USA to supplement the Philippine skills base at minimal cost whilst at the same time strengthening ties between academic institutions in the two countries.

These economic studies would contribute significantly to policy reforms being considered by DENR and DA.

F - Regional Transport Economics

There is also a need to study with regional transport economics in the Philippines, with most emphasis being focused on interisland transport. The cost of interisland

transport is very high and currently affects the maize market in particular which has an impact on livestock feed prices as well as productivity decisions by farmers isolated from markets.

It is recommended that USAID commissions a Regional Transport Economic Study, along similar lines to those discussed above for the study into Economic Returns from Different Incentives. Because some aspects of this topic have already been studied by USAID, the study TOR should reflect information needed to compliment existing studies.

G - Agroforestry Seed Collection and Distribution Program

As sustainable land use strategies become more widespread in upland areas, the demand for propagation materials for agroforestry species will increase. Supplies of seed for key species such as *Glericidia sepium* and *Cajanus cajan* are already scarce and causing delays in some planting programs. The price of seed for some species has also increased significantly - for example a kilogram of *Cajanus cajan* seed increased from ₱80 to ₱120 between September 1988 and July 1989.

As established agroforestry polycultures mature, seed may be collected to meet the demand from new adoptors of the technology. In upland areas there is an opportunity to develop a seed collecting, cleaning and distribution industry. This would provide additional livelihoods in the uplands, provide increased incentives for adopting sustainable upland management systems and help overcome the shortage of propagating material which is, at least in part, overcome by importing seed.

In reafforestation areas, there is an opportunity for local people to be engaged in managing new plantings in return for usufruct rights to seed and fuelwood resources sustainability harvested from the reafforested area.

In order that seed collecting groups are able to get their products to market quickly to ensure viability of seed and other propagating material there is a need for a distribution network to be established. This network would also prepare and monitor standards of viability, purity and infection which would be maintained with price incentives.

It is recommended that USAID provide resources to a national NGO (such as the Manila Seed Bank) to establish a national tree seed collection, distribution and marketing

cooperative. The cooperative would sell seeds at a profit with the surplus being used to finance a revolving fund for seed improvement and marketing activities as well as the establishment of a small seed testing laboratory which could be a mobile unit to serve all regions.

This program would help overcome the bottleneck of propagating material supply in adoption of agroforestry systems and support the establishment of a new livelihood system in the upland areas.

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7.0 GENERAL SUMMARY OF ACTIVITIES

July	25	Arrive Manila
	26	Inception Briefing, USAID
	27	Literature Review, Manila
	28	Mike Dalton, AIDAB
	29	Literature Review, Manila
	30	AIDAB Natural Resources Project Team
	31	Rich. Hirsch (RRDP), USAID Briefing (Rushing/ Queblatin), FAO, NZ Embassy (ITP Project)
August		
	1	Los Banos - IRRI, PC ARRD, UPLB
	2	Asian Development Bank
	3	World Bank, Literature Review, PIDS/PEDA
	4	DENR, Literature Review, Report Outline Complete
	5	Team Meeting, Writing
	6	CEBU-World Neighbours Project, GUBA
	7	CVRP- Mandaue, ACIPHIL Consultants
	8	CVRP- Ronda, Badian, Moalboal - CEBU
	9	FAO IPM Programme - Peter Kenmove, PICOP
	10	Report Writing, Interim Report Meeting - USAID
	11	Report Writing
	12	Report Writing
	13	Report Writing
	14	Report Writing, USAID, Poultry Farmer
	15	DA, Team Review Meeting
	16	DA
	17	Tarlac, Northern Luzon
	18	Report Editing
	19	Report Editing
	20	Rest Day
	21	Asian Development Bank, Debriefing USAID
	22	San Miguel Corporation, Bureau of Animal Industry
	23	Final Debriefing, USAID, DENR
	24	Asian Development Bank, Report Editing
	25	Final Report Compilation, Depart 1739
	26	Arrive London 0800.

ANNEX C

MANAGEMENT OF THE COASTAL ZONE FOR SUSTAINABLE DEVELOPMENT

by

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1.0 INTRODUCTION

The Republic of the Philippines cannot, for long, put off the task of conserving its coastal resources; no modern society can. These resources are too valuable to squander needlessly. We know, and accept, that some loss of fishery production must accompany coastal developments such as harbors, cities, mining, agriculture, and even dams. We know that each fisherman's share of the catch must decrease as more boats and nets join the fleet. But runaway depletion should not be acceptable and is not necessary. We must not leave the future to take care of itself while we plunder the planet today.

The most prominent geographic fact of the Philippines is that it consists of 7,107 islands with a total coastline of more than 17,000 km [9]. Political boundaries reflect this prominence as 80% of the country's provinces and two-thirds of all the municipalities share the coast. About 55% of the population resides in some 10,000 coastal barangays, plus larger urban centers. Seventeen of the 25 cities having populations in excess of 100,000 people are on the coast [9] . Associated land use activities concentrated on the coast are transportation infrastructure, industrial and commercial development, lowland agriculture (especially rice and coconut), aquaculture, tourism and recreation, land reclamation and waste disposal [9].

In the following pages we have tried to select out of the myriad of coastal problems that need solution, a few problems that we feel should, and could, be addressed by USAID and other donor organizations in the next five or more years.

2.0 CORAL REEFS

2.1 Overview

Coral reefs are the most characteristic ecosystem of the Philippine coastal zone. They have brought worldwide fame and numerous tourists to the country. According to J. McManus [13] coral reefs provide a substantial part of the protein intake in Southeast Asia. Reefs and nonreef coral communities within 15 km of shore are generally overfished, while offshore subsurface atolls and pinnacle reefs are often beyond the reach of small-scale fishermen. Major destructive forces include excessive sedimentation related to deforestation and various forms of destructive fishing, especially blast fishing. Only a small fraction of Philippine coral reefs are undamaged (5-10%). The main emphasis in the management of coral resources is rehabilitation of the reefs to a much better state.

The most promising approaches to conservation of coral reef seem to involve management at the municipal level. One concept of the community approach is the adaptive management scheme of McManus [13] involving community-based development specialists cross-trained in environmental and fishery monitoring who assist municipalities in the development of regulations and resource rehabilitation with local reefs and associated ecosystems. Reef management can be expedited in many areas with the establishment of alternative livelihood programs to alleviate excessive demands on the reef resources [13]. The community based coastal area management program is discussed in detail in Chapter 7.0.

2.2 Productivity and Values

The productivity of any coral reef depends upon many factors, most importantly the amount of damage it may have suffered in the past from destructive fishing practices and external sources such as sedimentation. The intensity of fishing and method used are also very important.

Two coral reef systems (Pamilacon and Apo Island) that were studied by Alan White [14] and estimated to be in fair to moderately good condition yielded 17.9 tons/year of fishery products per km^2 of reef system and 22.1 tons/km^2 of reef. Thus, it would seem that economic planners could safely use 20 tons/year as a rule of thumb catch for average

reefs. It should be noted that this figure includes the products of gleaning invertebrates, seaweeds, etc. from the reef flat as well as the fish catch.

As discussed in Chapter 4.0, Philippine fisheries production has stagnated at about 2 million tons/year since 1982. This has caused serious problems for coastal fishing communities that depend upon artisanal means and coral reef ecosystems to supply protein food and some cash.

Even if the reefs were effectively and immediately protected and the natural restorative process were enhanced, it is unlikely that any major increase could be expected from present coral reef dependent fisheries. Specifically, White [14] estimates a total coral reef inventory of 34,000 km^2 which would be expected to produce a maximum of 680,000 tons/year of product at 20 tons/km^2 using present approaches. (Note: of the various inventories of coral reefs, A. White's 34,000 km^2 of reef to a depth of 20 m has been chosen as most appropriate.)

Not all analysts would agree with a production figure as high as 20 tons/km^2/year; e.g., a recent survey concluded that a reasonable production figure would be nearer to 7 tons/km^2/year. Also McManus [13] guestimates that reef type fishes alone make up about 25% of national landings. This would be equivalent to about 500,000 tons (0.25 x 2 million tons) or 15 tons of fish per km^2 (plus 5 tons of gleanings, perhaps). Many other experts would put the coastal reef dependent fish at only 10 percent of the total The 20-ton figure, or an equivalent more conservative figure, is deemed appropriate for present purposes because it includes the total biological product of the reef (Table 2.2-1) including off reef catches of fishes dependent upon the reef for food or shelter. Also, note that the 20-ton figure is based on specific research for two typical reefs.

It should be realized that the coral reef ecosystem also supports fisheries that are conducted beyond its boundaries; e.g., small reef fishes fall prey to larger predatory fishes that hunt around the reef fringe. Also it should be realized that the coral reef resource provides values in addition to fishery outputs, such as coastal protection, building materials, habitat for a rich biodiversity and tourism opportunities.

Table 2.2-1
Coral Reef Resource Products and Uses

A. Major reef export products of economic importance

Resource	Role in Reef	Product-use
Stony coral(a)	Primary reef frame builder	Building material, fish, tank decoration
Precious coral(b)	Enhances habitat	Jewelry, decoration
Fish (b)	Link in metabolism	Food, aquarium fish
Mollusks (b)	Calcification, food chain	Shell collection
Tridacna clams(b)	Calcification	Decoration, novelty
Top shells, Trochus	Calcification, food chain	Pearls
Oysters (b)	Calcification, food chain	Pearls
Lobsters (b)	Scavenger	Gourmet food
Sea cucumbers	Detritus feeder, sand	"Trepang" food
Sponges (b)	Borer	Toiletry
Sea Turtles (b)	Food chain	Shell, oil, meat, eggs
Sea snakes (b)	Food chain	Skin, crafts
Misc. Invertebrates	Varied	Antibiotics, drugs
Coral sand	Substrate, beaches	Concrete, building
Ecosystem	Conservation, genetic diversity	Tourism, aesthetic appeal, natural laboratory

B. Subsistence food products commonly used.

Organism Group	Kind
Fish (c)	Large variety
Bivalves	Clams, mussels, oysters
Gastropods	Most large ones
Cephalopods	Squid, cuttlefish and octopus
Crustaceans	Crab and shrimp
Echinoderms	Sea cucumbers and sea urchins
Coelenterates	Jellyfish and anemones
Sea turtles	All except Hawksbill, eggs
Algae	Many edible varieties

(a)McManus [22] notes that 1,830,089m^3 were exported from the port of Zamboanga, Philippines in 1976.
(b)Seriously depleted on many reefs in the Western Pacific.
(c)The most significant contributor of animal protein in most Southeast Asian countries.
Source: [20]

2.3 Condition of the Resource

An extensive survey of the condition of the nation's coral reefs was completed in 1981 by a University of Philippines team lead by Dr. Edgardo Gomez of the Marine Science Institute (MSI). Approximately 600 survey sites throughout coastal Luzon, the Visayas, and Mindanao, plus smaller islands and islets, were investigated by divers using a transect/quadrant method. The reefs were classified in terms of the percentage of living coral cover on the reef crest and slopes [9]. The results (Table 2.3-1) show that the majority of reefs (70%) were in poor to fair condition while only 5.5% were in excellent and 24.5% in good condition.

While there are important, mostly non-controllable natural sources of degradation, the Philippine coral resource seems to be suffering mostly at the hand of man (Table 2.3-2). The following are the major controllable causes now recognized throughout the Philippines:

- Dynamite fishing. Considered by many experts to be the major destructive activity of concern in Southeast Asia [13]. Although commonly referred to as "dynamiting", blast fishing involves a vast array of commercial, military and homemade explosive devices. The blast stuns the fish making the job catching them much easier. Blasting is an extremely wasteful fishing method, which creates a high mortality among fish of all ages, only a portion of which are gathered up by the fisherman [13]. More importantly, the blast destroys the coral and other organisms that make up the structure of the reef. The loose rubble left behind is unsuitable for many kinds of coral larvae, thus slowing recovery. While the fish might be replenished in one to a few years, the reef may require decades to recover, and in its damaged state will not support as many fish as prior to the destruction. The technique involves dropping the charges directly on aggregations of fish in schools or coral patches, which are located visually. Thus, the fishermen tend to favor blasting corals in the calm waters of lagoons, and in other areas on calm days in waters less than about 15 m in depth [13]. It is not uncommon for an observer to count as many as six blasts per hour while positioned on a coral reef ecosystem.

Table 2.3-1

Status of Philippine Coral Reefs, 1981*

Location	No. of Stations	Excellent No.	Excellent %	Good No.	Good %	Fair No.	Fair %	Poor No.	Poor %
LUZON									
1. Albay	9	0	0	1	11.0	5	55.6	3	33.3
2. Bataan	10	0	0	0	0	0	0	10	100.0
3. Batangas	25	0	0	6	24.0	11	44.0	8	32.0
4. Cagayan	4	0	0	2	50.0	2	50.0	0	0
5. Camarines Norte	13	0	0	1	7.7	7	53.8	5	38.5
6. Camarines Sur	2	0	0	0	0	2	100.0	0	0
7. Cavite	9	0	0	0	0	6	66.7	3	33.3
8. Isabela	3	0	0	2	66.7	1	33.3	0	0
9. La Union	5	0	0	1	20.0	2	40.0	2	40.0
10. Marinduque	5	0	0	0	0	4	80.0	1	20.0
11. Mindoro Occidental	31	1	3.2	8	25.8	15	48.4	7	22.6
12. Mindoro Oriental	11	1	9.1	2	18.2	4	36.4	4	36.4
13. Palawan	49	6	12.2	17	34.7	20	40.8	6	12.2
14. Pangasinan	37	0	0	8	21.6	14	37.8	15	40.5
15. Quezon	4	0	0	2	50.0	2	50.0	0	0
16. Zambales	12	0	0	2	16.7	3	25.0	7	58.3
Sub-total	229	8	3.5	52	22.7	98	42.8	71	31.0
VISAYAS									
1. Antique	12	2	16.7	10	83.3	0	0	0	0
2. Bohol	22	0	0	8	36.4	8	36.4	6	27.2
3. Cebu	51	5	9.8	13	25.5	19	37.2	14	27.4
Hilutangan Is.	4	0	0	1	25.0	0	0	3	75.0
Mactan Island	15	1	6.7	3	20.0	3	20.0	8	53.3
Olango Island	7	0	0	1	14.3	4	57.1	2	28.6
Sumilon Island	4	0	0	3	75.0	0	0	1	25.0
4. Iloilo	64	9	14.1	18	28.1	27	42.2	10	15.6
5. Leyte	12	0	0	0	0	6	50.0	6	50.0
6. Negros Occidental	18	1	5.6	2	11.1	5	27.8	10	55.6
Refugio Island	4	0	0	1	25.0	1	25.0	2	50.0
7. Negros Oriental	98	5	5.1	20	20.4	41	41.8	32	32.6
Apo Island	5	0	0	5	100.0	0	0	0	0
8. Siquijor	31	0	0	9	29.0	9	29.0	13	41.9
Sub-Total	347	23	6.6	94	27.1	123	35.4	107	30.8

* 619 Stations in Four Categories of Living Coral Cover: Excellent (75-100%), Good (50-74%), Fair (25-49.9%) and Poor (0-24.9%)

Table 2.3-1 (continued)

MINDANAO									
1. Misamis Occidental	9	0	0	0	0	4	44.4	5	55.6
2. Misamis Oriental	1	0	0	0	0	0	0	1	100.0
3. Zamboanga del Norte	18	1	5.6	3	16.7	6	33.3	8	44.4
Aliguay Is.	8	2	25.0	3	37.5	2	25.0	1	12.5
Selinog Is.	7	0	0	0	0	1	14.3	6	85.7
Sub-total	43	3	7.0	6	14.0	13	30.2	21	48.8
GRAND TOTAL	619	34	5.5	152	24.4	234	37.8	199	32.3

Source: UP Marine Sciences Center, published in Coral Reefs and Mangrove Forests, p. 11; ref [10]

Table 2.3-2

Human Activities and Their Impacts on Coral Reefs

Activities	Impacts
1. Extraction of coral limestone	Reef foundation degredation
2. Extraction of coral sand	Turbidity, water flow dynamics
3. Explosive fisning techniques	Habitat destruction
4. Terrestial sediments from human activity	Turbidity, smothering
5. Physically damaging fishing methods	Habitat destruction
6. Reef trampling by humans or anchors	Habitat destruction
7. Overfishing of fish and invertebrates	Changes in ecosystem balance, lower sustainable yield
8. Aquarium fish collection	Selectively depletes population
9. Urban-industrial pollution	Biological degradation
10. Oil Spill	Biological degradation
11. Oil drilling	Turbidity, habitat destruction
12. Fish poisoning	Biological degradation
13. Spearfishing	Selective depopulation of fish
14. Construction	Habitat destruction, turbidity
15. Tourism	Collecting, minor habitat disturbance
16. Thermal or salinity changes	Detrimental to coral polyps and invertebrates

Source: [20]

- Muro-Ami and Kayaka fishing: Both techniques may be destructive because of the methods used to drive fish into the nets [13]. These two methods involve breaking corals, either with sticks (kayakas) or with weights on scare lines (muro-ami). Both methods are common along the fringing reefs. The latter method also includes commercial fishing that involves 200-400 people at a time operating from large ships. The 25 vessels involved in this fishery, based in the Philippines, operate throughout the South China Sea and Sulu Sea [13]. In addition to the environmental effects of this fishery, there are major safety and social problems concerning the use of young divers operating from crowded ships and manipulating nets at depths of 30 meters or more by free diving. In the Philippines, recent attempts to ban this type of fishery have been hampered by the problem of finding alternative livelihoods to support the estimated 15,000 people dependent upon the fishery [13]. Also the catch per fisherman can be 10 to 100 times greater than for other fishing methods [9]. See Section 4.3 on depletion of fish stocks.

- Chemical fishing: A problem that arises in certain localities is the use of chemicals to stun fish to ease their capture. The main problem is the use of cyanide to stun small decorative fishes for live capture and export to pet shops abroad for sale as "tropicals". The cyanide is released underwater as hydrocyanic acid around coral heads where many more fish are stunned than are taken. Cyanide is also occasionally broadcast in the water to aid in catching food fishes. Both uses are now banned by government order. The market may also solve the "tropicals" problem, anyway, since many cyanide captured tropicals die, often after purchase by wholesalers or retailers.

- Coral harvest and mining: In certain localities, coral is mined as the raw material for speciality tile making. In other localities, it may be dredged up for air strip or highway bed fill. While low levels of coral mining could have reduced productivity of coral reef ecosystems, it would not be expected to lower diversity because no scarce species is known to be involved. These uses have been outlawed and at present may be considered non-serious threats in general. Exports of coral

were 7,000 tons in 1974 and a lesser but unknown illegal quantity now [20].

Of current concern is the continuing harvest of coral despite laws prohibiting its taking. Certain coral species are collected and exported disguised as ornamental shells to Europe and North America (for which there is no prohibition) or smuggled out from Mindanao or Cebu to Australia or Papua New Guinea. The problem is not so great now, apparently, as it was 10 years ago. The remedy is vigilance in enforcing current laws in the 26 locations identified as "rich harvest grounds" for corals [17].

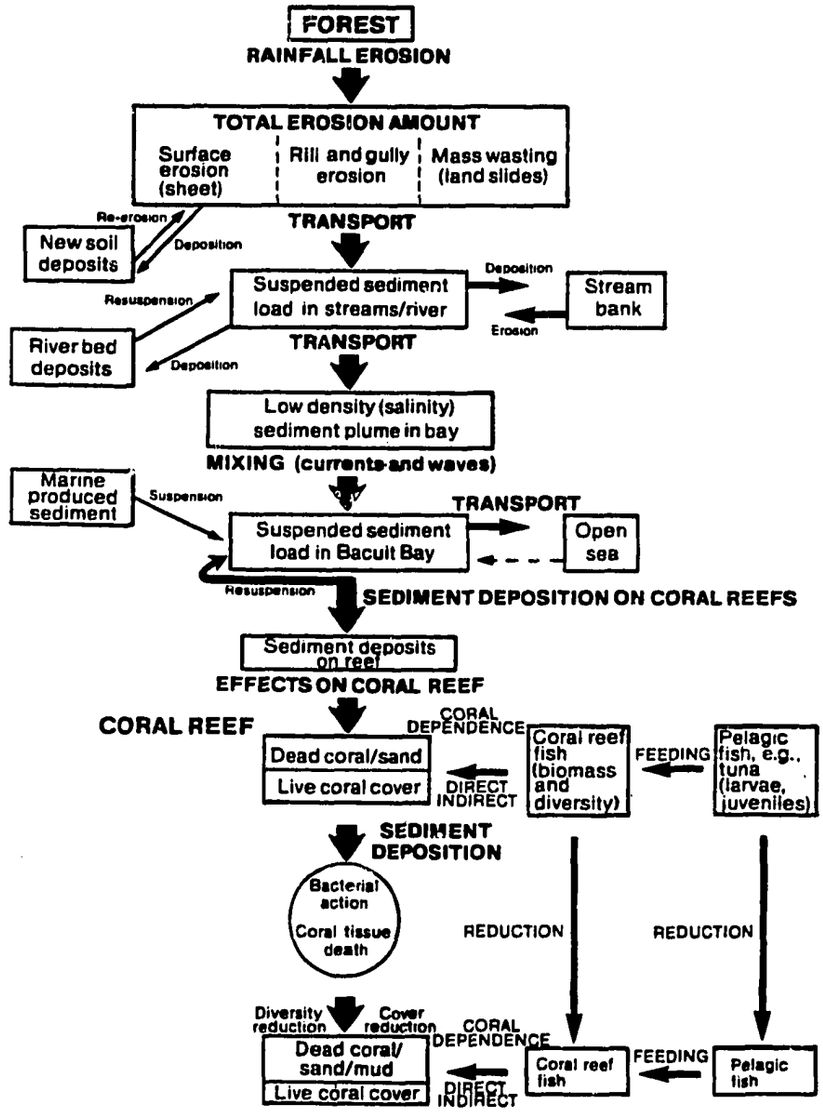
- Sedimentation. The combined activities of logging and slash-and-burn agriculture have now depleted much of the original forests of the Republic (see Annex A). The thin topsoil is easily washed away, and substantially increases the sediment load of coastal waters. Some corals tend to accumulate the silt, while others suffer from scouring by sediment-laden currents or from a depletion in the available light which is necessary for their nutritional support and growth (Figure 2.3-1). The silt may inhibit the settling of new polyps, lowering the resilience of the reefs to other disruptive forces such as outbreaks of the coral-predatory Crown-of-Thorns starfish [13].

  In Panganiban Bay sedimentation destroyed coastal reefs, forcing fishermen to travel 8 km to new fishing grounds. Many of those who could not afford the gasoline have stopped fishing altogether.

  Other sources of sedimentation include the dumping of mine tailings, for example, areas where long stretches of coral were buried by the Marcopper and Atlas Copper Mines [13]. Many experts believe that sedimentation from upland sources is the greatest threat to coral reefs now and in the near future.

2.4 Current Management

At first blush it would seem that very little remains to be done in the way of national edicts to protect coral reefs. There are countrywide prohibitions against cyanide use (Presidential Decree 704), taking of corals



Predicted pathway of soil eroded from the forest floor as it passes to the sea. Source: [19]

Figure 2.3-1

(Presidential Decree 1219), and blast fishing. This suite of regulations is without doubt much needed and most appropriate to the conservation task at hand. But unfortunately, enforcement is lax and violations occur regularly. The worst situation is with blast fishing which is not so innocently perpetrated by "outside" (e.g. Cebuan) fishermen or by popular collaboration wherein a whole village shares in the booty produced by one "dynamiter". In either situation it is difficult to bring the perpetrators to justice. But the laws are in place (See Annex E).

On the other hand, there are some significant gaps in the basic legislation protecting coral reef communities. For example, muro ami fishing is not addressed by any law or executive order. Nor are there any controls on the capture of baby fish for either the aquarium "tropicals" or aquacultural "seedstock" trades. One would have to conclude that the national Government's attempts to conserve the coral reef resource have been too few and too late and is the result of a failure in political courage. Recently, however, grassroots demonstration projects have shown that coastal communities themselves can create and implement effective conservation programs with minimal assistance.

2.5 Future Directions

To solve the problems besetting the coral reefs which are the Philippine's major maritime resource will certainly require different and innovative approaches. The President's Administrative Order 114, which aims to stop the "rampant and massive destruction" of resources by destructive fishing practices, is laudable in its intent but low in its potential to change anything. The Order set up a Committee of Ministers (and four additional members) with no new powers, no new funds, a laundry list of "responsibilities", and a requirement to file a quarterly report. This type of activity just continues the old pattern of "words for deeds", which is the administrative handmaiden for the path to resource exhaustion.

The steps needed to conserve coral reef resources are a reflection of what is needed to conserve all Philippine resources, i.e., holistic, well supported, strongly enforced, and innovative new programs. Muddling along is no longer defensible, because a path to a better future has been defined for coastal communities. This future involves a combination of community based self-help activities and central government support, as discussed in Chapter 6.0.

Many simple technologies for management of coral reef resource systems are already in use by coastal communities, e.g., artificial reef manufacture and placement. Some new technologies now under study at the University of the Philippines, MSI, may also be available downstream through "headstart programs" involving transplantation of corals from healthy reefs to denuded or degraded reefs [18].

In summary, the holistic, community based, conservation programs for coral reefs must incorporate and make effective the following protections for coral reef ecosystems:

- Elimination of dynamite (blast) fishing;
- Cessation of physically destructive fishing methods;
- Cessation of the use of chemicals in fishing;
- Prohibition of coral mining and coral harvest;
- Reduction of sediment delivery to the reef from the uplands;
- Designation of the most critical coral reef areas as sanctuaries or reserves; and,
- Rehabilitation of degraded coral reefs through transplantation of corals and related projects.

There is also encouragement to be gained from the recent Palawan case where deforestation was shown to be uneconomic through innovative economic analysis [19]. In this case, Gregor Hodgson and John Dixon predicted the sediment output from a logging operation and its impacts on coral reef based fisheries and tourism. The impacts were shown to have potentially devastating economic consequences for these two industries.

3.0 FLORAL RESOURCES OF THE COASTAL ZONE

3.1 Overview

Mangrove forests are an unusually valuable and ecologically complex resource. They are fringing forests which take value largely from the extensive length of coast that they cover. They contribute as much value to the sea side of the coastal zone as to the land side.

The products from mangroves include food, fibers, medicines, pulp for paper, matches, thatching material, and charcoal. More important than the material products are the hidden benefits from mangrove such as protection against erosion, cyclones and tidal bores, and production of particulate and dissolved organic matter that enrich downstream fisheries in the coastal waters [21]. Also they provide habitat for hundreds of species of fishes and invertebrates.

Sea grasses provide essential habitats for important species and also a major supply of nutrients to the marine food chain. Sea weeds contribute in the same ways as well as providing a major source of income and foreign exchange. Also because of their strategic position between coral reefs and mangroves, tropical seagrass beds act as effective buffers, reducing wave energy and exporting nutrients to nearby ecosystems. These interactions must be recognized in conservation programs.

Typically, both mangrove and seagrass ecosystems are rapidly disappearing because of the increasing multiplicity of demands upon the marine environment of the Philippines. Action to prevent loss is urgently needed.

3.2 Resource Values

The main component of the macro-flora of the Philippines Coastal Zone are (1) mangroves, (2) sea grasses, and (3) seaweeds.

Mangrove Forests

While small in remaining areal coverage at 140,000 ha [24], the mangrove forest fringe extends along a considerable length of the Philippine shoreline. This

fringe and and the deeper pockets found in embayments and deltas play a key role in the stability and productivity of the coastal zone.

Mangroves are said to "form the foundation of the food chain for coastal fisheries" [8]. They contribute large amounts of organic material to coastal waters through export of detritus from plant litter. During high tides, fish move into the mangrove to feed on invertebrates, juvenile fishes and detritus. Mangroves are also the nursery areas (sanctuaries for the young) for a variety of fishes and shrimps and provide the habitat for crabs, bivalves, gastropods, and other invertebrates. Species from 68 families of fishes have been identified from mangrove forests [8]. Mangroves and associated flora are an important source of firewood, charcoal, fish trap materials, poles and wood for housing of coastal families. They also tend to take up suspended solid matter and floating materials, thus improving water quality.

Seagrass Meadows

Sea grasses have only recently been recognized as an important resource: the seagrass meadow "plays an immense ecological role in coastal environments" according to Miguel Fortes [22]. The importance of sea grasses is due to their enormous quantities. One estimate would put their occupancy at 5,000,000 ha of submerged bottoms [25].

Seagrasses form dense beds and perform a wide variety of ecological services to the marine environment. Seagrasses stabilize the substrate, produce sediments, serve as habitats, nurseries, and as a primary food source for fish, many invertebrates, turtles and dugongs; they also provide alternative feeding sites for commercial and forage organisms [22].

Seaweeds

Also termed as "macrobenthic algae", the seaweeds play an important role in coastal zone productivity. Along with seagrasses they are the primary producers in the shallow benthic environment in the sea on which the higher members of the food chain depend for food energy. They form tremendously productive communities [26]. They help maintain ecological balance as an important component of the coastal ecosystem and also provide a valuable natural

resource. Seaweeds provide unique habitats for many small species of fauna [26].

As an important economic resource seaweeds are useful as food and as raw materials in the manufacture of agar, carrageenin and alginates, which find a wide variety of industrial uses. The production of seaweeds through mariculture can be a productive alternative livelihood [26]. Since 1984 seaweed farming (particularly for the genus Eucheuma) has been the number three fishery industry in the Philippines next to shrimps and tuna. This industry exported about US$25 million worth of products in 1986. The Eucheuma industry provides employment to more than 25,000 farmers in the southern Philippines [26].

Interactions

Seagrass beds act as hydrodynamic barriers which dissipate wave energy and create a low-energy zone that is favorable to mangroves. They also trap, stabilize, and produce sediments, all of which are processes of importance for mangroves [22]. Similarly, fringe and basin mangrove forests act as depositional basins and effective sediment binders, reciprocating for the benefit they derive from seagrass beds. The ability of the mangroves to regulate coastal freshwater flows retards changes in salinity that would otherwise be adverse to the seagrasses.

Mangroves and seagrass beds both tend to "leak" or export nutrients. This nutrient "leakage" ensures that each system receives the level required for optimum growth and development. Additionally, birds that rest in the mangroves and feed on seagrasses carry nutrients back into the mangroves by defecating after returning from feeding on the seagrass areas [22].

Dissolved and particulate organic matter runoff from mangroves into seagrass beds (and vice versa) may help maintain the rich nutrient pools of these two habitats. Mangroves and seagrass beds are also linked by animal migrations that lead to an exchange of energy between feeding and sheltering habitats [22]. It should be noted that coral reefs also enter strongly into this interaction.

What the above suggests is that the "integral coastal ecosystem" includes basin and fringe mangroves, seagrass beds and coral reefs. Also included are adjacent soft bottoms, tide flats, beaches, the water itself, and all life forms within. Therefore, conservation programs must

not focus on one of the elements, say mangrove forests, and ignore the rest. An holistic approach is needed.

3.3 Condition of the Resource

The over-exploitation which we witness today began in the nineteenth century. Traditionally, the most important mangrove products were tannin, charcoal, poles, wood chips, fodder and alluvial metal deposits (mainly tin). Later, aquaculture, agriculture, industrial development, harbor expansion, road building, and other activities contributed to the destruction of mangroves [22].

The rate at which mangroves have been disappearing from the Philippine coastal zone is alarming and tragic. The National inventory today stands at only one quarter of the original. In 1989, the question as to whether this rampant exploitation should be stopped is not on the agenda. The only real question is who will stop it, how, and when. Like the uplands forest, no one owns mangrove land. It is part of the unalienable commons and therefore related conservation policy does <u>not</u> involve individual property rights!

The situation for seagrasses and seaweeds is not so clear because inventory of these submerged resources is more difficult to accomplish by a factor of 10 or 100 fold. However, expert opinion holds that losses are severe.

Approximately 450,000 ha of mangroves were thought to exist in 1918. By 1972 this had dwindled to 228,000 ha and by 1988 to about 140,000 ha (Table 3.3-1). The remaining stands are widely scattered, but tend to be concentrated on Palawan (with 22% of total area), the east and southwest coasts of Mindanao (32%) and the Eastern Visayas and Bohol (with 23%) [8]. In terms of biological diversity and economic value, the decline in mangroves has been more significant than strictly areal measures would imply. LANDSAT statistics for the early 1980's indicated that there was almost no old-growth mangrove left in the country. About 10,000 ha were identified, of which two-thirds were in Palawan and one-third in Zamboanga del Sur [8]. The remainder is second growth.

The steady reduction in the past several decades can be attributed to the harvesting of mangroves for charcoal or fuelwood production, followed by forest clearing for fish pond establishment. Physical expansion of coastal communities may also have played a role [8].

Table 3.3-1

National Summary of Mangrove Area Statistics 1972-1988
(in hectares)

	1972	1988
Luzon	34,409.9	22,700
Visayas	38,467.6	37,325
Mindanao	1/ 120,066.3	2/ 37,400
Palawan	35,004.1	42,300
Total	227,947.9	139,725

1/ Does not include Tawi-Tawi.

2/ Does not include Sulu and Tawi-tawi.

Source: [24]

Now the most significant threat to the Philippine mangrove ecosystems may be their continuing impoundment for ponds which are used primarily for raising milkfish (bangus). Rapid development has led to an increase in ponds from 88,681 ha in the early 1950's to 195,832 ha in 1981 [23]. Although the government has issued two Presidential Decrees (Nos. 704 and 705) and three Conservation Decrees (Nos. 950, 1121 and 1152) to protect mangrove forests, they are still being destroyed at a fast rate.

According to Miguel Fortes [22], the most senseless exploitation is the clear felling of mangrove areas to build shrimp ponds that still rely on the recruitment of larvae from the reproductive stock at sea for seasonal restocking. Likewise, shrimp ponds built on clear-felled mangrove land may cease to be economically viable enterprises after a couple of years because natural recruitment of larvae no longer occurs.

Until recently, overharvesting and lack of replanting has been the usual source of degradation, as with upland forests. Most of the generalizations about logging policy and practice in the Philippines are applicable to mangroves [8] (see Annexes A and E). Commercial uses such as for timber, wood chips or viscose rayon manufacture have taken their toll. Local fuelwood demands lead to continuous cutting of branches and results in stunted shrubby trees which further tilts future use towards local subsistence [8].

According to the recent SPOT survey (1987-1988), about 95% of the present (1988) fishpond area of 205,000 ha was derived from mangroves [8]. Rough calculations show an average rate of increase in fishponds of 4,100 ha/year, close to the rate of decline of mangrove area. Despite supposedly tight restrictions on conversion of mangrove areas to fishponds after 1980, in the last seven years, the estimated reduction in mangrove area of 3,700 ha/year has continued to parallel the increase in fishpond area.

Fishpond conversions are often the final product of a process of destruction which convinces authorities that particular mangrove stands are no longer of value. The Forestry Management Bureau (FMB) or the Department of Agriculture (DA) has little or no presence in mangrove areas and apparently no effective ability to prevent illegal cutting. Once the mangroves are degraded through logging or natural causes, or in response to political influence, they are likely to be reclassified and jurisdiction transferred

to the Bureau of Fisheries and Aquatic Resources (BFAR), which in turn is likely to approve leases for fishpond conversion in the interest of raising fisheries production [8].

The threats to the seaweed and seagrass floras in the country come mainly from the over-exploitation of local stocks of economically important seaweed species, destruction of habitats due to pollution both from natural sources and industries, and from reclamation of coastal areas. The economic incentives which come with the increasing demands for seaweeds (as raw material for the colloid industry or as food) is a major factor in the increasing threat to several of the seaweed species now being exploited [26]. Many of the local stocks of Gracilaria, Gelidiella, Caulerpa, and Codium are in danger of being lost due to over-exploitation. The case of the genus Eucheuma is a classic example of a seaweed which was almost lost due to over-exploitation. The development of its culture technology saved this seaweed from total depletion [26].

There are increasing demands on seagrass beds as avenues for transportation, for homesteads and as dumping sites for wastes. The ecosystems are being destroyed as a consequence of the establishment of marinas, ports and adjacent industrial complexes, and the construction of waterfront housing. These activities largely conflict with the objectives of coastal resource conservation and sound management in the region [22].

Mangrove forest destruction allows land derived runoff into seagrass beds, causing smothering, shading, and eutrophication. These consequences inevitably lead to a reduction in both primary and secondary productivity, primarily because of a lowered photosynthetic rate [22]. Seagrass bed removal renders the sediments unstable. Sediments are then carried by currents or storms to mangrove areas where they may have detrimental effects, e.g., destruction of the nursery and feeding grounds or alteration in food-web patterns [22].

3.4 Current Management

The general policy of the GOP is to protect remaining mangrove forests of the country. Any official permission given nowadays to remove mangrove trees must be considered an exception (and there have many exceptions made for aquaculture ponds in the recent past). Yet a certain number

of illegal actions are also taken that result in losses. All in all, the depletion of natural mangrove stands has been greatly slowed by GOP actions taken specifically to discourage further exploitation.

By Presidential Proclamation (Nos. 2151 and 2152) 74,267.9 ha and 4,326.5 ha of mangrove forest were set aside, respectively, as conservation and preservation areas. There are "rampant illegal activities" within these areas [27]. In other GOP actions, a National Mangrove Committee was established in the mid-1970's, reorganized in 1980 (Special Order No. 178), disestablished in June 1987, and reestablished in November 1987. It has served many purposes related to research and conservation of mangroves [27] including evaluation of 177 applications for various mangrove utilization projects (141 were approved). The following is a set of prioritizations used by the National Mangrove Committee in making past recommendations for special protection areas for mangroves:

- mangroves areas adjoining the mouth of major river systems, covering at least 3 km distance along both sides of the river fronting the sea;
- mangrove areas near or adjacent to traditional productive fry and fishing grounds, areas of importance as breeding, spawning and nursery waters for fish and shellfish;
- mangrove areas near populated areas or urban centers, for use by people dependent on mangrove forest products;
- mangrove areas of significant hazard if developed because of storms, erosion, floods;
- mangrove forests which are primary or pristine and have dense young growth, in view of their important roles in local ecosystems; and,
- mangrove forests on small islands, forests which are important components in such small ecosystems.

The National Mangrove Committee appears to be inactive at the present time for reasons that are obscure or complicated. It can be activated at any time by senior officials of DENR, apparently, if it has important work to do. Staff functions are performed by DENR's Ecosystem Research and Development Bureau, (ERDB) in Los Baños.

Thus, while an apparatus for mangrove protection is place, it is only partially working and losses of an unknown extent continue. But at the same time a grassroots voluntary reforestation movement started 10 or 12 years ago in the South, and is now being officially supported in certain places by technical assistance (the seeds are easily available locally and no hardware or chemicals are needed). Replanting appears to be essential in many areas as natural reforestation of denuded tideflats is often very slow. The local self-help spirit that started the mangrove reforestation movement augers well for the future. A well organized pilot study is underway by the Central Visayas Regional Projects (CVRP) which incorporates not only mangrove replanting but many other "community - based" project components (see Chapter 6.0 on Micro-Scale Coastal Zone Management).

3.5 Future Directions

The GOP is aiming in the right direction but must increase its resolve to improve and enforce regulations and to expedite rehabilitation of denuded mangrove forest areas.

The CVRP program has encouraged mangrove replanting as part of a broader package of technical assistance to pilot areas. This appears to be a workable prototype but will require visits by Community Organizers and probably the furnishing of certain supplies and materials to community groups.

The following are ingredients of a draft plan (slightly modified) generated by the National Mangrove Committee and its DENR/ERDB staff [27] as on going "Recommendations/plan of action":

- Consult with mangrove dwellers and end-users in policy-making;
- Encourage participation by private sector and Regional DENR Officials;
- Amend PD 2151 and 2152 in proper consultation with concerned agencies;
- Cutting ban of mangrove must be partially lifted in FLA (Fishpond Lease);

- Create an inter-agency working committee to reconcile the positions of BFAR and DENR on the status of unproductive fishponds and unutilized FLA's;

- Strictly follow and observe provisions of PD 704 and 705; and,

- Formulate/draft a 25-year mangrove stewardship certificate/contract that will give mangrove dwellers and users tenurial rights in their occupation of mangrove areas.

The objectives should be supported in any macro- and/or micro-scale coastal zone management programs that are created for the Philippines.

With respect to the strengthening of enforcement of mangrove laws, rules and regulations, the following courses of action were recommended by DENR/ERDB on behalf of the National Mangrove Committee:

- Conduct a massive information campaign on the strategic importance of mangrove areas;

- Involve NGO's, local government and the religions, e.g., the Catholic Bishops Conference of the Philippines (CBCP);

- Coordinate with the media; and,

- For illegal fishponds:

  - make the developer rehabilitate an area equal to his illegal fishpond area;

  - put the illegal fishponds up for bid (with the present operator having the right to equal the highest bid); and,

  - give the management to the barangay where it is located under the supervision of BFAR.

There is a clear consensus that progress in Coastal Zone resources management depends upon an intensive education program involving all the media and continual closeup work by extension agents and community organizers. Toward this end, the National Mangrove Committee is advancing the following strategy [27]:

- We came up with the strategy on how to develop an effective and efficient mangrove conservation information dissemination campaign by enumerating available and popular media such as posters/comics, leaflets, magazines, newsletter and the like. Then, measures of media effectiveness were identified a) appropriateness; b) impact; and c) implementability. Media were rated as high (1) medium (2) and low (3).

- We have prioritized the media according to its applicability to each particular target audience by summing up the respective values that were rated.

- We found out that informal meetings, dialogues and radio were highly prioritized for community level, while slide video, posters/comics and interpersonal communication/extension agents were considered the least among the identified mediums.

- Leaflets, slide-video and newsletter were the best mediums being identified for research planners and policy-makers. While television, trainings, symposium/workshops and experiential cross visits were the least among the mediums.

- The law-enforcers will be best reached through leaflets and slide-video. Other mediums such as posters/comics, radio, trainings, symposium/ workshops, and experiential cross visits could be given second priority.

4.0 FISHERIES

4.1 Overview

The problems that beset the Philippine fisheries are widespread and deep running, with serious consequences for the one million persons employed in the fisheries sector (including 574,000 in nearshore artisanal fishing, 176,000 in aquaculture, 45,000 in commercial fishing) [8]. With total employment at 1,044,000 [11], it is assumed that about 249,000 are casual workers in the fishery sector.

The fisheries sector produces 55 to 75% [1, 8] of the Philippines animal protein consumption, over 5% of GNP, and nearly US$250 million in foreign exchange earnings.

The following USAID summary of the fishery sector for 1980 is still relevant for 1989, because the 1980's have been a period of fisheries stagnation [1]:

> "The Philippine nation is particularly dependent upon fisheries as a source for as much as 75% of the country's animal protein supply, and the traditional or municipal fishermen harvest 60% of this fish. With future population levels ... it is obvious that extreme pressure will be placed upon the fishery resources of the country.
>
> Resource managers in many countries have not fully grasped the consequences of the fisheries dilemma now emerging in Southeast Asia. Official views often hold that abundant stocks still exist, while in fact, few do and many are overexploited. Official views commonly state that there are opportunities for increased employment in fishing, while in fact the catches are already divided among too many fishermen... official plans call for rapidly increasing harvests of fish when this is probably not possible." [1]

4.2 Diagnosis

Analysis of the Philippines fishery situation as of mid-year, 1989, leads to the following conclusions:

1) Fishermen are at the bottom of the economic ladder.

2) Virtually all marine fisheries are in a state of depletion.

3) Fisheries production has remained stagnant since 1982.

4) The total number of fishermen in the workforce is too high.

5) The catch per unit of (artisanal) fishing effort is too low and decreasing.

6) Per capita consumption of fish and shellfish is declining.

7) Causes of above are: overfishing, destructive fishing, habitat loss and pollution.

It should also be noted that the average fishpond production per hectare appears to be declining.

4.3 Depletion of Fishery Stocks

The depletion of the Philippine marine fisheries is characterized by stagnation of production in the face of continued increase in fishing pressure. Production rose sixfold in 30 years, from 325,000 metric tons in the early 1950's [4] to two million metric tons in 1983; but it has remained at this level to the present time (Table 4.3-1 and Figure 4.3-1).

Notwithstanding this stagnation, fish and other food products from the sea are the Philippines "main source of low-cost animal protein" accounting for more than two-thirds of this protein. Per capita consumption has been in the range of 16 to 18 kg during the 1980's.

4.4 Fishing as a Livelihood

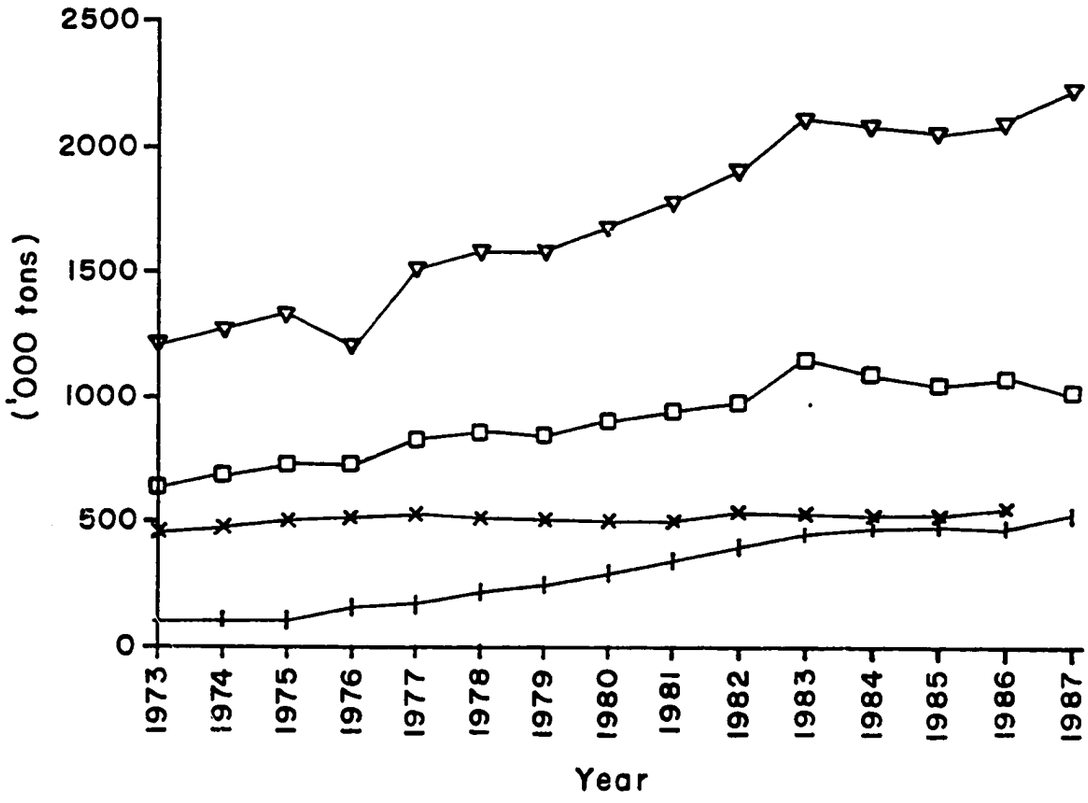
The predicament of the municipal (artisanal) fisherman has worsened in much of the country. According to a recent World Bank report [8], the average catch rate (catch/unit effort) of a fisherman has fallen by 42% in the last ten years in four main fishing regions (Bicol, Central and Eastern Visayas, and Southern Mindanao). In some other regions the catch rate has been maintained only by the use of heavy duty commercial boats and gear, which jeopardize

Table 4.3-1

Summary of Production
by Fishery Sector 1978-1987
(in metric tons)

Year	Total	Commercial	Municipal Marine	Municipal Inland	Aquaculture
1978	1,580,404	505,840	686,890	171,019	216,655
1979	1,581,303	500,747	635,538	203,820	241,198
1980	1,672,254	488,478	647,284	247,326	289,166
1981	1,772,897	494,768	709,989	228,639	339,501
1982	1,896,983	526,273	708,016	270,346	392,348
1983	2,110,230	519,316	770,988	374,853	445,073
1984	2,080,439	513,335	789,975	299,242	477,887
1985	2,052,111	511,987	785,132	260,250	494,742
1986	2,089,484	546,230	807,275	265,086	470,893
1987	2,213,040	591,192	816,247	244,631	560,970

Source: [7]



LEGEND :

- Aquaculture
- Municipal
- Commercial
- Total

Aggregate fish production, 1973 to 1986
Source : [7]

Figure 4.3-1

fish stocks, habitats, and livelihoods of thousands of artisanal fishermen.

The fishery for "small pelagics" (small, schooling, off-the-bottom fishes), which is so important to the small artisanal fisherman, has been particularly hard hit. The catch rate (catch/unit effort) is now only one-tenth of what is was just after WW II (Figure 4.4-1). The total catch has stagnated at about 260,000 metric tons.

A rise in real price per kg of fish paid to municipal fishermen (which could compensate for the smaller catch per fisherman) has not occurred in the years since 1982. In fact, the price has barely kept ahead of inflation. From 1982 to 1987 the total catch value in pesos rose 90.5% while the value of the peso itself dropped by 85.6% (Table 4.4-1). This price stagnation has meant that fishermen cannot move above their state of dire poverty. About 370,000 Philippine fishing families are living below the poverty line (2,500 pesos per month) and 270,000 of these have sunk to the "poorest of the poor" (with cash incomes less than 1,000 pesos per month) [8].

4.5 Aquaculture

A dismaying proportion of the scarce mangrove forests of the Republic have been removed to accommodate fish ponds and prawn (shrimp) grow out facilities (see Chapter 3.0). Current estimates show that these ponds occupy at least 210,000 ha of intertidal lands. Many are defunct and barren of production because of brain failure on the part of their developers e.g., many ponds would not even hold water.

Much of the pond hectarage is used for production of milk fish (bangus) for local markets. However, the most lucrative business is the production of prawns for export, a business which was very strong in 1988 because of failure of Taiwan production and high prices, but weak in 1989 with production costs (about US$4.50/kg) about equal to the international sales price.

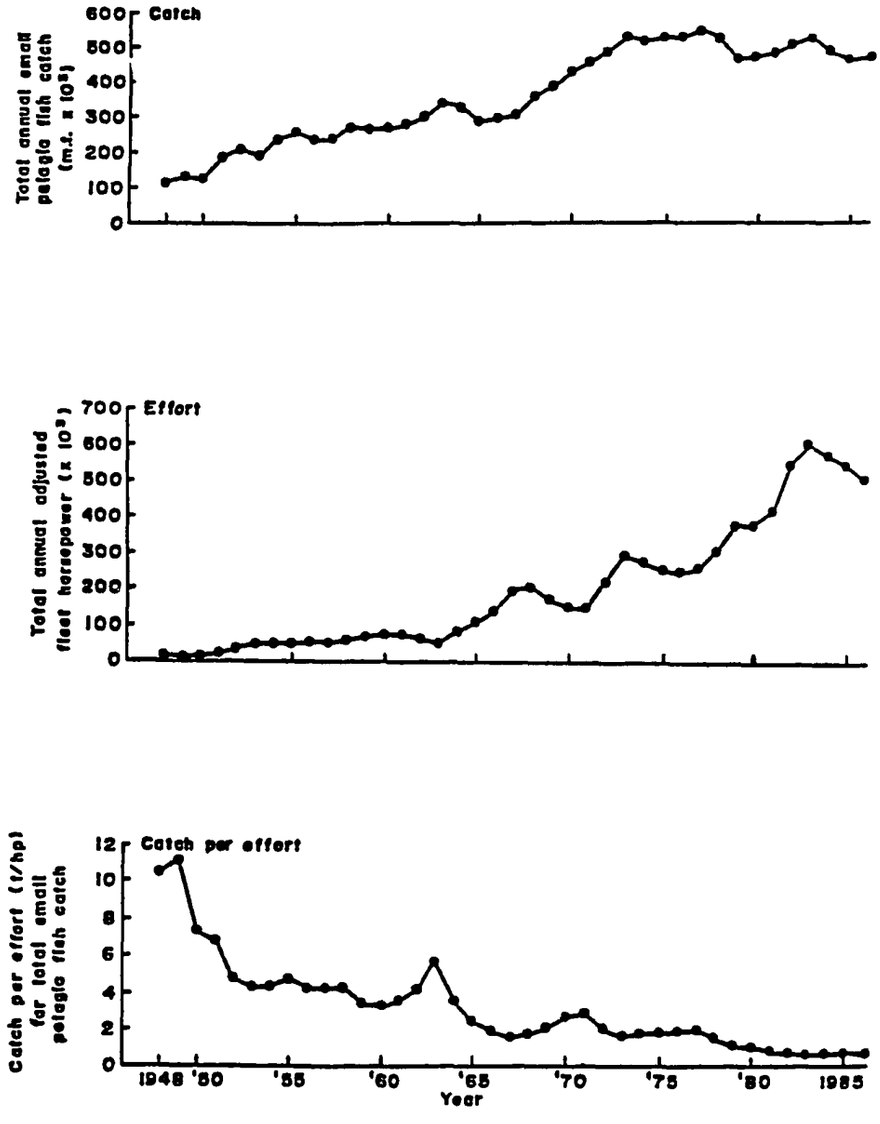
In any event, aquaculture is not expected to offer much help in either increased production or export sales in the near future. A breakthrough might come with the successful advent of hatcheries to produce seed stock (fry). As of now the destruction of the natural habitat of prawn and milk fish fry (shallow tidal flats and mangrove forests) has created a scarcity of seedstock.

Table 4.4-1

Municipal Fisheries Value and Peso Exchange Rate

Year	Catch Value in Million of Pesos	Pesos/US Dollars
1983	7,463	11.1
1984	10,291	16.7
1985	12,795	18.6
1986	14,611	20.4
1987	14,216	20.6
Difference	90.5%	85.6%

Sources: Refs [7, 8]



Time series of total small pelagic fisheries catch, fishing effort and catch per unit effort from 1948 to 1986. Source: [9]

Figure 4.4-1

It is important to see the prospects for aquaculture in the context of community socio-economic development. According to Ian Smith [56] "A socially feasible aquaculture system requires that coastal communities participate in decentralized planning for the adoption of aquaculture technologies and that benefits be widespread. Projects justified solely on technical and financial grounds usually fail to take into account the socio-cultural and institutional setting of coastal communities and there is the danger that the interests of these communities are being overlooked in the drive by many nations for foreign exchange earnings from such coastal cultured species as shrimp which require large-scale investments."

Smith also holds that, "Valuable lessons for aquaculture development planning and implementation can be learned from experience with agriculture's "green revolution" and the "appropriate technology" movement. Factors that need to be taken into account when planning socially feasible coastal aquaculture systems include: (1) informal and formal institutions, especially those of a legal nature that govern property or use rights in the coastal zone; (2) sources and degree of concentration of coastal community wealth; (3) male and female labor use patterns and availability; (4) extent of previous community collective actions and strength of local leadership; (5) previous experience with aquaculture or technological change in other sectors; (6) present technical and managerial skill levels; (7) extent of community linkages with external institutions, such as credit, extension and markets; and (8) socio-cultural aspects of community power structures, role of local elites, and consumer preference". [56]

4.6 Future Directions

From the perspective of this report, the most important future actions bear on the supply side of the fisheries equation. Therefore, improving, enhancing, and rehabilitating fishery areas and fish habitats are at the top of the agenda. Increasing fishing power and capability have been inapplicable since fish stocks became over exploited in the early 1980's. In fact, present thinking is to reduce the efficiency of commercial large-scale fishing to keep more artisanals in business.

Far and away the most important work is to stop illegal fishing. Illegal nets, explosives, and chemicals are not only wasteful methods of taking fish, but they also may cause serious damage to the habitats (e.g., coral reefs) and to fish stocks. President Aquino's Administration Order No. 114 of February 1989 (prevention of destructive fishing) states a good intention but real enforcement must now start. Not even mentioned in the Order was muro-ami fishing, a most destructive practice.

It seems that the commercial fishery units with larger boats could expand to some extent into oceanic stocks and thus take some pressure off more inshore stocks of fish. Such initiatives should be pushed in the future by fishery projects. There is plenty of ocean to explore within the national jurisdiction.

In the context of this report, it is sufficient to point out about aquaculture that it should be included in micro-scale Coastal Area Management and Planning (CAMP) (suggested in Chapter 6.0) as a possible source of alternative livelihoods.

5.0 PROTECTED AREAS

5.1 Overview

The Republic of the Philippines passed legislation for a national park program in 1932 and designated its first park in 1940 (the Hundred Islands National Park in the Lingayen Gulf). Since then, GOP has been experimenting with a great variety of approaches to land and sea natural area protection, none of which has accomplished permanency.

As of 1989, one could charitably describe the GOP protected areas program as transitional, less charitably as chaotic. Today the Republic of the Philippines has, at the best, a system of "paper parks"; at worst, it has no system at all for its 71 National Park-type areas. In the absence of a coherent program the future appears to depend less on GOP plans and policies and more on NGO and local strategies and upon the energies of a few motivated individuals. Where there is light today it is in the arena of these latter two.

5.2 Status of Protected Area Management

Protected areas in the generic sense are specific land or water areas designated for special control of exploitation. Protected areas get their right for protection from their rights of ownership. A private owner or a government agency can declare rules on use of the park with every expectation of conformance by the public, because the Government owns the area. This is quite different from regulation of use which is done through the police power of the state where ownership of the area is not prerequisite.

In the time available, we could not identify even the minimum ingredients of a national protected areas system, such as: a professional ranger corps, management plans for the 71 sites, organized enforcement programs, clear definitions of protected area types, strategy documents, etc.

The various national protected areas that do exist, and 71 are listed by Parks and Wildlife Bureau (PAWB) [28], are mostly ignored by GOP and occupied by squatters and scofflaws. The major reason given for this situation is that poverty has driven landless poorfolks into the parks. Only a few national protected areas have professional

rangers in residence. The various national designations of the past 49 years appear to have been made by whimsy rather than design and no effort seems to have been made subsequently to consolidate, review, and revise the "program" to give it coherence. We have identified nine types of protected areas (Table 5.2-1) that have been created (or sanctioned) by the national Government. Five of these types are sub-categories of the main "National Park" category according to the PAWB listings [28].

Integrated Protected Areas System

An idea apparently created by the Haribon Foundation in 1988 that has received a good welcome from DENR is the "Integrated Protected Areas System", or IPAS, which Haribon hopes will save 95% of the remaining species of flora and fauna. The IPAS asks to establish, manage, develop, protect, and conserve areas in a manner that will leave them un-impaired for the benefit and enjoyment of the present and future generations. Six categories of national protected areas are suggested: (1) Strict Nature Reserve, (2) National Parks, (3) Marine Parks, (4) Wildlife Sanctuaries, (5) Wilderness Area, (6) National Recreation Areas. These categories are defined, and the administration, management and development of the parks are then described in detail. The IPAS plan exists only on paper as of August 1989. A suggested budget of IPAS, if it could be supported by debt-for-nature swap dollars, is as follows (from an informal briefing paper prepared for President Aquino in July 1989):

Components of IPAS	Suggested Funding, Level (Million $U.S.)
1. Protected Areas Development, Protection and Management (including the preparation of each park's management plan)	22.5
2. Buffer Zone Management and Public Consultation(adopting multiple use strategies and zoning plans)	10.0
3. Training and Professional Development	3.0
4. Information and Public Awareness	3.5

Table 5.2-1

Types of Protected Areas in the Republic of the Philippines

Type	Ref.	Examples	Comments
1. National Parks			
National Park	28	Bataan National Park - 23,688 ha Quezon National Park	National Park category also includes other types of national areas (see below).
Monument	28	Capas Death March Monument - 2 ha Northern Luzon Heroes Hill - 1,316 ha	Act. No. 3915 gives all N.P.'s the status of game refuges and bird sanctuaries (2g).
Memorial Park	28	Aurora Memorial Park - several	
National Seashore Park	28	Agoo-Damortis National Seashore Park	
National Marine Park	28	Tubbataha Reef Marine Park - 33,200 ha	Only one marine park established to date.
2. Barangay Forests Parks	28		Also may be called Forest Tree Parks - range from 1.0-57.0 ha; most declared in 1988 as part of GOP decentralization.
3. Game Refuge and Wildlife Sanctuaries/Barangay Municipal Parks	28	Palawan - 763,399 ha Linguasan March - 30,000 ha	All areas listed by PAWB as game refuges and wildlife sanctuaries are termed "Barangay-Minicipal Parks".

Table 5.2-1 (continued)

4.	Wilderness Areas	28	Bohol Mangrove Wilderness Area - 547 ha	Very few of this type - only 9 listed by PAWB (8 of which are mangrove).
5.	Marine Sanctuary	32	El Nido Marine Sanctuary - 34,300 ha	El Nido is operated by DENR (with assistance from WWF "Debt for Nature Swap" program).
6.	Marine Reserve	31	Apo Island Reserve	"Marine Reserve" is used regularly to indicate "core" (marine area under strict protection; no exploitation or disturbance allowed); it is usually contained within a larger (3 to 4x) protected area.
		33	Sombrero Island	
7.	Biosphere Reserve	34	Puerto Galera Biosphere Reserve	This appears to be the country's only B.R.; has official approval of UNESCO.
8.	Tourist Zones	33	Apo Reef	These were declared as tourist zones and /marine reserves under P.D. 1810 (1978) but review indicates them to be marine coastal zone management zones, not protected areas (see Table 5.3-1).
9.	Watershed Reserve	30	Various	Managed by the Forestry Bureau of DENR.

5.	Ecological Information Base, Researches and Surveys	6.5
6.	Program Management and Support for the DENR (10% of total allocation).	4.55

Haribon has selected 66 areas throughout the Republic which it believes should be protected in the IPAS program, most of which are quite familiar as the areas conservators have been trying to save for years.

In the future, more government intervention in coastal development and resource conservation will be needed.

5.3 Coastal and Marine Protected Areas.

Status

The following was the situation in 1986, according to a staff report of DENR's predecessor agency [29].

> The role of marine parks/reserves in the National Parks System has never been clearly defined. As such the present system for their development and management as provided for by existing legislation is ambiguous and inadequate. As a result, no national marine parks/reserves have been declared to date (1986) although four municipal marine parks and at least two marine fish sanctuaries are in existence.
>
> Several major issues have to be resolved before a truly efficient system for marine parks/reserve ... could be developed. Perhaps foremost among these issues is the question of legal jurisdiction. Two major government agencies are mandated to manage marine parks/reserves: the Ministry of Natural Resources and the Philippine Tourism Authority. Jurisdictional overlaps also exist between the Ministry of Natural Resources and the Ministry of Agriculture and Food. (This same 1986 source states that a total of 63 sites were declared as marine protected areas by different legislations.)

Matters have become more complex in the intervening three years, but complex for the better one hopes. First, a new major initiative appears successful, i.e., the "Debt for

Nature Swap" arrangement by the office of the DENR Undersecretary for Research and Environment. The funds available are used for upgrading the management prospects for the St. Paul National Park and El Nido Marine Sanctuary on Palawan.

Candidate National Sites

A great deal of scientific effort has been applied to location and description of sites for national protected areas in coastal or marine settings.

Starting in the late 1980's, up to 140 sites were identified as possible candidates. But there exists today no official GOP list of proposed coastal/marine parks. However, one could be assembled in short order from existing records.

The GOP did proclaim a list of tourist zones/marine reserves (Table 5.3-1) which has not been rescinded [33]. The proclamation (P.D. 1801) states that: "No development projects or construction for any purposes be introduced within the zones without prior approval of the President of the Philippines upon recommendation of the Philippine Tourism Authority." Thus, it would appear to be more a list of CAMP "critical areas" for regulatory control than a list of protected areas. We have accepted it as such for the purposes of this report.

This CAMP approach seems to agree with the direction of the current administration of the Philippine Tourism Authority (PTA) which is to encourage community-based resource management in its listed touristic zones, for example, Puerto Galera [34]. However, it seems that PTA never did fulfill its mandate under PD 1801: "The PTA shall delineate well defined geographic areas within the zones with potential tourism value, promulgate rules and regulations subject to the approval of the President, and coordinate the integrated development of these areas for the optimum use of natural assets and attractions, as well as existing facilities." Therefore, protected area interests still have concern whether or not these zones constitute protected areas [29]. We believe the opposite, i.e. these "tourist zones/marine reserves" should be dealt with using the CAMP approach not as protected areas.

At present, it appears that the following coastal/marine areas are the highest priority for national protection:

Table 5.3-1

Islands, Coves, and Peninsulas Designated as "Tourist Zones and Marine Reserves" Under PD 1801"

- Whole of Batangas Coastline and the Offshore Islands of:

  - Fortune Island
  - Maricaben Island
  - Gaban Island
  - Ligpo Island
  - Malahibong Manok
  - Verde Island

- Fuga Island, Cagayan Province

- Oriental Mindoro

  Puerta Galera

  - Puerta Galera
  - Balatero Cove
  - Medio Island

  Bulalakao

  - Buyaoyao Island
  - Aslom Island
  - Bating Peninsula
  - Maasim Island
  - Balatasan Cove
  - Pocanel Island
  - Opao Island
  - Buyallao Peninsula
  - Suguicay Island
  - Libago Island
  - Sibalat Island
  - Pambaron Island
  - Apo Reed Island

- Boracay Island, Aklan

- Dumaguete

  Apo Island
  Siquijor Island
  Selinog Island (between Negros & Cebu)
  Aligway Island

Table 5.3-1 (continued)

- Cebu
- Tagbilaran (Bohol)

  Panglao Island
  Cabilao Island
  Balicasag Island

- Tacloban

  Guian, Eastern Samar
  Gigantangan Island, NW tip of Leyte

- Palawan

  Busuanga Island
  Coron Island
  Puerto Princesa & Surrounding areas
  Malampaya Sound and Islands
  Canaron Island
  Solitario Island
  Bacuit Bay Island
  Balabac Island
  Fort Bunton
  Busuanga Island

- Cagayan de Oro, Misamis Oriental

  Al-Sulnuan Point (West of Cagayan de Oro City)
  Camiguin Island

- Zamboanga

  Big and small Sta. Cruz Island
  Sangali Cove
  Sacol Island
  Ayala/San Ramon
  Malanipa Island

- Davao

  Maliputo Island - Talicud Island
  Ligig Island
  Eastern side of Samal Island

- Sombrero Island
- Honda Bay
- Apo Reef.

Each has been the subject of management guidelines formulation [29] and therefore could be ready in short order for national protected area designation. Any new designation would appear unwise until the present chaotic state of national protected areas is remedied.

Non-Governmental Organization Role

Recently non-governmental organizations (NGO) have been playing a more important role in conservation, including protected areas, by serving as "middleman". One example is the newly formed Tubbataha Foundation (Manila), established for the specific purpose of assisting in the management and protection of the Philippines "first marine national park" on the Tubbataha National Marine Park. The Foundation collects funds to assist the management program (no special funds have been budgeted by DENR for the new park) and acts through media contacts to publicize any damaging activity (e.g., a recent major effort to start a seaweed farm in the park) and to stimulate the Coast Guard to patrol the Park and the arrest dynamite fishermen.

In another example, the Haribon Foundation has an even closer relationship with two protected areas, St. Pauls National Park and El Nido Marine Sanctuary, both in Palawan. Working with World Wildlife Fund-U.S., Haribon was able to create a fund of US$2,000,000 in pesos (over 5 years) to accomplish a series of conservation projects. Ten percent of the annual allocation goes to pay for development and management of El Nido Marine Sanctuary, a 34,300 ha protected area (water only). The staff presently consists of eight people, of which 5 are rangers permanently in the field (eventually there will be 9). A main patrol boat and some smaller ones have been obtained along with radio equipment and other necessities. A headquarters office in El Nido Village and two ranger stations have been built. The rangers are actively patrolling the Sanctuary, mainly to discourage destructive fishing (but they have no authority or equipment to make arrests).

It is significant that El Nido and St Pauls are the only national protected areas (outside Manila) that are

really operational and that they are both managed from an Undersecretary's Office and not by PAWB.

Another NGO thrust that appears promising is the "adopt-a-park" program in which institutions (or individuals) provide care and support to a selected protected area (the way Tubbataha Foundation does for Tubbataha National Marine Park).

Local Government Role

Local government units (LGU's) have been actively experimenting with conservation in the last 10 years. The LGU approach is strictly economic and does not involve such intangible goals as protecting biodiversity. Yet the LGU initiative as presently developing could be broadened in scope to include "pure" nature protection. It is only a matter of incentives.

The first LGU experimenting with protected areas was the municipality of Oslob, Cebu, which created a marine sanctuary in 1974 at Sumilon Island in cooperation with Silliman University's pioneer work in this field by Dr. Angel Alcala [31]. The sanctuary was the core zone of a larger reserve that extended around the island and comprised about 33 percent of the whole reserve. The Sumilon Reserve has had a somewhat unstable political history, finally ending with fishermen freely violating the Sanctuary, beginning in May, 1984 (another "Tragedy of the Commons"). But research benefited greatly from this political failure, in that Silliman scientists were able to compare before and after data sets and show conclusively that with the sanctuary in operation fishermen's catches were double (1.98 kg/man/trip rather than 0.99 kg/man/trip [31]).

The Sumilon model was later used in several other Central Visayas municipalities, in work by Alan White [35], and extended to a major test program by the Central Visayas Regional Project (CVRP) in work led by Frederick Van de Vusse [36]. CVRP's nearshore program used a 44 km stretch of the west coast of Cebu from Ronda south to Alegria as a test site. An holistic approach is being applied in cooperation with the LGU's that includes coral reef protection, fishery habitat enhancement, mangrove re-forestation and alternative livelihood initiative [38]. A measure of progress is that 27 municipal reserves with sanctuaries are listed as having been established as of March 1989. (Note: We visited the district on August 8, 1989 and explored the Maolon Paol sanctuary by SCUBA).

Clearly the municipal reserve is a most promising conservation approach and should be formally reorganized as such by DENR in its future planning. The municipal reserve as a form of protected areas is discussed in greater detail in a following section.

Decentralization seems to be the policy of PAWB, particularly in facilitation of the establishment of barangay and municipal "parks" (LOI 1312). Since PAWB is a staff (not line) agency all programs are implemented by regional offices. PAWB has an annual budget of 14.3 million pesos and a central staff of 226 persons [28]. It seems that more staff are involved with Wildlife than Protected Areas.

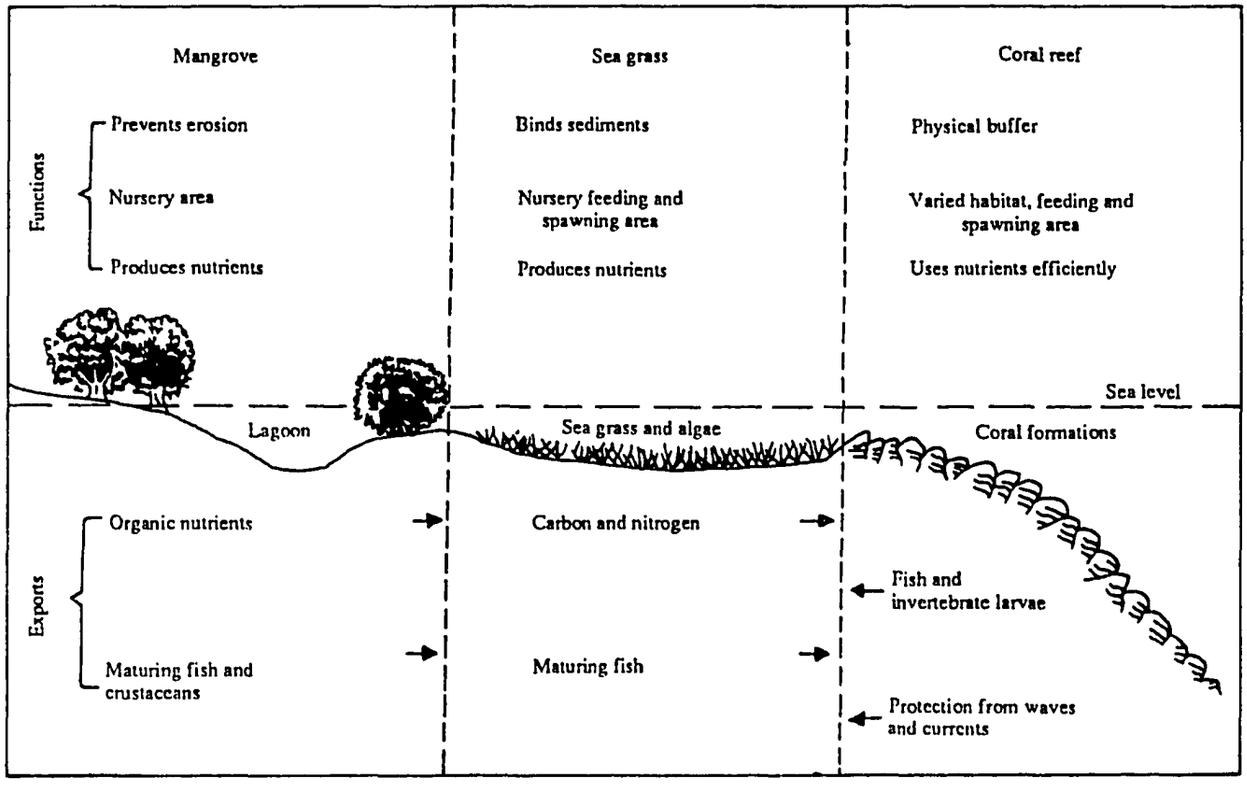
Another agency with some protected area involvement is Bureau of Fisheries and Aquatic Resources (Department of Agriculture) who are responsible for Marine Fishery Sanctuaries, such as Sumilon Island [40].

Ecosystem Parks

For the purposes of maintaining biodiversity and sustaining the economic productivity of coastal ecosystems, GOP should consider creating a new initiative: the establishment of Coastal Ecosystem Parks. These national parks would be few in number and carefully designed and configured to incorporate all the variety of sub-ecosystem components. The ideal coastal ecosystem park could include any of the following: coral reef (to a depth of 30m), reef flats, back reef lagoon (where it exists), seagrass meadows, seaweed beds, tide flats, mangroves, small bays/lagoon systems, river deltas, soft bottoms, and sandy beach and dunes (where they exist).

The idea is to incorporate the broadest diversity of sub-ecosystems/habitat types and therefore, hopefully, of coastal species support systems. Another goal is to be able to demonstrate the connectedness of the various components in the clearest way possible (e.g., Figure 5.3-1). It would be desirable in a practical sense to select sites such as Calauit Island (north Palawan) which is one of a few national protected areas to be fully protected at present and to have a resident ranger staff.

This would require policy and budget action by DENR followed by survey, prioritization, selection, management planning, and implementation. Because of the presence in the Republic of numerous well trained professional



Example illustration showing mutual benefits among coastal habitat types. Source: ref [20]

Figure 5.3-1

scientists, the survey and selection process should not be a problem.

Future Directions

A major need for GOP is to organize its protected areas activities and create a master plan based on the idea of an integrated system such as that advocated by Haribon Foundation as the Integrated Protected Area System (IPAS). The following should be done:

- Policy and Legal Review. A review of all protected areas with national destiny as a guide. Policies and laws should be reformulated to provide coherent expression to the national need for protected areas.

- Create a National Master Plan. A master plan and new design for a national protected areas program should be created around the idea of IPAS. It should articulate national needs, types of protected areas, jurisdictions, institutional mechanisms, selection process, sources of revenue (including user fees), planning principles, professional training of staff, enforcement methods, roles of NGO's, and so forth. It should contain terrestial, coastal, and marine elements.

- Create a Sub-National Strategy. A great variety of barangay and municipal coastal protected area schemes are evolving. They need national guidance and technical/monetary support. The various technologies that enable these protected areas to be successful need continuing experimentation, and transfer of results to the beneficiaries. A corps of community organizers should be employed and given special training about coastal technologies and cultures.

A major problem has been sources of funds for planning and management of protected areas. GOP should explore all possibilities for continuing sources of support for protected areas, particularly user fees, which are appropriate for international tourists who come mostly on package tours (US$10-15 added to each package would not be a deterrent). It seems likely that debt - swap programs can be relied upon for some help, but probably only in the near term.

It is important to carefully consider the respective roles of central and regional offices of DNR (and any other agencies involved). It may be necessary to retain a good share of control of national protected areas in Manila in order to maintain the highest standards of area management and staff professionalism.

Also, special attention should be given to the benefits of NGO involvement in the planning and management of protected areas. A policy should be formulated as part of the master plan which sets forth the terms and conditions (lease, contract, concession, etc.) under which NGO's might manage protected areas.

6.0 COASTAL ZONE MANAGEMENT

6.1 Overview

In this section we examine two quite different aspects of CAMP. One is macro-scale management which involves the national issues related to economic development of the coast such as international tourism, ports, manufacturing plants, etc., and the other is micro-scale which involves the municipality and barangay level of political organization. GOP made a good start in macro-scale CAMP in the 1980's and this activity should be re-energized in the 1990's. In the last five years, regional entities, Local Government Units (LGU's) and NGO's have made impressive progress at the micro-scale.

Coastal occupancy and coastal development have caused wasteful depletion of coastal resources, waste that is not a necessary consequence of economic progress. With the knowledge now accumulated and the techniques that have been created for coastal area management, this trend can and should be reversed. With appropriate guidance through integrated Coastal Area Management and Planning (CAMP) program, coastal communities can both maintain long term economic growth and conserve their natural resources for highest sustainable yields. But to do this, the CAMP program has to involve both resources management and development management and it has to integrate the concerns of all relevant sections of society and the economy. It is most important that coastal economic development be generated for the people of a country, not for the already rich and powerful.

The first step in solving coastal issues is to identify their causes; the major ones are [47]:

- High population growth;
- Poverty as exacerbated by dwindling resources, disturbed fisheries habitats and lack of alternative livelihoods;
- Large-scale commercial enterprises by organizations outside of the coastal area which displace or do not involve the local people and are motivated to obtain quick profits with little concern for the impact on the coastal environment;

- Lack of awareness about sustainable coastal area management among coastal people and policy makers;

- Lack of effective economic evaluation of the worth, contribution and ecological role of coastal resources to society; and,

- Inadequacies of enforcement of regulations and laws in aiding coastal area management efforts.

The test of any proposed use of coastal resources is whether the use is sustainable; that is, whether the resource can permanently sustain the proposed level of use. The test of any development not based upon renewable resources is whether or not its impacts upon resources and the human environment cause a long term loss, rather than a gain, in social and economic conditions. Also, the development of each local area should be planned to accomplish the maximum of multiple use opportunity; that is, development planning should ensure that fisheries, tourism, habitat protection, housing, shipping, and so forth, all can prosper by creating the optimum mix of uses.

In the future, more government intervention in coastal development and resource conservation will be needed because of: the growth in coastal populations and the social needs that will arise from that growth; increasing pressure on the coast to supply seafood, tourism revenue, and other needs; and the intense competition and conflicts that come with coastal area crowding. There is also the problem that coastal waters are a "commons", i.e., "By the law of nature these things are common to mankind -- the air, running water, the sea and consequently the shores of the sea" (Institutes of Justinian 2.1.1). The commons can only be managed by government intervention, even where that intervention is aimed at protecting traditional uses of the coast by the artisan or small holder.

The Philippine Coastal Zone is officially defined as follows [45]: "The coastal zone is the strip of land and adjacent lake or ocean space (water and submerged land) in which the land ecology and land use directly affect lake and ocean space ecology and vice versa. Functionally, it is a broad interface between land and water where production, consumption and exchange processes occur at high rates of intensity. Ecologically, it is an area of dynamic biochemical activity but with limited capacity of supporting various forms of human use. Geographically, the outermost

boundary is defined as the extent to which land-based activities have a measurable influence on the chemistry of the water or on ecology of biota."

"In determining the boundaries of the Philippines coastal zone, the point of reference used is the zero mark or mean sea level in the 1:50,000 topographic maps. The innermost boundary is one kilometer from the shorelines except at places where recognizable indicators for maritime influences exist like mangroves, nipa swamps, beach vegetation, sand dune, salt beds, marshlands, bayous, recent marine deposits, beach sand deposits and deltaic deposits in which cases the one-kilometer distance shall be reckoned from edges of such features" [45].

6.2 Macro-Scale Program

The national, or macro-scale, program for the Philippines should choose as its model a CAMP System that emphasizes master planning in the planning phase, and specialized project review and environmental impact assessment in the management phase. Clearly, the present institutional mechanisms are inadequate and new ones will have to be created.

The CAMP program should be designed to fit into the current governmental structure in a manner that causes the least disruption of present institutional alignments. The political situation is such that a new agency with strong powers that would preempt the authority of existing agencies would not be acceptable. The CAMP entity would serve in a planning, advisory, and coordinative role within the existing institutional structure, deriving most its clout through environmental impact assessment, development siting, and coastal project guidelines. The CAMP office should be located within an agency that already has appropriate regulatory powers, such as the DENR.

The CAMP program must begin with clear definitions of policy by Government, both legislative and executive, and a clear commitment to follow through. There must be a specific CAMP policy giving direction to the other departments and informing the private sector and international donors of the national intention to control coastal development and conserve coastal resources. Otherwise, all good intentions and all money spent on studies may come to naught [42].

Thus, the first task facing GOP is to reorganize its macro-scale (national level) CAMP which it abandoned after 1984. Very little needs to be changed because the initiative was so extensive and three volumes of reports were published [45]. The policy basis for a Philippine CAMP program is essentially in place and only needs some updating. Legislation has been enacted which taken all together gives a sufficient policy base for an integrated CAMP program. Two major components of the 15 different policy instruments are given below [43].

> Section 26 of Presidential Decree No. 1152 (Philippine Environmental Code) states that the national government, through the Department of Natural Resources (now, DA and DENR), shall establish a system of rational exploitation of fisheries and aquatic resources within the Philippine territory and shall encourage citizen participation therein to maintain and/or enhance the optimum and continuous productivity of the same.
>
> Section 27 of Presidential Decree No. 1152 provides for the measures for the rational exploitation of fisheries and other aquatic resources which include, but shall not be limited to: a) undertaking manpower and expertise development; b) acquiring the necessary facilities and equipment; c) regulating the marketing of threatened species of fish and other aquatic resources; d) reviewing all existing rules and regulations on the exploitation of fisheries and aquatic resources with a view of formulating guidelines for the systematic and effective enforcement thereof; and e) the conserving of the vanishing species of fish and aquatic resources, such as turtles, sea snakes, crocodiles, corals, as well as maintaining the mangrove areas, marshes and inland waters, coral reef areas and islands serving as sanctuaries for fish and other aquatic life.

A policy statement recommended by the Interagency Legal Committee of the Natural Environmental Protection Council (now in DENR) to begin the process of organizing a macro-scale CAMP program is as follows [44]:

> "It is hereby declared a policy of the State to pursue a continuing program of effective management of coastal zones to meet the socio-economic development needs of our country for the benefit of present and future generations. In pursuing this policy, it shall

be the responsibility of all government bureaus, agencies or instrumentalities, including political subdivisions involved in coastal management, to instill awareness to the public about the dangers of the degradation of environmental conditions in the country's coastal zones and encourage active participation of the people in all undertakings to conserve and enhance the country's coastal zones."

Phase One of the CAMP macro-scale program is strategic planning which could take about 1-1/2 years effort. The strategic plan would lay the foundation for the legislation or the executive order that is needed to authorize the program development (tactical) stage that follows. It should: 1) specifically assign responsibility for the program to a particular agency; 2) authorize the funding necessary for program development; 3) state clearly the objectives of the CAMP program; 4) recommend a method for collaboration among the various sectoral agencies and private interests involved; 5) state the time limits involved for various stages of program development; and, 6) require a specific program development or tactical planning and management organizing process [42].

Phase Two would be creation of a master plan including the complete macro-scale program as well as all the instrumentalities necessary for central government assistance of the micro-scale CAMP program. There is no shortage of models for CAMP type programs nor practitioners of CAMP: therefore, what is now needed is the political energy and the wherewithal to engage in Phases One and Two above.

6.3 Micro-Scale Program

It should be noted that integration of national objectives and local needs is a key to success as is maintaining the broadest framework in assisting LGU's. In effect, it would be beneficial to take a regional planner's approach. For example, the organization of a coastal program to rehabilitate mangrove forests for the sole benefit of the fisheries sector might succeed, but more likely it would fail if it lacks mechanisms to incorporate the other needs of villagers, forest industries, coastal agriculture, public health, tourism, port development, and so forth. Therefore, if a full-scale CAMP regional program can be organized, at least in the planning phase, a more satisfactory outcome can be expected.

Clearly, a major objective of macro-scale CAMP is to achieve some level of unity in the actions of the various Government Departments. The following from A. Tolentino (written before reorganization in 1987 but still appropriate) expresses this need [44]:

> "Some 50 existing government institutions are directly or indirectly involved with coastal zone research or management in the Philippines, but none has a direct responsibility for management as a whole. Naturally, in their operations, there are overlaps in effort and conflicts in jurisdiction, often arising from poor communication or coordination between agencies. A few examples may be cited: until the issuance of Presidential Decree 1968, corals were being thrown back and forth between the Bureau of Fisheries and Aquatic Resources and the Bureau of Mines; mangroves have been disputed by the Bureau of Forest Development, the Bureau of Fisheries and Aquatic Resources and to a certain extent by the Bureau of Lands; and marine parks and reserves are in no man's land with the Philippine Tourism Authority coming onto the territory previously claimed by the Bureau of Forest Development, the Bureau of Fisheries and Aquatic Resources and the Natural Resources Management Centre, not to mention the National Environmental Protection Council. It is not always clear where the jurisdictions of the Maritime Industry Authority, the Philippine Ports Authority and the Philippine Fish Marketing Authority begin and end."

7.0 RECOMMENDATIONS

7.1 Introduction

The following recommendations appear in our suggested order of priority, not in the subject order of the preceding text. The prioritization is largely based on timelines. For example, if strategic planning must precede mangrove tree planting in the expected sequence of events, the strategic planning would have the first priority.

7.2 Master Plan

As discussed in Chapter 6.0, the Republic badly needs an orderly process by which to consider the development and conservation of its coastal resources. This national master plan must address both the regulatory (police power) approach [58] and the protected areas (proprietary) approach [57]. Also, the plan must address both macro-scale and micro-scale elements referred to below as an "Element".

Element 1: Strategic Plan.

Take stock of the present situation, explore the sufficiency of policy and legislation, re-examine resource conclusions and current conservation actions, conduct related activities and prescribe the method of conducting a "Coastal Master Plan". A CAMP Committee copied from the National Mangrove Committee is expected to play a major role. Critical to the Strategic Plan is to insist that protected areas and CAMP be considered simultaneously in the Master Plan or other instrument [50, 51]. Another key to reprocess is the ability of scientists to "move from the objectivity and rationality of science into the less rational and more subjective roles of advocacy and policymaking" [49].

Element 2: Master Plan

Planning may be the best hope to get by the stagnancy (for CAMP) and the chaos (for protected areas) of the present situation. The Republic needs an enlightened view of its future, a future of sufficiency; GOP needs a vision of itself as competent in conservation of natural resources in the Republic. The Master Plan would review all existing information, promote guidelines for use of the coastal area, identify development zones (tourist and industrial), specify mangrove and coral rehabilitation, outline the protected areas component (of IPAS) for the coast, specify permit, project review, and EIA procedures, regional demonstration, and other essential initiatives.

7.3 Training

A variety of training needs exist presently and more will be created by the present proposal. Some overlapping with other activities is expected, particularly for community organizers (CO's) whose basic training would be the same whether they were scheduled to work in hilly or coastal environs. At the end of each of the following elements is provided our suggested focal point for implementation, a time frame and a rough cost.

Element 3: Training Coastal Community Organizers

The major training need now is for up to 1,000 CO's to be trained in all the general aspects of community needs from mapping to accounting and those special aspects required to work effectively in micro-scale CAMP, such as mangrove planting, artificial reef conservation use, coral reef protection, fishery techniques, coastal processing, and so forth, following quite close to the CVRP model. There could be several training centers (for the correct geographic spread) but it is visualized that they would all be under the common management of one lead university. An initial

training period of 4 months is visualized, with occasional refresher courses. It is anticipated that three training centers running two classes per year of 50 students each could train 300 CO's per year or 1,000 in 3 1/2 years, after one year to get organized.

Universities; 4.5 years; US$4.2 million.

Element 4: Training Technical Specialists

A few dozen Filipino specialists in specific coastal (fish biologist, engineer, botanist, etc.) disciplines, who would be involved in micro-scale CAMP work will need orientation courses in policy, technology transfers, communications, planning, cross-discipline experience, etc. It is visualized that they would be trained at the lead university under Element 3 in groups of 20 for 3 months each; twice per year; thus 120 could be trained in about 3 years.

University; 3.5 years; US$500,000.

Element 5: Training Protected Areas Personnel

A few key agency people (or NGO people, if they are managing protected areas) would be sent abroad for training; perhaps 10 for six months each for supervisory training (10 x $25,000 = $250,000). Another 125 would be trained in-country in both classroom and field situations, using expatriate trainers (such as U.S. National Park Service or Australian Parks personnel).

NGO and/or Agency (DENR/DA); 3 years; US$650,000.

7.4 Demonstration Programs

A variety of potential approaches would be addressed through various demonstration programs. The feasibility of

micro-scale CAMP has been amply tested. What remains to test is the regional, or meso-scale, CAMP. Also certain innovative protected area approaches based upon modern ideas need testing, particularly those having major multiple use components and those where carrying capacity impact be exceeded by tourism.

Element 6: Regional Level CAMP Demonstration

It is recommended that the Lingayen Gulf regional framework plan be implemented. The plan is the product of several years effort by ICLARM and NEDA working with UP's Marine Science Institute and other groups. It involves 19 municipalities and 2 provinces who must work together to save the Gulf's resources. The plan was funded by USAID/ANE as part of an ASEAN-wide CAMP initiative, but implementation funds were not provided by ANE. The program involves community self-help programs (mangroves, artificial reefs, coral reef protection, fisheries, alternative livelihood) but in the context of a regional cooperative effort. The EIA requirement in the six-year plan [ref 30, Section 4.4.4.1] should be tested as well.

ICLARM (NGO); 3.5 years; US$2.4 million.

Element 7. National Park/Reserves for Tourism

Three areas are proposed and a back up is also suggested because any could run into a road block early on, and a substitute would be handy. The three choices are: Honda Bay, Palawan, (proposed National Reserve); El Nido Marine Sanctuary, Palawan, Puerto Galera Biosphere Reserve, Mindoro, and, (as a back up) Apo Reef, Mindanao, proposed as a national reserve. The goal of the work on these parks is to experiment with all known modern techniques and multiple use approaches so as to create a national protected areas system that can serve numerous tourists but where facilities are located and the areas operated so as to maximize resource

protection and community benefit. We expect that two of the three areas should be able to pay for 80 percent or more of their operations through collection of user fees, merchandise sales, etc., after the fourth year of enlightened operation.

NGO; 4 years; US$2.8 million.

Element 8: Ecosystem Park Demonstration

What's missing from the coastal park system of the Republic is a model of an "Ecosystem Park/Reserve". The purpose for the coastal ecosystem park is to protect units of coastal habitats that when taken together (coral, seagrass, mangrove, beach, estuary, etc.) form integral ecosystems that can be kept in their original condition so as to maintain coastal biodiversity. Since this is a new idea, it will take considerable development time and the project should be located in a university such as UP Diliman or Silliman University in Negros. One key study site should be Olanjo Island, off Cebu. Remote sensing would be needed for site location and study. Transferability potential is high.

University; 4.0 years; US$1.7 million.

7.5 Public Education

Nearly every program proposal for natural resources conservation written in the Philippines gives a high priority to "massive" or "intensive" public education.

Element 9: Education via the CO Systems

Too often public education has meant that a few posters, videos, or teaching kits, or comic books get produced. Rarely is the really expensive part of this even considered, i.e., delivery of the materials and message to every nook and cranny of the country, with assurance that

it gets into the hands of the right people. But only education to this extent will really benefit coastal resources conservation. If a major public education effort were made, in conjunction with CO training and CO community works, we believe it could succeed very well. Standard materials need to be prepared and used, what distinguishes this program is the delivery system.

NGO; 4.5 years; US$3.9 million.

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ANNEX D

PRESERVATION AND MAINTENANCE OF BIOLOGICAL DIVERSITY

by

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"It is a process of change to meet the needs of the people, as defined by them, without lessening the potential for meeting their future needs, the needs of other societies, or those of future generations" [1]

"There is a growing number of Filipinos who realize that our most serious and insidious problem is the fact that government officials and the citizens, with very few exceptions, do not grasp that the unabated assault on the life-support systems of our land -- the forests, the soil, the sea, the life forms -- is central to all our other problems, especially poverty, and will intensify them. There is very little understanding that economy and ecology are faces of one reality; that they are inseparable. What are perceived as economic advantages are usually exchanged for the unwarranted destruction of our natural resources." [2]

"It is regrettable that the survival of biological diversity requires extraordinary initiatives such as: 'biodiversity reserves'. Only a world on the brink of ecological suicide would resort to such artificial means. To the citizens of a balanced world, the phrase 'biodiversity reserve' would sound just as ridiculous as does the concept of 'developer reserve' to us." [3]

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[1] Dr. Celso Roque, Undersecretary for Environment and Research of the Department of Environment & Natural Resources, in the draft of the Philippine Strategy for Sustainable Development.

[2] Sr. Ma. Aida Velasquez, OSB, in a paper entitled The Role of NGO's in Maintaining Biological Diversity given at Haribon Foundation's Technical Workshop on Philippine Biological Biodiversity supported by USAID, March, 1988.

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1.0 INTRODUCTION

The Philippines probably represents the single worst case scenario at present in terms of loss of biological diversity in tropical Southeast Asia, in particular comparison to Malaysia, Indonesia, and Papua New Guinea. In this assessment, I will attempt to summarize what is known about the diversity of life in the Philippine archipelago, what biodiversity-related projects are under way or being planned, and make recommendations for positive intervention. Due to the very short period of time that has been available both to research and prepare this assessment, I can make no claim to having produced a comprehensive review.

The recommendations have three goals: (1) to "rescue" as much of the unique biodiversity in the Philippines as possible, (2) to preserve as much of the remaining critical habitat as possible, and (3) to help foster a Philippine national consensus on a conservation strategy.

These can be achieved via: (1) creation of an Inventory and Gene Pool Rescue Program, (2) fostering a functional Integrated Protected Areas System, and (3) implementation of the Philippine National Conservation Strategy within the context of the Philippine Strategy for Sustainable Development (PSSD).

Biological diversity can be defined simply as the number of different kinds of species of living organisms that inhabit a given space, the genetic diversity of the individuals in populations of a single given species, and the diversity of the types of communities that living things form in nature. The Biodiversity Bill introduced in the U.S. Congress defines biodiversity as the "full range of variety and variability within and among living organisms and the ecological complexes in which they occur, and encompasses ecosystem or community diversity, and genetic diversity." The relationship between biological diversity and sustainable development is simple: the more undisturbed, highly diverse areas that exist within the boundaries of a given country, the greater the potential for achieving sustainable development in that country. A development that does not exhaust present or future resources is sustainable. Biodiversity can be thought of as a wealth of the future as well as the present. One can eliminate a dipterocarp forest with modern technology in a very short time, and thereby achieve an immediate cash return on that harvest. If the area is treated in such a way that does not

allow it to regenerate, then the potential for elements of that biodiversity to be used in the future (in ways perhaps not even envisioned at present because of our relatively primitive knowledge of biotechnology) is destroyed forever. Saving our biological diversity on a regional and global scale is literally like putting money in the bank for future use, a deposit that yields interest.

The unique biological diversity of the Philippines is threatened with extinction. Based on my previous work in the Philippines I had estimated that it was highly likely that 30-40% of the endemic (species found nowhere else) forest flora was already gone. I now believe that I may have been too conservative. It is probable that 50% or more of the unique species originally inhabiting the forests of the Philippines is gone and it is possible that the figure could be higher. That we do not even know how much of that biodiversity still exists, much less how much of it is extinct, is a measure of our ignorance of what is present in the Philippines.

One of the principle programs I recommend seeks to achieve that knowledge and to do so in a way that will rescue as much of the remaining biodiversity as possible via off-site conservation. Concomitantly, the institutional base for knowledge of biodiversity in the Philippines, as well as a constituency for that knowledge, will be enhanced.

The richness of Philippine forests is shown by the fact that there were 120 species of trees alone found in a plot of land slightly over 1 ha in size in the Lamao Forest Reserve. Mt. Makiling has more species of woody plants than the entire continental United States of America [1].

Norman Myers [2] points out that the pressure from the uplands population, which in 1988 was 14.4 million (23% of nation's total) may reach 26 million (30%) in 2000, and 42 million (28%) in 2020. These statistics are very significant. If the uplands population does indeed grow to 42 million, it will not matter much how good, bad or indifferent policies concerning maintenance of biological diversity are. It will then have been a matter of having salvaged as much as could be salvaged via scientific collections to "rescue" endangered species via off-site conservation.

A measure of our ignorance of what is actually out there, now and in the past, is the multiplicity of conflicting data on the numbers of species of various Philippine groups of plants and animals. Almost every

source provides different statistics, and it was not until the Philippine-German Forest Resources Inventory (FRI) [3] that we had a complete survey and a decent estimate of the amount of virgin forest left in the Philippines.

The state of our knowledge of Philippine biodiversity will not allow us any idea of how many of any of the major groups of plants and animals are extinct, endangered, vulnerable, or threatened. At the present rate of habitat loss, the remaining virgin dipterocarp forests, the biologically most diverse and economically most important forest formation in the Philippines, will be gone within 5 to 7 years [4]. Based on these bare facts we need to provide some positive intervention that will protect critical habitats and inventory existing resources in a more systematic way than has hitherto been possible in the Philippines. We need to do this for sound economic reasons involving the potential for medical, pharmaceutical, lesser known timber products, and other commercial applications, as well as the benefits accrued from healthy watersheds. A relatively recent survey of the remaining Philippine forests, for example, has turned up three species of Philippine trees with properties that are potentially active against the virus causing AIDS (Madulid, pers. com.). One of these species has not yet even been described.

Personal interviews with the individuals most involved with Philippine biodiversity at various centers, such as the National Museum and the University of the Philippines at Diliman and Los Baños, allows an understanding of at least the best estimates concerning the flora and fauna. On the government side, considerable information on policy and planning was obtained from the Department of Environment and Natural Resources (DENR) and the Department of Science and Technology (DOST). Implementation of any program or project requires a great deal of support from non-governmental organizations (NGO's). The organization that has been most active in both implementation and initiation of activities relating to the conservation of Philippine biodiversity is the Haribon Foundation.

2.0 STATUS OF OUR KNOWLEDGE OF PHILIPPINE BIODIVERSITY

Our knowledge of Philippine biodiversity is abysmal for many important groups. This does not reflect poorly on recently produced documents attempting to summarize the state of that knowledge nor on the efforts of the front-line scientists, but on the priority that has been given this sort of work. This state of affairs may also translate directly into the condition of the country's only National Museum. I believe that the urgency of the situation will alter those priorities and the evidence presented by the numbers of individuals speaking about these matters may provide hope that we will shortly know much more about these unique biota and be able to save representative portions.

2.1 Overview of the Biota

The 30 million ha of land (300,000 sq km) of the Philippine archipelago is contained on about 7100 islands. There are over 18,000 km of coastline with coastal waters that are nearly equal in area to the extent of land. The biota, particularly that of the lowland and lower montane zones, has strong affinities to the rest of the Malesian biogeographical region (Peninsular Malaysia, Borneo, New Guinea) and that of higher elevations have some affinities to the Sino-Himalayan region. For good summaries of our knowledge about the biota, see Fernando [5], Zamora [6], and Cox [7]. Each of these papers are related one to the another in the sense that one followed the other. Together, and with the background for an Integrated Protected Areas System presented by Petocz [8], they provide an excellent resource on the state of our knowledge about the Philippine biota.

That there is a crisis in Philippine biodiversity, and that we are on the threshold of an abyss that will contribute to the deterioration of the global environment, is evident from the simple fact that as of 1988, there were only 988,000[1] remaining ha of old growth forest (virgin and primarily dipterocarp forest). Since another source states that "rich tropical forest originally covered 94% of the land" [9], there would have been 28.2 million ha of original forest (94% of 30 million). If there were now only

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[1] This figure is probably on the high side and Michael Ross (pers. com.) informed me that the actual figure is probably around 700,000 ha.

988,000 ha of original forest left, and some 1.2 million ha of "mossy" forest remaining, this represents about 10% of that original forest area. This means that 90% of the original forest is now gone. According to well known theories of biogeography [10], a rule of thumb is that when 90% of the original habitat in a region is gone, 50% of the endemic life forms (unique species found nowhere else) are also gone. Can the Philippines already have lost 50% or more of its original endemic species of plants and animals? Quite likely; but we shall never know, for we have never had a reasonably good concept of what was in the original forests. This makes it all the more imperative to find the means to discover what is left in remaining original habitats, to protect that biodiversity on-site, and to supplement this with off-site conservation.

Man has been resident in the Philippines for 30,000-40,000 years. If the the Philippine archipelago has been in existence for about 60 million years, man's tenure here has been only 0.0007%, at most, of the geological life of the archipelago itself. Yet in that time, and particularly in the past 30 years, he has wrought enormous and deleterious changes in its biological diversity.

2.2 Terrestrial Ecosystems

The most useful classification schemes for the principal terrestrial communities are those based on the structure of plant communities. The more generalized the versions are, recognizing the broadest assemblage of species, the easier the systems are to use by laymen. Plant communities are after all where animals live. As pointed out by Tan and Rojo) [11] Philippine forest vegetation types described by Whitford [12] are still used today in basic outline. There have not been rigorous recent attempts to update these concepts or to equate them with modern schemes of classification such as that proposed by UNESCO [13]. However, a modified scheme used by Fernando [5] recognizes 12 forest formations: tropical lowland evergreen rainforest (divided into five sub-types each based on the dominant and common species of dipterocarps present), tropical semi-evergreen rain forest, molave (limestone forest), forest on ultrabasic (often also called ultramafic) rock, beach forest, mangrove, brackish-water forest, peat swamp forest (of limited occurrence and never fully documented in the Philippines), freshwater swamp forest, tropical moist deciduous forest, tropical lower-montane rain forest, tropical upper montane rain forest (the real "mossy" forest). Since we want to reach the non-botanist, however,

I am going to use and describe a much broader classification that recognizes the following forest formations proceeding from sealevel to subalpine: (1) beach, (2) mangrove, (3) molave, (4) dipterocarp, (5) ultrabasic, (6) pine, (7) montane.

Beach

This occupies sandy shores or beaches above high-tide. This forest is almost completely extirpated in the Philippines, but since the species are widely distributed through Southeast Asia, none are extinct. In its original form, the sea-facing side consists of a tangle of vegetation with pandans (*Pandanus* spp.), *Hibiscus tiliaceus*, *Pongamia pinnata*, and *Thespesia populnea* prevailing. *Casuarina equisetifolia*, the ironwood tree, often forms pure stands in the sandy floodplains.

Molave

The molave forest type is so-named because of the conspicuous presence of molave (*Vitex parviflora*). This forest usually occurs over limestone. Trees found in this type of forest are economically valuable and are easily accessible for exploitation. They are well-spaced and the interstices are filled with small trees and bamboos. Most trees are short-boled with irregular spreading crowns. The forest has a decidedly semi-deciduous foliage, especially when it is found in areas that have a pronounced dry season.

Dipterocarp

This is by far the most important forest type in the Philippines in terms of the commercial timber present. It comprises the great majority of the existing old growth forests below 900 m, and represents even today the majority of the standing timber in the Islands. It may be found over almost any type of topography, from immediately behind the beach up to an altitude of about 900 m. This forest is botanically complex and in totality the majority of the remaining biodiversity is represented in these forests. As the name implies, members of the Dipterocarp family are the dominant trees. Other major families of woody flowering plants are the Anacardiaceae (mango family), Leguminosae (bean family), Meliaceae (Mahogany family), Myrtaceae (Myrtle family) and Sapotaceae (*nato* family). With few exceptions all species of the Dipterocarpaceae are large

trees, most reaching heights of 40 to 50 m with diameters of 100 to 150 cm.

In the Philippines, the dipterocarp forest shows more or less distinct formations, making it possible to distinguish subtypes. These are named after the common names of the most dominant species in a given area, with the most common being the apitong, tangile, red lauan, white lauan, almon, bagtikan, mayapis, palosapis, guijo , manggachapui, yakal, ipil, kalunti, malaanonang, and tiaong. These are the common names used in the Philippines and bears listing here due to their economic importance. This forest formation develops best when rainfall is uniform throughout the year.

Pine

This vegetation type reaches its best development in the high plateaus of northern Luzon in the Mountain Provinces, where stands of *Pinus kesiya* (=*P. insularis*) are found. On the west coast of Mindoro Island and Zambales Province in Luzon stands of *P. merkusii* are found. The greatest proportion of this forest type grows between about 800 and 1800 m elevation in regions with a distinct dry season. Evidently, in areas where pines now grow, extensive broadleaved forests used to occur. Man, in eliminating the broadleaved forests, produced the conditions favoring the development of pine forest. Land occupied by pine forest is increasing owing to the continued destruction of surrounding broadleaved forest. The native pine was undoubtedly found in small numbers on dry, exposed ridges before human intervention.

Montane Forest

This forest formation is found from about 1,000 m up to various elevations depending upon the location and size of the mountain. The terrain is highly dissected with slopes over 18% and often over 30%. The upper forests of this formation where precipitation is heaviest are festooned with a great many epiphytes such as mosses, ferns, fern allies, orchids, etc. This part of the montane forest is often referred to as the mossy forest. Indeed, the latter term is often used, erroneously, as synonymous with montane forest in general. Where the winds become a factor the trees are often short and stunted.

Ultrabasic

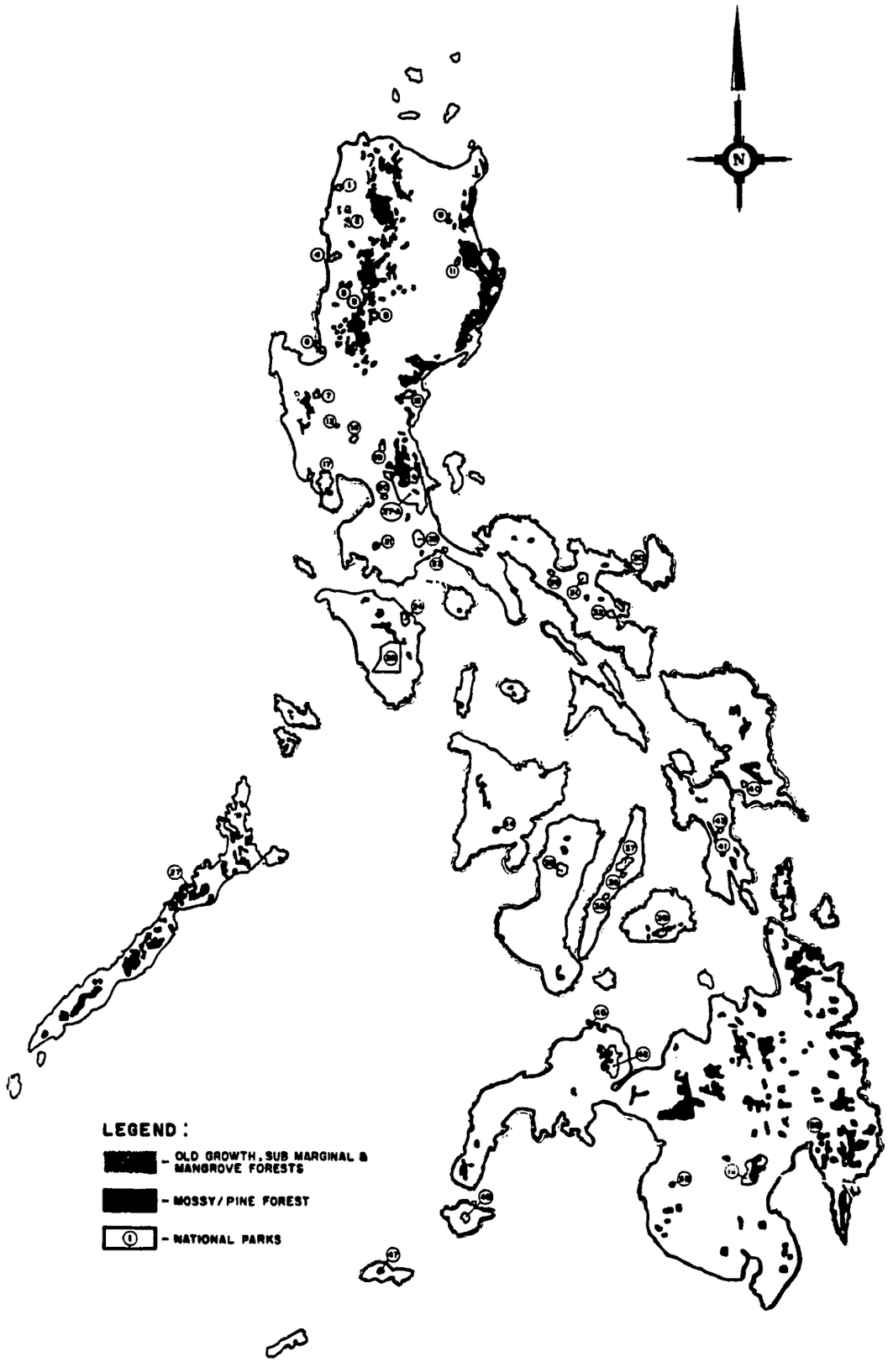
This forest formation consists of species adapted to living on soil with high concentrations of heavy metals. The vegetation is usually stunted and the plants have thick, hard leaves. The borders between this formation and adjacent forest are usually very sharp and clear. Many of the species that occur here are found only on ultrabasic soil and nowhere else. Palawan has a high proportion of this forest type but there are other locations, particularly in Northern Zambales and Dinagat Island. Most of the time this forest formation is "lumped" with the molave forest and both are referred to as "submarginal" forest in the FRI.

Vegetation Maps

To date, there is no published detailed vegetation map for the entire country. This may be due to the fact that the forests, which make up the bulk of the vegetation, are of exceedingly mixed types. A few detailed vegetation maps for certain small areas such as provinces or watersheds have been prepared, and a vegetation mapping project will soon be under way at the National Museum.

The map presented here of remaining Old Growth and Mossy/Pine forests in relation to the location of National Parks has been based on the map presented in the Master Plan for Forestry Development (Part One). The original had two major shortcomings. It used symbols that were impossible to distinguish after it had been reduced to fit into the draft report, and it lumped in those symbols a number of quite different forest formations. In the original the following categories were recognized on the legend: (1) Old Growth, "sub-marginal," and mangrove forests, (2) "mossy," and (3) pine.

Old Growth forests are defined as primarily virgin, dipterocarp forests. The final report of the Natural Forest Resources of the Philippines project (FRI) defines "sub-marginal" forests as "tropical rain forest dominated by lesser used species, mainly restricted to shallow and excessively drained limestone soils." This definition demonstrates that two quite distinct forest types are probably being lumped together here under this definition: the molave and ultrabasic forests as discussed and delineated above.



MAP OF REMAINING OLD GROWTH & MOSSY/PINE FOREST IN RELATION TO EXISTING NATIONAL PARKS

Figure 2.2-1

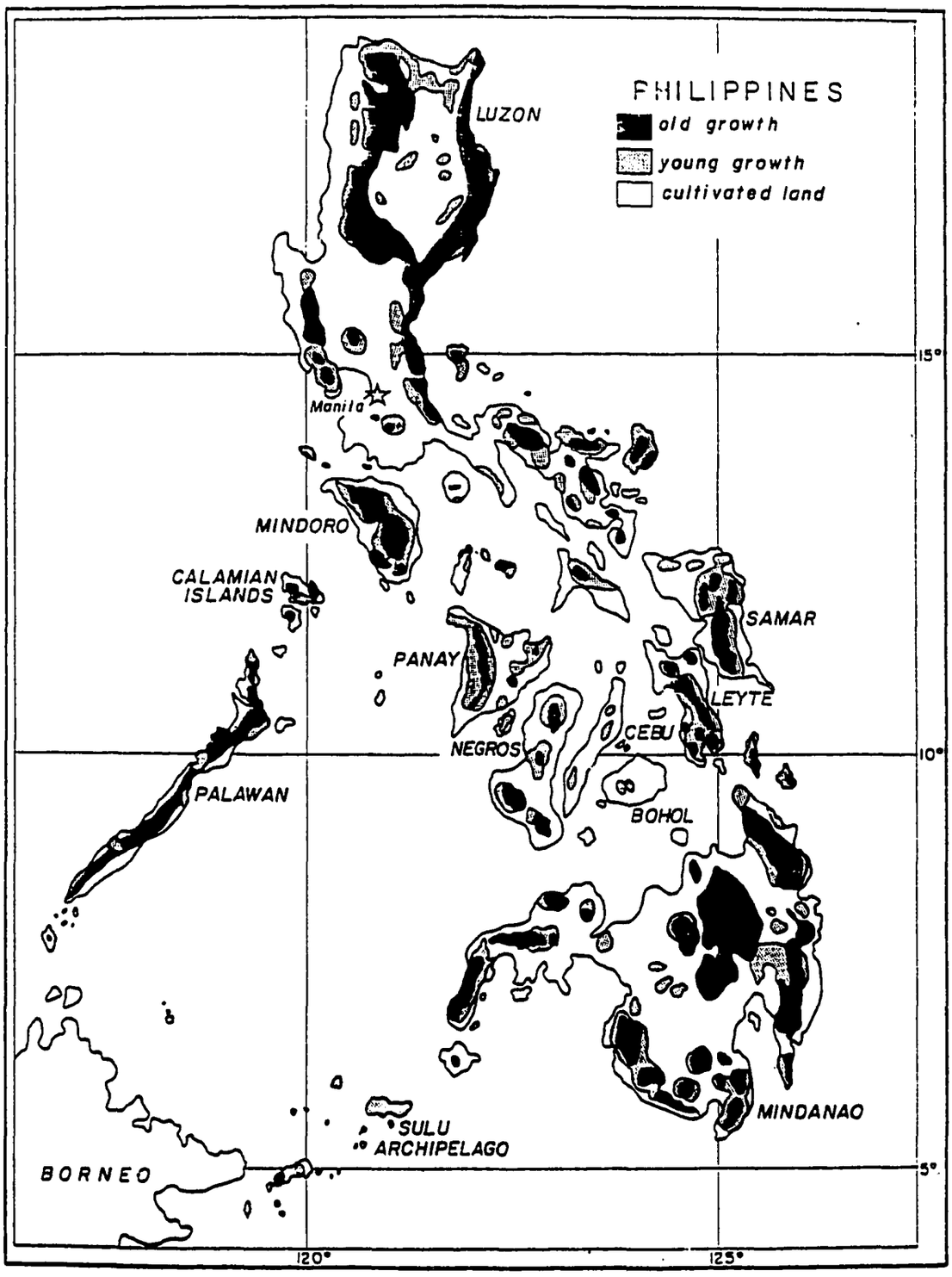

PHILIPPINES
old growth
young growth
cultivated land
LUZON
Manila
MINDORO
CALAMIAN ISLANDS
PANAY
NEGROS
CEBU
LEYTE
SAMAR
BOHOL
PALAWAN
MINDANAO
SULU ARCHIPELAGO
BORNEO
15°
10°
5°
120°
125°

Figure 2.2-2

Furthermore, on the original map I saw, the symbols used for mossy and pine forests were identical, and for someone who does not know where these forests are located it would be impossible to distinguish them on this map. Nevertheless, I felt that it would be useful to have a map that would graphically allow an instant visualization of remaining forest areas in general, and I had the data transposed into the two categories shown on the legend in the revised map. I tried to select symbols that would provide the eye an immediate impression. This map should be visibly compared to the Tan and Rojo [11] map that follows it.

Terrestial Biota

Endemism is high in terrestrial systems. It seems that the farther from the beach, the higher the percentage of unique species in the various groups. Alviola [14] states that there may be as many as 90-100 species of Philippine amphibians, or 60% more species than is known today! Alviola fears that at the rate of habitat destruction, we may never get to these predicted undescribed species before they are gone. He further states that 70% of the total number of geckoes found in the Philippines, 81% of the skinks, and 50% of the resident birds are endemic. Of 76 species of snakes, 60% are endemic.

In the tables that follow, I have attempted to present in one place the most recent and relevant information for our task here. I have supplemented the written sources listed above with personal interviews of the scientific practitioners -- the front line troops in the battle for Philippine biodiversity, so to speak, that has allowed me to bring certain data further up to date. The question marks demonstrate significant gaps in our knowledge. The dash marks mean that there wasn't even enough information available or provided that would allow us to know what we do not know! In the short time available to perform this assessment it was not possible to obtain exhaustive data.

Tables D-1 and D-2 are revealing in a number of ways. First, they demonstrate that three important elements of terrestrial biota are more poorly known than others. The estimates for the number of species of flowering plants, for example, have a considerable range. The figure usually given, around 8500, is based on Merrill's work (15) published 1923 - 1926. Data obtained during some exhaustive work I did with a group of Philippine flowering plants (a genus

Table D-1. Statistical Synopsis of the Status of Knowledge of of Terrestrial Plant Diversity in the Philippines

Biotic Group	Estimate # Species	% Unknown	Minimum % Endemic	Minimum % Extinct	Minimum % Endangered
Flowering Plants	8,000-12,000[1]	20[2]	27-75[3]	?	?
Ferns[4]	950	?	31	?	?
Mosses[5]	640	-	14	?	?
Liverworts and Hornworts[6]	518				
Fungi[7]	3,000±	?	?	?	?
Lichens[3]	789	?	-	?	?

[1]Most estimates are about 8,500 and based on Merrill [15].

[2]Based on extrapolation from Sohmer's work (unpublished) with Psychotria (Rubiaceae)

[3]Various estimates from Merrill [15], Fernando [5], Zamora [6], Cox [7]

[4]Zamora and Co. [16].

[5]Iwatsuki and Tan [17].

[6]Tan [18]

[7]Madulid (pers. com., citing a primary source).

[8]Gruezo [19]

- No information (not enough knowledge to let us state what we don't know)

? Unknown (a situation where we know that we don't know!).

Table D-2. Statistical Synopsis of the Status of Knowledge of Terrestrial Animal Diversity in the Philippines

Biotic Group	Estimate # Species	% Unknown	Minimum % Endemic	Minimum % Extinct	Minimum % Endangered
VERTEBRATES					
Mammals[1]	165	0-5	59	1.3	?
Birds[2]	557[2]	-	50[3]	-	?
Reptiles[1]	186	-	50-60	-	-
Amphibians[1]	74	-	70	-	-
INVERTEBRATES					
Insects[4]	16,704	60	?	?	?

[1] P. Gonzales (pers. com.)

[2] Gonzales [20] and pers. com. (these are both resident and non-resident birds)

[3] Aviola [14] who measures endemism against the resident birds, and about 29% by Gonzalez who measures endemism against all birds reported for the Philippines

[4] Gapud and Baltazar (pers. com>)
and Gapud, Philipp. Ent. 6:105-110 (1984)

- no information

? unknown

called Psychotria in the Rubiaceae or coffee family, unpublished) recognizes about 20% of the species as new. Perhaps, one could extrapolate this number to the endemic flora as a whole. We have, of course, no idea of how many of the unique plants restricted to the Philippine forests are endangered or extinct, but the combined number may be over 50%.

The fungi, which includes the group of organisms absolutely essential to the growth of native forest trees--the mycorrhizal fungi (fungi associated with the roots of trees and which have symbiotic relationships with those trees) are not well known. Fernando (pers. comm.), has indicated that there has been little work with the basic taxonomy of these important fungi.

The gymnosperms number some 32 species in the Philippines [21] and comprise the conifers, cycads, and podocarps. The endemism rate is high but the overall diversity is low and I have not included them in the table.

The birds are the most symbolic members of the Philippine biota. Indeed, I believe that the so-called monkey-eating eagle (actually monkeys are a minor part of its diet according to Gonzales and Rees [20] can probably serve as the panda of the Philippines. Those species known to be endangered are quite spectacular and unique. But even here, with this group, I could not get a satisfactory number for how many of the resident birds were endangered. Gonzales and Rees [20] list six . Dr. Edgardo Gomez, the Director of the Marine Science Institute at the University of the Philippines-Diliman, pointed out to me that relatively little was known about the coastal birds, and that nowadays it was difficult to even encounter them on anything other than the remotest islands, for wherever people are, they are hunted for food, their eggs are harvested, and they are otherwise disturbed.

Finally, the lack of information about the insects, though no surprise, is startling. Immediate intervention to support renewed efforts with this group should be undertaken, for they are threatened by the removal of the forest and no work in the tree canopies has been undertaken to begin to uncover the wealth of diversity that exists at that level of the biosphere.

2.3 Aquatic Ecosystems

The majority of the Philippine population lives in or near the Coastal Zone. Indeed, 87% of the population is estimated to live within 50 km of the coast (White, pers. com.) The freshwater ecosystems are composed of some estimated 630,000 ha of swamps, lakes, rivers, and reservoirs [22], where some 28% of the fish species known from the Philippines (freshwater and marine) exist. The marine coastal zone ecosystems include the estuaries where mangroves are (or were) present, sea grass beds, coral reefs, and benthos to 200 m depth, the limit of the continental shelf.

Freshwater Ecosystems

The rates of endemism (occurrence of unique species not found anywhere else on earth) in the freshwater ecosystem is significantly higher than in the marine situation. Dr. Edgardo Gomez predicts an endemism rate in the marine biota of at most 5%. Aside from the clearing of land of its original freshwater wetlands habitats, the larger freshwater lakes and rivers have been altered by siltation and pollution from urban, agricultural and industrial activities. In addition, some of the endemic freshwater fish are threatened by the indiscrimate introduction of alien fish. What is reported to be the smallest fish in the world (*Mystichtys luzonensis*) is endangered by tilapia and the white goby [22]. The only freshwater herring in the world, *Harengus tawilis* in Lake Taal, is also endangered by the introduction of alien fish. A proposal to study this may be supported by PCARRD. None of these interactions have been exhaustively studied. Due to the lack of an institutional entity that would continue to promote such studies, little is known about this sort of displacement, and we have little or no baseline data. Guerrero [22] has recommended a fairly concise and articulate list of research gaps in freshwater ecosystems for fish and certain invertebrates.

There has been little work done with freshwater plants, particularly the algae.

Marine Ecosystems

Dr. Edgardo Gomez indicates that there are three major problems in the marine environment: (1) overfishing and

over-harvesting in general, caused by the sheer numbers of people, particularly in shallow offshore tidal flats, (2) development with accompanying pollution, including the effects of upland logging and land clearing with resultant erosion, and (3) illegal and destructive fishing methods. Dr Gomez also confirmed the fact that it is extremely difficult, if not impossible, to document extinction in marine systems, except for the larger organisms such as turtles, dugongs, and the giant clams. According to Dr. Gomez, of the seven species of giant clams native to Philippine waters, one is "practically extinct" and another is very rare. Thanks to Dr. Gomez' leadership, the Marine Science Institute is documenting the biodiversity of marine organisms, and the Institute serves as a fertile ground for training of professionally sound marine science students.

Brackish Wetlands

Usually found behind the mangrove formation, this ecosystem is recognizable by the dominance of the Nipa palm (*Nipa fruticans*). This forest is sometimes conceptualized as part of the mangrove ecosystem.

Mangrove

This forest can be claimed more for the aquatic coastal zone than for terrestrial. It develops well on the mud flats at the mouths of rivers entering the sea near protected bays. They are limited by freshwater. Within this forest formation, zonation of species is determined by salinity.

Mangrove forests are rich feeding grounds in the coastal zone. Although not as diverse as some other ecosystems from a biological point of view, the economic value of mangroves is very high. It is also possible to rehabilitate mangroves and they lend themselves readily to management techniques. Zamora [23] provides figures that show that from 1972 to 1988 there was a total decline of nearly 40% of mangrove areas in the country (from 227,947 ha to 134,725 ha). A great deal of this loss was attributable to what he terms "fishpondification".

In Southeast Asia the principal species are members of the genera *Bruguiera*, *Ceriops*, and *Rhizpohora* (*Rhizophoraceae*). The families Avicenniaceae and Sonneratiaceae are also represented.

Beaches

Beaches are abrupt transitions between marine and terrestrial habitats. Most small Philippine islands have sandy beaches formed by coral reef growth and erosion. There coral sand beaches are an integral part of the reef communities and depend on healthy coral reefs for continued supplies of sand. Crustaceans, mollusks, and some worms depend on this habitat, and sea turtles nest only on undisturbed sandy beaches.

Sea Grass Beds

Sea grasses occur on sandy substrates and they, along with algae, constitute a distinct zone on reef flats, where wide shallow fringing reefs extend out from the shore. Many species of invertebrate fauna and fish depend on this community at some state in their life cycle. Sea grass-algal beds also fix large amounts of carbon and nitrogen, used by neighboring coral reefs [24].

Coral Reefs

Fringing coral reefs occur throughout the Philippines, but the best development occurs on small islands. Larger islands support reefs to a lesser extent due to high sedimentation rates, turbidity, and freshwater associated with river outlets. There are 34,000 sq. km of coral reef areas in the Philippines, with 60% of them occurring in Palawan [24]. As an ecosystem, the coral reef is rich in species, highly productive, and is based on the calcareous rock produced by calcerous corals. The ability to use phosphorus efficiently and to fix nitrogen aids coral reef productivity. As a result, reefs are inhabited by a wide variety of plants, invertebrate animals, and fish.

The flow of water through estuaries distributes nutrients to surrounding coastal waters. Coral reefs promote the growth of mangroves, beach communities and inshore sea grass and algal beds, and protect these ecosystems from erosive forces.

The complexity of interaction between these ecosystems and the species that inhabit them is far greater than in offshore waters. Thus the potential implications of ecological disruption in the Philippine coastal zone are significant.

Summary of Marine Biota

Tables D-3 and D-4 attempt to summarize what is presently known for most of the important groups of marine organisms. These tables are also reveal gaps in our knowledge.

A great deal needs to be done with the invertebrate fauna. Most of the emphases to date have been on the vertebrates, and particularly with the fishes. The other vertebrates are small in total numbers. De la Paz and Gomez [25] provide an overview of marine faunal diversity. They point out that neither the freshwater nor deep sea faunas can match the diversity of the tropical marine coastal fauna. The list of groups of organisms is every bit as complex, if not more so, as the terrestrial fauna going from the single-celled protozoans to the highest chordate, such as the marine mammals. They relate the richness of the fauna in the Indo-West Pacific to the extensive growth of coral reefs as well as mangroves in estuarine areas. These are the very areas that have been blasted, poisoned, and cut into mere vestiges of their former selves.

The larger marine mammals that ply Philippine coastal waters number among them one species of dugong, greatly endangered, several species of whale, and "dozens of species of dolphin" (Gomez, pers. com.). Gomez has indicated that we are not even sure of the number of species of dolphin involved. Many of these species are endangered on a regional basis due to activities such as tuna fishing.

For the plant life, the work that needs to take place is with the algae. Although a recent catalogue of Philippine marine benthic algae is available [29], which has helped immensely, Dr. Gavino Trono estimates that this may account for only 80% of the species and there can be no estimate of endemism at this time. Practically nothing is known about the microbenthic (small attached) algae.

Table D-3. Statistical Summary of the Status of our Knowledge of Major Philippine Marine Coastal Faunal Diversity

Group	Estimated No. of Species	% Unknown	Minimum % Endemic	Minimum % Extinct	Minimum % Endangered
VERTEBRATES					
Dolphins[1]	?	?	?	?	?
Turtles	4	0	0	0	100
Fish	1,400[2]	?	17	0	0
INVERTEBRATES					
Echinoderms[3]					
(Star Fish, Sea Cucumber, etc.)	500±	?	?	?	?
Crustaceans[1]	1,400	?	?	?	?
Annelid worms[3]	700±	?	?	?	?
Mollusks [1]	?	?	?	?	?
Corals[4]	400	?	?	?	?
Sponges[1]	100-200	?	?	?	?

1 Dr. Edgardo Gomez (pers. com.)

2 De la Paz and Gomez [25]. This number is an estimate of coastal zone species only. The total number of species reported for the Philippines is about 2150.

3 Pedro Gonzalez (pers. com.)

4 Nomenzo [26].

Table D-4. Statistical Summary of the Status of our Knowledge of Major Philippine Marine Coastal Plant Diversity

Group	Estimated No. of Species	% Unknown	Minimum % Endemic	Minimum % Extinct	Minimum % Endangered
Sea grasses[1]	16	-	0	0	?
Sea weeds[2]	865	?	?	?	?

1 M. Fortes [27]

2 Trono [28] & pers. com.

3.0 EXISTING AND PLANNED BIOLOGICAL INVENTORIES AND SURVEYS

3.1 Overview

Existing projects fall into floristic (plant) or faunistic (animal) categories. These projects seek to achieve a better understanding of the particular groups of organisms, particularly numbers, locations and (if done properly) importance in the ecosystem. These surveys should provide keys to unlocking the economic potential of species presently unknown to science. The individuals who are often best suited for these sorts of activities are usually much in demand for other projects due to their general level of training and competence. The problem is, as Julian Tongson, Executive Director of the Haribon Foundation told me with some exasperation, that there are not enough of such individuals. There are no individuals working full time on basic biodiversity projects in the Philippines today in which intensive labour is required to produce a sound inventory for portions of Philippine biodiversity. Still, despite this, there is often a productivity that is quite remarkable. What is very important for this sort of work is the support of a good library and funds for research travel, resources that are in short supply. Part of the institutional-base building that can be done, and for which there have been numerous requests over many years, is support of such basic resources. Journal subscriptions cost a lot of money, as do books, especially when paid for with precious foreign exchange.

Dr. P. M. Zamora, Director of the Institute of Biology at U.P. Diliman, expressed his evaluation of the situation succinctly when he said that, from his perspective, scientific inventories of Philippine biodiversity have the very highest priority. In the performance of inventories the needs, according to Zamora, are:

- Manpower training via graduate student training;
- Library resources/facilities; and,
- Ability to travel to institutions where reference collections of type specimens (specimens that in biological terms were used to describe new species) and to get to inventory sites.

Furthermore, the dissemination of the results through publications and other means should be a main objective and quality control must be assured.

3.2 Plant Surveys

This account is by no means exhaustive. These projects might often be long-term with limited activity, but that they often exist at all is often a testimony to the stamina and perseverance of individuals who have had little, or no support for their endeavours. Yet, these individuals are often called upon to provide information for the conservation planning process.

Terrestrial Projects:

One of the oldest floristic projects that has been underway for nearly three decades is that which has been carried out by Professor Juan V. Pancho of the University of the Philippines at Los Banos. Professor Pancho has contributed greatly to the health of botanical research in the Philippines with his Flora of Mt. Makiling and Vicinity project. This project has attempted to identify and illustrate the species of flowering plants that occur on Mt. Makiling. Although supported in the early years by grants from what was then the National Research Council of the Philippines, Professor Pancho has had little or no support for his work in more recent years. One volume of the Flora has been published and another is forthcoming.

A number of young botanists, often trained abroad and the majority working now at the University of the Philippines at Los Baños, are collectively making significant contributions to the knowledge of the plant life of their country. Mr. Edwino S. Fernando has been working with the palms of the Philippines as well as with seedlings of Philippine commercial timber trees. Mr. Fernando is also playing a leading role in the proposed Flora of the Philippines project. Besides Mr. Fernando, other members of the botanical community at the University of the Philippines at Los Banos are Mr. Jacinto C. Regalado, who has been working with a group of plants found throughout Southeast Asia and has been interested in cataloging the important reference collections of Philippine flowering plants that are in herbaria (repositories of plant research collections) throughout the world. Mr. Danielo B. Tolentino has been involved with the ferns of the Philippines and has been

doing active work with them. Dr. William Greuzo has contributed to an understanding of the lichens of the Philippines. This is an interesting group of plants that, although often quite visible in forests on the bark of trees, is often overlooked.

At the University of the Philippines Diliman the most active botanist at this time is Dr. P. M. Zamora. Despite his heavy administrative duties, he has maintained an interest in the ferns and mangrove forests and has produced a number of publications involving mangroves. Most of the botanical information concerning these groups in the Philippines has been derived from his work.

There has been a long tradition of floristic work at the National Museum in Manila. Indeed, the present Philippine National Herbarium (PNH) at the National Museum started life at the beginning of the American colonial period in what was then called the Bureau of Science. Although there had been some work during the Spanish period, the basis of modern floristic botany in the Philippines began with Dr. E. D. Merrill in the Bureau of Science. The early decades of this century are replete with hundreds of publications dealing with the flora of the Philippines. That was a simpler time when one or two vigorous individuals and collaborators, both foreign and local, could devote the majority of their time with the full resources of the government behind them. The National Museum inherited the collections of what became the PNH. Since the end of the war, during which the PNH, along with much of the library, was totally obliterated, the staff have, with the help of foreign herbaria that sent duplicates of Philippine collections to the PNH, succeeded in restoring the institution to a condition of prominence in Southeast Asia. However, over the past 20 years or so, the PNH has suffered from the general lack of resources allocated to the National Museum.

The number of individuals who are actively engaged in floristic work at the National Museum is very small. At this point, only two individuals have been actively involved in planning and carrying out projects on a National level. One of those individuals has been involved in large numbers of projects. One of the major projects over the past several years has been study of the medicinal plants of the Philippines under the direction of Dr. Domingo A. Madulid, Supervising Museum Researcher, and Officer-in-Charge of the Botany Division. Dr. Madulid has also been involved, as have others in the country, with the matter of endangered species. It is the inability of getting at this matter that

has, more than any other reason, led to the Flora of the Philippines project. Dr. Madulid has been instrumental in pursuing the concept of the Flora of the Philippines Project as the best means of getting at information that's lacking now and needed by conservation organizations.

The Flora of the Philippines project has been actively planned over the past 3 years. As mentioned, the concept arose when it was realized that much of the information being given to conservation organizations was considerably out of date, often going back to Merrill's work during the first two decades of the century. With the significantly diminished forest estate, and the fact that the flora of the Philippines has never been rigorously catalogued, it was decided that the only the way to cut through the circularity of information was to plan for a rigorous inventory and assessment of the flowering plants of the Philippines. The flowering plants were chosen because they are the most important single group of organisms that defines the terrestrial environment. The U.S. National Science Foundation has supported two formal workshops plus a number of visits, including a 3-month period of residence for Dr. Madulid in the United States at Bishop Museum. The major purpose of the project, however, is not merely to produce the tangible product represented by a published flora that catalogues the flowering plant life of the country, but to enhance the institutional base within the Philippines for carrying out this sort of work and "rescuing" endangered species via off-site conservation. Strong elements of this project are to improve the storage facilities at the National Museum in Manila, and to bring modern collections management procedures to the PNH. It is also hoped that the Flora Project will serve as a model for improvements in the institutional base for biodiversity issues throughout the Philippines. Three proposals have been written or conceptualized for the three interconnected parts in this project, the (1) Plant Inventory, (2) Collections Management, and (3) Writing/Documentation. The Plant Inventory part of the project refers to the rapid and prioritized collection of specimens from the remaining forest and other ecosystems in the Philippines. This will be done in a way that will not only improve the data base for flowering plants but will provide propagules for the off-site conservation of endangered species. Collections Management refers to that part of the project that will renovate the existing collections in the PHN as well as to transfer stronger management procedures and techniques to the staff. Both of the first two parts of the project will take place at the National Museum in Manila. The third part, Writing/Documentation, is to take place at the

University of the Philippines at Los Baños. This is where the majority of the scientists involved in writing the flora will reside and work.

There was a botanical survey funded by Hilleshog Forestry AB recently completed. It demonstrates how a quick survey can be done well [30]. The survey turned up many new records and new species which are even now being worked on, principally in European locations. The survey has not had follow-through and did not have in its purview the collection of propagules. There were also no institutional base-building components.

Marine Programs

On the marine side, there had been a number of projects concerning seaweeds and seagrasses as well as mangrove formations. As mentioned, Dr. P. M. Zamora has played a leading role in mangrove research. He has produced an overview of the mangrove diversity in the Philippines [23].

Dr. Gavino C. Trono, Jr. of the Marine Science Institute at U.P. Diliman, is a world reknowned expert on the seaweeds of the Philippine coastal ecosystem. Dr. Trono has been instrumental in building the Seaweed Information Center through funds made available by the International Development Research Center (IDRC) of Canada. The IDRC is a major resource in the Philippines for information about algae, particularly large algae fastened to the substrate (macrobenthic algae). Much of the library reference collections are computerized and one may obtain lists of references through queries made of the computer database. For example, a query for all taxonomic literature involving Philippine seaweeds identified 192 records that included all the major references to the taxonomy of this group of algae in the country.

Dr. Miguel D. Fortes is actively involved with programs concerning the seagrasses of the Philippines, particularly with their ecology and phenology.

3.3 Animal Surveys

Again, most of the research concerning existing programs in this area are being done at three principal centers in the Philippines: the University of the Philippines at Los Banos and Diliman and the National Museum. A

Master Plan for a "faunal survey" was initiated in 1971 at the National Museum. This survey was to deal with terrestrial and marine animal life in the Philippines. This has not been an active program since about 1975 or 1976. Most of the zoology staff are involved with marine animal groups.

The World Bank will be supporting a Compilation and Computerization of Vertebrate Species Distribution. The development of this data base for Philippine vertebrate species is going to be undertaken to record distribution and studies of these organisms in the country. The Zoology Department of the National Museum will be actively involved in secondary studies of all species of mammals, birds and amphibians. Most of the activities will center on the use of the collections at the National Museum, as well as unpublished sources in the Philippines and elsewhere. Because of time limitations there will not be any field work performed. It is also planned that the species data base system will be coordinated with the data base used by the World Conservation Monitoring Center.

The Zoology Department at the National Museum has been surveying the bird and mammal fauna since the end of the Second World War. The purpose is two-fold: to study the biology of common resident species, and to perform taxonomic work at the same time. The present work is concentrated in the Ilocos region and Panay. An expedition to Panay is pending in October, 1989. Its objective is to collect in the high mountains of the western section of the island, particularly the high ranges of Baloy (Gonzales, pers. com). This particular expedition will be a joint effort between the National Museum and the Cincinnati Museum of Natural History.

Mr. Gonzales plans to undertake work in the central range of Palawan after Panay because this area has never been fully collected. The interesting fact is that the planned field trips cannot be carried out without foreign collaboration. Therefore, the foreign collaborators determine the agenda. This is not to suggest that there are problems here, for true collaboration can be extremely constructive. However, Philippine scientists often cannot set their own agendas because they do not have sufficient public or private sector funding.

The insect fauna is probably the single greatest undercollected and poorly described terrestrial group. Dr. Clare Baltazar has in collaboration with Dr. Victor Gapud and Dr. Venus Calilung carried out excellent taxonomic

work over many years with almost no financial support. At this time the major insect groups for which there are reasonably modern lists for the Philippines are those for the small moths (Microlepidoptera), flies (Diptera), and the bees, wasps, and ants (Hymenoptera). Therefore there are major groups for which there are no identification guides or indices. Discussion between the Entomology Departments at UPLB and Bishop Museum may lead to an incipient collaborative effort for an insect survey of the Philippine Archipelago.

3.4 Habitat and Regional Survey Program/Projects

There have been a number of projects on a regional level and probably one of the best known is the Flora Malesiana Project. This project began in 1948 and has been largely centered in the National Herbarium in the Netherlands. It was a brainchild of Dr. C. G. G. J. van Steenis who was its motive force for nearby 40 years.

The project is a massively conceived one, being an attempt to catalogue and summarize the entire plant life of the Malesian region. This region encompasses Peninsular Malaysia, the entire island of Borneo, the rest of Indonesia, the island of New Guinea as well as the Philippines. The region is a cradle of plant biodiversity. The project is to catalogue everything from the algae to the flowering plants; work on the flowering plants began first.

When conceived this project was a good way to attempt a decent understanding of the plant life of the region. However, events since 1948 have made the project obsolete in a sense, and the approach is being questioned at this time. The work is of excellent scientific value, but what is making it obsolete is the rapid destruction of the regional ecosystems, particularly the forests. This has made imperative a much quicker approach that is, perhaps, not as exhaustive. Furthermore, the lack of indigenous support for this project has made it necessary to regionalize it in order to make it relevant to the countries concerned.

This has certainly been the experience of the Tree Flora of Malaya project, which after 22 years of work was finally completed in 1987. Dr. Francis Ng [31], one of the workers in the tree flora project, made it clear that the the slow rate of taxonomic progress in the tropics has made such projects increasingly difficult to promote and organize. Dr. Ng suggested that this problem can be overcome by demystifying taxonomy. Dr. Ng basically states

that the work has to be made relevant to the people in the countries involved and I agree. It is for this reason that the Flora Malesiana project has support only from the specialized scientific community who are its proponents as well as its workers.

One of the most recent and probably best forest surveys have been performed in the Philippines via a collaborative agreement between the governments of the Philippines and West Germany. This project has succeeded in assessing the location and extent of remaining forest ecosystems in the Philippines. This project had a satellite imagery component and follow-up ground-truthing. Staff spent, collectively, many man-years in the field sampling the most common and most important timber trees in the Philippines. It is one of the bases of the Master Plan for Forestry Development (MPFD).

Although a number of approaches to vegetation surveys have been made starting in the early part of the century, no recent good survey of the vegetation of the Philippines has been performed. A World Bank grant to the National Museum for a project entitled Delineation of Existing/Remaining Natural Habitats, to be headed by Dr. Domingo A. Madulid concerns a survey of the present vegetation of the country. This project, to be conducted late this year or early in 1990, will provide a means for selecting areas that are not yet included in the protected areas system and will attempt to produce a map of existing vegetation types within each of the major biogeographic regions in the Philippines, in order to ascertain what remains to be protected. This work will use data from satellite imagery for general coverage, and aerial photographs for detailed analysis. It will be complemented with field surveys by various teams to ascertain actual extent and coverage of these vegetation types. The project will rely heavily on the resource inventory that was mentioned above, which ran from 1983 to 1988. It will also rely on a similar inventory that was completed by NAMRIA and the Swedish Space Agency.

3.5 Summary of USAID-Manila Involvement in Inventory Programs

USAID has been constrained within its mission in the Philippines to provide much direct support for surveys and inventories. However, significant assessment has been possible indirectly through the support of various planning activities by the Haribon Foundation [32].

4.0 MAINTENANCE OF BIOLOGICAL DIVERSITY

4.1 Overview

"The underlying causes of biological diversity erosion are frequently found in agricultural, economic, energy, land use and trade policies that encourage the overexploitation of natural resources" [33]. In the Philippines this exploitation is also directly related to a rapidly increasing population. The continued erosion of the natural resource base, and in particular the nation's biological diversity, will be a primary factor in development that is unsustainable.

The maintenance of biological diversity is the key to sustainable development. The beneficial effects of healthy watersheds, for example, on water regimes that are clean and ample for irrigation of lowland crops as well as healthier coastal zone ecosystems (particularly coral reefs are obvious. Utilizing the four potential methods of protecting, preserving, and recording biological diversity (on-site conservation, off-site conservation, gene banks, and specimen collections), one can build an interactive system that provides the basis for conveying a country's natural history heritage into the future for the unabated use and enjoyment of coming generations. This is entirely in keeping with the Philippine Biological Diversity Survey and Action Plan. (as summarized by Alfonso [34]).

4.2 Methodologies

There are four principle ways of maintaining or preserving biological diversity: (1) specimen collections, (2) preservation of germ plasm in the form of seeds and frozen tissue samples, (3) off-site conservation in Gardens and Zoos, and (4) conservation of biologically critical habitats

Specimen Collections

Specimen collections are important tools used in the array of available techniques to maintain biological diversity. Dr. Jose Vera Santos [35], during an excellent summary of Philippine botany for the Association of Systematic Biologists of the Philippines in 1984, said that "The herbarium as the repository of old and recent plant

collections is the indispensable source of valuable information for vanishing species...". Collections have immediate impact on the ability to monitor changes in the environment. An excellent example of this is the fish collection of a museum in the United States whose oldest specimens preceded the onset of pollution in a particular body of water. The collections were utilized to determine when the accumulation of heavy metals in the environment began. By sampling the tissue of the preserved fish, which would not have existed had it not been for that museum, it was possible to pinpoint the time in which pollutants in the form of heavy metals and, later, chlorinated hydrocarbons. became a feature of the environment. Collections are best utilized as adjuncts to the living world outside. Otherwise, they eventually become only the record of a nation's biodiversity.

Seed Banks

Seed banks have long been used to preserve the genetic variability of important agricultural crops. With proper facilities some seeds can last centuries. Seeds of forest plants generally have short periods of viability but there are methods of significantly increasing such periods. In the Philippines such facilities for agricultural crops have been supported by projects at PCARRD. According to Dr. Ricardo Lantican, Undersecretary for Research and Development at the Department of Science and Technology (DOST), the International Board of Plant Genetic Resources (IBPGR) will be funding more such facilities in the Philippines and he is interested in expanding the scope to "non-economic" plants. A $25,000 facility will be built at the College of Forestry at UPLB. The Japan International Cooperation Agency (JICA) has recently turned over to the DENR a recently completed seed treatment and storage facility in Carranglan, Nueva Ecija. This facility will conduct research on sustaining the viability of seeds for long periods of time. We also now, theoretically at least, have the ability to freeze animal tissues at very low temperatures for very long periods of time, and still have viability retained. Indeed, we now have the theoretical ability to extract DNA material out of plants that have been dried. All of these methods give potential means for preserving germ plasm for the future.

Off-Site Conservation:

A third method of maintaining biological diversity is off-site conservation. Those plants and animals grown and bred in botanical gardens, arboreta, and zoos will probably be the only way in which certain species will be maintained for the future. Off-site conservation at least provides the hope that it is possible to bring the diversity being preserved in this manner back to nature, should it be possible to eventually recreate complex ecosystems such as natural forests. The Philippine Eagle Conservation Program, now situated in the Malagos Watershed about 32 km from Davao on Mindanao, is an excellent example of captive breeding in action. A private foundation funds the program, which has been in existence since 1969.

On-Site Conservation

Without doubt the best way to preserve a nation's biodiversity (or at least a large sampling of it), and to maintain it for future generations, is through the creation and maintenance of protected areas. Protected areas at this time account for only about 1.5% of the original forested area of the Philippines [2]. Furthermore, the areas selected as national parks in the Philippines have often not been selected on the best biological basis [8], and it has proven impossible to maintain the integrity of most of them.

4.3 Conservation Priorities in the Philippines

What makes an area critical for conservation purposes, as far as its biodiversity is concerned, is open to some debate, but it is clear that the smaller an area is, the less able it is to preserve biodiversity long-term. We do not know what the critical habitat sizes for most species are. The best rule of thumb is to fill the needs of the largest species resident in an area. That area then becomes an ark for all of the interrelated organisms in an ecosystem. It is clear that if enough area is set aside to protect that species, the monkey-eating eagle for example, a great many other species will be saved along with it. Many tropical forest tree species are found in very low densities (i.e., the number of different species in an area is high) and large areas are necessary to maintain these species.

Priorities in conservation in the Philippines must first be to save as much of the Old Growth forest as possible combined with efforts to simultaneously inventory their contents and to recognize and "salvage" critically endangered species via off-site conservation.

Hauge, et al [36], provide a strong biological basis for conservation priorities in the Philippines, using the Archipelago's vertebrate fauna. By first selecting as a priority Mindanao as the island with the greatest number of species, they then selected the island with the next largest group of species not found on Mindanao This determined the islands with the greatest number of endemics (species not found on any other island). Such single-island endemics constitute 28% of the terrestrial vertebrate fauna. This analysis demonstrated that Mindanao, Luzon, and Palawan have the greatest number of unique species, and contain 86% of all Philippine vertebrate species. They are therefore the most critical to conserve.

The IUCN [37], designation of degrees of threat should be used. They represent a standardization of the use of such terms as endangered and threatened.

Madulid [38] in 1982 summarized the dangers facing Philippine plant biodiversity and identified a number of endangered or already extinct species A main concern appeared to be the fact that Filipinos themselves were helping foreigners strip Philippine forests of rare and endangered ornamental plants which, along with habitat destruction, was spelling doom to hundreds if not thousands of species. Madulid [39] also outlined 10 ways in which botanists could help the conservation movement in the Philippines. Many of these ways, however, depend upon a good understanding of the number and relative rarity of plant species.

4.4 Background of Present Situation

The maintenance of biological diversity is probably the single and most crucial issue for the potential of sustainable development in the Philippines. The resources are strictly limited in time and cannot be replaced or renewed. It would be good if a panacea could be found but there does not appear to be any perfect solution, long or short term.

The concept of an Integrated Protected Areas System was first taken up in some detail during the planning for and conduct of a Technical Workshop on the Integrated Protected Areas System for the Philippines in 1988 [40], led by the Haribon Foundation and supported by USAID. Aside from the prioritization of 27 protected areas into categories based on biological and geographic considerations, the workshop recommended an independent IPAS authority with a Board of Directors chaired by the Secretary of DENR. The results of the Workshop were criticized on the basis of the methodology with which the areas were prioritized (J. Tongson, pers. com.). The issue has obviously become the focus of the attention of a number of very important donor agencies, including the World Bank (WB) and the Asian Development Bank (ADB). These two institutions have separately funded reports on protected areas in the Philippines. The authors of these reports attempted to get their respective institutions to combine their resources into one report, but were unable to do so.

The WB report, entitled Establishment and Management of an Integrated Protected Areas System, is a very valuable contribution in which eleven basic problems concerning the present system of protected areas are detailed, followed in each case by a recommendation. Petocz [8] identifies eight terrestrial, one wetland and two marine areas as priority areas for IPAS. Almost all of these are being funded by outside organizations and managed by NGO's with or without government support. Petocz [8] also identifies feasibility studies as the first series of activities for his vision of the steps to be taken in the IPAS project.

Petocz makes good recommendations on the steps to be taken in a sequential manner and has obviously put a great deal of thought into the process. He outlines 16 steps in the planning process. It would no doubt help lawmakers if this document could be more concisely summarized for that would allow a better grasp of the situation by individuals not in the business, but whose support is necessary. Petocz's contribution is essentially an all-encompassing manual and nearly all the information necessary is there.

The ADB report deals with management issues and provides a model for an overall framework for organizing the GOP response to this initiative. The issues are complex and total costs are unknown, as a number of separate studies and initiatives must be accomplished (see the 31 July draft of the Executive Summary of the IPAS in the MPFD). These recommendations represent one of the best blueprints for organizational action.

The Executive Brief on Foreign Debt and the Financing of Environmental Programs, a document prepared by DENR for President Aquino's trip to Europe in June 1989, specifically includes a section on the Protected Areas and Biodiversity Programs and details overall budgets for each program totalling $50.05 million for the former and $56.0 million for the latter.

4.5 Protected Areas and Wildlife Bureau (PAWB)

The focus for GOP planning for the Protected Areas System is in the Protected Areas and Wildlife Bureau (PAWB) of DENR. Figure 1 provides an overview of the present situation [4]. Figures 2 and 3 show the alternative recommendations for an independent, or nearly independent, IPAS Commission [4]. The box for the Bureau of the Commission in option 3 is PAWB. Thus, the Bureau would actually be the main implementor of the IPAS in that scenario. New regulations for this Bureau are now being discussed and finalized within DENR. The basic policy in this report clearly and concisely states the purpose and function of IPAS, but the GOP has lacked the political will to take a firm stand on the issue of their protected areas in the field where it really counts. The lack of will is demonstrated by the lack of significant budget commitments and the continued logging of virgin forests.

The Protected Areas and Wildlife Bureau is responsible for setting policies and guidelines for the protected areas that presently exist and, through the regional offices, for carrying these policies into the field, but it has not been a genuine success. It is important to understand that under the present organization the PAWB does not directly implement its policies or guidelines. All implementation is through the DENR Undersecretary for Operations to the Regional, Provincial and, finally, Community Offices of DENR. Actual implementation is undertaken by the Provincial and Community Environment and Natural Resources Offices where the particular protected areas are located. If the new regulations for IPAS are approved they will supersede the regulations now in force, although the basic implementation procedures will remain.

The forthcoming IPAS regulations are quite useful and, as mentioned, very explicit. Besides the basic policy "to establish, manage, develop, protect, and conserve areas under the Integrated Protected Areas System (IPAS) in a manner that will leave them unimpaired for the benefit and

Figure 4 5-1
(From Appendix III, Maste Plan
for Forests Development)

Option 1. Current Structure of National Park

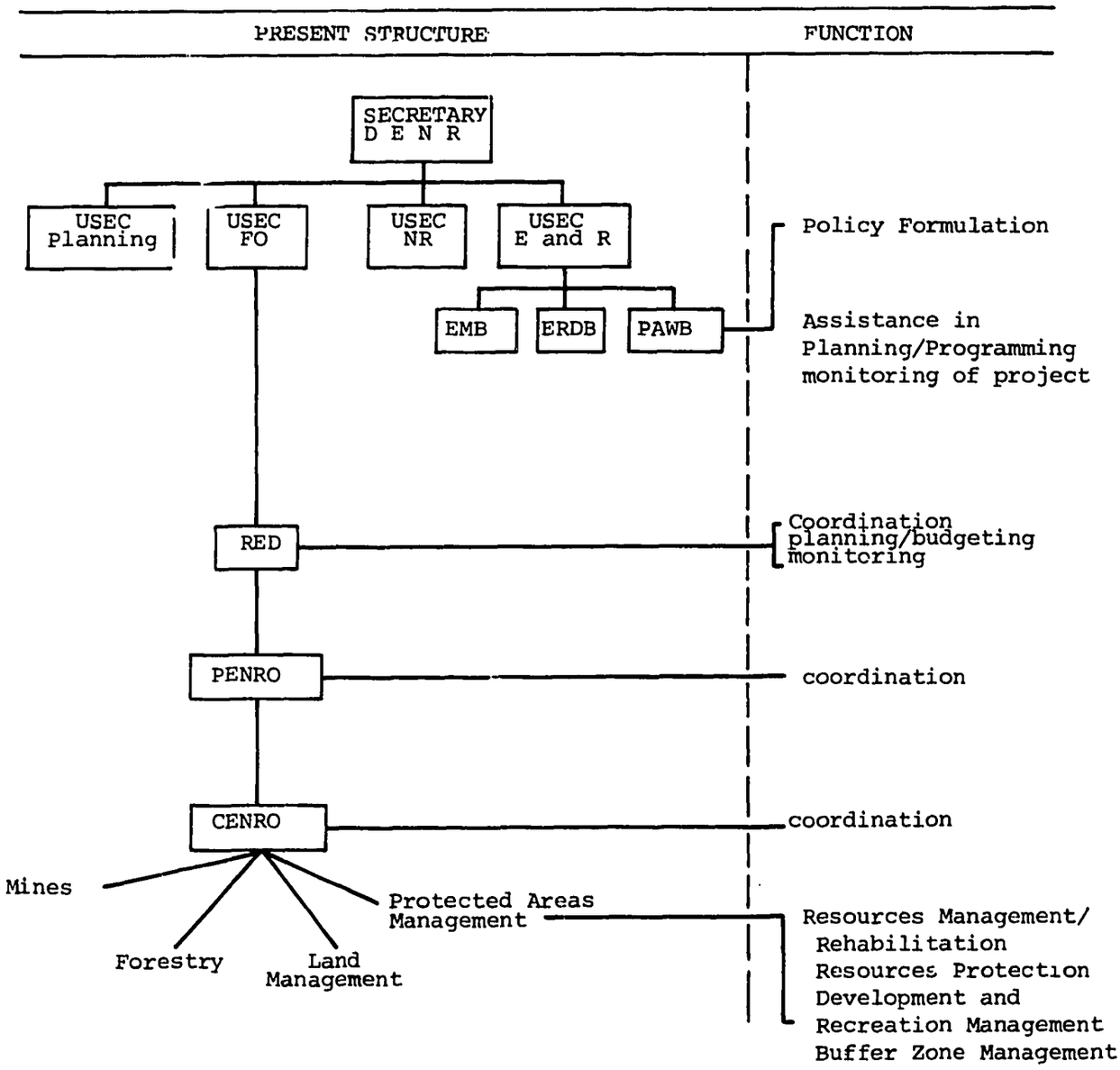


Figure 4 5-2
(From Appendix III Master Plan for Forests Development)

Option 2. Independent Commission

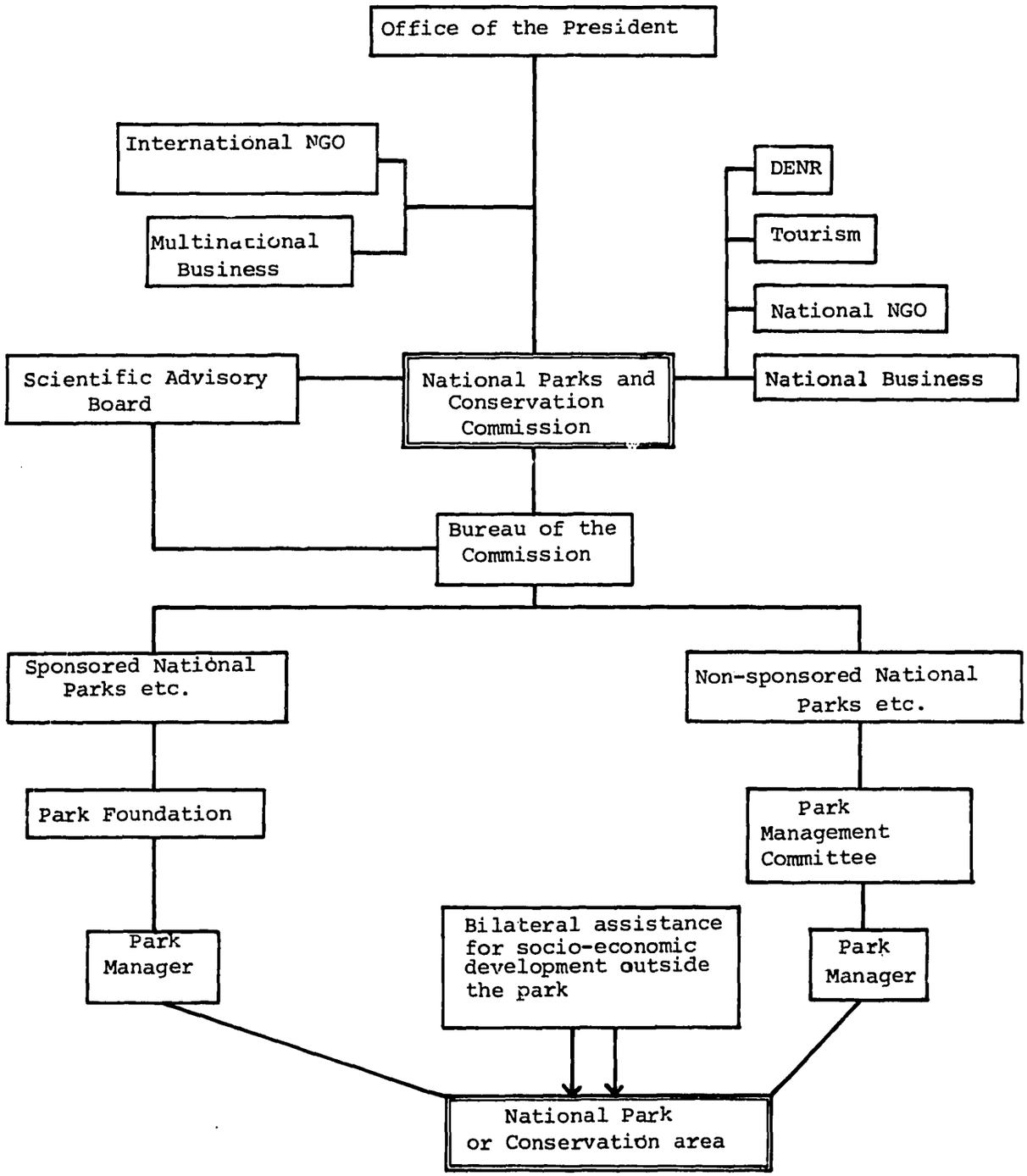
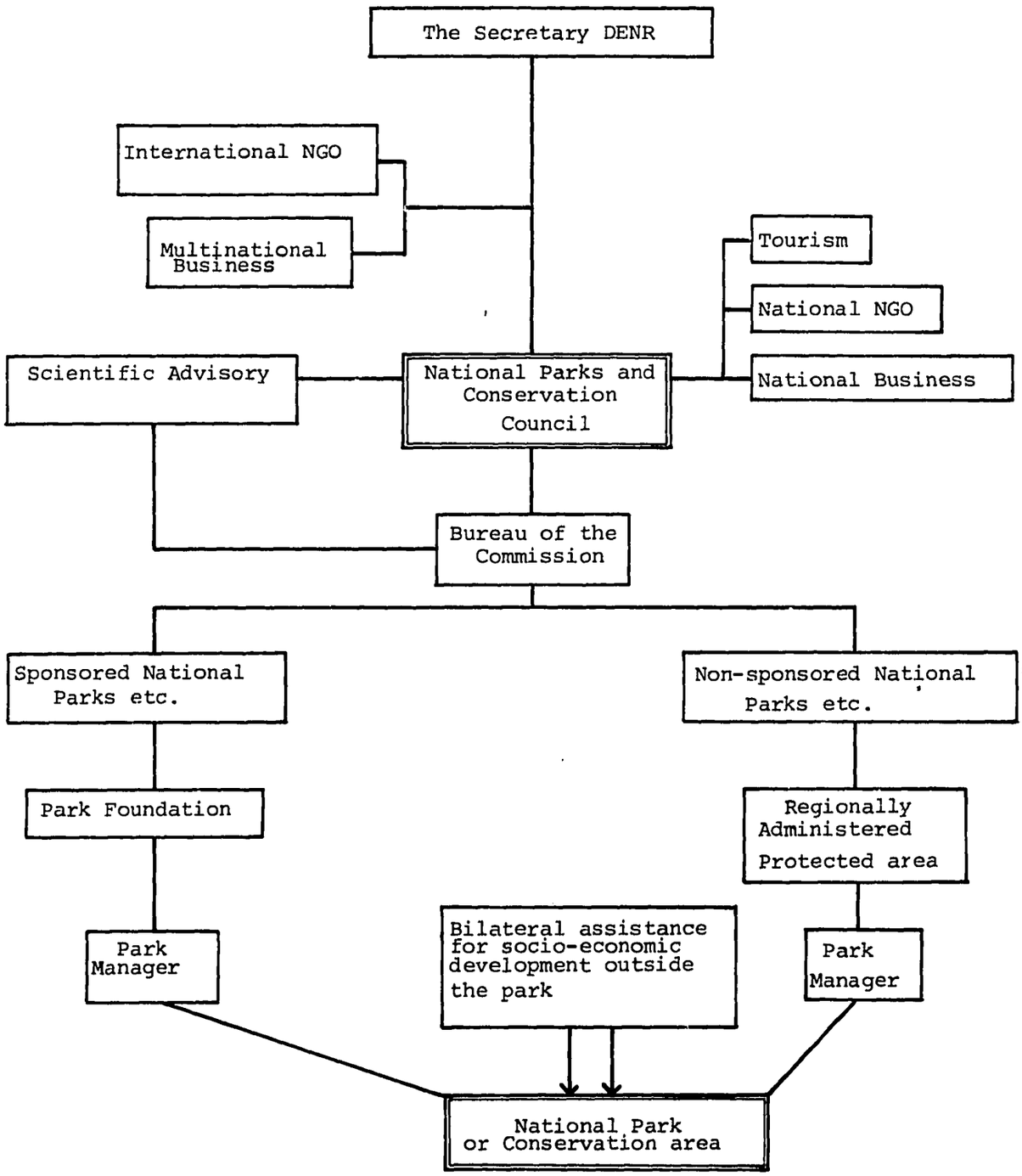


Figure 4.5-3
(From Appendix III, Master Plan
for Forestry Development)

Option 3. Transition Commission



enjoyment of the present and future generations," six categories of protected areas are defined: (1) Strict Nature Reserve, (2) National Parks, (3) Marine Parks, (4) Wildlife Sanctuaries, (5) Wilderness Areas, (6) National Recreation Areas. This is a great deal simpler than the present situation wherein 71 Protected Areas are distributed in 12 categories that are often poorly defined [41]. The administration, management, and development of the parks are then described in detail. Therefore, a good overall plan to recognize, manage, and develop the IPAS exists on paper, although not yet officially. The question is implementation. The track record of the GOP is not good here, as already mentioned. Another document of interest summarizes the history of the present PAWB, with functions, strategies and organization provided. For whatever reasons, and lack of dedication on the part of PAWB staff is definitely not one of them, the Bureau has not been able to be as effective as they themselves would have wished.

4.6 The IPAS Concept

The Integrated Protected Areas System concept is at an important threshold. With the current rate of deforestation high, donor interest is growing and the visibility of the issue becomes greater every day. It is imperative that appropriate professional expertise is engaged to utilize this opportunity correctly. Furthermore, action should proceed quickly. After political commitment, the major constraint to management of an IPAS is the lack of trained personnel. It is estimated that it may take 25 years to bring about a truly professional and well managed protected areas system (Jefferies, pers. com). Because deforestation may eliminate biologically valuable IPAS sites within 5 to 7 years, the GOP must act promptly. In the interim, in the interest of preserving what is left as quickly as possible, NGO management support for particularly important parks should be encouraged and funded by donor agencies.

4.7 NGO's and Debt-for-Nature

The situation demands that short-term and long-term solutions be tightly linked with overall coordination by well-trained professional people. There exists few examples of success in NGO-supported endeavours in the national parks. The Saint Paul Subterranean and El Nido Parks in Palawan supported by the Debt-for-Nature Swap, with the Haribon Foundation and the World Wildlife Fund playing leading roles, are such examples, as are the efforts

involving "community" marine parks. The CVRP has demonstrated that when it becomes in the self interest of a community to preserve a reef as a sanctuary from which "breeding stock" can return to adjacent areas, it works. The CVRP has helped the community at Moalboal to establish such a reserve, as one example. The Asian Wetland Bureau Philippines Foundation, Inc. will no doubt be playing a leading role in protected wetlands as it is now in Cebu.

At present there is a World Wildlife Fund (WWF) Debt-for-Nature program already in place in the Philippines valued at $2 million. This program is based upon a collaborative relationship between WWF, DENR, and the Haribon Foundation and was funded bv USAID. At this time, accordingly to Mr. J Tongson, Executive Director of the Haribon Foundation, there are nine active projects with a total present annual budget of P 7.139 million (about $325,000). These projects and their annual budgets (in pesos) are:

- Development and Management of El Nido National Park -- ₱1.536 million
- Development and Management of St Paul Subterranean National Park -- ₱3.12 million
- Manpower Training and Development for DENR staff and Community Level Reserve Managers -- ₱764,000
- Fellowships for Graduate Degree Programs in Wildlife Management and Field Research -- ₱312,000
- Implementation and Enforcement of CITES and Philippine Laws in Regulating the Trade of Wildlife and Wildlife Products; this has 3 components:
  - Census of the Philippine Monkey (<u>Macaca fascicularis</u>) -- ₱239,500
  - Monitoring of Wildlife Trading -- ₱160,000
  - Wildlife Trading Information Campaign - ₱146,000
- Field Studies of Philippine Medicinal Plants - ₱167,000
- Field Survey of Critical Plant Sites -- ₱157,000

- Planning for an Integrated Protected Areas System -- ₱468,000 (work proceeding this year on Mt. Isarog and Mt. Iria in Batanes)

- Program to Management Support for the DENR; funds provided the DENR to cover whatever overhead costs they encounter for their share of the program -- ₱780,000.

According to J. Tongson the work on Mt. Iria and Mt. Isarog involves 8 to 12 people from UPLB in botanical and zoological surveys of the areas. Batanes is not so critical from a biodiversity perspective, according to Mr. Tongson, but there are no social problems in the area, whereas Mt. Isarog has high biodiversity but a poor "law and order" situation. The scientific teams will collect specimens for 2 months, and there will be what Mr. Tongson calls "socioeconomic teams" that will be working with the communities in the peripheral areas. The idea is to train local people to manage the park and thereby provide direct employment benefits to the local communities. The implementation is to get local people to accompany the scientific teams into the field to see the boundaries; identify plants and animals, and be part of the survey process in general.

Haribon basically agrees with the MPFD recommendations. They are also getting more into an advocacy role for nature conservation in the Philippines and, again according to Mr. Tongson, are using the following as basic premises:

- "If you give natural resources to the people they destroy it. If, however, you give them proprietary ownership they become good stewards."

- Marine sanctuary concept by community action.

- Showing people how to use natural resources less destructively.

In general, although there are other valuable NGOs in the environmental arena [42], the Haribon Foundation has certainly played a leading role so far in nature conservation. This brief review is by no means even approximately comprehensive, not even for all the activities being undertaken by Haribon.

The role of NGO's becomes extremely important, as does the ultimate disposition of IPAS, because of a pending extremely large-scale WWF Debt-for-Nature Swap that might be funded by USAID. The magnitude of the potential project dwarfs the previous one. It will require a well-organized, effective IPAS, as well as a number of effective and capable NGO's.

Haribon is preparing for the possibility of the larger Debt-for-Nature Programme that would, if funded, provide US$ 18 million distributed over 8 years, in amounts of 1, 2, 3, 3, 3, 3, 2, 1 million per year. There are seven major programmatic areas, with the largest being Protected Area Development and Management with support for eight parks, a project to repurchase logging concessions, and another to extend local community participation in park management. [43]

4.8 Importance of Off-Site Conservation in the Philippines

Because of the potential loss of the remaining tropical forests, it is unlikely that the biodiversity of the country can be secured without an effective IPAS. Even with an effective IPAS, at current habitat sizes many species will still become extinct. To reduce the potential loss, off-site conservation is the only means by which any meaningful rescue of elements of Philippine biodiversity can be accomplished in the long-term. We must provide the means to identify and "capture" critically endangered species and propagate them in and out of the Philippines.

Documents recently came to light concerning draft plans for a number of projects in the general area of captive breeding. These are proposals generated mostly within DENR and in particular PAWB. They are listed here because the potential projects have been approved by NEDA, despite the fact that more specific information has not been obtained

- Experimental Stockfarming of Common Water Monitor Lizard (Varganus salvator). The objective is to generate technology for stockfarming this reptile. Funding will begin in 1990 at $84,000 per year The source of the funding is foreign. The total cost of the project over 5 years is calculated at $202,000. The implementing agency is PAWB.

- Management Program for the Philippine Monkey (Macaca fascicularis). The objective is to formulate a management program for the Philippine monkey due to the fact that they are taken in great numbers from the wild each year for commercial and medical purposes. The total cost of this program over 5 years is $712,000, all of it to be obtained from foreign sources according to the information available. Implementation is to be by PAWB.

- Survey of Rare, Threatened, and Endangered Philippine Wildlife Species. The objective is to develop conservation and management strategies for rare, threatened, and endangered wildlife. According to the proposal document this project will use representatives from different regions who are trained in wildlife identification to verify the status, determine the distribution and possible populations of species considered rare, threatened, or endangered. This is supposed to lead to the development of strategies to conserve and manage the species listed in CITES and by the IUCN. Funding is proposed at $279,000 over 5 years, all of it foreign in origin. Implementing agency is to be PAWB.

- Conservation Program for the Philippine Flying Lemur (Cypocephalus volans). The objective is to promote the conservation of the lemur by acquiring knowledge of its bioecology, and to disseminate information to the general public. Total budget is $183,000 for 5 years, all foreign derived. Implementing agency is to be PAWB.

- Program for the Preservation of Biodiversity. A program designed to undertake a nationwide and regional conservation and breeding program for selected rare, threatened, and endangered species such as the Philippine monkey, water monitor lizard, and Philippine flying lemur. Total cost $959,000 over 5 years, all of it foreign derived. Program implementation is by PAWB. It is not clear from the program documents whether this duplicates or complements the aforementioned specific projects.

These projects auger well if the planning is well organized and professional staff well-trained in these techniques are available. PAWB has neither the number of

staff nor the trained staff available to do all of this without considerable support.

Another project in this area is entitled: Establishment of Wildlife Germplasm Bank in the Cordillera, to be implemented by Baguio State University with the regional DENR office. The project deals essentially with easy to breed, and not necessarily endangered, mammals and birds. The five-year project will cost $3,000, all of it foreign derived.

4.9 USAID/Manila Involvement in Conservation of Biological Diversity

USAID has provided some significant support for major intervention on behalf of the maintenance of biological diversity to date, principally through the present WWF Debt-for-Nature Swap. It was also USAID funding that provided the means by which Haribon Foundation could publish the Philippine National Conservation Strategy (PNCS). In 1988 USAID supported workshops through Haribon that has resulted in a much better understanding of the status of our knowledge of Philippine biodiversity. For these reasons, I applaud the USAID/Manila Mission and hope that as a result of the recent recognition on a global scale of the relationship between the maintenance of biological diversity and the concept of sustainable development, that it will be possible to do a great deal more because the need is great and the time is short.

5.0 IDENTIFICATION OF NEEDS AND RECOMMENDATIONS FOR ACTION

5.1 Overview

The need in the Philippines for all issues concerning biological diversity is enormous. How it can be accomplished in a way that makes long-term sense and outlives the particular funding that might be forthcoming is the real issue. I do not believe that it would be worthwhile to fund programs without some assurance that there will be some changes in the basic Government of the Philippines attitude and commitment toward these activities.

The objective of this assessment has been, as mentioned earlier, to review first the status of knowledge of biological diversity in the country, then what is being planned or carried out at present, and to make recommendations after having identified gaps in our knowledge. Three major gaps are: (1) absence of a sound national inventory of Philippine biological diversity and a strong institution to manage and coordinate such an effort, (2) lack of a functional and believable protected areas system that encompasses what is left of the biological diversity of the Philippines, (3) lack of a national consensus on a conservation strategy that is "bought into" by all of the public and private sector. I will outline the best way to meet those needs below.

5.2 Priorities and Criteria

As mentioned several times in this assessment, my highest priority is saving as much of the remaining biodiversity as possible within the context of an IPAS that works. Within that context my highest priority is bringing biologically critical areas of Old Growth forest into an IPAS. The problem is that I do not believe that GOP resolve, carry-through and commitment will be forthcoming. Even when it exists in Manila, such resolve is rarely carried through into the field. This is why separate assessments (MPFD and the Haribon Technical Workshop on an IPAS) have recommended an independent IPAS attached directly to the President's Office. My evaluation of this is that it is not politically viable. Even if it were, it would still not guarantee that the President's will is carried down to the actual management and protection of the areas

themselves. My perception, therefore, is that the IPAS will not succeed in time. It may be 20 years too late.

If this perception is correct, then the only way to salvage biodiversity is to (1) recognize the species of greatest potential importance as quickly as possible, and (2) salvage as many of them as possible through off-site conservation. This leads to a concept of a well managed and coordinated Inventory and Gene Pool Rescue Program.

5.3 Inventory and Gene Pool Rescue Program (IGPR)

The best means to achieve an Inventory and Gene Pool Rescue Program is to create a Center for Biological Diversity that will have that program as its primary mission. The concept is not unlike that presented in the U.S. Biodiversity Bill, which will name the National Museum of Natural History at the Smithsonian Institution as a Center for Biological Diversity. The Smithsonian Museum would be expected to serve as a manager and coordinator of biological diversity work taking place throughout the country and to provide support for such work not only by passing funds to workers at other institutions, but also to provide the library and collection resources that such work requires to be sound and successful. Computerized data bases would use standardized, internationally accepted programs. The principal goals of the Inventory and Gene Pool Rescue Program would be to:

- Perform work leading to a National Inventory of Philippine Biological Diversity.
- Provide as a direct product of the inventory seeds, cuttings, and live specimens of endangered species for cultivation and preservation in botanical gardens, zoos, seed banks, both in the Philippines and abroad.
- Strengthen the institutional base for inventory work in the Philippines.
- Provide education and public outreach concerning the natural history of the Philippines.

The National Museum in Manila hasn't the staff, management skills, or leadership ability at this time to carry out this program by itself. The proposed program will, however, ultimately make it possible for such an institution to take a leading role in promoting and

protecting Philippine biological diversity. The components of the IGPR are discussed below in priority order.

National Inventory of Philippine Biological Diversity

A coordinated plan of action to produce a sound accounting of the biota of the Philippines using modern methods of surveys and computerized data-base management will require strong management and infrastructure. The plan would create the conditions whereby the greatest emphasis will be placed on the groups for which we know the least--gaps revealed in the status report given earlier. A major goal of the inventory would be to secure genetic material of critically endangered biota. One of the tangible results of the Inventory would be a series of publications that could well be published as was the Guide to Philippine Flora and Fauna series [44], under the auspices of the predecessor to the present DENR. That series, though a very significant and valuable attempt, could not be based on new information for the most part and only dealt with a relatively small number of groups.

The Inventory would have a number of subcomponents:

- Establishment of Working Groups: Teams or working groups of scientists would be assigned to the different groups of organisms, with each group establishing a plan for its inventory. The working groups would then be given the responsibility to carry out these plans. For the terrestrial plants, there would be three working groups: flowering plants and ferns, mosses and liverworts, and fungi and lichens. Terrestrial vertebrates and birds, amphibians and reptiles, and (most important) insects and arachnids (spiders), for the terrestrial fauna. Marine Science Institute would take the lead in establishing and coordinating the working groups for marine plants and invertebrate animals.

  Program Duration: 10 years

  Program cost : Estimated at $1 million per annum for complete inventory. Includes costs of U.S. scientists spending time in Philippines and field work.

Funding source : USAID via grant to WWF Consortium in which guidelines would be provided to establish appropriate international linkages.

- Ex-Situ or Off-Site Conservation for Critically Endangered Species

The only way in which long-term survival will be assured for critically endangered species of Philippine biota is a crash program to cultivate the plants in botanical gardens and arboreta, and breed the animals in zoos under captive breeding programs. The former will be done by linking the field work with several botanical gardens in the tropics that are anxious to obtain Philippine material, and which have programs with established track records. This is in keeping with the concepts of The Botanic Garden Conservation Strategy [45]. The latter can be accomplished by bringing individuals from various U.S. and other institutions who have run successful programs in captive breeding to the Philippines, as well as by upgrading zoo staff in the Philippines via visits to such facilities. The GOP should be asked to contribute to saving their flora by their creation of a soundly financed Botanical Garden.

Program Planning: 1 year

Program Duration: 3 years with renewable 3 years terms after that depending on progress.

Program Methodology : Obtain propagules of endangered plants and carefully select endangered animals during the National Inventory work. Create a National Botanical Garden and provide the National Zoo with a strong captive breeding component.

Program Costs : $150,000 per annum estimated (with GOP funding for Botanical Garden)

Funding Source : USAID grant to WWF Consortium

- Physical Plant Enhancement

  Ultimately a sustained IGPR will depend upon the creation of better facilities for the National Museum, although a structure is not necessary to begin the inventory.

  Program Planning Duration : 1 year

  Program Construction Duration : 1 year

  Building costs : $ 4.5 million

  Funding source : Japanese Government, with 1/3 cost provided by Philippine Government to demonstrate commitment

- Staff Enhancement

  The staff at the National Museum are for the most part without advanced training and lack broader experience. This program would provide periods of residence of 3 to 6 months in U.S. institutions for such staff (as well as staff from other institutions) to collaborate with fellow specialists.

  Program Duration: 10 years

  Program Goals : Awarding 2 to 4 staff enhancement awards per year.

  Program Costs : $4-7000 per awardee for a maximum of $28,000 per annum

  Funding Source : USAID grant to WWF Consortium

  Program Methodology : Staff will establish contact with specialists in his/her field, make arrangements to be invited to collaborate, apply to Committee of Center established to make selections. Staff member must publish a result of his/her visit in a referred journal.

Part of the commitment of the GOP would be to establish 2 to 4 new Ph.D-level positions per year for 5 years at the Center for Biological Diversity, which as envisioned is a remodeled and renewed Museum, beginning in the third year of the Program.

- Germ Plasm Banks for Seeds and Other Genetic Material

  Seeds, cuttings, and cryogenic (frozen) samples of tissue all represent ways in which germ plasm can be stored. As our biotechnology improves it will no doubt be possible to do things we cannot yet even envision. I recommend a workshop presided over by the Department of Science and Technology (DOST) that will take a very broad view of the potential of storing such genetic material both in and out of the Philippines.

  Program Duration: 1 year

  Program Methodology : Have DOST, at the level of Undersecretary for Research and Development, conduct a workshop to study the potential for long-term seed storage research and cryogenic storage of tissue samples of endemic plants and animals of the Philippines. Preparation for the workshop should be 6 months with responsibility for its success given to the Undersecretary. Funds would be made available for experts from all over the world to participate in this workshop.

  Program Costs : $50,000 -- Mostly for travel expenses of 8-10 foreign specialists and 20-30 Filipino specialists.

  Funding Source : USAID via grant to DOST.

Education and Public Outreach

Education and public outreach, in the form of courses, travelling exhibits, videotapes, lectures, seminars, and special events are among the means by which the present and future generations of Filipinos can be taught about their heritage and will learn that they are the stewards of it.

Program Duration	:	7 years beginning in fourth year of National Inventory, after the new facility is available.
Program Conditions	:	GOP support all staffing needs for this part of the program.
Program Costs	:	$100,000-$200,000 per annum for average cost of $150,000 per annum
Program Methodology	:	Subcontract by WWF Consortium to institution in which public program ability is high.

Short-Term Priorities under IGPR

The list that follows is in order of priority (the highest priority listed first):

- Botanical survey of Old Growth forest for plant diversity.

  In response to the urgent need to protect what is left of these forests, a survey carried out in conjunction with staff of the National Museum and UPLB is appropriate.

Program Duration	:	3 years
Program Costs	:	$ 100,000 per annum
Funding Source	:	NSF or USAID through grant to WWF or National Museum (Manila).

- Initiation of Philippine Insect Inventory.

  Due to the lack of knowledge on this group and the potential economic importance, a working group should be convened quickly to begin planning this endeavour. This inventory would be based at UPLB, where the nucleus of a strong group already exists. The addition of foreign collaborators to help the group, would enable the project to begin. It would be sited at UPLB's Natural History Museum, which would automatically enhance that facility.

  Program Duration: 10 years

  Program Costs : $150,000 per annum

  Funding Source : USAID grant to WWF Consortium

- Workshop on Developing a Strategy for the Creation of a National Botanical Garden.

  There is no facility in the Philippines in which rare and endangered plant species flora can be cultivated and maintained off-site with any assurance of long-term viability. The sad case of the National Capital Botanic Garden, established on University of the Philippines' land, is an excellent example of the futility of all such previous efforts in the Philippines. The integrity of the garden could not be maintained against squatters. A group of Philippine botanists have held informal meetings on the topic and would like to formalize some basic plans. The group is sponsored by the National Museum. The GOP itself should be asked to provide the space and facilities for a Botanical Garden whose emphasis would be on off-site conservation of rare and/or endangered species.

  Program Duration: Planning - 2 months; Workshop 3 days

  Program Costs : $3,000

  Program Methodology : National Museum organizes and coordinates Workshop.

  Funding Source : USAID grant to National Museum

5.4 Protected Areas Program

The protected areas system in the Philippines is conceptually and in reality an extremely frustating issue. The present system of governance of protected areas has been outlined above. My own admittedly brief review has made clear the following:

- Many of the staff at PAWB, who are mostly very dedicated individuals, do not appear to understand what the IPAS really is.

- Many citizens seems to consider the production of a "plan" as all that is necessary. There is little concept of how to implement such a plan and how to make it work. Furthermore, even those who have tried have became demoralized and frustrated when circumstances at the site ultimately mitigate against everything they try to do. This is again a matter of GOP will and commitment.

- A number of different donor agencies are involved in planning processes that often seem to have little connection to one another.

- Most plans have failed to successfully address the issue of community involvement in the protected areas process in a convincing manner, except for some marine projects.

- The GOP will, to commit sufficient funding and to carry through with the enforcement aspect of protected areas management, is extremely limited.

- Representatives of various donor agencies approach the Integrated Protected Areas System concept from different directions and with different prejudices, and have yet to "integrate" their concepts.

- Frustration has led to one school of thought that would remove the actual management of the protected areas from government hands entirely and distribute them as various donor "enclaves," practically with sovereignty and extra-territoriality. This would be entirely counter-productive and would never result in a behavioral change, the issue I believe we are really trying to get at.

- The WB and ADB reports on IPAS with fairly concise recommendations, are not necessarily contradictory; indeed they are in most ways complementary. But they represent a great deal of unassimilated information that has yet to percolate through the GOP and NGO communities for action.

In my perhaps pragmatic approach to this problem, or series of problems, I am going to make a rather unusual recommendation (particularly in light of the urgency): further study, as well as some immediate action.

Synopsis of Problems

- Lack of inclusion of critical habitats outside the present protected areas.

- Lack of experienced and/or professionally trained PAWB staff.

- Lack of donor coordination.

- Lack of understanding of IPAS concept.

- Lack of GOP commitment.

- Lack of support on the ground, both in the Parks and in the "buffer" zones.

- Lack of appropriate enabling legislation.

Each of those needs can be addressed at a level, and in a way, where appropriate expertise can be obtained. It is recommended here that a USAID grant to the WWF Consortium be provided to address each of the points above, with the following Program elements:

- Assessment of all the assessments and a clear conceptualization of where this thing should go. It will take a knowledgeable person at least 3 months, and maybe 6, to do this and help the concerned community come to a consensus.

- Inventory of sites for potential inclusion in protected areas system (addressed in short-term, urgent project under IGPR above).

- Training of PAWB Staff. (Mr Greg Texon of PAWB has already worked out a series of training courses he is anxious to implement.)

- Education of GOP and public about IPAS concepts. (This can be done through a series of seminars, workshops, and briefing sessions.)

- GOP inducements to commit full support (No funds unless commitment is demonstrated.)

- Donor forums (at highest level possible.)

- NGO involvement/collaboration in community interaction in "buffer" zones. A consortium of local NGO's should be formed with continued WWF support to develop an NGO plan of action and distribution of responsibilities. No single NGO can handle all that needs to be done by itself.

Program Duration: Initial period 5 years with renewal potential every 5 years

Program Costs : 2 million dollars per year which would include costs for management of several selected parks.

Funding Source : USAID grant to WWF Consortium or Debt-for-Nature Swap.

The facts speak for themselves. According to present estimates that should be the most reliable, there are officially only about 988,000 ha of Old Growth forest left. In actuality, the figure is more likely about 700,000 ha and disappearing at an average rate that will see it gone in 5 to 7 years (Ross, pers. com.) . In addition there is (officially) roughly about 1.2 million ha of montane/mossy forest left. I believe this estimate is probably also too high; the map discussed in section 2.2 based on information supplied by the FRI startingly indicates how little is left of the original forest ecosystem, and how scattered those remnants often are. As much of the remnants that contain significant remaining biodiversity in the Philippines should be incorporated into the protected areas system as quickly as possible. Many of the Filipino people, for whatever social and cultural reasons, have not tended to look at protected areas as a precious national heritage that belongs to all of them, and which should therefore be preserved for all generations. Rather, they view these areas as being part of a commons; if they do not extract whatever resources are available, someone else will. Future generations are the big losers. Haribon Foundation and other NGO's are just now beginning to address these issues.

5.5 Philippine National Conservation Strategy

Conceptualization of a forum that would allow a new national consensus for the Philippine National Conservation Strategy should be undertaken. Plans for this forum would include representation from all relevant institutions and NGOs in the Philippines. The main agenda would be to create a representation from the Philippine community that will allow this strategy to be accepted and bought into by all concerned. The DENR has covered many of the needs of a national environmental strategy in the Philippine Strategy for Sustainable Development (PSSD), but the issues concerning conservation in general (outside of the IPAS) and biological diversity in particular, are not specifically taken up. This is where a Forum on a revised Philippine National Conservation Strategy can serve a useful role.

Project Duration:		Planning: 6 months Workshop: 5 days
Project Costs	:	$35,000 (estimated)
Project Methodology	:	DENR should convene this Forum with strong representation from the National Museum, UPLB, UP-Diliman, and relevant local and foreign NGO's. This forum should take as a starting point the existing version of the Philippine National Conservation Strategy and revise it, with the ultimate goal of having it accepted by the majority of the Philippine community. Strong caveats should be placed at the doorstep of DENR for a wholehearted go at this endeavour. Three world-renown experts in the field of protected areas should be specifically invited by DENR to participate. If DENR does not wish to accept this mantle it should be given to a consortium run by the National Museum.
Funding Source	:	With provisos above, to DENR or to the National Museum, directly via a grant from USAID/Manila.

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6.3 Acknowledgement

I am indebted to all of the individuals I contacted and who gave of their time. I am particularly indebted to Dr. Domingo Madulid and Mr. Edwino Fernando who served as extremely important source persons. The Honorable Senator Heherson Alvarez was kind enough to see me on two occasions in regards to biodiversity matters. I appreciated the fact that Dr. Celso Roque took time on 3 occasions out of busy schedules to see and talk to me. Mr. Greg Texon gave me a great deal of information about GOP plans for an IPAS. Mr. Julian Tongson was extremely helpful and indispensable for information on Haribon's activities. The hospitality and support of Mr. Kevin Rushing was appreciated. I thank all of my team member colleagues and our Project Leader, Dr. Tom Scanland, for their support, and I particularly thank Mr. Ron Greenberg whose critical review of my draft, as well as numerous discussions, helped me hone some of my ideas and concepts.

6.4 SUMMARY OF ACTIVITIES

Date	Description
20 July (Thu.)	Left Honolulu at 2:00 p.m. arrived Manila 8:00 p.m. the same day
21 July (Fri.)	Reported to office and after brief introduction by Project Leader, established working area and then departed for the National Museum to begin assessment of biological diversity projects. At National Museum spoke to Dr. Domingo A. Madulid, (Senior Research Scientist - Div. of Botany) and Mr.Pedro Gonzales (Curator of the Division of Zoology). I requested that Mr. Gonzales call a meeting for me with his staff so that I might inform them about my mission. He agreed to arrange for a meeting with his entire staff for Monday the 24 of July.
22 July (Sat.)	Reported to office and spent the day beginning to assess the available literature.
23 July (Mon.)	Reported to office at 9:00 a.m. and proceeded from there to National Museum. At 10:00 a.m. met with 6 members of the Zoology Division. I explained that this could be a very important mission for biodiversity issues in the Philippines. I had lunch with Dr. Madulid, met with the Director, Fr. Casal and shortly thereafter proceeded to the Haribon Foundation to meet with Mr. Maximo Kalaw. Mr. Kalaw, a very busy man who has dedicated himself to conservation issues, met with me and John Clark.
25 July (Tue.)	I had made arrangements to travel to the University of the Philippines-Los Baños, to meet with individuals in the Department of Entomology, College of Agriculture, and Department of Forest Biology. The individuals who made arrangement for most of the day was Mr. Edwino Fernando, and I met with him first

at 9:30 a.m.. At 10:00 a.m., I had a meeting with the Vice Chancellor for Academic Affairs, Dr. William Padolina. I explained my mission, and afterwards met with the Director for Research, Dr. Corazon B. Lamug. The University is already supporting the planning for a major project called the Flora of the Philippines Project.

Mr. Fernando had arranged lunch with a number of faculty of the University, particularly those who are involved with in the Philippines Flora Project Dr. Juan V. Pancho, Dr. William Gruezo, and, in addition, Dr. Venus Calilong, The present Chairman of the Department of Entomology and the Director of the University's Natural History Museum.

After lunch I was conveyed to PCARRD, where I met with Dr. Virgilio A. Fernandez, Deputy Executive Director for Institution Development and Financial Management, as well as the Director of Forestry Research Division. PCARRD is basically an agriculturally oriented organization which is now called the Philippine Council for Agriculture, Forestry and National Resources Research and Development. The old acronym is still maintained even though this is a new name. I requested a printout of the literature stored in their computerized data base that pertained to biodiversity projects. His assistant provided a listing of some 50 projects, not one of which was really in the biodiversity arena.

26 July (Wed.) I proceeded to the office at 8:30 a.m. and from there the entire team, now all in, went to a briefing session at the USAID mission. In the afternoon I went to the Protected Areas and Wildlife Bureau of DENR to meet for the first time with Mr. Gregorio Texon who has been given the coordinating responsibility for the Intergrated Protected Areas System (IPAS).

27 July (Thu.) I returned to Los Baños to meet again with Mr. Fernando and individuals in the Entomology Department, where I spent some time discussing a potential endeavor with the insects of the Philippines. The insects, of all the terrestrial fauna are the least known. I met with Drs. Calilong, Baltazar, and Gapud, the three of whom have served as a very formidable nucleus for an insect inventory for which they have gotten very little encouragement or support. I was given a basic idea about what is unknown about the insect diversity in the Philippines.

28 July (Fri.) In the morning, after spending time at the office engaged in literature review, I returned to the National Museum to meet again with Mr. Gonzales to attempt to get some information still lacking from his group in the zoology Division. In the afternoon I returned to the office and continued to try to catch up with planning and literature review.

29 July (Sat.) Spent the entire day at the office reviewing literature and making plans for further interviews.

31 July (Mon.) I spent the morning and most of the early afternoon as well, to about 3:00 p.m., at the University of the Philippines-Diliman. I began the day with a long interview with Dr. E. Gomez who, as the Director of the Marine Science Institute in the College of Science, has been instrumental in much of the marine endeavours in the country. He then took me to see Dr. Gavino Trono, who is a well known seaweed taxonomist. Dr. Trono and I spent about an hour together and I found out what I had not yet known about the status of knowledge of the marine seaweeds of the Philippines. During lunch with a group of the staff at the Marine Science Institute, I was able to discuss with Dr. Miguel Fortes his knowledge of the sea grasses of the Philippines. After lunch I met with Dr. P. M. Zamora who is the Director of the Institute of Biology of the College of

Science. Dr. Zamora reviewed with me his knowledge of status of inventory work in general in the Philippines, and made some suggestions and comments that are used and quoted in this assessment.

1 August (Tue.) After reporting to the office I proceed to USAID to have an interview with Kevin Rushing who provided me with some background on USAID programs. I returned to the office in the afternoon and proceeded to continue trying to catch up with literature review. In the evening Dr. Edgardo Gomez and I had dinner and I was to able to fill in some gaps of my knowledge in the marine situation in the Philippines.

2 August (Wed.) I had an appointment with Mr. Julian Tongson, Executive Director of Haribon Foundation, at 9:00 a.m. Mr. Tongson brought me up to date about the status of various projects that Haribon has been doing and provided some interesting history of some of the projects. After my interview with Mr. Tongson I proceeded back to PAWB where I met again with Mr. Gregorio Texon, who on this occasion provided me a large number of documents that really helped me to better understand the history and nature of PAWB itself.

After my interview with Mr. Texon I proceeded to the Forest Management Bureau where I met with Mr. Bruce Jefferies at 2:30 p.m., and had the opportunity to find out from him what he had been doing in terms of the IPAS. Mr. Jefferies had been retained to provide some input into the IPAS part of the Forest Management Plan. During this time I also had the opportunity to meet a number of people who are involved with the Management Plan for Forestry Development; Mr. M. Ross, Consultant, and Mr. Policarpo A. Najera, the Project Manager for the MPFD, and another consultant for the same Master Plan, Mr. Goran Nilsson Axberg. I also

received from Michael Ross copies of the July 25 draft of the master plan for forestry development.

In the evening at 7:00 p.m. there was an Advisory Committee meeting of the Flora of the Philippines project. This Committee is presided over by Sen. Heherson Alvarez and the individuals present besides myself included: Dr. Celso Roque of DENR; Dr. Ricardo M. Lantican, Undersecretary of the Department of Science and Technology; three members of the National Museum, Dr. Romualdo M. Rosario, Asst. Director for Operations, Dr. Lolita Bulalacao, Botany Division and Dr. Domingo A. Madulid also of the Botany Division; Mr. Edwino Fernando, of the U.P.-Los Baños; and Dr. Melecio Magno, President of the Philippine National Science Society.

3 August (Thu.) I spent most of the day in the office checking the literature and beginning to write part of the report. At 3:00 p.m. I returned to the National Museum where I had another meeting with Mr. Gonzales because, again, there were still some gaps in information from his Division.

4 August (Fri.) At 9:00 a.m. I had another appointment with individuals in the Protected Areas and Wildlife Bureau including Mr. Texon, and an individual within PAWB, responsible for the Marine parks section, Mr. Ver Palaganas. In the afternoon I returned to the office and continued to work on literature review. 5 August (Sat.) worked in the office all day on literature review and further planning for interviews.

7 August (Mon.) Spent the entire day working on report as well as literature review. In the evening Mr. Ron Greenberg and I met with Mr. Julian Tongson and other members of Haribon Foundation. We accomplished a great deal at this informal meeting, and I was able, finally, to meet 3 individuals

	I had not been able to contact: Drs. Angel Alcala, Pablo Alfonso and Alan White.
8 August (Tue.)	The morning was spent in the office working on my report. In the afternoon I had arranged a visit with Sen. Heherson Alvarez in his office with Mr. Greenberg and Mr. Rushing.
9 August (WEd.)	I spent this day in the office.
10 August (Thu.)	I spent the morning at the office on report writing and in the afternoon the entire group went to a briefing session at USAID.
11 August (Fri.)	I had a 10:30 appointment with Dr. Celso Roque, Undersecretary at the DENR and the afternoon was spent back in the office writing the report and continuing the literature review.
12 August (Sat.)	Report writing all day.
13 August (Sun.)	Report writing all day.
14 August (Mon.)	Report writing all day.
15 August (Tue.)	Report writing all day.
16 August (Wed.)	Meeting with Dr. Ricardo Lantican, Undersecretary, Dept. of Science and Technology. Dr. Lantican and I spent two hours together discussing how the DOST would be part of the plans related to biodiversity and sustainable development. Dr. Lantican informed me of the seed banks that existed in the country and also informed me of an organization called IBPAR which provides support on a regional basis for germ plasm preservation. These seed banks, of course, are geared almost entirely to agricultural crops. Dr. Lantican would personally like to extend that concept to non-agricultural plants.
17 August (Thu.)	Report writing all day.

18 August (Fri.)	Report writing all afternoon. In the morning I met again with the Staff of the Marine Science Institute and Institute of Biology at U.P.-Diliman, and after that had another, brief meeting with Dr. Celso Roque.
19 August (Sat.)	Report writing all day.
20 August (Sun.)	Report writing all day.
21 August (Mon.)	Finalization of report, preparation for departure.
22 August (Tue.)	Depart Manila

ANNEX E

NATURAL RESOURCE POLICY AND ECONOMICS

by

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1.0 OVERVIEW OF ECONOMIC CONDITIONS

This Annex presents an overview of the economic and policy factors affecting environmental and natural resources management in the Philippines. Chapter 1.0 provides an overview of economic conditions and trends; Chapter 2.0 reviews the macro-economic policy framework. In Chapter 3.0, the sectoral policies and their impact on natural resource management and use are discussed. Chapter 4.0 examines the cross-sectoral linkages and macro-economic and natural resource policy linkages. Chapter 5.0 discusses the major economic constraints to improvements in environmental and natural resources management. Chapter 6.0 presents recommendations.

In general, there is a need for greater analysis of both macroeconomic and microeconomic impacts and consequences of current natural resource management practices and of proposed alternative management practices. As a prerequisite, there is a need to strengthen the capacity to formulate and analyze natural resource policies.

The economic conditions and trends underlying resource utilization patterns in the Philippines are described below. Included are those conditions and trends relative to economic growth, balance of payments and trade conditions, population, employment and income, donor assistance, and development planning.

1.1 Introduction

The Philippine economy is confronted with numerous challenges which affect its potential to achieve its long-term development goals. Among the most serious threats to realizing sustainable development are historically poor environmental and natural resource management practices, high rates of population growth, a mounting debt management problem, and widespread rural poverty. The interaction of these has served to deplete the natural resource base as a source of wealth while increasing competition for scarce capital resources.

Among the most deleterious environmental and natural resource management practices that have been (and currently are) engaged in are those that are destructive of the very basis of natural wealth. Coral reefs have been destroyed by

dynamite fishing used to increase short-term production while impairing long-term fishery yield potentials. Logging has concentrated on increased production from primary and old growth stands while little reforestation/replanting has occurred.

Exacerbating the problems arising from poor natural resource management are the increasing demands that the high rate of population growth in the Philippines place on those resources. Rural poverty and landlessness, combined with increasing population pressure in lowland areas, have caused high levels of migration to upland areas where development pressures have developed.

The importance of these issues is reflected in the Medium-Term Philippine Development Plan which identifies the alleviation of rural poverty through improved agricultural production and natural resource management (and increases in incomes derived from those activities. as, amongst the nation's highest priorities [1].

1.2 Economic Growth and Trade

After several years of very slow or negative real growth in the gross domestic product (see Table 1.2-1), the Philippine economy has begun to exhibit more robust growth. From the negative growth years of 1984 and 1985 (when GDP shrank by 6.4 and 4.3%, respectively), the GDP has grown by 5 to 6% per year since 1987 [2].

The natural resources sector (agriculture, forestry and fisheries) has not recently, however, been as robust as other sectors of the economy. Indeed, in terms of real growth, the natural resource sector has exhibited counter-cyclical tendencies. Although there was negative real growth in the GDP in 1984 and 1985, the natural resource sector grew by 2.3 and 3.3%, respectively [3]. In 1987, however, as other sectors experienced high real growth, the natural resource sector grew by a mere 0.4%.

The Philippines is, and has historically been, a net importer. Since 1983, however, the negative trade balance has decreased from US$2.5 billion in 1983 to US$1.0 billion in 1987. Exports during this period remained relatively constant, while imports decreased. Among the leading exports of the Philippines are coconut oil (6.7% of total exports in 1987), logs and lumber (2.5% of total exports), and sugar and copra (1.6%).

Table 1.2-1. Basic Economic Data

	1983	1984	1985	1986	1987
Growth and Inflation		(percent change)			
Real GDP	0.9	-6.4	-4.3	1.5	5.1
Agriculture, Forestry and Fishery Sector	-2.4	2.3	3.3	3.7	0.4
Industry Sector	0.7	-10.2	-10.2	-2.1	8.0
Service Sector	3.2	- 7.4	- 4.4	2.9	6.4
Consumer Price Index	10.0	50.3	23.1	0.8	3.8
Gross Domestic Product	(in billion pesos, 1972 constant Prices)				
Total	99.92	93.93	89.90	91.29	95.95
Agriculture	19.52	20.32	21.12	22.03	22.05
Forestry	0.82	0.77	0.71	0.65	0.65
Fishery	4.41	4.33	4.42	4.55	4.64
Balance of Payments		(in million of US$)			
Exports (Fob)	5,005	5,391	4,629	4,842	5,720
Imports (Fob)	-7,487	-6,070	-5,111	-5,044	-6,737
Trade Balance	-2,482	- 679	- 482	- 202	-1,017

Source: National Statistical Coordination Board, 1988

Compounding the negative effects of the trade deficits is the debt situation of the Philippines and the effects of debt service levels. In 1983, the total outstanding debt of the Philippines was US$24.1 billion, of which US$13.7 billion were long term loans. By 1986, total debt had grown to $28.2 billion, of which US$21.6 billion was long term [4].

1.3 Population and Employment

The 1980 Census recorded a total population of 48,316,000. By 1987, the population had grown to an estimated 57,356,000, an average growth rate of 2.4% per year (see Table 1.3-1). There are, however, considerable differences of opinion regarding the exact rate of population growth since the 1980 census and the present.

The population is largely rural; approximately 60% resided in rural areas in 1985, according to the World Bank [5] and is largely employed in the primary sector which comprises agriculture, forestry and fisheries (approximately 48% in 1987). While there is a high incidence of poverty in the rural areas, rural unemployment has been low but increasing (ranging from 3.5 to 6.8% between 1983 and 1987), although underemployment is estimated at above 15%.

1.4 Foreign Donor Assistance

The Philippines relies heavily on donor (both multi- and bi-lateral) assistance to achieve its public investment program. This assistance is obtained through both grants and loans: the former having no repayment requirement, the latter usually obtained on favorable terms (low interest, long repayment periods, and/or grace periods). The major sources of official development assistance (ODA) are the World Bank, the Asian Development Band (ADB), the United States (USAID), Japan (JICA and OECF), the United Nations Development Programme (UNDP) and other UN agencies, Australia, West Germany, and New Zealand. Overall annual ODA commitments in the recent past have averaged approximately US$2.3 billion, of which US$700 million is from Japan, US$580 million from the ADB, US$450 million by the World Bank, US$360 million from USAID, and US$200 million from other donors [6].

The National Economic and Development Authority (NEDA) has served as the primary coordinator of ODA in the Philippines. In this capacity, NEDA is responsible for

Table 1.3-1 Population and Employment

	1983	1984	1985	1986	1988
Population					
Total (in thousands)	52,055	53,351	54,668	56,004	57,356
Growth rate (%)	2.5	2.6	2.5	2.4	2.4
Employment		(in thousands)			
Total	19,212	19,632	19,801	20,595	20,795
Agriculture, Forestry Fishery	9,880	9,740	9,698	10,289	9,940
Unemployment (%)	5.4	6.2	7.1	11.1	9.5
Urban	9.3	10.7	11.8	11.5	13.8
Rural	3.7	3.5	4.4	3.9	6.8

Source: National Statistics Coordination Board, 1988

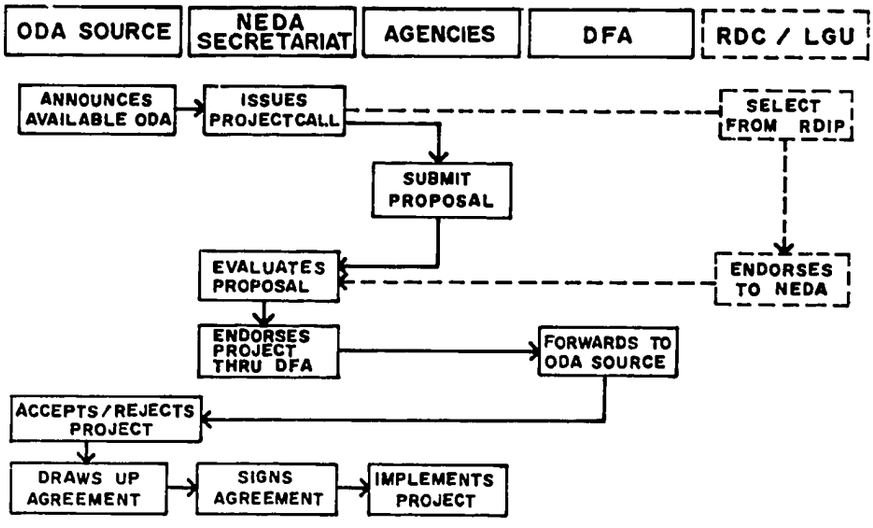
coordinating ODA availability and public investment needs. The primary vehicle for this programming activity is the Mid-Term Public Investment Program which is revised annually within the framework of the Mid-Term Philippine Development Plan. The process for evaluating and programming of grants and loans is shown as Figure 1.4-1.

The forecast departmental allocations under the Mid-Term Public Investment Program are shown on Table 1.4-1. Of this investment requirement, foreign exchange requirements amount to $5.14 billion, or 41.5% of the total [7]. A list of projects by DENR currently receiving ODA and the donor is shown on Table 1.4-2.

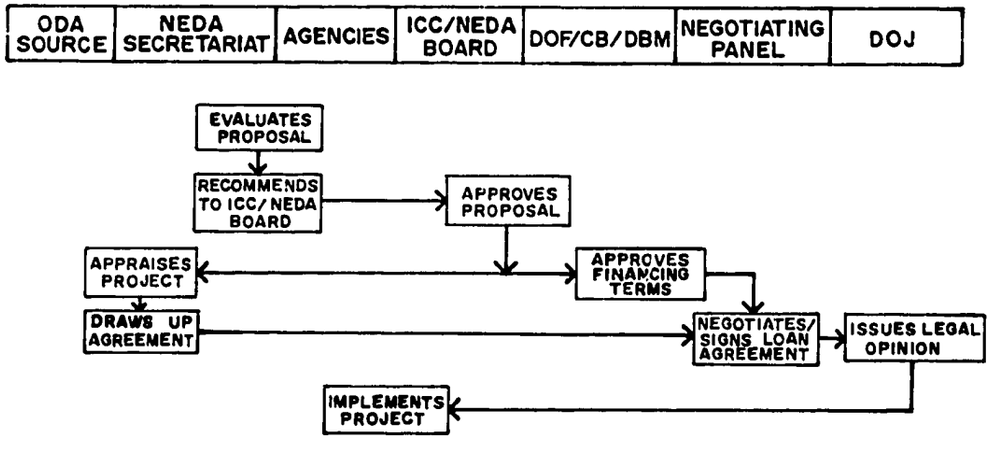
In the past, however, the Philippine government (and NEDA, in particular) has been criticized for its low rate of availment of ODA. Between 1977 and 1987, over $4.5 billion in loans were committed by multi-land bi-lateral donors. During this period, the government was able to disburse only 48% of these funds [6]. Compounding the problem have been the delays in project implementation which have resulted from bottlenecks in the decision making process at the central government policy-making level, at agency head quarters, and at the project level. NEDA has reported that 72 projects financed by the ADB, World Bank, OECF and USAID experienced average delays of 31 months each [6].

To overcome these bottlenecks and to achieve a higher rate of availment of ODA funds, the Philippine government constituted the Project Facilitation Committee (PFC) in 1988. The PFC seeks to streamline the project approval process by removing policy bottlenecks, setting targets for ODA utilization, and providing for the closer contact with projects.

A recent step toward better coordination between the Philippine government and the donor community is in the Philippine Aid Plan (PAP). Under PAP, ODA commitments will be coordinated by one entity (at the time of this report, the World Bank appears to have been given that responsibility), while the PAP Coordination Committee (PAPCC) of the Philippine government will coordinate the identification of public investment (primarily infrastructural) requirements of the government. At the June 1989 meeting of the Consultative Group in Tokyo, both donors and the Philippine government expressed their intent to allocate PAP funds to improved environmental and natural resources management.



Grants



Loans

Flowchart for Processing ODA Grants and Loans
Source : NEDA, 1988

Figure 1.4-1

Table 1.4-1 Departmental allocations under the Mid-Term Public Investment Program (1988 - 92) (in billion ₱)

Department/Agency	Investment	% Total
Public Works and Highways	69,180	40.4
Transportation and Communications	17,425	10.2
Environment and Natural Resources	4,355	2.5
Agriculture	4,553	2.6
Agrarian Reform	4,362	2.5
Local Government	8,722	5.1
Health	8,461	4.9
Central Visayas Regional Project Office	1,029	0.6
Other	53,331	31.1
Total	171,418	100.00

Note: Excludes government owned or controlled corporations.

Source: NEDA, 1988

Table 1.4-2 Representative Ongoing, and Recently Completed Programs/Projects in Natural Resource Management

Environmental Enhancement	Funding Source
- Regular Watershed Rehabilitation Activity	GOP
- Cotabato-Agusan River Basin Development Project	
- ADB/OECF Forestry Sector Loan	ADB
- RP/Japan Watershed Maintenance Project	Japan
- Third Davao del Norte Irrigation Project	ADB
- Regular Forest Protection Activity	GOP
- Forest Fire Management Project	UN/FAO
- Management of National Parks	GOP
- Stockfarming of Calamian Deer	Special
Natural Resource Management and Development	
- Natural Resources Mgmt Development Project	Australia
- Regular Reforestation Projects	GOP
- ADB Fisheries Sector Loan	ADB
- Bukidnon Industrial Tree Plantation Project	New Zealand
- Ilocos Norte Forest Development Project	ADB
- Integrated Social Forestry	GOP
- RP/German Cebu Upland Project	Germany
- Dipterocarp Forest Management	Germany
- Highland Integrated Area Development	Japan
- Integrated Forest Protection Pilot Project	World Bank
Institution Strengthening	
- ASEAN-US Watershed Management	US
- Crocodile Farming Institute	Japan
- Strengthening of Integrated Social Forestry Program	UNDP
- Magat Smallholders Agroforestry Pilot Project	World Bank
- Bamboo Research and Development	UNDP/FAO
- Palawan Integrated Area Development Plan	
a) Land Classification Project	EEC
b) Upland Stabilization Project	ADB
c) Strategic Environmental Plan	EEC
d) Land Surveys and Titling Project	ADB
- Allah Valley Watershed Management	ADB
- Forestry Development - Watershed Management	Japan
- Seagrass Restoration Project	IDRC

Source: NEDA, 1988. Mid-Term Public Investment Program
DENR, 1989. Briefing Papers

With PAPCC, having been assigned an integral role in the coordination of ODA, the responsibility for the programming and evaluation of public investment requirements appears to be shifting from NEDA to PAPCC. This, together with recent changes in NEDA leadership, has resulted in uncertainty regarding the role that the Public Investment Staff of NEDA will play with regard to the project/ODA approval process.

1.5 Development Planning

Development planning in the Philippines is guided by the Medium-Term Philippine Development Plan (MTPDP) prepared by NEDA. The latest plan, covering the period 1987 to 1992, delineates the goals, objectives and targets, on a sectoral basis, of the Philippines [1,7].

In its broadest context, Philippine development efforts in the planning period are to be directed toward:

- The alleviation of poverty;
- The generation of more productive employment;
- The promotion of equity and social justice; and
- The attainment of sustainable economic growth.

The development of agriculture is fundamental to the achievement of these goals, and is, thus, afforded the highest development priority. During the plan period, agricultural (including forestry and fisheries) growth rates are forecast at real growth rates of 5.0% per annum. Increases in the production of non-traditional export crops and commodities and the implementation of policy reforms are assumed. Among these reforms will be those related to a more efficient use of land, expansion of research and extension services, removal of macroeconomic policy biases, and the improvement of the marketing systems. Increases in the output of rural-based industries and the provision of infrastructure in rural areas are also assumed.

The private sector is expected to serve as the motivator and the prime mover toward the realization of these development goals [1]. The private sector, including businesses, non-governmental organizations, and private voluntary organizations, are expected to take the lead in undertaking and sustaining the programs and projects necessary to achieve the development goals and objectives.

To accomplish this, the Philippine government has embarked on a program to encourage and support private institutions and initiatives. This will be facilitated by the government's proposed policy of decentralization, in which more powers will be devolved from the central government to the regions and provinces. The regions and provinces will serve as focal points for development efforts. Citizen participation will also be increased.

Also integral to the achievement of the Plan's development goals is the continuation of population policies promoting the attainment of small family size on a voluntary basis, and the reduction of the population growth rate to replacement fertility levels by 2010 (by which time, under most forecasts, the population of the Philippines will have doubled from its 1980 level).

The MTPDP has established the following sectoral objectives for the natural resource sector:

- Promotion of efficient and judicious use of natural resources;
- Assuring that the sustainable production capacity of natural resources be realized;
- Expansion of implementation of community-based natural resource management and conservation;
- Achievement of more equitable sharing of the benefits derived from natural resource development and utilization;
- Increasing of the sectoral contribution to poverty alleviation; and,
- Promotion and maintenance of the ecological balance.

To achieve these objectives, regulations and procedures will need to be modified in which stricter and more effective enforcement of laws and regulations be pursued" [1].

2.0 MACROECONOMIC POLICY

2.1 Introduction

This chapter presents an overview and background of macroeconomic policies (section 2.2). The elements of the structural reform programs are discussed in section 2.3 with special reference to the fiscal environment. The role of natural resources in the Philippine economy and the relevance of macroeconomic policy for natural resource management and use is explored in section 2.4

2.2 Overview

In the 1970's, the Philippine economy exhibited a high rate of growth, with the gross national product (GNP) expanding at over six percent annually. This success was achieved through programs and policies which proved to be unsustainable and structurally unbalanced. Government economic policy favored capital-intensive, import-substitution policies at the expense of the agricultural and export sectors. Government support of unsustainable industrial policies was financed increasingly through external borrowings as private savings levels remained low.

Income distribution remained skewed, with the top 10% of the population having more than fifteen times the income of the poorest 10% in 1985 [8]. Absolute poverty levels were rising rapidly due to the unequal ownership of assets and to the lack of employment-generating activities on the part of the government. The capital-intensive nature of the government's industrial policies mitigated against the absorption of labor from agriculture to industry. The agricultural sector continued to absorb more than forty percent of the total labor force. In addition, the government pricing structure decreased farm incomes. Other government policies which contributed to the drop in the agricultural terms of trade included price controls on agricultural products, export taxes, and the marketing monopolies of the sugar and coconut trade. The overvalued exchange rate made Philippine exports less attractive while, at the same time, farm incomes were further lowered by the fall in international sugar and coconut prices. Table 2.2-1 illustrates the major macroeconomic developments between 1982 and 1988 [9].

Table 2.2-1 Macroeconomic Indicators 1982-88
(growth rates in % unless otherwise indicated)

Indicator/Year	1982	1983	1984	1985	1986	1987	1988
Real GNP	1.9	1.1	-6.8	-3.8	1.5	5.1	6.7
Real GNP per Person	-0.8	-1.5	-9.6	-6.7	-1.2	2.3	_
Unemployment[a]	6.0	5.4	6.2	7.1	11.8	11.2	9.6
Underemployment[a,b]	34.2	35.9	35.7	33.7	35.6	33.6	32.7
Real Exchange Rate[c]	-5.4	16.2	-0.6	-8.3	22.0	8.1	-
Inflation Rate	10.3	10.0	50.3	23.1	0.8	4.5	

SOURCE: Philippine Development Report 1988; National Census and Statistical Office; and, Philippine Statistical Yearbook, 1988.

a Actual rate

b Underployment signifies the percentage of those working less than 40 hours per week.

c Decline indicates appreciation

In the early 1980's the Philippine economy reached a crisis point, in large part, because of the structurally unbalanced policies of the government, and compounded by the global recession, the decline in the world market price of the primary exports, the decline in the volume of timber exports, and the steep rise in international interest rates. By 1983, the mounting debt burden precipitated a liquidity crisis in which the government was no longer able to meet foreign debt payments. This led to the cessation of any foreign credit. In late 1984, a Stand-By Agreement was reached with the International Monetary Fund (IMF) and a stabilization program was initiated. Funds were dispersed conditionally upon the observance of performance criteria or structural reforms to be undertaken by the Philippine Government. The structural reforms featured policies designed to achieve price, public finance, and balance of payments stability and will be examined in more detail below.

2.3 Structural Reform and Macroeconomic Policies

Structural adjustment loans (SALS) and sectoral adjustment loans (SECALS) aim to restructure the economy in the long-run through the gradual removal of major controls and distortions affecting factor and commodity prices. Loans (and grants in some sectoral adjustment programs) are provided to cover balance of payments shortages or other crises in the short-run.

Since the mid-1980's, the Government of the Philippines has attempted to create an environment conducive to sustainable economic development. In the Stand-by Agreement arranged with the IMF, foreign creditor banks agreed to a debt repayment rescheduling, as did multilateral and bilateral donors, and new private lending sources were identified. In return, the Government agreed to implement structural economic adjustments designed to achieve price, public finance, and balance of payment stability and to reduce the level of government controls and interventions in the economy.[10] A major discussion of the economic policy reforms in both the private and public sector which have been achieved or are under discussion follows.

Private Sector

Deregulation policies aim to curb the excessive regulation of agricultural markets that have helped to lower

producer incomes. Among the reforms undertaken (or presently under discussion) are:

- The dismantling of the coconut and sugar marketing monopolies;
- Lifting import restrictions on wheat, soybeans and fertilizers; and,
- Lifting price controls on rice, corn, other feedgrains, poultry and pork [3].

The objective of these market liberalization measures is to increase allocative efficiency and market responsiveness to changing resource scarcities. While the impact of deregulation has not been studied in depth, farm prices of coconut, sugar cane, palay (rice seeds), and corn have risen since 1987.

Trade liberalization policies aim to promote exports and liberalize imports. The lifting of export taxes increases the competitiveness of Philippine products in foreign markets, which can lead to increased foreign exchange earnings. Import liberalization increases competition and encourages diversification. Since 1986, import tariffs have been removed or reduced for many products.

Public Sector

Improved fiscal policies are aimed at increasing government revenues and reducing public expenditures in order to reduce government deficit.

In the Philippines, the structure of domestic revenue and tax collection procedures has been a major area of reform in recent years. The Philippine tax system relies heavily on regressive indirect taxes; very little collection of direct taxes is undertaken. While nominal tax rates are high, actual collection is low [8].

The overall tax effort is strikingly low (on average 11 to 12 percent of GNP) in comparison to countries of comparable economic status. In 1986, the tax revenues to GNP ratio reached 12.2 percent but slipped back again to 11.1 percent in 1988 [12].

Low tax revenues arise not from low statutory rates but from poor collection performance on the part of the government. Major constraints include a lack of enforcement,

existence of a system of special privileges and exemptions, low elasticity, and the dependence on taxation of imports and exports.[8]

Income tax revenues amount to only two percent of GNP; in comparable middle-income developing countries two or three times that amount is usual.

Table 2.3-1 presents the effective rate of tax by income class as a percentage of average family income. The effective rate of tax paid by higher income families is lower than that paid by the lower income groups. The tax reform package of 1986 was designed to improve compliance and reduce tax evasion. Further reforms are needed to unify and simplify the various corporate taxes, reduce the number of income tax rates, and to simplify the legal and bureaucratic procedures. Measures need to be taken to increase the capability of the Bureau of Internal Revenue to improve compliance and more adequately deal with tax underreporting and evasion. It is estimated that income tax revenues could be doubled in this way.

Total government expenditures dropped sharply in 1983 but returned to previous levels by 1986. Debt service payments increased from under twenty percent in the mid-1970s to over twenty-five percent of total government expenditures by 1988.

Other public sector reforms include the rationalization of government financial institutions (GFIs) and the privatization of selected government owned or controlled corporations.

While it is too early to evaluate the impact of these reforms, the government feels that there has been a reorientation of incentives within the economy which reflects a less capital-intensive, more employment-generating emphasis, combined with an export and agricultural sector orientation.[10]

In addition to the economic policy reforms currently undertaken, the structural adjustment component has addressed political reforms (such as decentralization), social reforms, including the implementation of the Comprehensive Agrarian Reform Program (CARP) and the expansion of social services delivery to the lower income population.

Table 2.3-1 Effective Rate of Tax by Income Class, 1985
(percentage of average family income)

Income Class	All Taxes	Direct Taxes	Indirect Taxes	Individual Income Tax	Fuel & Oil Taxes
I - IIIa	26.8	5.2	19.8	0.63	1.78
IV - VIb	32.1	8.8	23.3	1.63	2.70
VII - IXc	18.2	6.4	11.8	1.89	2.00

a - Average gross income ranges between ₱2,020 - ₱3,733

b - Average gross income ranges between ₱4,553 - ₱6,465

c - Average gross income ranges between ₱7,933 - ₱30,784

Source: National Census and Statistics Office, Survey of Family Income & Expenditures.

Future policy reforms presently under discussion include improved planning, monitoring, and implementation of public investment projects, increased non-governmental organization (NGO) participation in delivery of basic services, and improved implementation of ODA funded projects.

Policy reforms concerning natural resource management and use will be discussed in more detail in the following chapter.

3.0 SECTORAL POLICIES

3.1 Overview

An overview of the agricultural, fisheries, and forestry sectors is presented in this chapter, including a discussion of policy issues related to natural resource management and the economic impact of these policies on natural resources.

3.2 Agriculture

The agricultural sector continues to be the engine of growth for the Philippine economy. The agricultural sector (including fisheries and forestry) employs nearly fifty percent of the total workforce, contributes approximately one-third of the GDP, and over one-third of total export revenues. [13] Table 3.2-1 below presents the gross value added in agriculture in constant prices. Gross value added increased in the period from 1972 to 1987 except for sugarcane, which declined from ₱1,063 to 701 million in large part due to the decline in world market prices and to marketing inefficiencies.

The agricultural sector has expanded rather rapidly from 1970 onwards, growing by over 4% per year (and over 5% if the declining forestry subsector is excluded) [25].

Major crops include rice, corn, coconut products, sugarcane, bananas and pineapples.

Based on an analysis of the import/export data for 1986 and 1987, the total value of agricultural exports far exceeds the value of agricultural imports.

The outlook for rice exports is not favorable, owing to productivity increases and U.S. export price subsidies, but it is expected that the Philippines will continue to maintain near self-sufficiency levels of production [25]. The outlook for corn exports is even less favorable as the world price for corn is lower than the Philippine costs of production. In the medium-term, the Philippine Government is expected to maintain corn prices in order to encourage self-sufficiency levels of production. [26]

Marginal increases in coconut products and sugarcane are expected, depending on the world market prices. The

Table 3.2- 1 GROSS VALUE ADDED IN AGRICULTURE, 1972 TO 1987
(In million pesos at constant prices of 1972)

TYPE OF PRODUCTION	1972	1982	1983	1984	1985	1986	1987
AGRICULTURAL CROPS	8,956	15,932	14,968	15,564	16,434	17,198	16,871
Palay	2,749	4,489	3,900	4,201	4,665	4,973	4,625
Corn	1,012	1,522	1,373	1,470	1,698	1,847	1,932
Coconut including copra	1,154	1,370	1,210	952	1,420	1,821	1,803
Sugarcane	1,063	1,544	1,133	1,332	829	775	701
Banana	188	792	903	909	931	935	878
Other crops	2,790	6,215	6,449	6,701	6,891	6,847	6,932

'Revised Estimate as of March 1988
SOURCE: Economic and Social Statistics Office
National Statistical Coordination Board

dramatic growth in bananas and pineapple as export crops in the 1970's are expected to stagnate given market saturation. [25] (See Section 4.2 for a discussion of the importance of agriculture and natural resources in the Philippine economy.)

Government Agriculture Strategy

Government strategy in recent years has, after years of relative neglect, given renewed priority to the agricultural sector [10]. In the 1970's and early 1980's, policies promoted the industrial sector over the agricultural sector, even though agriculture provided employment for more than half the working population.

The stated objectives of the government's agricultural policy are:

- To increase the real incomes of farmers and fishermen to above-poverty levels;
- To provide adequate food for the country's growing population; and;
- To maintain low and stable food prices for consumers. [10]

These objectives are somewhat conflicting. Low consumer food prices do not lead to increase farmer incomes unless substantial subsidies are involved. But substantial consumer subsidies or farm price supports do not coincide with the conditions of the Structural Adjustment Loan (SAL) agreement. This agreement necessitates the removal of structural distortions that reduce incentives for agricultural production (export taxes, price controls) or reduce the efficiency of resource use (input subsidies).

The economic impact of this strategy appears to depend on the particular institutional framework and structure of producer incentives to invest or not in environmentally sustainable strategies. These issues are discussed below.

Economic Issues

Security of land tenure and the structure of agricultural incentives (agricultural terms of trade) are the two issues underlying the economics of natural resource use in the agricultural sector.

1. Incentive and Secure Land Tenure

The major economic issue confronting the agricultural sector and natural resource management is the lack of secure land title on the part of a large proportion of the rural population. There are two basic issues to consider: the relative scarcity of available land for farming (as seen in decreasing average farm size) and the unequal distribution of land assets, especially in the lowland sugar areas. In addition to the maldistribution of land, a large percentage of farmers are tenants and do not own the land they farm. [5,8]

The relationship of land tenure, as if relates to agricultural production, is treated at length in Annex B on Sustainable Agriculture. There are significant economic effects on natural resource use related to landlessness and the lack of secure tenure. Unless there is an economic incentive for farmers to invest in natural resource conservation methods, it is not rational to expect them to do so.

Security of tenure over resources is the critical incentive in the maintenance and/or improvements that lead to improved resource productivity and to the use of sustainable methods. Lack of secure land title reduces the market value of land to the tenant, prevents its use as collateral for loans, results in underinvestment in land improvement and conservation, and biases crop choices against tree crops. [14]

If farmers do invest in land improvements and they subsequently lose access to the land, they will not receive any of the benefits of their investment. The economically rational alternative under these conditions is to minimize investments and when the land resources are depleted, shift to sites with higher fertility.

Unless this situation is ameliorated, it is not economically rational for farmers or landless laborers to invest in long-term resource conservation strategies.

2. The Structure of Agricultural Incentives: The Agricultural Terms of Trade

The anti-agricultural bias of past policies (some of which continue into the present) has an indirect impact on natural resource management and use. The government's heavy investment in the industrial sector included incentives favoring capital-intensive strategies. Capital-intensive

investments failed to provide employment opportunities and could not absorb a growing pool of labor from the agricultural sector. [8]

Price policies (such as price controls on agricultural products, export taxes, and marketing monopolies in the sugar and coconut trade) have had adverse effects on the agricultural terms of trade and reduced producers incomes. The decline in the international prices of the two major export crops (sugar and coconut) have only worsened the situation. The excessive protection given to the industrial sector also raised producers costs as the prices of agricultural inputs increased. [8,25]

Thus, an increasing work force in the agricultural sector was depending on a diminishing real GDP per capita for its livelihood. Farmers were no longer sure of obtaining a reasonable return for their crops. The reduced profitability of agriculture served as a disincentive for investment in soil conservation or long-term strategies because of the reduced returns. [5,8]

Subsistence farmers and landless laborers, faced with reduced earnings due to the unavailability of land or diminishing profitability of agriculture, are continually searching for income-generating activities. In the absence of alternatives, the exploitation of open access natural resources was, and is, frequently undertaken. The gathering of firewood, fishing, and charcoal making are important sources of income. Unless agriculture can become more profitable and other off-farm income-generating activities can be devised, the overexploitation of the open-access resource base will continue unabated. [4,5,14,15]

Structural Reforms in the Agricultural Sector

Since 1984, numerous structural reforms have been undertaken in agriculture in conjunction with IMF, World Bank and USAID (ESF) loans or grants. [10] Currently under negotiation are Sectoral Adjustment Loans for the Natural Resource Sector (World Bank), and for Fisheries and Forestry (ADB).

Recent agricultural economic policy reforms have the general objective of removing market distortions which reduce the profitability of agriculture and, thus, lower producer incentives. Input subsidies were also removed or lowered in order to reduce the overall agricultural budget and to promote a more efficient use of inputs.

The major agricultural policy reforms undertaken since 1984 are:

- The removal of import restrictions on wheat, soybeans, fertilizer and pesticides;
- The lifting of price controls on rice, corn, other feedgrains, poultry and pork;
- The reorganization and preliminary dismantling of the coconut and sugar marketing monopolies; and,
- The removal of export taxes on primary exports; and the reduction of pesticide and fertilizer subsidies. [10]

Reforms are still needed in the following areas:

- The restructuring of the rural credit sector to provide credit at reasonable interest rates to small and medium-sized farmers;
- The removal of import restrictions still in place on phosphate fertilizer, which constitutes approximately twenty percent of all fertilizer imports;
- The removal of the administrative fee (an indirect tax) on copra exports which reduces producer incentives and the competitiveness of Philippine copra in international markets;
- The continued restructuring of the coconut and sugar markets to increase competition and lower marketing costs;
- Improvements in marketing systems in order to increase competitiveness, improve marketing infrastructure and storage facilities;
- A reallocation of research funds with greater emphasis on upland crops and farming systems; and (most importantly),
- The acceleration of the agrarian reform program to reduce the number of landless farmers or those without proper titles to land. [5,8,10,14]

The Impact of Agricultural Reforms on Natural Resources Management and Use

Little research has been undertaken in the Philippines on the impact of agricultural policy reforms themselves. For example, what is the impact of the removal of export taxes on agricultural exports? While economic theory tells us that removal of the export tax will lead to an increased foreign demand for exports and eventually to increased production and higher farmers incomes, the particular impact of the removal on Philippine farmers has not been studied.

Little empirical research has been undertaken on the economic impact of natural resource degradation nor on the impact of the policy reforms on natural resource management by either the GOP or the donor community. (Several case studies on the fisheries and forestry sectors will be discussed below).

As far as policy reforms serve to increase farmer incentives and help to optimize production, they can generally be seen as improving the natural resource environment. On the other hand, given secure land tenure, the improved incentive structure could lead to increased investment in long-term and resource conservation techniques. In the absence of secure land tenureship there is far less incentive to invest in resource conservation techniques. It is also possible that incentives could lead to an intensified exploitation of natural resources unless input and output prices reflect the resource costs. [5,16]

Subsidy reductions on fertilizers and pesticides are, in general, believed to have a salutory impact on the environment.[14] Table 3.2-2 below illustrates the comparative use of fertilizers and pesticides in the Philippines in the 1970's and 1980's. Increased consumption is due in large part to subsidies which encourages inefficient and excessive use. The smaller increase in fertilizer consumption was inhibited by the tariffs on cheaper imports.

Excessive fertilizer use for long periods damages the soil structure and the over-application of chemical pesticides and fertilizers can lead to such negative externalities as groundwater contamination [5,14].

Research conducted in Indonesia confirms the link between excessive insecticide use and the outbreak of brown planthoppers which threatened Java's rice crop in 1985.

Table 3.2-2 Comparative Fertilizer and Pesticide Use in the Philippines

Fertilizer Use (kg/ha)		Pesticide Use (metric tons)	
1974-76	27	1976-80	3097
1984-86	33	1981-85	4571

Source: [16]

Economic analysis confirmed that fields not treated with insecticides had 75% lower planthopper incidence, higher yields, and lower production costs. [14]

The exploitation of open access natural resources was, and is, frequently undertaken. The gathering of firewood, fishing, or charcoal making can be important sources of income. Unless agriculture can become more profitable and other off-farm income income-generating activities can be devised, the overexploitation of the open-access resource base will continue unabated.

3.3 Forestry

Forests have played a key role in the Philippine economy and contributed substantially to foreign exchange earnings in the 1950's through the early 1970's. The recent decline in the forestry sector is due to three reasons: the lower price/quality of the lumber; reduced supply; and, more governmental restrictions on the industry. Supply has been reduced, in large part, by the uncontrolled exploitation of forest resources by timber companies benefiting from government policies which do not adequately capture economic rents and from illegal cutters who pay nothing for wood. [12] In addition, the cutting of forest lands has attracted migrant farmers searching for cultivable land. The shifting cultivation techniques practiced by these migrants is a process that leads to settlement, has resulted in severe soil erosion which causes heavy siltation of streams and river systems, and has destroyed and coral reefs and other forms of marine life. [10] The conversion of mangroves to fishponds has also contributed to indiscriminate forest degradation. [15]

In this chapter, the importance of forestry to the Philippine economy will be discussed, as will the economic impact of government policies contributing to the degradation of forestry resources. Possible policy reforms will also be discussed.

The Importance of Forestry to the Philippine Economy

The forest and wood industry has played an important role in the Philippine economy in terms of its GDP contribution from the mid-1950's through the mid-1970's. Declines in production and export earnings are due to depletion of the forests.

Large-scale logging began in the Philippine after the second World War, largely in response to U.S. market demand. In late 1949, forest products contributed only 1.5 percent of total exports, but increased to 11 percent by 1955. [15]

In the 1960's, the logging industry grew tremendously due to the high demand for wood from the Japanese market. Table 3.3-1 below presents the log production, volume of exports, and exports as a percentage of total production. Production increased from 6.6 million cubic meters in 1960 to a peak of just over 11 million in 1969, but declined to 5.3 million by the early 1980's. Export volumes grew to over 8 million cubic meters by the late 1960's and declined to under one million by 1980. Exports as a percentage of total production peaked at over 80 percent in 1966. In general, production and export levels declined after 1969, in large part due to depleted resources.[4]

Table 3.3-2 presents the gross value-added in forestry between 1972-1985, which shows a declining value. By 1981, forestry's contribution to the GDP had fallen to below 1%.

Government attempts to develop pulp and paper product industries have been disappointing; their percentage of total GDP has fallen from 1.6% in 1975 to 0.4% in 1986.[5]

In 1970, the export value for logs was US$243 million for logs and US$58 million for processed wood products (lumber, plywood and veneer). But by the end of the decade, processed wood products had increased to nearly three-quarters of the total value of the heavily declining forestry exports.[5] While declining international prices helped to reduce the total value of exports, log production had fallen by nearly 50%.

The Economic Impact of Forestry Policies

Government policies which have encouraged the rapid depletion of forest resources include inappropriate timber pricing policies, incentive policies which encourage inefficient wood processing industries, and logging concession systems which hasten forest depletion.[5]

Timber Pricing Policies

Although the forestry sector produced considerable foreign exchange earnings, the GOP has failed to capture full economic rents. Many exports were "unofficially"

Table 3.3-1 Log Production and Export: 1960-1981
(in Cubic Meters)

Year	Production	Exported	% of Production
1960	6,596,458	3,028,020	45.9
1961	6,771,781	3,749,087	55.4
1962	7,668,078	4,593,485	69.9
1963	6,536,115	4,542,505	69.5
1964	6,175,142	3,486,646	56.5
1965	8,047,148	5,534,375	68.8
1966	7,843,283	5,648,531	84.8
1967	11,113,650	7,510,956	67.6
1968	11,583,713	8,649,021	71.3
1969	11,004,564	8,616,078	78.3
1970	10,679,519	8,443,256	79.1
1971	8,416,099	7,018,218	83.4
1972	10,445,620	6,949,312	66.5
1973	10,189,898	5,434,217	53.3
1974	7,331,898	4,579,225	62.5
1975	8,440,691	3,050,262	36.1
1976	8,645,835	2,331,297	25.9
1977	7,873,490	2,046,735	25.9
1978	7,168,549	2,210,463	30.8
1979	6,577,864	1,248,153	19.0
1980	6,400,000	714,885	11.0
1981	5,399,523	706,399	13.0

Source: [7]

Table 3.3-2 Gross Value Added in Forestry 1971-1985
(in constant price in ₱ billion)

Year	
1972	2.0
1973	2.4
1974	1.8
1975	1.3
1976	1.6
1977	1.6
1978	1.6
1979	1.4
1980	1.4
1981	1.2
1982	1.0
1983	0.8
1984	0.8
1985	0.7

Source: National Accounts Staff, NEDA

undertaken so the government often failed to capture tax revenues from all exports (only capturing those from official experts). Economic rents can be defined as the difference between the value of the product and the production costs, including marketing costs and a reasonable profit. It is estimated that the GOP captured only 16.5% of logging rents between 1979 and 1982. If the government had captured fifty percent of the rent during the 1979-1982 period, it would have provided over US$300 million annually; (an amount which could fund a considerable amount of reforestation efforts).[15]

The increased profits earned by timber concessionaires due to low rents paid, assisted in accelerating the process of forest degradation. In the past, the government has inconsistently applied a variety of forest charges, license fees, sales, export and realty taxes, which never have amounted to more than 15% of actual rents.[5] In short, government policy did not clearly promote reinvestment in forest resources.

Table 3.3-3 below presents taxes as a percentage of the reported export values of wood exports for the period between 1970-1982.

A ban on log imports had been legislated in 1976, primarily to promote the Philippine wood processing industry, and, secondarily, to conserve forest resources. The ban was not enforced but the possibility of a later ban increased the haste of logging concessionaires to minimize logging efforts. Illegal log exports continued after 1980 when the ban was applied to most exports and discrepancies between Philippine export data and Japanese import data demonstrate this. In 1981, for example, the Philippines "officially" exported 365,441 cu.m. to Japan; Japanese import statistics show over 1.4 million cu.m., a discrepancy of over 1 million cu.m.[4]

The low government charges for fuelwood extracted from public lands encourages resource depletion and probably depresses market prices (which discourages the use of substitute fuels) and make private fuelwood production a not very profitable affair.[5]

Wood Processing Industries

Import prohibitions on pulp and a partial export prohibition on logs protect local wood processing industries. Both discourage industrial efficiency through

Table 3.3-3 Taxes as a Percentage of Reported Export Values of Logs, Lumber, Plywood and Veneer (1979-82) (in million pesos)

Year	Total Taxes From Forest Sector	Total Reported Exports	Taxes as % of Exports
1970	207	1666	12.4
1971	235	1623	14.5
1972	124	1455	8.5
1973	228	2788	8.2
1974	135	1859	7.3
1975	111	1682	6.6
1976	127	2006	6.3
1977	125	1975	6.3
1978	134	2404	5.6
1979	419	3757	11.2
1980	294	3405	8.6
1981	338	2715	12.3
1982	367	2479	14.8

Source: [15]

lack of competition. As the ffARM study [5] notes, the additional jobs in the processing industry are bought at a high cost in terms of the logs consumed and the revenues foregone. Inefficiencies also raise costs of production, and profits. Some observers estimate that if processing efficiency can be increased, the Philippines should have a comparative advantage in timber production and processing, assuming a policy of sustained yield management.[5]

The Logging Concession System

The logging concession system has traditionally discouraged concessions from practicing sustained yield management. In the 1970's, concessions were granted for periods of one to ten years, on a non-competitive basis and have since been granted for 25 years, with a possible renewal of another twenty years. As the harvest cycle of many tropical species exceeds that time period, concessionaires do not generally practice long-term strategies but try to maximize profits through short-term exploitation.[15] There is no incentive to ensure long-term regeneration of forest resources.

Policy Reforms

Various policy reforms are presently being undertaken in the forestry sector. Government policy, however, has often been inconsistent. For example, in 1982 the GOP cancelled 53 timber licenses and started various forestry programs (ISF, PROFEM, etc.) designed to improve forest resource management. In the meantime, however, the status quo (that is, the usual timber management/logging instruments) remained in place. (See Annex A for a complete discussion of these initiatives).

Among the recent policy reforms in the forestry sector:

- A halt in the licensing of new concessions;
- Increased stumpage fees for existing licenses;
- A pilot program of competitive stumpage bidding; and,
- The requirement of a deposit (₱ 10,000 per ha) to be returned upon completion of replanting.[16]

Among the needed policy reforms are:

- The removal of tariff exemptions on imported capital machinery which encourages mechanized logging;

- Increasing the fees charged for fuelwood extracted from public lands, thereby discouraging resource exploitation;

- Increasing the fees charged to timber concessionaires to reflect the true economic rents (which will increase government revenues and lead to less wasteful depletion);

- Establishing a system to differentiate timber charges based on ad valorem systems based on export price values which will increase government revenues and reduce the wholesale conversion of forest lands to grass, brush and agriculture;

- Increasing logging concession contracts to longer lengths to encourage sustained yield management; and,

- Reduction of tax and tariff protection to wood processing industries to give them incentives to increase efficiency and minimize costs in the face of import competition.[5,13,15]

The World Bank is currently discussing with DENR possible policy reforms to become part of the upcoming Sectoral Loan to the Natural Resource Sectors. Among the economic issues under discussion include the level of user fees for public resources which discourage rent-seeking behavior. The current economic rent accruing to loggers of average efficiency are estimated the order of ₱1,200-1,300 per cu.m., or over 40 percent of the domestic price of logs. If exports were allowed and border prices prevailed, then the rent would be approximately two-thirds of the border price. Varying rent rates are being discussed for new and existing licenses.[17]

3.4 Fisheries

While the fisheries sector generates only a small percentage of the GDP annually, it is of great importance as fish and other seafood provide more than half of the total protein requirements for the average Filipino house-

hold [4]. In this section, the importance of fisheries to the Philippine economy will be discussed as will government policies contributing to the degradation of fishery resources. Possible reforms will be presented.

The Importance of Fisheries in the Philippine Economy

Philippine fisheries production accounted for 5% of the GNP and was valued at over $2 billion in 1987. Per capita consumption is estimated at 35-40 kilograms per person per year, one of the highest consumption rates in the world.[18] Total value of exports has increased steadily between 1974 (US$18.4 million) and 1987, peaking at US$310 million in 1987. Major exports are tuna, shrimp, and seaweed, which comprise over three-quarters of total fishery exports. The major market is Japan.[13]

Although fish production increased from 892,000 metric tons in 1970 to 1.7 million tons in 1980, the per capita supply of fish, once postharvest losses, fish exports, and population growth taken into account, actually declined from 25.6 kilograms in 1976 to 22.7 kg. in 1980, climbing again to 35 kgs in 1986.[4] Table 3.4-1 below presents the quantity and value of Philippine fisheries production for the period 1977-1987.

The fishing industry in the Philippines has three distinct types: municipal, commercial, and aquacultural fishing. In 1987, commercial landings accounted for 27.4% of total tonnage, while municipal and aquacultural fisheries accounted for 49.4% and 23.3% respectively. Commercial fishing is theoretically restricted to areas further than 7 miles from the coast (although, in reality, they regularly encroach upon municipal fishing grounds) and use of trawlers greater than three tons.[18] Commercial fisheries supply most of the large (domestic) urban and export markets. Municipal fishing is characterized by small economic units that contribute to local fish markets and have no direct influence on supply and prices in larger markets.[13] Aquaculture refers to the controlled raising of aquatic plants and animals in brackish and marine waters.

The fisheries sector employs over one million people, or 5% of the total labor force. In addition, fisheries service industries (including input supply, marketing, distribution, processing, boat building, ice plant, cold storage, net-making, and equipment manufacture and distribution) employ approximately 50,000 people.[18] Municipal fishing employs the vast majority (75%), while

Table 3.4-1 Philippine Fisheries Production by Sector
1977-1987 (Qty. in MT, Value in Million $)

Year	Aquaculture Q	Aquaculture V	Commercial Q	Commercial V	Municipal Q	Municipal V	Total Q	Total V
1977	163,590	63	518,165	177	827,100	201	1,508,855	441
1978	216,655	60	505,747	173	857,909	241	1,580,404	474
1979	241,198	83	500,747	176	839,358	268	1,581,303	527
1980	289,166	92	488,478	189	894,610	301	1,672,254	582
1981	339,501	143	494,768	206	938,628	348	1,772,897	697
1982	392,348	170	526,273	218	978,362	366	1,896,983	754
1983	445,073	240	519,316	232	1,145,841	477	2,110,230	949
1984	477,887	363	513,335	326	1,089,046	593	2,080,268	1,282
1985	494,742	436	511,987	393	1,045,382	736	2,052,111	1,565
1986	470,893	540	546,230	462	1,072,361	863	2,089,484	1,867
1987	497,577	685	585,636	475	1,056,970	925	2,140,183	2,085

Source: BFAR Fishery Statistics, in Agrodev, 1988 [18].

commercial fishing and aquaculture employ four and twenty-one percent respectively.[5] Fishing is, of course, a seasonal activity (in many areas due to high winds and typhoons during part of the year) limited on average to 5-8 hours/day for approximately 20 days/month for 6 months per year.[19] Municipal fishermen form a major poverty group in the Philippines; the catch per unit of artisanal fishing effort is low and decreasing. Rises in the real price per kilo of fish paid to municipal fishermen (which could compensate for the smaller catch per fisherman) have not occurred since 1982. In fact, the price has barely kept pace with the rate of inflation.[20]

Economic Impact of Coastal Zone Degradation

The process of coastal degradation has been hastened by overfishing, mangrove clearing and sedimentation from soil erosion. Physical damage to coral reefs has come from blast fishing. Inland freshwater lakes have become polluted from industrial pollution and agricultural wastes.

It is difficult to quantify the costs of the degradation of coastal resources as the impacts of overfishing, coral reef destruction, etc. will become more apparent in the long-run. It is also difficult to quantitatively estimate the cost of increased sedimentation on the coastal areas as the relationships are not completely understood.

Although fish production has continued to increase during the past decades, the rate of increase in production growth has leveled off, as Table 3.4-1 illustrates. It is felt by many fisheries experts that the leveling-off of production is due to overfishing and that the total present actual catch is dangerously close to the estimated total potential catch.[15] The gross value-added has stagnated between ₱4.3-4.4 billion since the early 1980's after rising since the early 1970's, as shown by Table 3.4-2. Government policies which support investment in capital-intensive fishing techniques have further exacerbated the situation, leading to the increased use of this equipment which raises yields and, hence, hastens the depletion of existing resources and of potential yields.[4]

Policies have tended to favor larger commercial fishing at the expense of municipal fishing, as research has been undertaken mostly on high technology fishing. Loans to the sector have also gone to larger commercial fisherman to buy equipment.[4]

Table 3.4-2 Gross Value-Added in Fisheries in Constant Prices 1972-1985 (Pesos - Billion)

Year	Value Added
1972	2.7
1973	2.9
1974	3.0
1975	3.2
1976	3.3
1977	3.5
1978	3.7
1979	3.7
1980	3.9
1981	4.1
1982	4.3
1983	4.4
1984	4.3
1985	4.4

Source: National Accounts Staff, NEDA

Issues in Fisheries and Natural Resource Management

There are two underlying issues pertinent to the political economy of fisheries and natural resource management. The first issue concerns the management of a renewable resource which is aid to have reached or exceeded maximum biologically sustainable levels of production. The second issue concerns the fisherman themselves, a vast majority of whom are living below poverty perels.[22] The question remains how to reconcile these two problems; that is, how to increase the incomes of small fishermen when the resource upon which they depend is maximally exploited at present.

Among the recommendations for reducing production levels have been limitations on total amount of fish landed, regulation of mesh and gear size, taxes on catch, or limits on the number of boats. [5,18]. Enforcement would prove difficult, however, especially for the widely dispersed municipal fisherman. But taxes and sanctions on an already impoverished group do not seem equitable.

The logical alternative would be the development of alternative employment opportunities. While this is a frequently made recommendation, the alternatives, often prove very limited. The agricultural sector is characterized by already high levels of underemployment and other opportunities may not exist in nearby areas. While many migrate to urban centers, a possible solution is to reduce levels of fishing effort by limiting the gear size and to outlaw high technology boats.[22] This would work in favor of the small fisherman to the detriment of the large trawlers whose catch would be significantly reduced. Although commercial fishermen comprise only a small percentage of the work force, their percentage of the total take is far higher. For example, in a study undertaken in San Miguel Bay, small trawlers representing only 3% of fishing units and employing 7% of the local fishing labor force earn the largest shares of total catch and approximately 50% of total profit due to their increased economic efficiency. By lowering the economic efficiency of trawlers through gear regulation, more fish will be available to small fisherman.[20]

In the long run it is necessary to develop employment alternatives to fishing for subsistence level fishermen. In the short-run, efforts to improve conditions among small-sale fishermen should be based on better enforcement of existing regulations which attempt to limit competition between trawlers and small-scale fisherman, and allow small-

scale fishermen a larger share of the catch. This will not prove an easy task as it entails a reallocation of resources to small-scale fisherman from wealthier large-scale commercial interests who often have influence locally.[4]

Policy Reforms and Recommendations

Among the needed policy reforms are:

1. Remove the Monopoly on the Collection of Milkfish.

In 1975 monopoly concessions for the collection of milkfish fry (recently hatched fish) were granted by the government to a few concessionaires. In the past, fry collecting had been a major or secondary source of income for tens of thousands of coastal residents. [2] After the monopoly was imposed these collectors were allowed to sell only to the concessionaire at a fixed (low) price. Prices of fry plunged from 90 to 120 pesos per thousand before the monopoly to 30 to 60 after. Removal of the monopoly will increase competition, in the market, create jobs and increase incomes for small-scale fry collectors through lower marketing costs.[4]

2. Restrict Gear Size to Limit High Technology Fishing.

Restricting gear size and enforcing already existing regulations will reduce the economic efficiency of commercial fishing (thereby reducing their catch). Together with the enforcement of existing regulations regarding the control of access and allocation of fishing rights, a more equitable division of fishing catch and profits will result between municipal and commercial fishing. (See Section 3.4.2 above).

Failure to enforce policies which reserve near coastal areas to municipal fishing results in large scale trawlers encroaching on fishing grounds reserved to small-scale fisherman. Municipal fishing grounds are, therefore, becoming dangerously overfished and the share of total catch and profit earned by small scale fishermen is diminishing. [22,19]

Bans on some high technology fishing gear could also reduce the rate of resource depletion, as yield levels decline.

3. Remove the Subsidy on Diesel Fuel.

Commercial fishing boats commonly have engines fueled by diesel. By removing the subsidy on diesel fuel, the operating costs of commercial trawlers will rise cutting into their profitability relative to smaller boats.[5]

4. Develop Opportunities for Employment in Non-Fisheries Sectors.

The need to draw labor away from over exploited coastal fishing grounds to agriculture and other sectors has been well recognized [5,18,22]. But the numbers of municipal fishermen continues to rise. Opportunities in agriculture, aquaculture, local manufacturing, and agro-processing industries should be studied and financed.

5. Increase the Level of Rent Recovered from Fishponds Located in Mangrove Areas.

The establishment of large fishponds has had a destructive impact on coastal mangrove forests, which play a key role in the coastal zone ecosystem. It is estimated that between 1976 and 1976 mangrove areas in the Philippines declined nearly 50%. Because of the high capital costs of establising fishponds, they have benefitted wealthier businessmen with the initial capital requirements.[4] By increasing the level of rent, the government will increase pressure for the abandonment of unproductive fishponds and reduce incentives convertion mangrove forests into fishponds.

4.0 CROSS SECTORAL IMPACTS

In this chapter cross-sectoral linkages or externalities, are discussed, as are role of natural resources in the economic development of the Philippines. The linkages between economic and natural resource policy are also examined.

4.1 Cross-Sectoral Linkages

The impact of natural resource degradation is felt not solely within the various sectors of the economy, but in interrelationships and linkages between two or more sectors. These cross-sectoral linkages or externalities either positive or negative, can often have a great impact on the natural resource base.

The impact of soil erosion on coastal areas is an example of a cross-sectoral linkage in the Philippines. Heavy siltation from deforestation is cited as the major cause of watershed and coral reef destruction. In a study conducted of the Magat watershed, it is estimated that 50 tons per hectare are lost each year due to soil erosion largely due to deforestation and various farming techniques (contour strip farming, tillage, etc.). The delivery of eroded soil downstream casues heavy siltation which leads to watershed degradation, higher irrigation costs and coral reef degradation. The link between upstream erosion and downstream watershed degradation is not well understood, especially as it may be years before full downstream costs are felt. This renders any exact quantification of costs difficult [4, 5].

Pesticide use, supported by government subsidies are another example of cross-sectoral linkages. Agricultural runoff carries pesticides into streams and rivers where it can poison water supply and aquatic life. Overuse of fertilizers can damage soil structure while excessive use of pesticides can lead to groundwater contamination. (See Section 2.3).

The environmental and economic study undertaken of the Palawan Integrated Environmental Program is the first attempt to apply traditional cost-benefit analysis techniques to proposed natural resource interventions in the Philippines. The three main types of conservation activity proposed were landbased conservation, mangrove conservation

and inshore marine conservation. Cost-benefit analysis was carried out for these three activities and for the program as a whole. Low discount rates of zero and five percent were used to emphasize longer-term benefits and costs. The results of the study were that the benefits from mangrove conservation would be very high and that irrigation benefits from catchment protection would also be high. [23] In addition, a study was undertaken of the comparative costs and benefits of the logging versus fisheries and tourism industries in Palawan. The study concluded that benefits from fisheries will remain constant overtime, while benefits from tourism will increase. In the study it was estimated that continued logging will generate smaller and decreasing benefits and that the supply of logs will disappear after five years [24].

The study of cross-sectoral linkages and the possibility of negative externalities is important in the formulation of government natural resource policies. There is a need for both micro and macro level studies to be undertaken in the Philippines in order for decision-makers to have appropriate information to formulate policies which will truly attain the government's stated goals.

4.2 The Role of Natural Resources in the Philippine Economy

Natural resources play a large role in the Philippine economy, employing over fifty percent of the total labor force and contributing nearly one third of the GDP and over one-third of total export revenues [9]. It is estimated that sixty percent of the population lives in rural areas [8]. Table 4.2-1 presents the share of the natural resource sector in the total GDP. Despite government investment policies in the 1960's and 1970's which clearly favored the development of the industrial sector at the expense of agriculture and other primary sectors, it is surprising to see the continued importance of these primary sectors to GDP. While agriculture's share of the GDP has increased since 1972 and the fisheries share has remained constant at five percent, forestry's contribution has declined from four percent in 1972 to almost nothing. The importance of the natural resource sector to the Philippine economy is even greater than illustrated in Table 4.2-1 as the indirect linkages to other sectors, such as agro-processing, are not taken into account.

Table 4.2-1 Share of Major Sectors in the Gross Domestic Product of the Philippines (in percent)

SECTOR / YEAR		1972	1986	1987	1988
I	AGRICULTURE	20	24	23	22
II	FISHERIES	5	5	5	5
III	FORESTRY	4	4	*	*
	SUBTOTAL I-III	29	30	28	27
IV	INDUSTRY	32	31	32	32
V	SERVICES	39	39	60	40

* = Less than one percent

SOURCE : Extrapolation from the Philippine Development Report, 1988, [9]

The share of the natural resource sector in total employment, as shown in Table 4.2-2, is also indicative of the importance of the sector. The percentage of total employment furnished by agriculture (including fisheries and forestry) has remained between 42 to 44% in the 1980's. This is surely an under-estimation as it does not include the large number of underemployed in the sector. Total agricultural employment grew from 5.9 million in 1980 to 7.2 million in 1986, an annual increase 3.4% [8]. The annual growth rate of the gross value added in the agricultural sector between 1982 - 1986 was 1.6%, far below the growth in employment [12]. This indicates that average agricultural incomes were falling during the period.

The role of the natural resources sector in employment (over forty percent of total employment since 1980) is more important than its role in terms of income (averaging just under thirty percent). This indicates an inequality between sectors, with increasing poverty in the rural sector.

Another indicator of the importance of natural resources in the Philippines economy is the share of primary resource exports. Table 4.2-3 indicates that primary resource exchange revenues.

4.3 Macroeconomic Trends and Natural Resource Management

Trends in several key macroeconomic and demographic variables give an indication of the status of the natural resource environment growth, labor force growth, and the lack of growth of employment opportunities outside the primary sector.

Population growth in the Philippines is a major cause of poverty and of the increasing exploitation of the natural resource base. The current population growth rate is approximately 2.5% per year which is the highest growth rate among Asian countries except for Bangladesh. If present trends continue, the population will almost double within 20 years [5].

Population growth increases the size of the labor pool, leading to depressed real wages. While a direct correlation between population growth and resource depletion cannot be proven, it is clear that an increased population,

TABLE 4.2-2 Employment in Agriculture[a/]
(% of total employment)

YEAR	%
1980	42
1981	43
1982	43
1983	44
1984	44
1985	43
1986	42

[a/] Including fisheries & forestry employment.

SOURCE : Extrapolation from NCSO , Data Survey

Table 4.2-3 Percentage Share of the Value of Primary (Resource) Exports in Total Country Exports

1972	93%
1986	38%
1987	33%
1988	33%

SOURCE : Extrapolation from the Philippine Development Report, 1988, [9]

with few employment opportunities outside the primary sector, will put increasing pressure on deminishing resources.

The Government's new population strategy outlined in the Population Policy Statement (1987) attempts to control population growth through provision of family planning clinics. Adequate funding of this program is needed and the success of the strategy will have a positive impact on lessening the rate of natural resources depletion.

The Philippine labor force is growing at a yearly average 3.6% between 1980 and 1986, a rate appreciably ahead of the population growth rate (See Table 4.3-1). This is in part due to the increased participation of women in the labor market. During the 1970's the economy was expanding and the growth in employment opportunities kept pace with labor force growth. In the mid 1980's, however, the GDP dropped appreciably and unemployment reached over eleven percent and underemployment over 16% in 1986. Unless jobs can be created at a higher rate than the increase in employment, the pressure on land and natural resources will increase augment, as more and more unemployed and underemployed seek incomes on increasingly unproductive lands or through sale of over exploited forestry and fisheries resources.

The lack of employment generation in the industrial sector, where the average employment growth rates are far below those in agriculture, is due to the capital intensive nature of industrial policies (employment growth the industrial sector between 1980 and 1986 was a mere 0.24%).[8] Incentives should be given to encourage more labor intensive strategies to create employment opportunities in the industrial sector, and relieve pressure on the over exploited natural resources sector. If non-agricultural or non-primary sector opportunities are not created, the income seeking underemployed will continue to denude local forests through the gathering of fuelwood and other products and to over exploit coastal fishing areas.

4.4 Macroeconomic/Natural Resource Policy Linkages

Macroeconomic policies can have a great impact on natural resource management as they have powerful effects on how resources are allocated [14]. Impacts are felt on natural resource management through interest rates, exchange rates, and through pricing and trade policies.

Table 4.3-1 Demographic Indicators: Labor Force Statistics.

A. Average Yearly Growth Rates of Working Age Population, Labor Force and Employment (in percentage)

	1980-82	1984-86	1980-86
Working age population	2.2	2.9	3.02
Labor force	3.5	3.2	4.20
Employment	2.7	3.0	3.60

B. Proportion of the Labor Force Unemployed and Under-employed (as percentage of the total labor force)

	1980	1982	1984	1986
Unemployment	8.1	9.5	10.6	11.1
Underemployed	13.0	16.5	17.6	16.5

Source: National Census and Statistics Office (NCSO)

Interest rates determine the cost of capital and have an impact on decisions regarding the choice of labor intensive versus capital intensive strategies. On the one hand, a low cost of capital discourages labor intensive industrial policies which would absorb labor from resource depleting primary activities. On the other hand, a low cost of capital could encourage capital intensive logging and fishing activities.

An over-valued exchange rate discourages exports by making local goods more expensive (and less competitive) in foreign markets. This could lead to reduced farmer incomes and the need to engage in such resource depleting activities as charcoal making. An overvalued exchange rate may discourage resource depletion as the international price of the resource (timber, fish etc.) is less attractive. In the Philippines, the exchange rate was slightly overvalued before the mid-1980's crisis and is now more or less at equilibrium.

Pricing and trade policies, such as those in the Philippines in the 1970's which encouraged industrial development at the expense of agriculture, can have a deleterious impact on the natural resource base. High import tariffs which served to protect local industry raised the costs of agricultural inputs, lowered their competetiveness in international markets and reduced farm incomes. Price controls and marketing monopolies also reduce the price received by the producer. Because of these policies, many subsistence farmers or farm workers need to search for supplemental income. The availability of forests and coastal fishing grounds make them the most natural choice as sources of supplemental income.

5.0 ECONOMIC AND POLICY CONSTRAINTS

In this chapter economic and policy constraints which prevent improved management and use of natural resources will be discussed and possible recommendations are suggested.

There are a multitude of economic and policy constraints which hinder sustained natural resource management and use. Some are general in nature (that is, affecting the socio-economic environment as a whole), while others affect the agricultural, forestry and fisheries sectors individually.

General Institutional Constraints

- The lack of the institutional capacity on the part of NEDA to appropriately allocate resources in the natural resource sectors. NEDA needs to develop expertise in methods of economic and social benefit cost analysis in order to more effectively allocate natural resource funds and to monitor and evaluate on-going projects.

  Delays in project implementation resulting from the inability to dispense ODA funds in a timely manner hampers the successful use of allocated natural resource funds. Bottlenecks in the decision-making process are a major cause of the delay in the dispersal of ODA funds and apply not only to NEDA but also to the involved departments (DENR, DA, DAR) at the national, regional and provincial levels.

- The lack of the institutional capability on the part of DENR to conduct analysis of on-going policies and their impact on natural resources management and use or to make recommendations for needed changes in existing policies which affect natural resource degradation.

- The paucity of research undertaken by both the private and public sector on the economic causes of natural resource degradation and the micro and macroeconomic implications of the consequences of current natural resource management practices.

Socio-Economic Constraints

- Population growth in the Philippines is a major cause of poverty and of increasing exploitation of the natural resource base. Population growth increases the size of the labor pool putting increasing pressure on diminishing natural resources.

Constraints in Agriculture

- The lack of adequate economic incentives to encourage improved management practices is the underlying cause for many of the natural resource related constraints in the agricultural sector.

  Policies which reduce producer incentives such as price controls, export taxes, marketing monopolies have an indirect effect on natural resource management and use. The reduced profitability of agriculture serves as a disincentive for farmer investments in soil conservation or other long-term techniques.

- The lack of secure tenure over land for many farmer is a strong disincentive for land or forest users to maintain or improve resource productivity and to practice sustainable methods. Lack of secure tenure prevents the use of land as collateral to obtain credit for investments in land improvements and biases crop choice against tree crops, which demand long-term investment strategies. The economically rational alternative under these conditions is to minimize labor and inputs and then, when the land resources are depleted, to shift to sites with higher fertility.

- Underemployment and the lack of income generating activities outside the agricultural (or fisheries) sectors puts further pressure on natural resources, as often the only possible means for earning income is through the firewood gathering, fishing, or the production of charcoal.

- Import restrictions placed on phosphate fertilizers (which constitute approximately twenty percent of all fertilizer imports) raises the price of phosphate fertilizer to farmers.

- Administrative fees on copra exports (which constitutes an indirect tax) reduce both producer incentives and the competitiveness of Philippine copra in international markets.

- Marketing monopolies in the coconut and sugar industries stifle competition, raise marketing costs, and lower the competitiveness of Philippine sugar and coconuts in foreign markets.

Forestry Constraints

The major economic constraints related to the forestry sector are:

- Government tariff exemptions on imported capital machinery which encourages mechanized logging.

- The low level of the fees charged for fuelwood extracted from public lands, which encourages resource exploitation.

- The fees charged to timber concessionaires which lead to large profits and which represent only a minor proportion (17%) of the true economic rent.

- The system of logging concession contracts which fails to encourage sustained yield management.

- Tax and tariff protection given to wood processing industries have produced inefficient industries and an increased consumption of national resources (logs).

Constraints in the Fisheries Sector

- Policies which favor large commercial fishing at the expense of the municipal fishing sector, a major poverty group. Among the policies are: research funds have been largely invested in capital-intensive, high technology fishing; loans have been available primarily to wealthier fishermen; and, subsidies on diesel fuel increase profits of large trawlers.

- Failure to enforce government policies restricting coastal areas to municipal fishing has decreased the share of the total catch and profit earned by municipal fishermen.

Institutional/Regulatory Constraints

The institutional and regulatory framework of the environment and natural resources sector is a reflective of the policy structure within which resource management occurs. Institutionally, there are two governmental organizations that have primary responsibility for the sector: the Department of Environment and Natural Resources (DENR) and the Department of Agriculture (DA). The former has responsibility for regulation and management of development activities in the upland areas, for forests, and for coastal zone management. The latter has responsibility for agricultural development of the lowland areas and for fisheries and aquatic resources. There are, however, areas in which the responsibility of these institutions overlap (in particular, with regard to upland agriculture and coastal fisheries). There are also a large number of governmental activities that either directly or indirectly engage in activities that affect the ability of DENR and DA to meet their missions. Also adding to the institutional complexity of effective environmental and natural resource management is the framework of laws and regulations in the Philippines. This framework is extensive and highly variable in terms of consistency and specificity. A brief discussion of the institutions and the regulatory framework is presented in Appendix 1 to this Annex.

6.0 RECOMMENDATIONS

6.1 Overview

Many of the issues raised in the present Natural Resources Assessment involve policy reforms needed for improved natural resource management and use.

Policy reform is a long painstaking process; it includes policy formulation, implementation and impact evaluation; it can also include an analysis of reasons for the non-implementation of existing policies.

A program of natural resource policy and planning is recommended. The goal of the program is to strengthen the Philippine capacity to identify key policy areas in natural resource management and use, analyze policies, and recommend needed policy changes. The program will also build consensus and develop the capacity for advancing various policy options. This will lead to increased efficiency in the allocation of natural resource funds.

The priorities, objectives and major inputs are described below.

6.2 Natural Resource Policy and Planning Program

Introduction

The goal of the program is to increase the efficiency of the allocation of natural resource funds in order to obtain sustainable development through the strengthening of the GOP's ability to evaluate natural resource needs, to plan and effectively allocate natural resource funds, and by developing a constituency in the public and private sectors with the capacity for advancing policy options.

Priorities

The major priorities or purposes of the Natural Resource Policy and Planning Program are:

- Strengthening the institutional capability of NEDA to appropriately allocate resources in the natural resource sector through improved monitoring and evaluation;

- Strengthening the capability of DENR to analyze, formulate, and implement policies and projects dealing with natural resource management and use;

- Developing a constituency within the government and private sector committed to the need for policy reform in natural resource use and the implementation of those reforms;

- Developing the data base (management information system) necessary to evaluate priority issues in natural resource management and use; and,

- Strengthening the coordination within governmental departments and between the central agencies and the regions to better manage natural resources and identify priority issues.

Program Instruments

Major inputs for the Natural Resource Policy and Planning Program include:

- Provision of institutional support through short and long term training especially in the areas of resource economics and data collection and analysis techniques;

- Provision of technical assistance especially in the areas of resource economics, policy coordination, and data collection and analysis;

- Support of research and policy analyses in natural resource management through provision of research grants and institutional development assistance to government agencies, universities, private research institutes, and NGO's concerned with resource management and use; and,

- Support of policy dialogue though workshops on issues and priorities in natural resources, and through other means of dissemination of information on the state, management and potential of natural resources.

Description of Priorities

The four major priority activities of the Natural Resource Policy and Planning Program are briefly described below:

1. Institution Strengthening of NEDA

At the macro-level, NEDA needs to develop the capacity to apply methods of broad social benefit - cost analysis to the allocation of funds for natural resource management. Included in this is the determination of the importance of the natural resource sector both to the overall economy and in inter-sectoral linkages.

To strengthen the capability of NEDA to analyze the implications of sectoral resource allocations, short-term technical assistance will be provided in resource economics, social cost-benefit analysis techniques, and program monitoring and evaluation. Long and short term training will also be available for NEDA personnel.

2. Institution Strengthening of DENR

Under the program, the capability of DENR to analyze, formulate, monitor and implement natural resource management policies will be strengthened through provision of technical assistance and training.

Three long-term experts will provide technical assistance to DENR, each for 2-3 years: an intergovernmental relations specialist; a resource economist; and a data collection/analysis specialist. The intergovernmental relations specialist and the resource economist will be placed in the Socio-Political Affairs Office of the Special Concerns Office which reports directly to the Secretary of DENR. The data collection/analyst specialist will be located in the Division of Planning and Policy Studies, reporting directly to the Assistant Secretary.

As a first step, research priorities will be established in the areas of resource economics and policy analysis of natural resource use and management.

A second step will be to review existing GOP policy and legislation related to natural resources (agriculture, fisheries, forestry, mining and water resources) and evaluate the economic incentives and discentives created by

the implementation of these policies. The effectiveness of policy implementation will also be reviewed. In light of the above, implementation or policy reforms will be formulated. This is a long term process. Once strengthened, DENR will have the capabilities to:

- Examine the economic impact of natural resource degradation;
- Assess the economic value of proposed policies; and,
- Formulate policies that attempt to reduce policy distortions that increase environmental degradation, and create incentives (rather than discentives for sustainable resource use).

The intergovernmental relations specialist will be responsible for providing advice to the Secretary of DENR on coordination between various GOP Departments (NEDA, DA, DAR, DOTC, DPWH) and between DENR central and regional offices in order to achieve a better management of natural resources and to identify priority issues. In short, the intergovernmental relations specialist will advise DENR on how to position itself vis-a-vis other Departments and its own regional and provincial staffs. He should be a senior level planner with extensive experience in natural resource management, public administration and have some knowledge of the existing Philippine administrative structure.

The resource economist should be a senior level (PhD) economist with extensive background in resource and macroeconomics, policy planning and analysis and in quantitative economic techniques, preferably with some experience in the Philippines. The resource economist will be responsible for undertaking policy analyses, and training counterparts.

The data collection and analyses expert should have an extensive background in both field level data collection issues and in data analysis. A background in developing baseline data needs and management information systems is essential. The data analysis expert will spend a significant part of his/her time working at the provincial and regional levels.

3. Developing a Constituency for Natural Resource Policy Reform

Under the program, a constituency will be developed within the government, non-government and university sectors committed to the need for policy reforms in natural resource use and for the implementation of those reforms. This component has the two fold objective of furthering the base of knowledge on natural resource related topics and, most importantly, of developing a cadre of individuals who are committed to examining current policies and impacts and will be able to respond to GOP resource economic needs. A group such as PIDS would be a good choice to administer the program.

Through the financing of collaborative research and workshops, the awareness of environmental issues and the need for change in private behavior and public policy will be increased.

Among the instruments for developing a constituency concerned about issues in natural resource management are:

- The financing of collaborative research on the part of local thinktanks (such as PIDS), the universities and other groups. Research topics will be chosen by a committee chaired by PIDS and representing the various groups;

- The financing of Ph.D. and Masters theses research on natural resource topics;

- Sabbatical visits of key international resource economics specialists to Philippine institutes and universities will be financed, as will sabbaticals for Philippine economists to receive further training in resource economics; and,

- The organization of periodic workshops on matters of concern, such as the identification and prioritization of research needs. Organized by PIDS, the workshop participants would come from NEDA, DENR, and DA, DAR, Department of Budget and Management, Department of Finance, and from the universities and the private sector.

4. Developing the Necessary Database (or Management Information System) to Evaluate Priority Issues in Natural Resource Management and Use

Long term technical assistance in data collection and evaluation will be provided for this activity.

The first task is to assess existing routine data collected by DENR and to re-evaluate data needs. The purpose will be to eliminate routine data collection that does not focus on key issues, to establish routine data collection targeted on the monitoring of major resource trends, and on impact assessment of GOP programs.

Existing data collection operations in DENR will be strengthened through workshops, training seminars and in-country short-term training. Training topics will include survey techniques, sampling methodology, rapid rural appraisal techniques and computer applications. Funds for additional contractual enumerators will be available for periodic studies.

While improving data collection and analysis efforts in field offices (at provincial and community levels) is the main focus, improvement at the national level, especially with regard to homogenizing data collection methodologies nationwide, will also be provided through provision of consultant services, short-term training, workshops and seminars.

6.3 Specialized Studies and Technical Assistance Needs

Natural Resources Rent/Depreciation Study

There is a need for a Natural Resource Rent/ Depreciation Study. This should be a joint project undertaken by NEDA, DENR and PIDS to establish real rents for public natural resources in order for the GOP to recover equitable charges for sustainable use of public natural resources. A periodic review mechanism for changing rents will be established. Key areas might include forest land, rents, grazing leases (if they are continued).

As a second step, the feasibility of realistically calculating the depreciation of costs of natural resources in the Philippines and including such costs in the system of national accounts and GOP rent charges for the use of public national resources. A short-term consultant (perhaps

from World Resources Institute or the Harvard Institute for International Development) could assist the already on-going work.

Assessment of Rural Support Staff Needs

This study, administered by NEDA and PIDS, will involve the preparation of a personnel needs plan to assure that skilled technical and administrative personnel are available at all levels of DENR and DA to implement the programs under their jurisdiction. The plan will identify the numbers and qualifications of personnel required to meet departmental needs, assess the shortfall in existing resources to meet those needs at all levels (headquarters, region and province), and formulate a plan for meeting the future needs.

Computerized Index of Environmental and Natural Resource Regulations

This is a project to be undertaken by DENR/EMB to prepare a computerized index of environmental and natural resource regulations, standards, and laws. This will provide personnel at the regional and provincial levels with a standard reference to assist them to better understand and enforce the laws, regulations and standards currently in force. The system should consist of an index to the regulations and the text of the laws regulations, and standards and should be compiled in a readily up-datable form.

Legislative Rationalization

As discussed above, there is a need to rationalize the regulations framework concerned with environmental and natural resource management. In this study, an NGO will be contracted to review all laws and regulations addressing natural resource management and recommend to DENR and Congress for the removal of inconsistent, redundant or unclear laws and regulations.

Upgrade Project Management in DENR

Within DENR's Foreign Funded and Special Projects Office, there is a need to improve and upgrade staff skills in project management, project planning and evaluation and

project accounting/administration. This project will provide 2 long-term (ie. 3 year) secondments to that office for that purpose. The seconded personnel will divide their time in three, approximately equal, areas: assisting DENR staff in the above areas, undertaking project management and accounting, and training DENR personnel. The needs in these areas will be best met by provision of long-term technical assistance that will allow working with as wide a group as possible within DENR.

Support to Environmental Management Bureau

The lack of support that the Environmental Management Bureau has received in the past has hampered its ability to be effective as the primary governmental organization concerned with environmental planning and management. This program will provide monetary support to DENR/EMB to hire additional staff, procure hardware (ie. monitoring and testing equipment), obtain training, and provide logistical support and supplies to field operations.

Tourism Zone Coordination/Clearance

At present, there is no coordination between DENR and the Department of Tourism in relation to the latter's ability to unilaterally declare any property to be a Tourism Zone and, thus, effectively remove potential parkland from DENR oversight or administration. The objective of this program will be to facilitate coordination and consultation between DENR and DOT with regard to the Integrated Protected Area System. Included will be a review of current practices in identifying/allocating lands for particular purposes, identification of problem areas with respect to conflicts between reserves and tourism uses, and preparation of recommended changes to legislation or regulations that will require coordination with DENR of plans by Department of Tourism to declare areas as Tourism Zones.

Assistance in River Revival/Clean-up

The surface waters of the Philippines are, for the most part, polluted to the point that they are no longer suitable for potable water supplies. Increasing levels of pollution in many rivers is beginning to impair their use for irrigation and other uses. While the Philippine government has embarked on a program to revive several

rivers, there remains much that needs to be done before surface water quality is improved throughout the country.

While not specifically a technical assistance activity, donor agencies can provide assistance to DENR and NGOs in this area that will improve the effectiveness of DENR in managing water quality. Among the steps that donors can take to provide this assistance are:

- Assistance in selection of rivers for clean up;
- Development of clean up plans;
- Enlist PVO and private sector assistance;
- Purchases of equipment;
- Provisions of technical assistance;
- Public education and information campaigns; and,
- Project monitoring.

In considering involvement in a river restoration/-water quality improvement program, it should be noted that, based on a recent experience in the Philippines, the most effective organizational model involves a partnership between the government and the private sector (including both NGOs and the for-profit private sector).

6.4 Training Needs

While overall training needs and plans will be identified by the design team, the following are some specific examples of training needs.

Environmental Impact Statement Training

This objective of this project will be to train entry-level scientists in the preparation of environmental assessments for infrastructure projects under MAI/PAP. The personnel will be contract hires (possibly through an NGO) who will be given practical experience in conducting environmental assessment. USAID will also benefit from the provision of such personnel by receiving assistance in meeting its requirements to analyze the environmental effects of the MAI/PAP projects.

Workshop on Environmental Assessment (EA) Planning

While environmental assessments are mandated by Philippine law for a wide variety of projects, their use, has been limited and is viewed largely as a procedural step in the project cycle rather than as a planning tool that can improve and strengthen project designs. The purpose of this workshop will be to educate senior officials of departments represented in the Cluster A group regarding the benefits of using EA as a planning tool and to bring the concept of environmental planning forward in the project cycle rather than continue to treat environmental matters in a reactive manner.

The workshop will be given by consultants working with counterparts from DENR (EMB). Activities associated with the workshop include:

- Examine current practices by the departments represented on the Cluster A group;
- Prepare workshop materials; and,
- Hold the workshop for Cluster A members.

7.0 LIST OF PERSONS CONTACTED

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ANNEX E - Appendix 1

Institutional and Regulatory Framework for Environmental and Natural Resource Management

by

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INSTITUTIONAL AND REGULATORY FRAMEWORK FOR ENVIRONMENTAL AND NATURAL RESOURCES MANAGEMENT

1.0 INTRODUCTION

The ability of the Philippines to meet the challenges posed by the myriad of environmental and natural resource problems that it confronts is dependent, in large part, on the presence of institutions capable of effectively addressing those problems and on whether the policy/regulatory framework exists to facilitate the effectiveness of those institutions. While much of the institutional and regulatory framework to meet the challenges of effective management are in place, a critical issue to the donor community is the capacity of those institutions to employ the resources that could be made available in a manner that will result in effective sustainable environmental and natural resources management. Of equal concern are the effectiveness and appropriateness of the policy/regulatory instruments that guide the management of environmental and natural resources.

A framework of institutional instruments exists in the Philippines that is sufficient to support most of the environmental and natural resources policies of the Philippine government and to implement the recommendations offered by the assessment team. These institutions include both governmental and non-governmental organizations and the for-profit private sector and are discussed below with regard to their mission, goals, and organizational capacity.

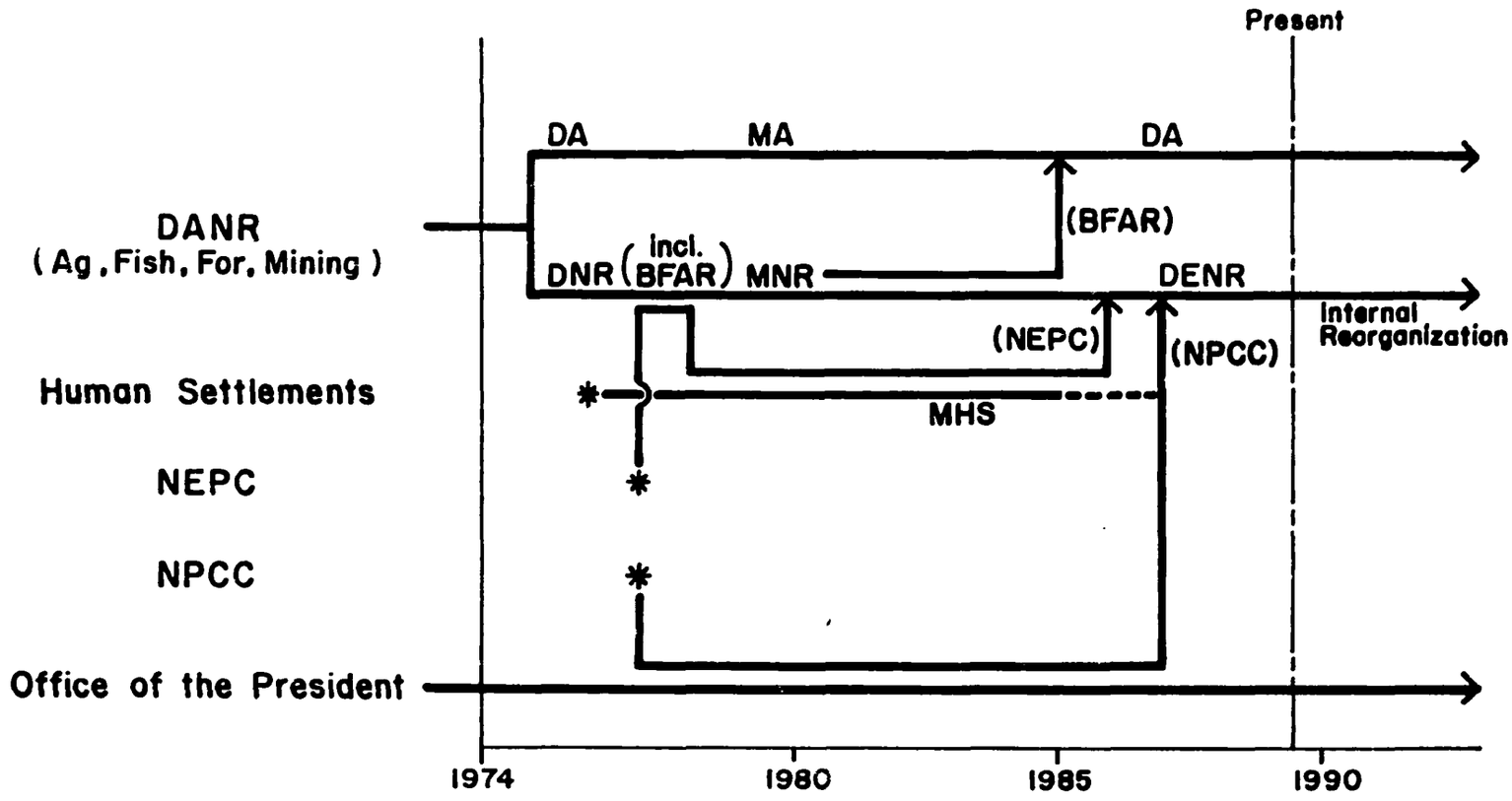
2.0 GOVERNMENTAL ORGANIZATIONS

The two principal governmental agencies with responsibility for environmental and natural resources are the Department of Environment and Natural Resources (DENR) and the Department of Agriculture (DA). The forum has responsibility for environmental quality and planning, forestry, lands, and minerals management. The latter is concerned with agricultural development and fisheries and aquatic resources.

There is, however, considerable overlap between the two Departments in terms of functional responsibility. While DA has primary responsibility for agriculture (including extension services), its area is limited to lowlands. In the upland areas, DENR is responsible for agriculture and rural development. Also, DENR is responsible for coastal zone management (including coral reef protection and coastal forests). DA, however, has primary responsibility for management of coastal fisheries and aquatic resources (with the exception of aquaculture, which is under the jurisdiction of the Department of Trade and Industry). These somewhat blurred jurisdictional lines arise, in part, from the history two institutions (until 1974, DENR and DA were combined under the Department of Agriculture and Natural Resources) and from the complexity of the structure of the legislation and regulatory framework that guide Departmental programs discussed below. A schematic depiction of the almost continual reorganization of environmental and natural resource management functions is presented in Figure 2.0-1.

2.1 Department of Environment and Natural Resources (DENR)

DENR was created in a reorganization of the Ministry of Natural Resources in 1987 (Presidential Order 192). Several formerly autonomous bodies were also merged into the new department. The Presidential Order mandated a complete change from a collection of line agencies that were coordinated only at ministerial level to an integrated line and staff organization. The line of authority and accountability passes from the Secretary through the Undersecretary/Operations to Regional Executive Directors (RED) to Provincial Environment and Natural Resource Officers (PENRO) to Community Environment and Natural Resource Officers (CENRO).



Principal Natural Resources Agency Reorganizations
(1975 – Present)

Figure 2.0 - 1

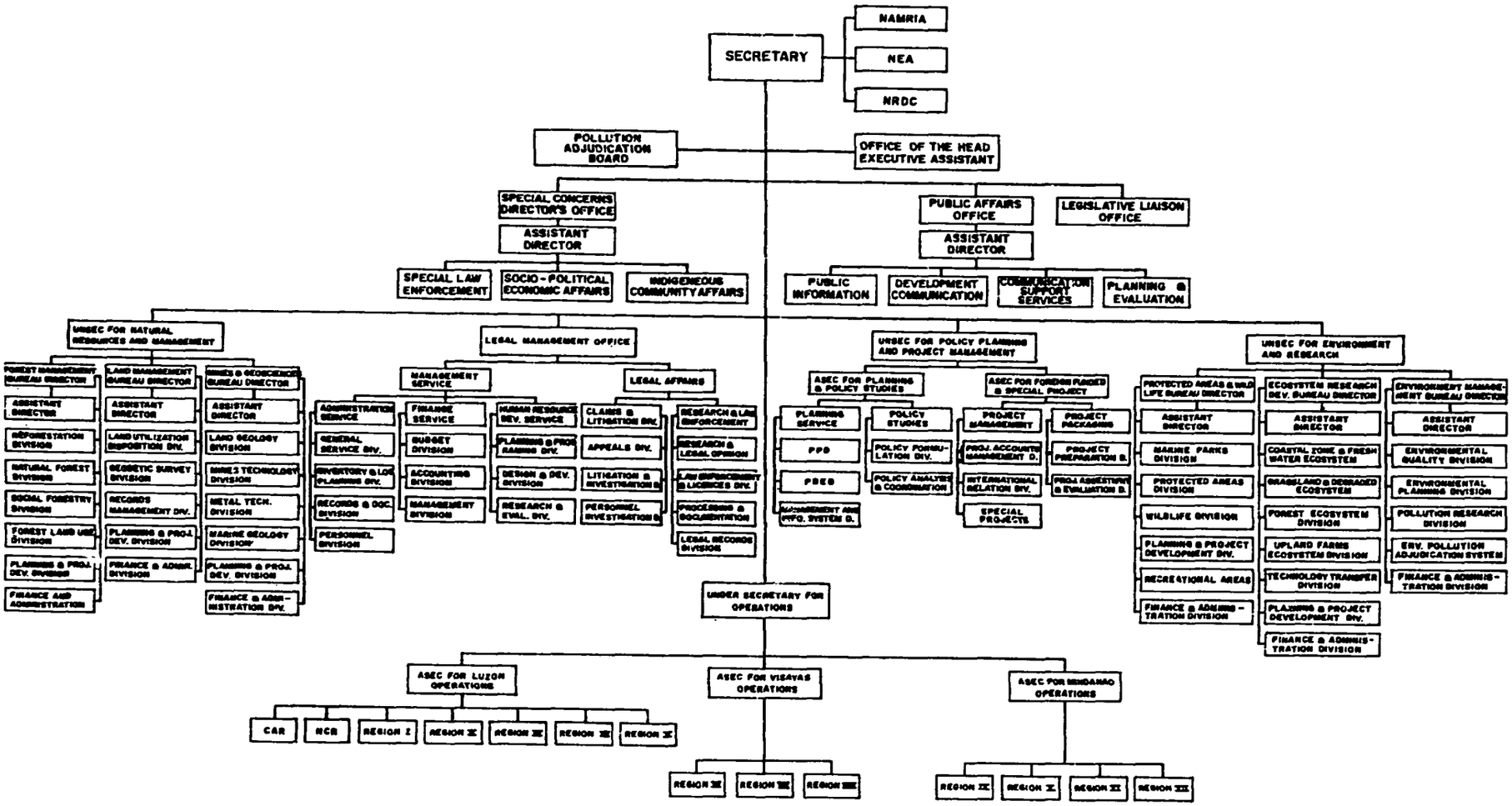
At headquarters the staff functions are grouped in the charge of Undersecretaries for Policy, Planning, and Project Management; Environment and Research, and Natural Resources and Management plus a Director for Legal Affairs and Management.

In each Regional Environment and Natural Resource Office (RENRO), the Regional Technical Directors for Forest Management, Land Management, Environment and Protected Areas, Ecosystem Research, and Mines were, by and large, formerly regional directors of their former agency; i.e., a regional forester became a Regional Technical Director for Forest Management.

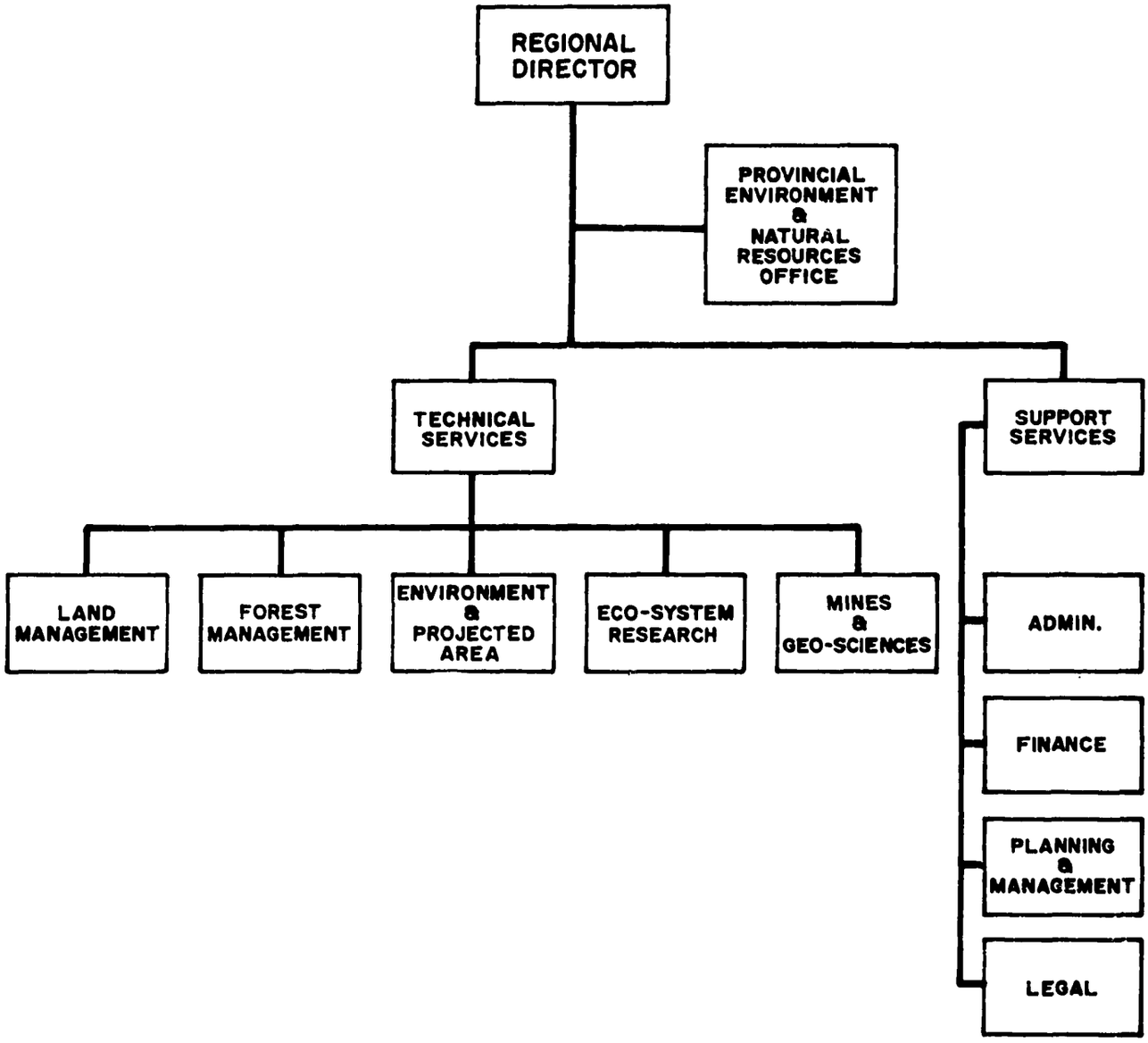
The organization of DENR is shown on Figure 2.1-1, while the organization of the regional office is shown on Figure 2.1-2. Within the CENRO, organization, positions are allocated for technical services (forest management, survey, forestry, environment, and parks) and for support services.

DENR has six staff bureaus: a) the Forest Management Bureau (FMB) comprised of the former Bureau of Forest Development (BFD) and Wood Industry Development Authority (WIDA), with responsibility for forest land use, forest management, reforestation and social forestry; b) the Land Management Bureau (LMB) with responsibility for the survey, classification and disposition of public lands; c) Mines and Geo-Sciences Bureau with responsibility for terrestrial and marine geological surveys, mines and metal technology; d) the Environmental Management Bureau (EMB), comprising the former National Environmental Protection Council (NEPC), staff activities of the Pollution control Commission and the Environmental Center of the Philippines; e) the Ecosystem Research and Development Bureau (ERDB), which absorbed the former Forest Research Institute and the National Mangrove Committee and contains specialized units for coastal zones, grasslands and degraded ecosystems, forests, upland farms and technology transfer; and f) the Protected Areas and Wildlife Bureau (PAWB), responsible for all national parks and wildlife sanctuaries, including those presently belonging to other government organizations. [5]

DENR currently (1989) has a regular staff complement of 22,500, supplemented by 12,700 casual and contractual employees. In terms of headquarters staff bureau employment, FMB has over 400 regular and casual employees; LMB has almost 600, Mines and Geo-Sciences has 450; EMB, 216; ERDB, 340; and, PAWB, 315. Employment in regional offices consists of 19,500 regular and 10,950 casual and



DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES
ORGANIZATIONAL CHART



DENR REGIONAL OFFICE ORGANIZATION

Figure 2.1-2

contractual employees. Included in this are approximately 7,000 forest guards (who are responsible for more than 7,000,000 ha of forest lands).

The reorganization was a precursor to a determined move to regionalize the agency. Hence, major decision making authority was delegated to the RED's. This represents good management if it reduces the endless delays entailed in deferring all decisions to Manila.

The move toward regionalization included the delegation of authority and responsibility to the PENRO's and CENRO's. If working well, there would be a two-way flow of policy: that which originates at the operating levels below the CENRO's and moves upward for review and decision making and that which starts at the top and moves down through the system. In theory, the decision maker at each operating level would be advised by the staff experts available to him. At least six forces still affect the manner in which the theoretic construct functions. The most important is that the whole operating style is different from that which the majority of the staff is accustomed: it will take more time for people at the middle, let alone the bottom, to begin to initiate and move rather than wait for detailed instructions from Manila. Secondly, the number of technically capable staff people means moderately good staffing to the regional level, but real deficiencies below that, e.g., there are seldom Land Management or Mines personnel in the CENRO's let alone Environmental Management personnel. Thirdly, there is a minimal amount of experience at the department level to coordinate and make functional a regionalized line and staff organization. Fourth, there is no well developed staff capability at the Manila or RENRO levels to interface with the socio-economic oriented central agencies, particularly NEDA. Fifth, the management of research has been seriously disturbed. Sixth, the lower levels of the organization have little understanding of, ability to do, or desire for, planning as a basis for requesting money, manpower, and material.

It is important that this organization have a chance to settle in, work out the kinks, and progressively adjust to the gaps and shortcomings that experience is bound to reveal.

The regionalization thrust is to improve the efficiency and effectiveness of a line agency. Superimposed on this thrust has been a determined government policy to decentralize. The decentralization focus is increasingly on the Provincial governments. The pressure for the PENRO's to

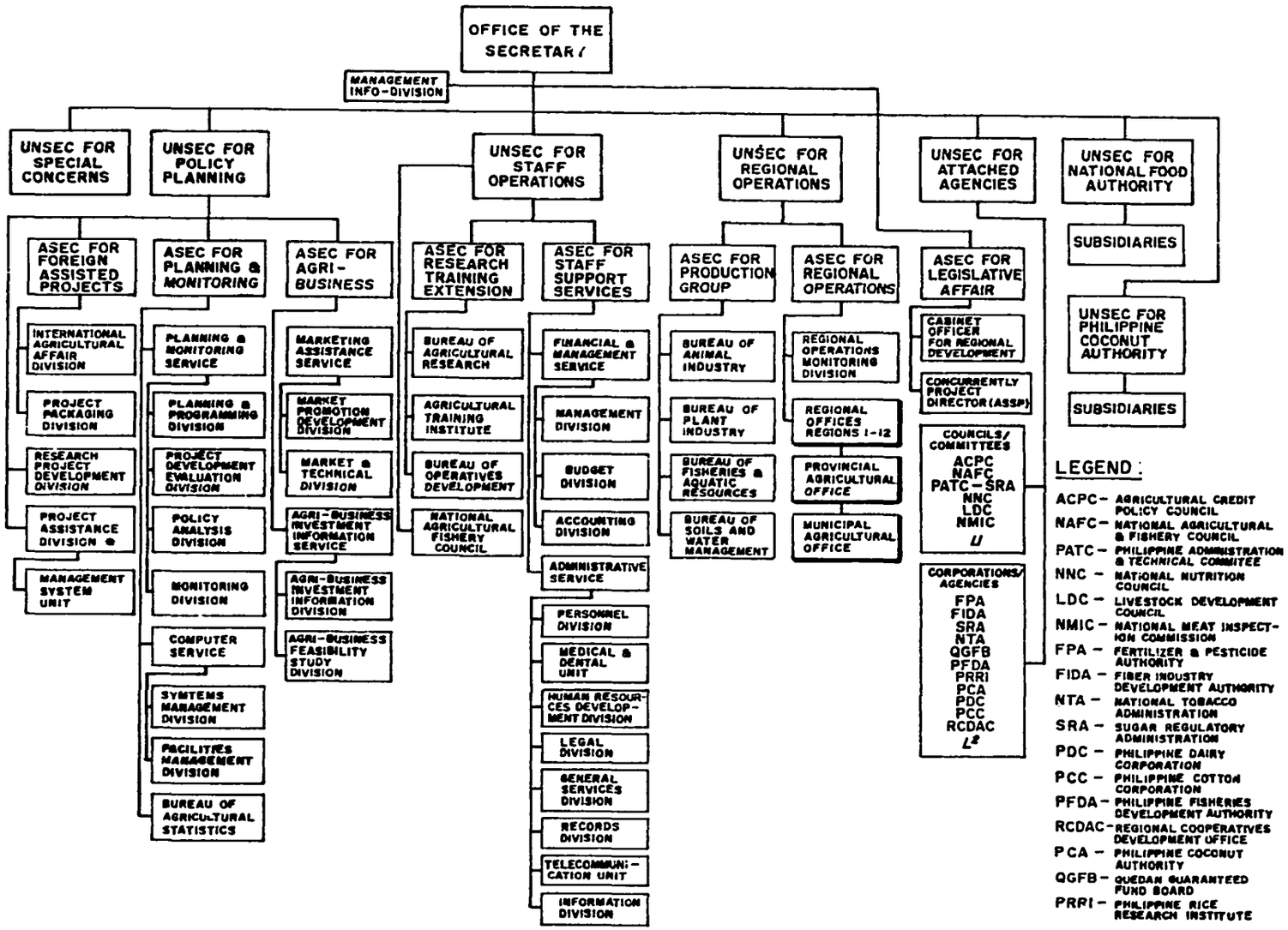
become planners and intergovernmental coordinators is growing, and will become critical if they do in fact become the chief natural resources staff advisors to the Provincial Governors.

One issue that does not seem to have been addressed is the matter of the relationship between the Governors and the Mayors and other officials of the municipalities. The municipalities are headed by elected officials, but the units of government have been created by the sole sovereign authority: the national government. Thus, there is no hierarchy from local to Provincial to national levels. Nonetheless, in current decentralization descriptions, the Governors are to become major forces in allocating not only those discretionary resources left to them by local revenue acts, but for the national resources allocated to PENRO's, PAO's, CENRO's, and Municipal Agriculture Officers (MAO). This dimension may be quite important in matters of coastal zone management which includes management of the mangroves as well as the near-shore fisheries and coastal land use controls.

2.2 Department of Agriculture (DA)

The mission of the Department of Agriculture was enunciated in Executive Order 116 as being to support rural and agricultural development by providing the necessary policy framework, investment, and support services for agricultural enterprises. With the emphasis on alleviation of rural poverty place by the Philippine Government, the Department of Agriculture serves as the primary institutional focal point for programs to raise incomes in the agricultural and fisheries subsectors and to promote employment opportunities for rural populations. DA has concentrated its efforts on the lowland areas which lie within its jurisdiction (as stated above, upland areas fall under the jurisdiction of DENR). To achieve these goals, DA is charge with policy formulation and implementation, and coordination with other governmental agencies.[5]

The organizational structure of DA is shown on Figure 2.2-1. Under the Secretary of Agriculture, there are six Undersecretaries (Special Concerns, Policy Planning, Staff Operations, Regional Operations, Attached Agencies, and National Food Authority). Under the Undersecretary for Regional Operations are the Production Group (which includes the Bureaus of Animal Industry, Plant Industry, Fisheries and Aquatic Resources, and Soils and Water Management) and Regional Operations (which includes the Regional Operations



DEPARTMENT OF AGRICULTURE
ORGANIZATIONAL CHART

Figure 2.2-1

Monitoring Office, the Regional Offices, Provincial Agriculture Office, and the Municipal Agriculture Offices).

As with the DENR, DA has undergone several reorganizations since the early-mid 1970s (see Figure 2.0-1). Indeed, until recently, two departments were included in the same organization (Ministry of Agriculture and Natural Resources). The same regionalization and decentralization policies affecting DENR are also being addressed by DA. Thus, the inclusion of regional, provincial and municipal agriculture operations under one Undersecretary is significant; as is the inclusion of staff support technical bureaus under the same Undersecretary.

In 1984, the Bureau of Fisheries and Aquatic Resources (BFAR) and the Philippine Fisheries Development Authority were transferred from the Ministry of Natural Resources to the Department of Agriculture. At the time of the transfer, BFAR was converted to a staff bureau.

In the Philippines, ownership of the fishery is divided between the offshore resources directly controlled by the national government and the coastal fishery, where municipalities exercise some measure of control. By default (both from lack of technical expertise at the municipal level and from the limited powers granted to them) much of the control over fishing resources lies with BFAR. Compounding the blurred jurisdictional lives, while BFAR is largely responsible for fisheries, aquaculture falls within the jurisdiction of the Department of Trade and Industry and coastal zone planning and management of mangrove (coastal forest) resources lies with DENR.

Within DA, over 26,800 persons are employed on a regular basis, approximately 3700 of which are assigned to headquarters functions (493 in BFAR). DA further employs approximately 4800 persons on a casual or contractual basis.

2.3 Other Agencies

Among the other governmental organizations that have either jurisdiction over some aspect of environmental and natural resources management or are involved in activities that employ those resources are: Department of Public Works and Highways (infrastructure), Department of Transportation and Communications (ports), NEDA (development planning and programming and preparation of integrated rural development plans), Department of Tourism (tourist zones), Department of Agrarian Reform, various groups under the Office of the

President, Department of Local Government, Department of Education, Cultural and Sports (environmental education curriculum development), Department of Science and Technology, and the Provinces and municipalities.

3.0 NON-GOVERNMENTAL ORGANIZATIONS

The status of NGO/PVO capacity that can be effectively utilized in assisting GOP and/or donor organizations in developing and implementing sustainable natural resources and biodiversity maintenance programs/projects appears to be similar to that of the Government, i.e., the proven capacity is thin [30-32]. Local NGO's are numerous and those with direct or side interests in the natural resources sectors may exceed 500. The number with more than paper staffs and with useful prior experience may be as few as 10. We have suggested a program for better defining the capacity in earlier Annexes.

The private sector role appears to be larger (see particularly Annexes A and B) and open not only to larger scale sustainable forestry and agriculture projects, but to sponsoring river cleanup programs such as the Tullahan project sponsored by San Miguel Corporation. It is a general finding that nearly every problem area can and should be addressed by a number of different approaches. Thus we see a significant role for NGO's and the private sector in parallel or converging activities with GOP initiatives. For several areas, we see and have recommended master planning and/or objective and priority setting activities to precede significant applications of funds to splintered implementing instruments.

4.0 ORGANIZATIONAL ISSUES AND CONSTRAINTS

In the earlier ffARM study conducted by the World Bank [5], the most significant organizational issues related to natural resource management well identified as arising from limited mandates, resource limitations, confusion resulting from reorganization, potential for corruption of the line agencies charged with natural resource management, and ineffectiveness of organizations below the national government (in headquarters) level. [5] Reexamination of organizational issues under this assessment has led to much the same conclusion, with the exception that progress is being made on many fronts toward these alleviation.

Although reorganization of the Departments has largely been accomplished and much of the confusion over roles, responsibilities, and direction has been resolved, there remain areas of overlapping jurisdiction among the responsible agencies that will require considerable coordination and cooperation to effectively implement programs. Funding levels have also improved but are still below the levels required to achieve the government's stated policy goals and objectives.

However, six stresses affect the practical operation of the theoretic structure. Firstly, the professional staff is not accustomed to operating with independent authority and responsibility. Secondly, there is a shortage of capable staff people to support all levels of the organization leaving the Provincial Environment and Natural Resources Officers and Community Environment and Natural Resources Officers pretty much alone. Thirdly, there is limited experience in Manila with the actions needed to make a regionalized line and staff operation function. Fourth, very little support is available to develop and support initiatives taken to the national councils such as Group A, Cabinet Cluster "A", National Economic Development Authority, and the Department of Budget and Management. Fifth, management of the research apparatus is in disarray. Sixth, there is little appreciation for the role of small area planning that can be aggregated into larger units as a basis for field management.

Not only is the Department of Environment and Natural Resources regionalizing, it is trying to adjust to national policies to decentralize to at least the Provincial level. The idea is to have Provincial Environmental and Natural Resource Offices and Provincial Agriculture Officers report

directly to Provincial Governors. How this move will affect their place in the line hierarchy is not clear, nor is the Regional Economic Development Authority Officers relation to Provincial Planning staffs. Also in matters of coastal zone management, the municipality is recognized as a key unit. But Mayors and other municipal officials are not subservient to Governors.

5.0 LEGISLATION AND REGULATORY FRAMEWORK

There is an extensive body of legislation and regulations related to environmental and natural resources management in the Philippines (see Table 5.0-1 for a partial listing of the major legislation and regulations affecting the sector). The regulatory framework created by these laws and regulations exhibits a high degree of complexity. This arises, in part, from the accumulative nature of rulemaking and from the wide variability in generality/specificity of the rules themselves. Also contributing to the regulatory complexity is the process of rulemaking whereby both the legislative and executive branches of government engage in setting policy and formulating regulations.

The accumulative nature of legislation and regulation is illustrated in Table 5.0-1. As can be seen, these are laws and regulations that remain in place decades after enactment or promulgation. While these address issues of concern at the time, in many cases subsequent rules were put into place to address changed circumstances without removal of earlier instructions or policies. Such an accumulation can result in inconsistencies.

Environmental and natural resources laws and regulations that are in place also exhibit wide variability with regard to specificity. This has led to a wide body of regulations and complicated the implementation and process. A recent compilation of regulatory citations (containing no text, only subject, title, location, and reference type) is 112 pages [26]. As seen in Table 5.0-1, there were at least 65 laws and regulations addressing forest management in place as of mid-1987

The rulemaking process also contributes to the complexity of the regulatory structure. Laws passed by Congress (and its predecessor bodies) range from very general policy directions to very specific, project-related instructions and guidance. Regulations (in the form of Presidential Decrees, Executive Orders, Administrative Orders, and Letters of Instruction) originate from the executive branch; frequently in response to specific areas of concern and, again, ranging widely in specificity.

The complexity of the regulatory structure results in difficulties with regard to implementation. The primary difficulty in implementation is that field personnel charged

Table 5.0-1

Selected Environmental and Natural Resource
Laws and Regulations

Area	Law/Regulation[1/]	Subject/Title
General Environmental Management	RA 3931	National Air and Water Pollution Control
	RA 6365	Nat'l Commission on Populatiron
	PD 78	Created PAGASA
	PD 79	Revises RA 6365
	PD 166	Revises RA 6365
	PD 564	Created Phil. Tourism Authority
	RA 3931	Pollution Control Law
	PD 984	Revises Pollution Control Law
	PD 1041	Created Natural Resource Center
	PD 1121	Created Nat'l Environmental Policy Commission
	PD 1151	Philippine Environmental Policy
	PD 1152	Philippine Environmental Code
	PD 1181	Air Pollution Control-Mobile Sources
	PD 1198	Restoration of Environmental Damage
	PD 1586	EIS System
	PD 1873	Pollution Control-Industrial Estates
	LOI 411	Inter-Agency Committee on Pollution Problems
	Act 3091	Import of Pesticides
	Act 3983	Protection of Wild Flowers
	RA 622	Created Bureau of Soil Conservation
	RA 1288	Prohibits Planting Tubli
Forestry	GO 50	Organization of the Forestry Bureau
	GO 92	Regulation of Utilization of Forest Products
	Act 16	Creation of the Forestry Bureau
	Act 171	Remuneration of the head of the Forestry Bureau
	Act 222	Creation of Bureau of Forestry/Dpt of Inter
	Act 1148	Forest Act (conservation policy)
	Act 1407	Restriction of Free Utilization of Lower Group
	Act 1544	Internal Revenue Taxes on Timber for Railways
	Act 1575	Taxes on Timber
	Act 1989	Creation of School of Forestry (UPLB)
	Act 2649	Funds for Reforestation
	Act 2657	Administrative Code (Sec 920-935)
	Act 2711	Revised Administrative Code (SEC 1814-1842)
	Act 2902	Taking of Lower Group Timber without License
	Act 3225	Taking of Lower Group Timber without License
	Act 3388	Communal Forests "Manner of Removal"
	Act 3752	Cutting of Certain Tree Species
	Act 3577	Taking of Lower Group Timber without License
	Act 3809	Game and Fish Oaths and Testimony

Table 5.0-1 (continued)

Act	3915	National Park System
Act	3941	Measuring of Timber
CA	100	Lease of Public Land for Special Purposes
CA	304	Reforestation Law
CA	347	Land Classification, Survey and Subdivision Law
CA	436	Reforestation
CA	447	Kaingin Law
CA	452	Pasture Land Act
AO	1	Creation of Bureau of Forestry and Fishery
EO	40	Planting on Idle Public Lands
Act	13	Prohibition to Cut Trees Near Springs
Act	42	Limitation of Reforestation/Tree Plantation
RA	115	Funds for Reforestation
RA	121	Lease of Public Land for Special Purposes
EO	65	Exportation of Veneer and Peeler Logs
RA	151	Measurement of timber
RA	152	Registration of Forested Private Lands
RA	153	Charges on Firewood
RA	173	Charges on Forest Products from Private Lands
RA	310	Public Land Survey and Subdivision fund
RA	352	Creation of College of Forestry (UPLB)
RA	370	Grouping of Trees
RA	460	Operation of Sawmills
RA	826	Creation of Parks and Wildlife Commission
RA	1239	Registration of Log/Lumber Agents
RA	2706	Creation of Reforestation Administration
RA	3092	Unlawful Occupation/Destruction
RA	3571	Prohibition to Cut Trees on Public Places
RA	3501	Unlawful Occupation/Destruction
RA	3985	Amendments to Pasture Land Act
RA	4715	Southern Cebu Reforestation Development Project
RA	6239	Forestry Profession Law
PD	1	Reorganization of the Executive Department
PD	330	Log Smuggling
PD	331	Sustained Yield
PD	389	Forestry Reform Code
PD	705	Revised Forestry Code
PD	853	Real Property Taxation of Forest Lands
PD	865	Log Exportation
PD	953	Requirement to Plant Trees in Certain Places
PD	1153	Requirement to Plant Trees by Every Citizen
PD	1559	Amendment of P.D. 705
PD	1775	Institution of Criminal Actions
EO	1[illegible]2	Reorganization
EO	278	Application for Utilization of Forest Resource

Table 5.0-1 (continued)

Fisheries	Act	4003	Fisheries Act
	CA	115	Fisheries Act Amendment
	CA	297	Fisheries Act Amendment
	CA	471	Fisheries Act Amendment
	RA	294	Fisheries Act Amendment
	RA	428	Dynamite Fishing Prohibited (1950)
	RA	462	Fisheries Act Amendment
	RA	659	Amends CA 471
	RA	1535	Amends Sec 1, 2, 3, & 4 RA 428
	RA	2056	Alteration of Navigable Waters
	RA	3048	Prohibits Trawler ops in less than 7 Fathoms
	RA	3512	Created Fisheries Commission
	RA	3586	Prohibits Export of Bangus Fry
	RA	4519	Created Inst of Fisheries Dev and Research
	RA	6451	Prohibits Electro-Fishing
	PD	43	Development of Fishing Industry
	PD	604	Revise/Consolidate Laws on Fishing
	PD	704	Revise/Consolidate Laws on Fishing
	PD	813	Revise/Consolidate Fishing Laws
	PD	977	Created Phil Fish Marketing Authority
	PD	1015	Revise PD 704
	PD	1058	Penalties for Illegal Fishing
	PD	1698	Use and Conservation of Corals
Lands	CA	141	Public Lands Act
	CA	452	Pasture Land Act
	CA	553	NDC Access to Pub Land
	RA	274	Subdivision of Act Land
	RA	310	Pub Land Survey and Subdiv Fund
	RA	580	Home Finance Commission
	RA	926	Public Land Survey - Agrarian
	RA	1607	Intramuros Declaration
	RA	1899	Reclamation of Foreshore
	RA	3034	Mindanao Develop Authority
	RA	3054	Central Luzon/Cagayan Valley Authority
	RA	3844	Agrarian Land Reform (29)
	RA	3856	Panay Dev Authority
	RA	6390	Agrarian Reform
	PD	2	Land Reform Area
	PD	20	Rent Control
	PD	262	Ag Use of Virgin Public Lands
	PD	354	MAB
	PD	410	Ancestral A & D
	PD	570	Tondo Foreshore Dev Authority
	PD	619	Large Scale Grazing
	PD	706	Dagat-Dagatan
	PD	757	Nat'l Housing Authority

Table 5.0-1 (continued)

	PD	772	Anti-Squatting
	PD	824	Metro Manila Commission
	PD	861	Use of Pasture Lands
	PD	933	Human Settlement Comm
	PD	1048	Implement Samar Int Rur Dev
	PD	1084	Public Estates Auth
Water Resources	Act	2152	Irrigation Act
	Act	2652	Irrigation Act Amend
	Act	3002	Harbor Board Port of Manila
	Act	3208	Irrigation Act Amend
	Act	4062	Hydropower
	Act	4175	Irrigation Act Amend
	CA	363	Anti-dumping
	RA	128	Ship Inspection [17]
	RA	758	Amend Sec 12 Act 2152
	RA	1298	Multi Purpose Project Auth.
	RA	1383	Nat'l Waterworks & Sewerage Auth.
	RA	3046	Baseline of Territorial Sea
	RA	3601	Nat'l Irrigation Authority
	RA	4062	Auth. Pres to Borrow from IBRD for Irrigation and other purposes
	RA	4850	LLDA
	RA	5173	Phil Coast Guard
	RA	5446	Amend Sec 1 RA 3046
	RA	6236	MWSS
	PD	198	Local Water Systems
	PD	274	Pasig River
	PD	281	Pasig River Dev. Council
	PD	296	Waterway Encroachment
	PD	424	Nat'l Water Resource Council
	PD	425	Amend RA 6234
	PD	552	Amend RA 3601 - NIA
	PD	600	Prevention/Control Marine Pollution
	PD	601	Revise RA 5173
	PD	979	Revise PD 600
	PD	1067	Water Code
	EO	30	Interim Water Resources Development Authority

Notes:

1. Act - Legislative Act of the Philippine Commission (1900-1935)
   CA - Commonwealth Act (1935-1942)
   RA - Republic Act (1946-1972)
   PD - Presidential Decree (1972-1986)
   EO - Executive Order
   LOI - Letter of Instruction

Table 5.0-1 (continued)

Source: a. GOP. 1988, Directory of Environmental Legislation
b. Lennertz, R. and Sarmiento, V. 1989. Appraisal of the Legal Framework Governing the Management of Dipterocarp Forests in the Philippines

with implementation and enforcement may not be aware of the regulations to be implemented/enforced. Another difficulty arises from the selective exemptions included in many regulations [27].

Much of the regulations concerning environmental protection date to the late 1970's. Presidential Decree (PD) No. 1121 created the National Environmental Protection Council in 1977 and mandated that the environmental impact of projects (whether undertaken by public or private sector entities) be assessed [27]. In 1978, PD 1586 established the Environmental Impact Statement (EIS) system and reduced projects subject to the EIS requirement to those located in environmentally critical areas. Proclamation 2146 (in 1981) defined certain areas and types of projects as environmentally critical and, thus, subject to EIS system. Also, in 1981, the Environmental Compliance Certificate System was created by Letter of Instruction (LOI) 1179. This LOI also provided for exemptions of projects from the EIS requirement upon recommendation of the Minister of the proponent Ministry [28]. Also, the rules and regulations of the National Pollution Control Commission with regard to air and water pollution control and standards date from 1978 and have remained since then [29].

Annex F

PROPOSED BIO-DIVERSITY AND TROPICAL FOREST ACTION PLAN MEMORANDUM FOR SECTIONS 118 AND 119 OF THE U.S. FOREIGN ASSISTANCE ACT

by

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1.0 INTRODUCTION

The purpose of the USAID/Manila biological diversity action plan is to identify the activities which USAID/Manila may undertake to support the conservation of biological diversity and tropical forests in the Philippines, is supportive of the Government of the Philippines' and non-government organizations' policies for conservation of biodiversity and tropical forests, meets the U.S. Congressional Mandate provided in the Foreign Assistance Act, Section 118, Tropical Forests and Section 119, Biological Diversity, as amended in 1986, and considers Mission management and budget constraints.

This action plan describes the status of current tropical forests and biological diversity in the Philippines (Section 2), summarizes current USAID Mission supported activities in biological diversity (Section 3), reviews recommended actions for AID/W and USAID/Manila to consider (Section 4), subject to the availability of funds, and discusses the extent to which current and/or proposed activities meet the conservation needs in the Philippines and the intent of the Congressional Mandate (Section 5).

This action plan draws heavily on an Environment and Natural Resources Assessment prepared for the Mission, particularly the annexes on biodiversity and tropical forests. The Assessment describes Philippine biological resources, evaluates their status, identifies pressures affecting them, and proposes actions which can be taken to assure the sustainable use of those resources.

It is supplemented by information provided in a draft Master Plan for Forestry Development in the Philippines prepared for the GOP and the Asian Development Bank and an Integrated Protected Areas System analysis prepared for the World Bank and the GOP.

2.0 THE STATUS OF BIOLOGICAL DIVERSITY AND TROPICAL FORESTS

The majority of biological diversity in the Philippines is contained in its tropical forests and coastal ecological systems. While this is a simplication of the richness of Philippine biodiversity, it will be useful to separate conservation and management concerns in these two habitat forms.

2.1 Tropical Forests

Forest Resources

It appears that by 1989, there may be only 6,250,000 hectares of tropical forests left in the Philippines out of total of 17 million ha in the mid-1940s. While official GOP figures (Table 2.1-1) estimate that there were 988,300 of old growth (virgin) dipterocarp forests in 1988, more recent estimates place the figure closer to 700,000 ha. Much of the old growth forest is in lower productive stands above 400 m and on slopes in excess of 50 percent. 1,500 ha may be all that remain of lowland dipterocarp forests on Alienable and Disposable land (A&D), which are the most biologically diverse forests in the country. The most abundant forest types are residual dipterocarp forests, most of which have been logged within the last 25 years, and mossy forests. Official GOP figures for 1988 are presented in Table 2.1-1.

Forest Production

Production, export levels, and gross value added in the forestry and wood industry have declined since the last 1960s, in large part due to depleted resources. Forest production grew from 6.6 million cu.m. in 1960 to 10-11 million cu.m. in 1967-1973, and declined to 5.3 million cu.m. in 19811 and 3.8 million cu.m in 1988. Log exports, primarily to Japan, rose to 3 million cu.m. in 1960, approximately 8.6 million cu.m. annually between 1968, and 1970 and fell to 706,400 cu.m. in 1981, and 628,942 cu.m. in 1988. Gross value added (GVA) in forestry has steadily declined from 13.4 percent or 2 billion pesos in 1972 to 2.4 percent or .7 billion pesos in constant prices by 1985. In 1970, the export value for logs was $243 million and $58

Table 2.1-1 Area and Proportions of the Main Forest Types in 1988 (hectares)

LAND USE/TYPE	RESERVE	A&D
Dipterocarp Old Growth Forest	986,800	1,500
Dipterocarp Residual Forest	3,332,800	80,000
Mossy Forest	1,134,200	3,200
Pine Forest, Closed	129,600	0
Pine Forest, Open	107,100	2,100
Submarginal Forest	535,700	8,500
Mangroves	125,700	13,400
TOTALS	6,351,900	108,700

SOURCE: GOP 1988

million for processed products. By 1988, it had declined to $156.5 million for raw logs.

Deforestation

Estimated annual forest losses from logging, the conversion for agricultural uses, and fuelwood consumption are estimated to be 210,000 ha. Officially recorded logging in old growth forests has averaged at least 40 to 50,000 hectares a year while forest loss in the 3.3 million logged over forests is at a rate of at least 119,000 ha per year. Reliable estimates of deforestation from concessions indicate that an additional 34 percent of illegal logging is occurring. Illegal logging from non-concession areas may be even higher. While official logging rates average 4 million cu.m./yr from productive stands, it is estimated that fuelwood consumption may be as high as 40 million cu.m./yr. Consequently, deforestation in old growth stands may be twice the official figure, or 100,000 ha per year. If there are only 700,000 ha. of old growth forests left, then these forests will be lost within seven years while the residual forests may last another 17 years. Even if this estimate of deforestation is too high, it only means that the old growth may disappear between 7 and 12 years.

Since 1950, the GOP has planned to reforest over 1 million ha at an average annual rate of 24,200 ha. Actual reforestation rates have been 261,078 ha at an average annual rate of 4,914 ha. Disturbingly, the trend in the 1970s and the 1980s is a steady decline from over 7,000 ha/yr in the 1970s to less than 2,000 ha/yr in 1986 and 1987. Since 1983, the Industrial Tree Plantations replanted approximately 56,000 ha at an average annual rate of 9,333 ha. If this is compared with a national annual average deforestation rate of over 200,000 ha, it is clear that the approach to reforestation is totally inadequate.

Causes of Deforestation

In the Philippines, as elsewhere in Asia, deforestation and forest degradation has been occurring primarily on land owned by the Government, not by private citizens. Government, then, affect tropical forest use by virtue of the fact that they are the owners of property rights and in their right to collect taxes and set regulations.

Since the 1940s, major forest stocks have been depleted because of intensive logging, log exports, and for conversion to agricultural uses. Since the 1970s, several log export restrictions and bans have been promulgated to reduce deforestation, but controls have been totally inadequate since enforcement has been set aside because of political pressure and short-term economic considerations.

While timber extraction is one of the direct causes of deforestation, the more critical underlying causes are rooted in government forest policies. Government policies which have encouraged the rapid depletion of forest resources include inappropriate timber pricing policies, incentive policies which encourage inefficient wood processing industries, and management policies for logging concessions.

Timber Pricing Policies

Although the forestry sector produces considerable foreign exchange earnings, the GOP has failed to capture the economic rents of these resources. Economic rents, defined as the difference between the value of the product and the production costs, including marketing and reasonable profit, are usually charged as stumpage fees. It is estimated that the GOP captured only 16.5 percent of logging rents between 1979 and 1982. If 50 percent of the rents had been captured, it would have provided over $300 million annually which could have been reinvested in reforestation.

Timber prices do not reflect the true value of the forests because they are determined largely, if not solely, by the few commercial species harvested in it and they do not include the economic value of non-timber products and ecological and hydrological functions. The destruction of tangible economic value includes economic returns from forest use for commercial wood and non-wood forest products, provision of food for indigenous forest dwellers and agriculturalists as well as material benefits from watershed protection for soil retention and regulation of water run-off. Since the flow of non-wood products has rarely been described and is part of the informal sector, it is undervalued. These resources form the basis for a forest's capacity to supply a steady annual stream of income and the opportunity to develop alternative forms of uses such as rattan cultivation, nuts, oils, fibers, dyes, fruits, ornamental plants, and pharmaceuticals. The economic value of soil and water retention, while difficult to measure, are considerable.

National Income Accounts and Reinvestment Policies

The national income accounts do not reflect the true economic value of the forest resources. The social costs and benefits of forests resources, multiple uses, and biological diversity are not captured. The standing stock of the forests are not counted as capital which is being depleted. Consequently they are considered a free good which leads to "mining" of the resource without regard to appropriate reinvestment levels. Revenues generated from forest rents are returned to the general accounts and reinvestment is inadequate in forest management, monitoring, or research.

Concession Management Policies

The logging concession system has discouraged adoption of sustained yield management practices in several critical areas. Concession periods are 25 years and awarded non-competitively. Harvest cycles are set at 35 to 45 years after initial cutting. The concession period is considerably shorter than the replacement rate for hardwood species, some of which do not produce seeds until their 70th year. Because tenure for the concession holder is less than the harvest cycle and the replacement rate, concession holders rationally try to maximize profits through short-term exploitation.

Further, because concession rights are not transferable or competitively bid, the value of investments or the lack of value of a concession can not be regained by the investor. Consequently, the costs of forest degradation are born by the government and the general public while only some of the forest's true value are realized.

Macroeconomic and Agricultural Policies

Government macroeconomic and sectoral policies during the 1970s and early 1980s favored capital investments in the industrial sector and resulted in disincentives for investment in the agriculture and natural resources sectors. At the same time the labor force was rapidly growing and was not absorbed by the industrial sector. In combination with a lack of access to agricultural land in the lowlands, continued high population growth, poor, rural farmers expanded the conversion of logged-over forest land. Because these lands are in the public domain, land tenure, credit, and extension are not available for these farmers

which serves as a further disincentive to make investments in land management. Since tropical soils are readily depleted by the farming techniques presently used in upland areas, farmers find it more economically rational and productive to convert readily accessible secondary forests to agricultural uses than to intensify agricultural investments.

Bans and Enforcement

Since the 1970s, several log export restrictions and bans have been promulgated to reduce deforestation, but controls have been totally inadequate since enforcement has been set aside because of political pressure and short-term economic considerations. Illegal export and under reporting has been common, i.e., the Philippines officially exported approximately 365,500 cu.m. of timber to Japan, although Japanese imports show over 1.4 million cu.m., a discrepancy of over 1 million cu.m.

The cutting guidelines are often ignored and the lack of an independent, routine monitoring system prevents senior government officials and elected representatives from having a true understanding of the amount of forest resources present and the trends in resource declines.

Consequences of Deforestation

The consequences of deforestation and the direct and indirect economic costs to the Philippines are significant. These include a) the degradation of the forest reserves and the subsequent collapse of the timber production industry, b) an increased rate of erosion and subsequent siltation of downstream irrigation systems and hydropower reservoirs, c) the degradation of marine and freshwater fisheries, d) the increased conversion of forests to lower value, less productive shifting agricultural uses and cogon grassland, e) the massive loss of biological diversity, and f) an increase in the contribution to global warming.

The economic costs of deforestation estimated as the loss in sustainable production may be $39.1 million/yr. This is calculated assuming an expected rate of production of 2 cu.m./ha/yr, a cutting rate of 210,000 ha, at a mill gate price of 2,000 pesos/cu.m. This does not include unquantified social costs, loss of non-timber products, opportunity costs for forest use, or loss of genetic material. The economic costs of degradation for 2.3 million

ha of degraded forests are estimated to be $10.7 million assuming a reduction in productivity from 1.5 to 1.4 cu.m./ha/yr, at 2,000 peso per ha, at a net loss of 50 percent of the gross value. This should be compared with the present value of $4,650/ha of residual forests and as much as $10,000/ha for old growth forests.

If current practices continue, it is inevitable that the forest production industry will collapse resulting in the loss of 80-90,000 jobs in production and an unknown percentage of the 120-130,000 associated jobs in wood processing. Current extraction rates do not meet domestic demand and raw logs are being imported from Malaysia. It is estimated that at current supplies of domestic timber, and at the current 12 percent annual increase in demand, there will be a log deficit before the late 1990s. The recent government decision to waive the 10 percent duty on imported logs represents the current urgency to protect employment and this condition is expected to get worse in the future. As raw logs become scarce throughout the region and prices escalate, the GOP will be faced with additional demands for foreign exchange to purchase raw timber and eventually processed timber.

Non-wood forest products such as rattan, climbing bamboo and erect palms are harvested from forest reserves. The loss of these forests will then have a cascade effect on the loss of supply of these commercially important species and subsequently employment in this sector will decline.

Soil erosion in the Philippines varies with the type of land use but has reached serious proportions throughout the country. Erosion rates range from 200 tons/ha/yr in disturbed grasslands, 53 tons/ha/yr in poorly managed forest plantations, 27.6 tons/ha/yr in old shifting agriculture sites, to as low as 1.6 to 4.9 tons/ha/yr in well managed rainfed farming compared to a maximum tolerable limit of 3 to 10 tons/ha/yr. Additional data indicates that soil erosion resulting from logging and upland access roads may contribute as much as 50 percent of the erosion coming from a watershed.

Excessive siltation from deforestation increases the siltation rate in major reservoirs and irrigation channels. For example, in 1956, the Ambuklao hydroelectric power dam was designed to have a 75 year life. It now is no longer fully operational due to heavy siltation and fouling as a result of extensive logging, mining, and upland farming.

2.2 Coastal Resources

The Philippines coastal resources cover nearly 18,000 kilometers of coast, 27 million ha of coastal waters of which 4 million ha are coral reefs, and 1.1 million ha are coastal wetlands including between 106,000 and 140,000 ha of mangroves. In 1987, Philippine fishery production accounted for five percent of GNP and was valued at over $2 billion. Close to 3 million people make a living from fisheries and other coastal resources. Exports of tuna, shrimp, seaweed and other fisheries products have steadily increased in value and by 1987 reached $310 million.

Annual fish production has stagnated at 2 million tons/yr and the average catch rate (catch/unit effort) has fallen 42 percent in the last ten years because of overfishing. 20 percent of the 50 major fishing grounds are believed to be overfished.

In 1981, 70 percent of the coral reefs were in poor to fair condition, 24.5 percent were in good condition, while only 5.5 percent were in excellent condition. The two primary causes of coral reef degradation are excessive sediment load and dynamite fishing. Other causes of reef destruction are net fishing methods that break off coral (muro-ami and kayaka), chemical fishing, and coral mining for construction.

Mangrove forests (106-140,000 ha), sea grasses and coastal marshes (5,000,000 ha), and seaweed beds form the foundation for the food chain for coastal fisheries by serving as critical nursery areas; process nutrient flows which provides food, fibers, medicines, pulp, thatching material and charcoal; serve as buffers from coastal erosion and cyclones; and are the source of goods for domestic and international trade. There are now no more than 140,000 ha of mangroves out of 450,000 ha in 1918. The primary causes of degradation are from overharvesting for fuelwood production and conversion for fish and shrimp pond production.

Government policies which support investments in capital-intensive fishing techniques, in the absence of a program for sustainable yield and monitoring, has led to overfishing and the stagnation in production. In addition, fishery policies, support for research, and subsidies for diesel fuel, favor larger commercial fishing at the expense of municipal fishing. In the absence of alternative forms of employment, uncertain tenure over coastal resources, and limited access to alternative fisheries management

strategies, municipal fishermen have overexploited local resources.

The solutions to the problem of overexploitation of off-shore and near-shore coastal resources and protection of coastal biological diversity lie in establishing enforceable approaches for sustainable production yields for off-shore fishing, improved community management of near-shore resources, and finding alternative forms of employment in displaced near shore fishermen. Achieving sustainable coastal resources management will require reform and enforcement of policies which balance long-term resource management objectives with economic incentives and provide a more equitable distribution of the benefits from coastal resources.

2.3 Biological Diversity

Biological diversity describes the variation in life forms and their stored genetic material. About 1.4 to 1.7 million species have been identified and described, mostly in the temperate zone, while, it is estimated that there are between 5 and 30 million species in the world. Although the humid tropical forests cover only 7 percent of the earth's surface, they contain more than 50 percent of the world's biodiversity.

Terrestrial Biodiversity

The Philippines are known to contain well over 30,000 species of plants and animals. The flowering plants alone comprise 8-12,000 species, ferns, mosses and lichens over 2,300 species, insects over 16,700, while birds, mammals, reptiles and amphibians number approximately 1,000 species. Because it is an isolated chain of islands fairly well separated from mainland Asia and Australia, it has evolved one of the higher rates of endemic, or unique, terrestrial species in the world. Endemism may be as high as 75 percent for flowering plants, 47 percent for ferns, 50 percent for birds and reptiles, 70 percent for amphibians, while the number of known endemic marine species are not particularly high among fishes. The number of endemic insects, aquatic invertebrates and algae, and other terrestrial plants are not known because of inadequate levels of sampling.

Because the Philippines' tropical forests were remote and there has been a significant lack of domestic and international funding for inventories, the number of

described species is significantly less than other regions of Asia. Estimates of unknown species range from 60 percent for insects to 20 percent for flowering plants, and may be 5 percent for mammals which are generally readily collected and known to traditional forest dwellers.

The greatest degree of biological diversity is found in habitants or wide associations of plants and animals. In the Philippines, the major habitat types which house the greatest biological diversity are the old growth dipterocarp forests, the residual dipterocarp forests, mossy forests, and marine habitats.

The causes of the loss of terrestrial biological diversity are directly related to the loss of tropical forests as described above. During the past 75 years it appears that at least 30-40 percent and maybe over 50 percent of the endemic forest flora has already become extinct. Since the bulk of biological diversity in the Philippines occurs in the dipterocarp and mossy forests, their conversion threatens the massive extinction of over 50 percent of the remaining endemic species of the Philippines. This loss may be the single worst ecological disaster in tropical southeast Asia.

The most important losses can not be fully evaluated because most of the species in the Philippines have never been identified. Still, commercially valuable species include the hardwood trees in the dipterocarp family, other families of trees, orchids, rattan, ornamental plants, plants which can be used to treat cancer and AIDS, and other lesser known forest products.

Marine Biodiversity

Marine biodiversity in the Philippines is greatest in the mixed coastal fauna in the coral reefs, mangroves,, and sea grass beds. The number of organism is highly rich and diverse. Well over 5,000 species of plants and animals can be found can be found in these habitats. The most diverse groups include the fish (1,400), crustaceans (1,400), and sea weeds (700) although there are no reliable estimates of the number of unknown species in the Philippines tropical waters. More than 90 genera and at least 488 species of coral are identified. The largest concentration are located in the southwest parts of the country with 60 percent of the coral found on the shelf off of Palawan. Among the better known fish, over 17 percent are endemic to the Philippines.

The majority of the marine species however, are considered to be commonly distributed throughout the Pacific region and are not that rare. However, the dugong and all four marine turtles are endangered because of the loss of habitat and overcollecting. The most directly threatened turtles include the hawksbill and the green turtle.

Priority Conservation Needs

The overriding issue for the conservation of biological diversity will be the extent of old growth dipterocarp forests that can be set aside for a protected area system before the extinction rate accelerates. Because of biological processes of movement and colonization, the number of species that can be supported in a given area increases more rapidly with an increase in the overall size of a protected area. That is to say, 10,000 ha of continuous old growth forest may support 100 to a 1000 times more species than ten 1,000 ha plot. In addition, in order to maintain one species, at least 5,000 individuals must be conserved. If only one individual is found in 10 ha, which is not an uncommon density for rare plants, then at least 50,000 ha will be needed to conserve that species. Because of these biological processes, even if logging were halted before the next hour, another 20 to 25 percent of the Philippines species could become extinct.

3.0 USAID/MANILA SUPPORT FOR TROPICAL FORESTRY AND BIOLOGICAL DIVERSITY

USAID/Manila has had a recent involvement in supporting and monitoring biological diversity activities while the involvement in forestry and agroforestry has been more extensive. The Mission's current action plan encompasses three major strategic areas of support for sustainable development in the Philippines. These are a) improved natural resources management, b) decentralization, and c) diversification and profitability of the rural economy. In addition, the Mission is providing some support for population programs, that, if supported by the GOP, could help reduce the population growth rate and thereby reduce the future pressure on resources and slow the erosion of biological diversity. The Mission is providing direct and indirect support for the conservation of forests and biological diversity.

3.1 Direct Support

In the Philippines, AID is supporting the conservation of tropical forests and biological diversity through three on-going and one planned project. These are the Rainfed Resources Development Project (RRDP), a Biological Diversity Survey and Action Plan, and Forestry/Fuelwood Research and Development Project (F/FRED), and the proposed program and/or project in Environment and Natural Resources.

Through RRDP, USAID supports efforts to raise the income of farmers and fishermen through improved resource management techniques. This project provides approximately $24.3 million to support community planned natural resources management, forest regeneration and protection, the development of agroforestry packages, mangrove forest management, the conservation and rehabilitation of natural coral reefs, and fish habitat improvement. The project's successful efforts may lead to reduced pressures to convert some tropical forests to unsustainable agriculture practices and the conservation of select marine reserves.

The Biological Diversity Survey and Action Plan provides $2 million through a Debt-for-Nature swap. Its purpose is to assist a Philippine NGO, the Haribon Foundation, to survey biological resources and prepare a national conservation action plan. USAID/Manila participates in the regional F/FRED project which supports

research and development of fast-growing, multipurpose tree species and strengthens the research capabilities of forest scientists.

Finally, the proposed Environment and Natural Resources Program and/or Project will provide support to the GOP to more effectively and efficiently manage the country's renewable natural resource base. The program and project can include support for the conservation of tropical forests and biological diversity as proposed in Section 4.

3.2 Indirect Support

The Mission's efforts to improve the income of the rural poor and support the decentralization and privatization of resource management decisions may serve indirectly to reduce the rate of deforestation and the loss of biological diversity. Through the Agrarian Reform Support Program, the Mission is assisting the GOP Comprehensive Agrarian Reform Program (CARP) which will increase land tenure in lowland areas. Farmers in lowland communities and coastal areas who have tenure over their natural resources will have more incentives to make investments in resource management. These investments could result in an increase in productivity and thereby reduce the pressures to convert the remaining biologically diverse lowland dipterocarp and the less diverse, but ecologically important, mangrove forests.

4.0 RECOMMENDED ACTIONS

It is recommended that USAID Manila support efforts that will lead to sustainable forest management and serve to arrest the massive losses of scarce tropical forests and the extinction of the Philippines' biological diversity. Proposed support can be provided through an Environment and Natural Resources (ENR) Program, an ENR Project, a Debt-for-Nature Swap, and other Mission funded projects. The building blocks to a comprehensive biological diversity and tropical forestry program include a) immediate efforts to save the remaining old growth dipterocarp forests, b) a short term inventory and gene pool rescue program for biologically important areas, c) short and medium-term efforts to develop a sustainable forestry management program, and d) strengthening the management of protected areas, and e) efforts to promote sustainable local management of upland and coastal areas by the private sector. The remainder of this chapter is divided into two sections, recommended actions and suggested implementation options for the Mission to consider.

4.1 Recommendations

It is recommended that the Mission provide support to the following specific priority topics:

<u>Recommendation 1: Conservation of Old Growth Forests</u>

An immediate priority for the GOP is to make the political commitment to conserve its remaining old growth dipterocarp forests. Failure to do so given the current rate of deforestation, may cause the irreversible loss of the remaining 700,000 ha of old growth forests, preclude future options for developing a sustainable forest management program, and the extinction of thousands of endemic species within 7 years. Because there is an immediate need to address this problem, it is recommended that USAID provide assistance for direct on-site conservation of these unique tropical forests prior to their extinction. This can be accomplished through support to:

- The GOP to establish and implement a policy reform to immediately halt all logging of the remaining 700,000-900,000 ha of old growth dipterocarp forests;

- The GOP and NGOs to establish and begin managing an Integrated Protected Areas System, including the biologically important old growth dipterocarp forests;

- NGOs to acquire the remaining 1,500 ha of lowland dipterocarp forests on Alienable and Disposable land;

- The GOP to establish a monthly monitoring and reporting system based on aerial photographic surveys of priority old growth dipterocarp reserves. This monitoring system should remain in place until it is determined that the major illegal deforestation efforts have ended;

- The GOP and NGOs conduct a series of studies and inventories which will identify priority areas for developing conservation management programs. These studies would include a) a rapid assessment to identify priority areas for direct conservation efforts based on biological importance and the size of existing forest reserves; b) identify the type and magnitude of pressures on the reserves; c) develop a triage hierarchy for conservation efforts. The triage hierarchy would be the synthesis of the rapid biological study and the degree of threat to the protected area; d) in the priority areas, conduct rapid socio-economic studies to identify preliminary opportunities to work with local communities to develop community based programs which will reduce forest degradation; and,

- The GOP and NGOs, based on the rapid series of studies, to begin to develop and implement conservation management plans and buffer zone programs in the priority protected areas. These more detailed management plans should be viewed as living documents which will be revised as additional information becomes available concerning biological and socio-economic conditions.

Recommendation 2: Inventory and Gene Pool Rescue Program

While the activities in recommendation 1 will have the greatest positive effect on conserving the Philippines' tropical forests and biological diversity, it is not clear if the GOP has the political will to enforce a logging ban

in the old growth dipterocarp forests. If they do, then the GOP and the donor community need to recognize that there will still be a continuing loss of species within protected areas because of biological processes. An additional percentage of species and their genetic material can be conserved through rapid inventories and a gene pool rescue program. If the GOP does not make the policy decision to conserve its remaining old growth dipterocarp forests, then USAID should support an international inventory and gene pool rescue program.

Therefore, it is recommended that regardless of whether the GOP makes the needed policy reform in recommendation 1, USAID provide support to domestic and international NGOs and research groups to conduct a rapid inventory and gene pool rescue program. The level of immediate attention, and funding, for this activity should be directly related to the GOP policy decision concerning old growth dipterocarp forests. If the GOP supports the conservation of these forests, then these efforts can be implemented by the GOP, USAID and other donors over a 10 year period. If not, then USAID should provide direct support over the next 5 years.

USAID can support organizations to:

- Identify primary collection sites
- Conduct rapid biological surveys and collections of priority sites; and,
- Select research centers for identification and maintenance of the biological collections. The options which should be evaluated include plant and animal storage in international and national gardens, international centers for captive breeding, and biotechnology centers which can store genetic material for potential future development.

Recommendation 3: National Conservation Strategy

In order to build the national consensus to conserve the country's biological resources, it is recommended that AID provide a small grant to DENR and Haribon to review and revise the draft Philippine National Conservation Strategy.

Recommendation 4: Sustainable Forest Management

It is recommended that USAID assist the GOP to undertake reforms and enforcement of forest policies. This effort should include identification of economically attractive incentives for forest concession holders and local communities to sustainably manage the residual dipterocarp forests. This can be accomplished through a policy analysis effort in conjunction with other donors working in this sector. The specific areas which require immediate attention are timber pricing policies, concession management policies, and a review of macroeconomic and agricultural policies which are directly and indirectly having negative effects on forest management. Sustainable forest management efforts should be focused on concession holders and local community managed forests. Specific reforms needed are noted in Section 2.1.

Recommendation 5: Sustainable Agriculture Program

Efforts to set aside protected areas will not be successful unless the degree of pressure on those reserves can be reduced. This can not be effectively accomplished by on the ground guards and such an approach would probably fail in the political arena. Effective programs are needed to tackle the causes of deforestation and this includes poverty alleviation throughout the upland areas and more immediately in and around protected areas. This will require investments by GOP, NGOs, the private sector and the donors to improve sustainable forest management practices and agriculture practices.

A general recommendation is for USAID Manila to expand or continue assistance to the GOP to reduce the constraints to sustainable upland agriculture. The primary constraints that need attention are a) land tenure in upland areas, b) policy reform which permits the Department of Agriculture to collaborate with DENR to provide improved upland support services for sustainable agriculture, c) provision of upland agriculture support services, d) the privatization of land suitable for sustainable agriculture production, and e) providing alternative off-farm employment development.

To provide complementary support for biodiversity and tropical forest conservation, it is specifically recommended that USAID Manila support efforts to improve the incomes and find economic opportunities for farmers in and around priority protected areas. Specific activities

include a) provision of land tenure through DAR and DENR, b) development of a community-based action program with local communities, NGOs and government officials, c) rapid rural studies to identify alternative farming practices (forest management, agroforestry) which can be adopted to improve incomes, d) rapid assessments of long-term prospects for economic development including working in parts of the protected areas or with park systems.

Recommendation 6: Coastal Community Management

If recommendations 1 and/or 5 are adopted, it is recommended that USAID support NGOs to develop community based coastal management and conservation programs which will conserve marine reserves and mangroves. This effort should be included as a sub-element of a larger program. Marine habitat and mangrove management provides an important source of local income for local fisher families and successful programs can lead to increased biological diversity, improved resources management, and increased incomes. Because the global biological value of the Philippines' marine and mangrove habitats are not particularly high, this is not considered a top priority.

Recommendation 7: Donor Coordination

It is recommended that USAID Manila play a major role in donor coordination in biological diversity conservation and addressing long-term objectives in tropical forest management. The capacity to provide large amounts of grant assistance may make it more attractive to the GOP to collaborate with USAID in natural resources conservation, the US has a strong comparative advantage in biological diversity, and the Congressional Mandates provide additional incentive to the Mission take up this position.

Recommendation 8: Reduce Emphasis on Small-Scale Approaches

It is recommended that USAID not provide any additional resources to small-scale projects aimed at localized conservation programs, unless the GOP is willing to undertake a major policy change regarding old growth dipterocarp forests. In the absence of policy reforms and enforcement, any resources expended on small-scale activities are not likely to accomplish conservation before massive extinction occurs. Support for NGO advocacy would be an exception to this recommendation, since it would have

a policy element to it which might influence the decision of the GOP to halt logging of the old growth forests.

4.2 Options for Implementing the Proposed Program

Table 4.2-1 provides a summary of the recommendations and the type of methods which the Mission can use to implement this program. The criteria for the proposed approaches are ones which minimize Mission staff workload during design and implementation.

Environment and Natural Resources Program

A PAIP is being prepared which will propose including sustainable tropical management and biological diversity conservation in a broadly focused program sector assistance grant to the GOP. The following areas are recommended for inclusion in the program:

- Policy reform to immediately halt logging of 700,000-900,000 ha of old growth dipterocarp forests (recommendation 1);
- Policy reform to establish an Integrated Protected Areas System which includes the old growth dipterocarp forests (recommendation 1);
- Policy reform and enforcement to establish a monthly monitoring and reporting system based on aerial photographic surveys of priority dipterocarp reserves (recommendation 4);
- Reduce the constraints to sustainable upland agriculture through a) providing upland land tenure and b) policy reform which permits the Department of Agriculture to collaborate with DENR to provide improved upland support services for sustainable agriculture (recommendation 5); and,
- Donor coordination (recommendation 7).

TABLE 4.2-1 Summary of Proposed Implementation Options

RECOMMENDATIONS	ENR Program	NR Project	Debt for Nature	ST Grant	Other Mission Projects
1. Tropical Forest/ Biodiversity Conservation					
a. Halt logging virgin timber stands	X				
b. Establish IPAS	X				
c. Management IPAS		X	X		
d. Acquire lowland dipterocarp forests			X		
e. Monthly monitoring system w/aerial photos	X				
f. Special studies		X			
g. Develop/implement management plans		X			
2. Rapid Reconnaissance and Storage Program		X	X		
3. National Conservation Strategy				X	
4. Agriculture Sustainability					
a. General Agriculture Sustainability Projects					X
b. Agric. Sustainability in "buffer zones" - Land tenure - rapid assessments and community programs	X	X	X		
5. Forest Policy Reforms	X				
6. Coastal Zone Conservation and Management		X	X		
7. Donor Coordination	X	X		X	

Natural Resources Management Project

The following activities could be implemented as a component of a Natural Resources Management Project which could complement the Environment and Natural Resources Program. All of these activities could be implemented as grants or a buy-in to the existing Cooperative Agreement between USAID and a consortium of US NGOs primarily including the World Wildlife Fund-U.S., The Nature Conservancy and the Center for International Development and Environment, WRI. The activities are:

- Studies and inventories to identify priority areas for developing conservation management programs (recommendations 1 and 2);
- Inventory and gene pool rescue program (recommendation 2);
- Develop and implement conservation management plans and buffer zone programs in priority protected areas (recommendation 1);
- Sustainable agriculture program for farmers living in and around priority protected areas (recommendation 5); and
- Community based conservation of marine reserves and mangroves (recommendation 6).

Debt-for-Nature Swap

The following activities could be incorporated in a Debt-for-Nature Swap or folded in with a Natural Resources Project. Most of the activities proposed in the project might be supported under a Debt-for-Nature Swap.

- NGOs acquire the remaining 1,500 ha of lowland dipterocarp forests on Alienable and Disposable land (recommendation 1);
- Develop conservation management plans and provide economic alternatives to farmers in and around protected areas (recommendation 1; and,
- Biological diversity advocacy.

Short-term Grant Under Existing Projects

- Small grant to DENR and Haribon to review and revise the draft Philippine National Conservation Strategy (recommendation 3). Alternatively, this could be included in a Natural Resources Management Project.

Inclusion in Other Mission Programs/Projects

The following activities could be incorporated in other existing or future Mission projects:

- Reduce the constraints to sustainable upland agriculture through a) determination of the likely intensity of sustainable agriculture and identification of the amount of labor that can realistically be absorbed in upland areas and b) supporting efforts leading to increasing alternative off-farm employment opportunities (recommendation 4);

- Provision of upland land tenure could also be included as an amendment to the Mission's Agrarian Reform Support Program (recommendation 1); and

- Training in natural resources management, sustainable forest management, and policy and resources economics analysis.

5.0 CONCURRENCE WITH CONGRESSIONAL MANDATES

Currently the Mission's efforts in conjunction with AID/W funding meet the intent of the Congressional Mandates in Forestry and Biological Diversity, although the current level and type of support is not sufficient to prevent the loss of biological diversity and tropical forests. When the Rainfed Resources Development Project and the initial phase of the Debt-for-Nature Swap are completed, the Mission's current support in this area will end.

If the Mission incorporates any of the first five recommendations above into the proposed program and/or project, it will both exceed the intent of the Congressional Mandate and make a major contribution to conserving the Philippines biological diversity and remaining tropical forests.