Socioeconomic Root Causes of Biodiversity Loss in the Philippines
Summary

Introduction

The Philippines is experiencing a very high rate of biodiversity loss, indicated by a phenomenal decline in quality and number of habitats such as the forests, coral reefs, and mangroves. This loss has deleterious impacts on the long-term sustainability of community livelihood systems, political cohesion and governance, and overall national welfare. It is becoming evident that biodiversity loss has root causes in the social, institutional, economic, and political spheres. A host of socioeconomic factors, including economic and political history and rapid population growth, contribute to the erosion of environmental quality and biodiversity loss. Conservation efforts have failed to reverse the trend in large part because of inattention to these root causes. Despite investments by NGOs, government agencies, and international development banks, forest cover and other important habitats continue to decline. This paper aims to study the root causes of biodiversity loss, examining their nature and significance in three diverse islands of the Philippines. The results of the study could be used in the formulation of policy, advocacy, and information programs to mitigate, stop, and ultimately reverse biodiversity loss in the Philippines.

The direct causes of forest cover loss in the Philippines are over-harvesting and habitat alteration. The major proximate causes of primary forest loss are commercial logging, community logging, *kaingin* (slash and burn agriculture), and conversion of forest lands to other uses. In mangrove ecosystems, extraction of fuel and construction materials, and development of fish ponds have been a major causes of rapid destruction. In the case of coral reefs, fishing techniques using dynamite and cyanide are probably the most important cause of biodiversity loss[1]. An important variable in determining the impact of these activities is the "access factor" which is a measure of access to the forest or other resource including, for example, the distance of forests from waterways and roads and the ruggedness of the terrain[2]. These variables are involved in positive feedback loops that drive the exponential decrease in habitats. Commercial logging provides access, which in turn increases community logging and *kaingin* rates. Thus, besides being in itself a destructive force in terms of biodiversity, commercial logging, through the construction of logging roads, induces migration to the uplands, timber poaching, and *kaingin*.

In this study, we examine the root causes that are, in turn, driving these proximate causes. This work looks at the problem of root causes from two perspectives: at the macro- or national level and at the micro- or ecosystem level. We analyzed the situation at the national level by looking at relevant sectors such as the political economy and macroeconomics. We also investigated the social, economic, and political causes in three island ecosystems: Cebu, Negros,

[1] Unlike forest cover and mangroves, natural infestation, such as that of the crown-of-thorns starfish, is a substantial cause of loss of coral. However, some experts argue that this is also caused by environmental disturbances.

[2] For example, differences in ease of access explain why beach forests have been logged completely, while areas such as the Northern Sierra Madre, which is relatively inaccessible remain forested.

and Palawan. These islands are situated in different biogeographic zones of the Philippines and have very different histories and political economies. From these three studies we hope to obtain conclusions that are valid at the national level, and which, when compared with the macro-level study, lead to strong conclusions about the root causes of biodiversity loss in the Philippines.

Site Descriptions

There are over 40,000 species of wildlife in the Philippines. Because of the isolation of some of the islands of the Philippines since the Pleistocene era, Philippine forests are home to numerous endemic life forms. Rapid deforestation, transformation of mangrove swamps, and destruction of coral reefs all point to significant loss of biodiversity. When the Spaniards first came to the country in 1521, about 90% of the total land area was covered by forests[3]. Forest cover decreased to about 70% by 1900, 49% by 1950, and 18% by 1994[4]. The present rate of forest cover loss is 180,000 ha per year. Conditions in other ecosystems are similar. Only 27% of mangrove forest remains, and 95% of coral reefs are in bad condition. As a result, at least 192 species are threatened or endangered, including 86 bird species, 33 mammals, and 3 reptiles. About 60% of endemic Philippine flora are now extinct[5]. The tamaraw (*Bubalus mindorensis*) and the Philippine Eagle (*Pithecophaga jefferyi*) are on the verge of extinction. All the national parks of the Philippines have been degraded to various degrees by human encroachment, to the point that about half are no longer biologically important[6].

Cebu is a long narrow island, with a mainland area of 4,397 km^2, which lies geographically at the center of the Philippines. Of the three islands in this study, it has undergone the most development and urbanization. Much of the island receives limited rainfall. A saw-toothed mountain range runs its whole length. Limestones and marls are evident and karst topography is present[7]. About 73% of the island has slopes of more than 18%. Although Cebu was still forested at the beginning of Spanish colonization, its forests were almost totally gone by the end of the 19th century. Many factors played a major role in biodiversity loss: colonial history, the continuing shift of land use from agriculture to industrial and urban development purposes, and increasing population pressures. Cebu also illustrates the "contagion effect"--how its own degradation affects nearby islands.

Negros, which lies to the west of Cebu, has a land area of 12,699 km^2. It is the fourth largest island in the Philippines[8]. Negros has pronounced wet and dry seasons. Rolling hills,

[3] The Philippines has a total land area of about 300,000 km^2.
[4] Environment Management Bureau 1996
[5] Department of Environment and Natural Resources 1990
[6] PAWB 1989
[7] Wernstedt and Spencer 1967, Dickerson 1928, Barrera et al. 1954
[8] Draft Biodiversity Report, PAWB-NBU

valleys and plains, and mountain peaks characterize the island's topography. A group of volcanic mountains traverses the length of the island. Mt. Canlaon is the highest peak on the island at 2,450 metres. Negros offers the case of an island-ecosystem that has been largely transformed into a plantation economy[9]. Seventy percent of the country's sugar plantations are concentrated in Negros, primarily in Negros Occidental, the larger part of the island. Other economic activities, including mining, forestry, fisheries, and industry have been of secondary but important consequence to the island´s biodiversity. Since sugar traditionally formed the bedrock of the Philippine economy, Negros made a significant contribution to the country's economy and, correspondingly, Negros elites exercised considerable political influence.

Negros Island has very little forest cover left[10]. Old growth is limited to the steep slopes and top of the high mountains. Mt. Canlaon is the only protected area in Negros, with an area of 32,314 ha[11]. Large mangrove trees in southwestern Negros and in small coastal islands have all practically disappeared because of creation of fish ponds and saltbeds[12]. Although they were abundant in the 19th century, only about 1,000 ha of mangrove remain[13]. Only 4.8% of living coral reefs in Negros are in excellent condition while almost 75% are in poor to fair conditions. The wastes from industrial activities, notably sugar mills, ultimately end up in coastal and marine waters[14]. In recent years, pollution of coastal waters has also been traced to excessive amounts of fertilizers and pesticides originating from nearby fish ponds.

Palawan lies in the western part of the Philippines, about 240 km southwest of Manila. The province is comprised of some 1,768 islands and is considered the largest island province; Palawan island is the fifth largest island in the Philippines. The province has almost 2,000 km of coastline. The climate is tropical and monsoonal. Palawan soils are largely alluvial or formed from underlying bedrock[15] and, overall, are of low to moderate fertility. The island is bisected by a chain of mountains, and 75% of total area has slopes over 18%. The steep incline has discouraged logging until recently, but this topography also renders Palawan´s ecosystems fragile and prone to erosion. The province's natural vegetation differs from most Philippine Islands, and fauna species include many endemics. Flora and fauna are predominantly Bornean in character. The island is a

[9] While probably the most important case of this type, it presents itself as a model to the lesser plantation economies that evolved in different parts of the Philippine archipelago, namely in Central Luzon, and in later periods, in Mindanao.
[10] Swedish Space Corporation 1988
[11] Mt. Canlaon is among the most degraded natural parks in the country. Wildlife hunting and military shelling have driven away wildlife fauna and devastated large areas of forest. It is a biodiversity-rich area and is listed among the 18 Centers of Plant Diversity in the Philippines. Five of the rarest birds in the country are found in the area. Due to continued deforestation, several species of plants and animals have been declared endangered.
[12] Alcala 1977
[13] Swedish Space Corporation 1988
[14] Alcala 1979-1982, Davies et al. 1990
[15] Eder

refuge for several species threatened elsewhere in the archipelago, such as the blue-naped parrot and Philippine cockatoo, and for the last Philippine crocodile population[16].

Palawan has been referred to as the "last ecological frontier" of the country because of its relatively intact ecosystems. Development started late in Palawan. Forest canopy still covers 54% of its total land area[17]. It also has the second largest remaining mangrove forest, with some 28,000 ha, which has been declared a Mangrove Swamp Forest Reserve. About 38% of the Philippines coral reefs are located in Palawan[18]. In 1990, UNESCO designated the province as part of the international network of Biosphere Reserves. Over the last four decades, Palawan has attracted people from all other regions in the country. With a population density of 35 persons per $km^{2,}$ compared to a national rate of 202, Palawan is perceived to have the capacity to accommodate more people. However, concerns are already being expressed on the rapid loss of biodiversity and environmental degradation. Development began to accelerate at the same time that environmental activism and concern with conservation is rapidly gaining ground. This has given the local government the opportunity to take an alternative path to development; its Strategic Environmental Plan now provides a comprehensive framework for sustainable development of Palawan.

Research Methodology

This study consisted of sectoral studies at the national level and multi-sectoral case studies of three island ecosystems. These two groups of studies are complementary and mutually reinforcing. The national sectoral studies consisted of analyses of Philippine biodiversity, demography, economy, and politics. These were complemented by multi-sectoral studies of three island ecosystems. The tools of systems dynamics (SD) were used by an interdisciplinary team for the analysis of root causes of biodiversity loss. For the timeframe of the study, we chose the century between 1890 and 1990, which includes the last decade of Spanish colonial rule, the entire period of American occupation, and Philippine independence.

Systems Dynamics Approach: The objective the SD approach is to construct a computerized model of complex systems, usually involving linkages of economic, demographic, political, and environmental components. In such a model, concepts are necessarily defined quantitatively. Quantification has the advantage of fixing the meaning of concepts, since variables must be expressed as objective measures. For example, we may claim that political influence of a certain social group is a strong driving force in deforestation, but "political influence" is not an acceptable variable in SD. Instead, in this particular case, the number and size of forest

[16] Eder
[17] Swedish Space Corporation 1988. However, 24 years earlier, Palawan had about 92% of its land covered with forest (Bureau of Forestry).
[18] Fernandez 1997

concessions owned by the social group are better variables because they are objectively measurable.

This study does not attempt to develop a computerized simulation model. We simply used the techniques of SD to achieve clarity and identify relationships among the independent variables. SD provided us with a methodological paradigm – a guide for the analysis of causal loops and linkages in an extremely complex system. For an interdisciplinary team, a shared SD approach facilitates communication as well as integration and comparison of information. The linkages between the factors and the strength of these linkages emerged out of qualitative and quantitative arguments. We think this approach is the only way to avoid interdisciplinary confusion in a project aiming to identify the causal connections between biodiversity loss and a complex web of economic, social, historical, and political variables. Another advantage of the SD approach is the possibility of extending this research toward the full development of a simulation model. Such work would require a significant investment in data gathering and in professional time. The returns would include a more profound understanding of the phenomenon of biodiversity loss, a tool for a rigorous empirical check, and the possibility of identifying optimal policies.

A focus on causal feedback loops is the distinguishing feature of SD. Systems involving social, economic, political, and environmental subsystems are notoriously complicated. Concentrating on feedback loops greatly diminishes the number of variables and focuses attention on those variables that are crucial in generating and controlling social and economic problems. Our interest goes beyond the identification of root causes. Ultimately, we want to discover policies that could moderate or control the loss of biodiversity. For policy purposes, the most important factors are those enclosed within feedback loops.

Team Research Process: The research team was interdisciplinary and relied heavily on team-work. Brainstorming in a workshop setting was the principal analytical tool. The analysis constructed causal maps by starting with the biodiversity loss indicators, moving on to direct causes, and then to the entangled web of root causes. The logic of the research process was simple. The team postulated a set of linked causes that lead to the known behavior of biodiversity indicators. The implications of these postulates were then compared with empirical data.

The first step in the approach is the enumeration of key elements of the system under consideration. This list was the outcome of a team workshop which reviewed the existing literature and the issues papers prepared for this study. The SD approach requires the representation of each biodiversity loss indicator as the central variable of a systems diagram that indicates causes, effects, and their linkages through causal loops. The drawing of causal loops is therefore the next step. These diagrams relate the system elements to one another and to the principal variables, i.e. the biodiversity loss indicators. These diagrams, in turn, suggest the graphical system models which constitute the hypotheses of the project. In another team

workshop, we considered the implications of these models in terms of empirical data. Through a process of this kind, which may involve a few iterations, we could futher refine the SD diagrams.

In the actual research process, the limited availability of data required simplification of the analysis. Data on biodiversity, as rigorously defined, do not exist in any form for the islands. The pragmatic alternative is to infer biodiversity loss from proxy measures, for which we used loss of forest cover; loss of corals; loss of mangroves; and decreased populations of indicator species. Similarly, we limited the spectrum of direct causes by considering only a few important categories: over-harvesting; habitat alteration; species introduction; and chemical pollution[19]. Given the limits of available quantitative data, the project undertook a largely qualitative analysis of the models to deduce conclusions about root causes of biodiversity loss for the three islands. A detailed comparison of the situations in these three places yielded insights into the national situation.

Local Context: Cebu

The high population density of Cebu and the easy natural access to its forests that is provided by its long coastline were the most important root causes of the loss of its biodiversity. Cebu illustrates how deforestation has been carried to its ultimate end. By the end of the 19th century, Cebu's forests were almost totally gone. In 1903, the forest cover of Cebu was about 17,000 ha out of a total land area of about 508,000 ha. By 1974, the forest area was down to a negligible 400 ha. The destruction of the original forest cover of Cebu Island is said to have contributed immensely to the extinction of at least nine species and sub-species of birds from the island[20]. Cebu illustrates the history of the forest and biodiversity under conditions of persistent poverty and increasing population density. The case of Cebu also shows that forest cover is good proxy indicator for other biodiversity indicators, such as mangroves and coral cover.

A large part Cebu's rugged terrain is unsuitable for agricultural production. The island has relied heavily on trading and industrial manufacturing. Since early colonization, pressures on Cebu environment particularly the forest, have been immense. Export of forest products, shipbuilding, domestic consumption for fuel, and industrial use for mines were among the major reasons. Reclamation projects also destroyed large areas of mangroves. The lack of arable land was not only due to Cebu´s limited coastal plains. The concentration of the best agricultural areas in the hands of the religious orders and later of a few mestizo families have also pushed people to occupy steep areas, where uncontrolled *kaingin* has eliminated the original vegetation.

[19] Specific direct causes under these categories depend on the particular biodiversity loss indicator under consideration. For instance, examining forest cover loss, the direct causes under the category of over-harvesting could be commercial logging, firewood gathering, and community forestry.
[20] Rabor 1959; but see Magsalay 1985, 1993

The central, strategic location of Cebu played a significant part in the development of the island as a major entrepot. Foreign trade influenced Cebu's settlement pattern in three ways[21]: First, it induced the growth of nucleated settlements along the coast and near the mouths of rivers. Urban Cebu´s expansion was facilitated by the reclamation of wetlands by people who wanted to establish their residence within the city[22]. Second, since exports consisted mainly of forest products that were gathered by inland villages and even from neighboring islands, a web of trading relationships evolved within the island. Local goods flowed towards the coast as imported wares found their way inland. Lastly, long distance trade influenced a change in the social structure and led to the development of social ranking.

The Legacy of Spanish and American Rule

The principal proximate causes of forest cover loss in Cebu before and at the beginning of the study period were land conversion, *kaingin*, and community logging for timber and firewood. In 1903, Cebu was already the most densely populated island in the Philippines. Throughout the last century, the number of persons per hectare of arable land was about six times the national average. The implications of the critical shortage of arable land vis-à-vis the constantly growing population in a dominantly agrarian economy are obvious. First, landless farmers seek subsistence in the most easily accessible and commonly-owned forests and convert them to cropland with slash and burn methods. The narrow shape of Cebu meant easy access by sea to most parts of the island, except the middle portion that is steep and rugged. In addition to increasing agricultural land and consumption of firewood, people cut trees to supply the boat-building industry and export markets. The beach forest and the mangroves were converted to residential areas and cropland. Limited fertile lowlands have pushed the Cebuano peasants to occupy marginal areas that should not have been used for agriculture. Their unfamiliarity with soil conservation techniques such as field terracing, contour plowing, crop diversification and composting have exhausted and depleted the soil.

Problems created by population density were aggravated by the Spanish colonial policy of concentrating good agricultural land into huge haciendas of the Spanish clergy and the elite, which resulted in the further contraction of the land available to the masses. The American Regime did not alter land tenure patterns, although it abolished the Spanish system of tributes. The result was the continuous conversion of forest land into agriculture. The other reaction to the shortage of land in Cebu is migration out of the island. However, there was little out-migration from Cebu until this century. Under Spanish rule, mobility was severely restricted by the colonial government because the tribute system, as well as the budget of the parish, depended on the population under its wings. Numerous clearances were required in order for a native to get a passport to travel to other islands. Moreover, the passports were valid for only three months.

[21] Hutterer 1977
[22] Cullinane 1982

The Americans encouraged resettlement, particularly in Mindanao, but this had little effect on the demographic crisis in Cebu.

In the 19th century, church lands were situated in the best agricultural lands in the island and were expanded through donations and purchases[23]. Agricultural production was encouraged by the religious orders in their haciendas. In the 1850s, increased production of export crops, notably sugar and tobacco, resulted in the recruitment of migrant peasants as plantation workers for religious estates and haciendas. Tenants and wage laborers were hired to plant tobacco, cacao, corn, and sugar. In this period, Spanish and Chinese mestizos engaged in land speculation and acquisition inside the port area and nearby towns. This was triggered by new business opportunities in agriculture and trading[24]. These mestizo families continued to play a key role in the island's commercial life, drastically changing the land tenure and crop production systems. In the 1860s, foreign vessels began to load cargos of sugar and hemp and customs houses were built. American and British business houses also opened in the island. Streams of migrants flowed towards the trading centers. Business opportunities became available in the urban areas owing to increased foreign participation in the economy. During this period, people from Cebu started settling in northern Negros.

On the eve of the demise of the Spanish colonial government, wealthy mestizo families not only ruled Cebu's commercial life but also its political life. A few of them participated in the short-lived Philippine revolutionary government. When the revolutionary army began suffering major setbacks, they shifted allegiance and served in the new American colonial regime. They also expanded their business networks into the nearby islands, ultimately dominating business.

The American colonial era saw a series of policies designed to ease the population pressure in some highly populated areas and bring more people to the provinces with less inhabitants. In 1903, the U.S. colonial authorities promulgated the Public Land Act to influence population redistribution. It encouraged pioneer settlements, particularly in Mindanao. Between 1910 and 1939, migrant workers and settlers were transported to other islands to fill the latter's labor needs. Over 40% of the total transported laborers and homeseekers originated from Cebu[25]. In 1938, the National Land Settlement Administration launched a project to settle people in the Koronadal plain of Cotabato[26]. Resettled families came from areas of agrarian conflict, particularly those with high tenancy rates. Agrarian unrest remained a major snag in the American colonial regime. Armed uprising during this period showed the seriousness of the agrarian problem. Efforts to redistribute the church estates failed. Tenancy and usurious practices ruled

[23] Cullinane 1982
[24] McMicking 1967
[25] Low 1956
[26] Pelzer 1948

the lives of the Cebu peasant in part became of the high resale value of land, which was beyond the reach of peasants.

Independence and Current Conditions

In the post-colonial period, when the forests were almost totally gone, there was no other alternative to industrialization. Mining, manufacturing, and tourism grew. Cebu is now the second largest urban economic center in the Philippines, and is a major destination of direct foreign investment. In the 1980s, massive construction of economic and tourism infrastructure began in Cebu. This included special economic zones which were primarily situated in the coastal areas. The regional development council has prescribed the establishment of industrial estates that are government-owned but privately managed[27].

Industrial growth, however, has not benefitted the majority of Cebu´s population. The island's performance in the migration flows reveals the limited economic opportunities available to the Cebuanos. Between 1948 and 1960, the island's population density increased by 18.7% and, between 1960 and1970, by 22.6%. A number of post-war migrant families came from provinces plagued with agrarian problems. In 1990, there were 520 persons per km^2 in Cebu compared to 221 persons per km^2 in 1948. Poverty is still rampant. Most households still use firewood, giving the forest very little chance for recovery[28]. In any case, most of Cebu's forest lands have already been converted to other uses. Today, land availability remains a big problem.

Despite various land reform programs of the Philippine government, a high incidence of tenancy in the rural areas of the province prevails. The biggest landowners in Cebu are either top government officials or powerful politicians[29]. Just 595 families in Cebu, or about 1% of the total household population, control over 38% of all cropland and as much as 94% of the total private agricultural lands in the province included in the recent Comprehensive Agrarian Reform Program. Politicians are also known to be major agricultural landowners. The Department of Agrarian Reform (DAR) has allotted 25,688 ha for redistribution but, since 1988, only 36% have been awarded to beneficiaries. The delays were due mainly to the many protests and petitions, which have gone all the way to the Supreme Court and to the office of the President, for exemptions from coverage filed by landlords.

Confronted by a degraded environment, hordes of Cebuanos are migrating to other parts of the archipelago and even out of the country. This is a familiar recourse by Filipinos in the face

[27] One such zone is the Mactan Export Processing Zone (MEPZ) which is being developed in three phases. MEPZ I houses more than 100 companies, employing about 32,772 workers. MEPZA II has a total area of 63 ha, of which 42.5 ha are classified as industrial.
[28] In 1990, 360,000 out of the 506,000 households used firewood.
[29] Reported in *The Freeman*, a Cebu newspaper.

of diminishing lands coupled with low yields. However, at the same time, the economic growth of the cities prompted the arrival of streams of rural migrants to urban areas of Cebu. This influx facilitated the rapid transformation of the island's landscape from predominantly rural to predominantly urban. Indeed, this trend is true of the rest of the country, but the relationship between demographic factors and environmental degradation is highlighted in Cebu.

The industrialization of Cebu has changed the nature of environmental pressure; much of the pressure has shifted from extraction of resources to pollution. Water treatment facilities are non-existent. Waste disposal facilities are insufficient. Industrial firms lack anti-pollution devices. Today, Cebu is experiencing an acute shortage of water[30]. Cebu's mangroves have been totally depleted by construction of industrial estates, tourist facilities, development of fish ponds, and land reclamations. Thus, on top of deforestation, pollution from industries, owned and managed by Cebu's socio-political-economic elite, have added to Cebu's environmental woes. Efforts to remedy the situation are not wanting. Since the beginning of the century, reforestation projects have been instituted in the island. Most probably, these failed because of rampant corruption and Cebu's ability to survive economically and politically without such natural resources.

The Cebu case study contributed the following to the national model for biodiversity loss:

- The study demonstrated the significance of a large initial population and the failure of demographic policies to prevent migration to the uplands.
- Cebu´s geography provided easy access to forest lands. The case demonstrated the role of the "access factor".
- Although Cebu has been industrializing with some success, the generation of non-agricultural jobs has been inadequate to absorb excess farm labor. Cebu's industries attracted more migrants to the island.
- In Cebu, deforestation led to the loss of other habitats, such as mangrove and coral covers. This supports the assumption that forest cover is a good proxy for biodiversity.

Local Context: Negros

Negros Island points to two significant factors affecting biodiversity loss. These are the conversion to sugar plantations of large tracts of land in the second-half of the 19th century which, in turn, brought about phenomenal population growth in Negros. Conversion and population growth led to the destruction of forest cover to make way for plantations and settlements. Beach forests gave way to dense human communities while low-lying dipterocarp forests were converted to agricultural lands. Colonial systems created the sugar elite and established trade policies that fed the growth of the plantation economy in Negros. Two types of settlers came, both attracted by the opportunities offered by the sugar economy: the traders and capitalists who acquired large

[30] Many Cebu establishments have resorted to desalinization, and the Metro Cebu water district is now building a dam in the Mananga watershed to increase Cebu's water supply.

tracts of land, and the farm hands and their families, who were contracted as workers. In due time, while the sugar lords amassed wealth, the impoverishment and underemployment of many farm workers and settlers in Negros contributed to upland migration and clearing of upland forests.

The Legacy of Spanish and American Rule

In the early years of Spanish rule, Negros was sparsely populated, especially in contrast to neighboring islands such as Cebu. Through the 1770s, Negros towns were isolated from each other. Only in the early 19th century, when effective defenses were put up against Muslim invasions, was it possible to establish towns near the sea. The intensive cultivation of the island began in the second half of the 19th century, when the Spaniards introduced agricultural monopolies for export production. Sugar cane soon became the island´s primary export commodity. After the first sugar hacienda was established in 1849, more and more tracts of land and forest were cleared. Chinese *mestizos*, edged out of the money-lending and trading arena by Western financial and trading houses, immediately moved into agricultural production. They secured titles to fairly large tracts of lands in Negros, carving these out of the forests. The needs of a plantation economy contributed to forest cover loss in other ways, in addition to clearing for fields. Demand for firewood for the mills and household needs ate up the mangrove forests, lumber requirements for construction led to felling of more trees, and other areas were cleared for access roads and railways as the economy grew. The expansion of haciendas and the increase in the volume of trade were almost uninterrupted, up to 1898, when Spanish rule was ended[31].

Various factors hastened the conversion of the island into the number one sugar-producing area in the Philippines. British and American investment firms provided capital for local traders and planters as well as efficient Western-manufactured milling equipment. Improved technology, in turn, made for a more favorable economies of scale, and improved profits led to bigger land acquisitions. A sharp increase in sugar prices in the mid-1850s, an effect of the Crimean War, boosted the industry. The opening of the Suez Canal in 1869 facilitated exports to Europe, and for the next 15 years, Britain remained a major purchaser[32]. The Spanish colonial government's restrictions prevented European participation in plantation development. However, since the *mestizo* class was dependent on European merchant capital especially in the purchase of machinery, commercial ties between the two were strong[33].

The population of Negros increased as much as five times over the first five decades of the sugar economy. More towns and parishes were created[34]. The prospects of big returns from

[31] Cuesta
[32] Tan Cullamar 1986
[33] Tan Cullamar 1986
[34] Cuesta

agricultural land and the promise of jobs lured many speculators and farm workers to settle in Negros. The opening of the port in Iloilo, Panay, in 1855 facilitated the flow of people and produce. By the 1860s, most migrants came from nearby Panay, which was one of the most densely settled islands in the archipelago[35]. The peak of immigration was reached in 1885[36]. By the 1880s, business-minded Negros planters chose to hire day-laborers, rather than work with a tenancy system[37]. Thus, the sugar plantation economy was instrumental in introducing modifications to the Philippine socioeconomic structure. By the 1890s, most coastal forests of Negros had been cleared, prime land had been mostly acquired by the new haciendero class, and a monoculture economy was put in place[38].

Migration to the uplands has had distinct features that roughly coincide with the movements of people to Negros. Pre-sugar boom upland migration was composed mainly of natives who refused to be incorporated into the colonial society. Although these small bands of fugitives from the colonial law cleared patches of upland forest, they also served as a deterrent to extraction of forest resources by lowlanders. These "guardians" of the forest did not survive the advance of the sugar haciendas. After exhausting the more accessible areas, speculators targeted the uplands. This started the second wave of migration and settlements in the uplands, mostly richer migrants who brought with them their families and workers. The creation of more towns and establishment of more plantations in the lowlands and foothills created a reverse movement of people from the hills lured by jobs, especially during the harvest season[39].

By the 1890s, most Philippine sugar exports were going to the United States while the European market was taken over by sugar beet. Under American rule, beginning in 1901, tariff reductions were instituted to support the sugar industry, and free trade ties were established, making the US the most important trading partner of the Philippines until the 1970s. US colonial policy on Philippine exports crops from the 1900s to the 1930s, notably the removal of tariffs and mutual trade preferences, supported the expansion and modernization of sugar production. As a result, more areas were cleared for sugar cultivation. A succession of US and Philippine laws modified the trading agreement but, on the whole, sustained the dependence of the island's economy on its preferential market relations with the US. The Laurel-Langley Agreement extended the preferential trade status given to Philippine sugar in the US market until 1974[40]. After 1974, production dropped by 50%. In 1982, the US reinstated a Philippine sugar quota, but at a lower rate. US sugar quotas further declined beginning in 1991, when the Philippine Senate rejected the extension of the US lease for military bases in the country.

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[35] Fast and Richardson
[36] Cuesta
[37] Fast and Richardson
[38] Billig
[39] Cuesta
[40] The Philippines was given a US quota of 980,000 to 1.5 million metric tons, bought at prices 35% higher than the world market rate.

Preferential trade agreements enjoyed by the Philippines from the beginning of American rule up to the 1970s sustained the sugar economy of the island. Profit margins fluctuated, but government loans and subsidies to the industry and the guaranteed US quota nurtured the industry. Duty-free access and generous US quotas are attributable to the interests of American corporations which own half of the Philippine sugar industry's milling business [41]. Conversion of land to sugar continued up to the mid-1900s. The sugar oligarchy, who had a powerful lobby in government and whose industry leaders occupied top government positions, were able to secure government assistance and influence policies subsidizing the production and trading of sugar. For its part, the Philippine state had a stake in sustaining the sugar industry, since sugar remained the country's major export until the 1970s.

Independence

While the phenomenal population growth in the second half of the 19th century was not replicated in the 20th century, Negros´s population continued to increase at about the national average rate. By the 1960s, the western region of the island had become an area of large-scale emigration of landless families, partly owing to harsh tenancy conditions in the sugar haciendas[42]. Poor Negrenses went to Metro Manila and other cities to work as household help and factory workers. Landless farmers also sought escape from hacienda bondage by becoming *kaingineros* or workers in the logging industry, adding to the upland migrati

Sugarcane production has remained largely inefficient and suffers from low productivity. Production increases from 1850 through the 1970s can largely be attributed to increased areas planted, rather than improvements in productivity. Decreases manifested in later decades can be attributed, on the other hand, to non-planting due to low world market prices and market disruptions[43]. In the 1970s, one-fourth of the total land area of Negros Occidental was still planted to sugar[44]. Today, 76% of the agricultural land in Negros Occidental is planted in sugar. In northern Negros, some 55% of cultivated lands are devoted to sugar. On the plains of western Negros, about 41% of cultivated area is devoted to sugar, producing 40% of total Philippine export sugar[45].

In Negros Oriental, the level areas between coast and mountainous areas are densely populated and intensely cultivated for corn, rice, coconut, cotton, bananas, and sugar cane production. On the whole, however, there is less arable land on this part of the island. Interior areas are rugged and mountainous. Careless logging and the practice of *kaingin* have given way

[41] McHale
[42] Wernstedt
[43] In 1959, 193,000 ha of sugar lands produced 112 *piculs* per ha. By 1972, cultivated areas jumped to 424,000 ha but yielded only 68 *piculs* per ha *(Sugarland Bacolod*, 11, no. 4, cited in McCoy 1982).
[44] ILMS
[45] Wernstedt

to secondary forests and soil erosion. Steep slopes have been cleared for upland rice planting and especially corn, not so much because the land is suitable for the latter, but because it is one of the few crops that could grow under the conditions. In 1994, 65% of total employed labor force of Negros Oriental was in agriculture.

The island was deriving a significant portion of its income from its primary forests by the 1940s. These rainforests thrived throughout the central mountainous region of Negros. Concessions were issued to various lumber firms. Due to weak law enforcement, illegal logging took place along side legal cutting. By the 1960s, sparse stands of secondary, non-commercial forests characterized northern Negros' highlands. Nonetheless, dense stands of virgin tropical forests still clothed the Negros cordillera and forested areas could still be found in the more inaccessible parts of the Tablas Plateau[46]. In Negros Oriental, much of the clearing of primary forests occurred in the early 1950s[47].

In post-colonial Philippines, the national political system was dominated by sugar oligarches, who constitute a powerful lobby known as the "sugar bloc." Negrense sugar planters and millers continued successfully fighting for quotas, cornering credit facilities, and ensuring favorable legislation and trade agreements protecting their interests. Provincial political leadership has been limited to the circles of large plantation owners. They have successfully twisted economic and foreign policy to serve their short-term ends. To meet the US quotas, the government created the Sugar Production Council in the 1960s and provided financing for the construction of more sugar mills. The devaluation of the Philippine peso and the adoption of export-oriented policies in the 1960s proved to be profitable for agricultural exports. Coinciding with the US trade embargo on Cuba, sugar doubly benefited from this shift in government policy. The increasing presence of the World Bank and Japanese interests in Philippine economic development showered the sugar industry with loans for modernization Between 1964 to 1979, the World Bank provided $76 million for a range of rural development programs. The sugar industry succeeded in securing over half of this credit facility[48]. During martial law, marketing was taken over by government and placed under centralized trading agencies, on the rationale that the economic and social stability of the economy rested on the sugar industry[49].

The sugar bloc has also successfully thwarted attempts at land redistribution. Their strong lobby limited the land reform programs of the 1950s, 1960s, and 1970s to rice and corn. President Aquino's Comprehensive Agrarian Reform Law was compromised by a strong sugar bloc lobby in Congress. The Department of Agrarian Reform has placed 26,992 ha and 126,658 ha of sugar cane lands in Negros Oriental and Occidental, respectively, under land reform. But in

[46] Wernstedt
[47] Cadelina 1992, cited in Bais Bay Basin Report.
[48] Boyce; McCoy 1982
[49] LUSSA

Negros Oriental only 40% of agrarian reform lands have been distributed, and in Negros Occidental only 26%[50]. Land ownership remains highly skewed. The 9% of planters whose lands are above 50 ha own about 52% of total sugar lands[51]. There are an estimated 140 sugar barons in North Negros and 125 in South Negros, each owning 100 ha or more. Of the labor force, 65% is in agriculture and only 10% in manufacturing and construction. Manufacturing activity largely revolves around sugar milling[52].

Although the government enacted laws to enhance the welfare of sugar workers, it failed to ensure the full implementation of these laws. The government not only turned a blind eye to injustices, it also used its military might to harass sugar union leaders and members. Negros Occidental emerged as one of the most impoverished and insurgency-infested areas in the country by the 1980s[53]. To survive, displaced sugar workers took the initiative to work on idle lands. Planters, fearful of social consequences, lent out a few thousand hectares for subsistence production to their workers during those bleak years. To a certain extent, the food crisis in Negros's monocrop economy in the 1980s and the uncertainties in the world market have prepared the ground for diversification efforts and some voluntary land transfer.

In the mid-1980s, difficulty in getting crop loans and the economic collapse faced by the whole nation, in view of the upsurge in the anti-Marcos protests, prompted many sugar planters to convert their lands to other uses, notably prawn farming. Japanese financiers lent money and expertise to Negrense entrepreneurs, making the venture possible. Coastal sugar lands were converted to capital-intensive prawn ponds and hatcheries. Between 1984 and 1994, agricultural lands declined by almost 12% while fish pond areas grew by almost 120%. However, the profitability of prawn production has declined as prawn farming expanded elsewhere in the rest of Southeast Asia. Only the most efficient producers have survived.

The major causes of environmental degradation are clearly rooted in the historical factors that converted the island, particularly the province of Negros Occidental, into a monocrop sugar economy. This monocrop character makes the Negros case distinct from the rest of the Philippine archipelago's island ecosystems. Exponential increases in cultivated land and population beginning in the late 19th century led to deforestation and its consequent biodiversity loss. In the 20th century, destruction of forest cover was supplemented by the encouragement of commercial logging. Extensive agricultural exploitation of the island has, in addition, brought about serious sedimentation problems that have filtered down to the island's mangrove forests and coral reefs. The brackish water fish ponds created for prawn farming have been criticized for their adverse impact on the quality of the water supply and ground water.

[50] Planning Services, Department of Agrarian Reform
[51] Sugar Regulatory Agency [SRA] 1988-89 data, cited in Alarde-Regalado 17
[52] SRA Report, cited in Alarde-Regalado 22
[53] LUSSA

These factors--land conversion to sugar production, unemployment in neighboring islands and in Negros itself, migration to lowlands and uplands, *kaingin*--comprise major, linked positive feedback loops which connect negatively to forest cover. The intensification of one cause supported the increase in the others, with the result being the decline of forest cover. Quantitative proof for these feedback loops could be stronger if data were available on the growth of upland communities, the volume of fuelwood used by households, trees harvested for clearing of roads and commercial trading, and the loss of forest cover over the decades.

The Negros case study contributed the following for the national model for biodiversity loss:

- The elite that came out of the plantation economy dominated not only the island of Negros but also wielded influence in national politics. The concentration of land and wealth in the hands of a few individuals gave them tremendous power.
- A politically powerful group of landowners can resist popular calls for agrarian reform.
- The fluctuations in the fortunes of the sugar industry resulted in higher poverty incidence in Negros, which induced migration to the uplands.
- The US influenced forest cover loss through the US Sugar Quota.
- Strong international demand for timber influenced the loss of forest cover in the Philippines.

Local Context: Palawan

Palawan is interesting because its forests still cover 54% of the total land area and, as a result, it is one of the most important regions for conservation of biodiversity. There are a variety of reasons why Palawan survived the spasm of deforestation in the Philippines. First, the Spanish influence in Palawan was minimal compared to other parts of the Philippines. Spanish rule did not go much beyond the islands of Northern Palawan. Palawan was never reached by the encomienda system of the Spanish colonial period and has no large plantations. An economically and politically powerful landed gentry did not take root in the island in any significant way.

Second, Palawan did not attract migrants until the first half of the 20^{th} century. The location of the National Penitentiary and the Leper Colony in the island, coupled with the prevalence of malaria were some of the reasons for the lack of population "pull" of Palawan. As of 1990, the province's population density was 35 persons per km^2, compared to the national rate of 202 per km^2. However, today Palawan has the highest rate of in-migration in the country. It was one of the chosen sites for settlement of the excess populations of the other islands. The population of Palawan increased from 35,000 in 1903 to 627,000 in 1995.

Third, environmentalism overtook the development process and settlement of Palawan. After the revolution of 1986, civil society became a significant force in Philippine politics.

Conservation investments have given priority to Palawan, and the island has become the primary target of tourism investments. With tourism, concern about the environment of Palawan was heightened, and advocacy for its conservation increased. However, the reckless development of resorts, together with the exploitation of mineral resources, and the high rate of immigration endanger the island's natural wealth and beauty. Intense awareness of these threats led to the formulation of the Strategic Environmental Plan, and to the organization of a multi-agency Palawan Council for Sustainable Development.

The Legacy of Spanish and American Rule

When the Spaniards began their colonization of the Philippine archipelago in 1565, Palawan island was inhabited by indigenous groups, the Tagbanua, Batak, and Palawan, and by Muslim settlers. These people sustained themselves by shifting cultivation, raising animals, and gathering wild tubers, fruits, honey, bird's nests, mollusks, and numerous other forest and sea products. By the 1570s, the Spaniards were collecting tribute in the Calamianes and the Cuyo islands of Palawan. Efforts to relocate the natives to towns were not initially successful and, while the number of converts to Christianity seemed to indicate effective colonization, the Spaniards did not really change the natives of Palawan.

Before the Spaniards came and throughout most of the period of Spanish occupation, the territories of Palawan were under the influence of Muslim peoples from Borneo and Sulu. This influence persisted in south and central Palawan into the second half of the 19th century[54]. Muslims attacks continued until 1886. The Spaniards saw Palawan as the 'key to the Philippine archipelago, and quite suitable as a military port. They established their capital at Puerto Princesa, which by 1883, had developed into small colonial town with over 1,000 inhabitants, primarily local soldiers, and deportees and migrants from other islands. Migrants came from all over the archipelago, and established such cash crops as sugar cane and coconut as well as fruit trees and cattle raising. The Spaniards had the largest land holdings. Palawan became a place of exile with the outbreak of the country's revolution against Spain in 1896, and captured revolutionaries increased the ranks of the deportees. These same deportees then successfully revolted against the Spanish on Palawan[55].

During the period of American occupation, Palawan´s largest exports were timber and secondary forest products, including rattan, tanbark, nigue, almaciga, and beeswax. Planting of coconuts and abaca continued, and new crops, including maguey and rubber were tried. While it was reported, in 1907, that there was a satisfactory increase in the amount of land cultivated over the previous years, there was also a regret that "many thousands of acres of rich level land in

[54] Ocampo
[55] Ocampo

Palawan are lying idle for lack of inhabitants to occupy and cultivate them". Such regrets consistently failed to mention the fact of long-standing tribal habitation.

Palawan's frontier character influenced the design of American resettlement policies. The Americans established sites for a leper colony (1902) and a penal colony (1904). They established a reservation for the Tagbanua at Aborlan, where they established an industrial school. The natives were then encouraged to gather their residences around it. The Palawan were 'being persuaded to come down to the coast by the establishment of little government trading posts.' Puerto Princesa continued to function as a military garrison. The Muslim residents, seen as a problem, were resettled with the use of force in the southeastern coast[56].

Migration played a big role in the development of Palawan. Before the turn of the century, people from Cuyo and other islands migrated to Palawan island. It started as a seasonal farming activity, but as opportunities in Cuyo became scarcer, because of population density, and/or farming opportunities became more attractive, families settled on the Palawan mainland. The Cuyunons were shifting-cultivators[57]. Migrants of more recent times also came in search of agricultural land and the opportunities Palawan's natural resources offer.

Independence

Starting forty years ago, Palawan became the destination for migrants from all other regions in the country seeking better livelihood opportunities. Palawan attracted people being pushed away by the growing population and limited economic opportunities in the nearby islands, which were more densely populated. After World War II, migrants streamed into Palawan. A 24,000-ha land settlement area in south central Palawan was established to accommodate settlers from Central Luzon who were displaced by insurgency or leaving other thickly populated areas of the country (1950). The Cuyunon, Agutaya, Cagayanon, and Muslims were the first to be resettled. These populations were then pushed further up the mountain slopes. The experience of the Tagbanua displacement from 1900 to 1980 by various government projects and corporate activities is illustrative; the results have been disastrous to human life, cultural traditions, and the environment[58]. People also came with the logging and mining companies (1960s-1970s) and more recently with the tourism industry. Migration has accounted for about half of the population growth[59]. Population increased from 106,269 in 1948 to 317,782 in 1980. By 1995, it had reached 627,000.

[56] Ocampo
[57] Eder
[58] Fernandez 1997; Ocampo
[59] Pernia & Israel, Spatial Development, Urbanization and Migration Patterns in the Philippines. For 1948-60, migration caused 59.2% of the population change; 51.3% for 1960-70; 46.3% for 1970-80; and 47% for 1980-90.

In the 1960s and the 1970s, there was a heavy influx of development corporations and agribusiness companies into Palawan, each staking claim over large areas. American, Japanese and later multinational companies engaged in logging and mining. Claims for logging, mining, pasture, fishing, and corporate farming rights, if plotted out on a map, would indicate that corporations have claimed the island of Palawan twice over. In the 1970s and 1980s, politically influential individuals were able to obtain concessions to large tracts of forest concessions in Palawan. However, successful advocacy by environmental groups led to a total ban on logging on the island. Environmentalism has overtaken the development process and settlement of Palawan.

Palawan prides itself on being the only province with a Strategic Environmental Plan (SEP) enacted into law. The SEP has been adopted as a comprehensive framework to guide the local governments and the national government agencies involved in development. The SEP calls for the sustainable development of Palawan through the improvement in the quality of life of its people in the present and future generations. Development shall be characterized by ecological viability; social acceptability; and an integrated approach.

The main strategy of the SEP is the establishment of an Environmentally Critical Areas Network (ECAN). ECAN is a graduated system of protection and development control over the whole of Palawan, including tribal lands, forests, mines, agriculture areas, settlement areas, small islands, mangroves, corals reefs, seagrass beds, and the surrounding sea. The SEP shall also provide for the management of resources outside ECAN, including coastal resources, catchment areas, timber and mines, lowland development, settlement areas, and tourism. In addition, a total commercial logging moratorium was declared in Palawan in 1992. All timber license agreements are suspended and other private permits are disallowed until the ECAN has been fully delineated. With all these policy safeguards, the island of Palawan should have a much better chance of conserving its biodiversity.

> Environmental awareness has risen dramatically, with substantial impacts on policy:
> *A principal reason for changing local attitudes and practices in Palawan is the increasing vigor with which international and Philippine non-government organizations (NGOs), environmental and socially conscious in orientation, are attempting to nudge government development planning and everyday economic behavior in the direction of greater ecological sustainability. An impressive array of international NGOs and other funding agencies concerned with environmental protection and the well-being of local peoples, often indigenous peoples, is today represented in Palawan. More impressive still is the coterie of local NGOs that have grown up in the last ten years...By some counts more than one hundred NGOs now operate in Palawan.*

....In particular, these initiatives seek to turn over to the indigenous people themselves the legal management of the concessionary rights to these resources [copal and rattan]-- *rights that heretofore have been in the hands of outside financiers, who presumably had less interest than local residents in exploiting these resources in sustainable fashion...At a more general level, ... NGOs have also had significant impacts on government policy. Their efforts, for example, led to a recent total commercial logging moratorium in the province, a recent ban on the live fish trade, and the formation of ...a civilian watchdog group funded by the provincial government to monitor and report illegal logging, illegal wildlife trading, and the like. There is already local talk about Palawan's environmentalmovement being a model for the Asian region...*[60]

Current Conditions

Palawan remains basically an agricultural province, producing rice, corn, copra, and cashew in surplus. About three-fourths of it annual fish production or 72,000 metric tons is supplied to Metro Manila. There are more than 36,000 farmers, 11,000 municipal fishermen, and 441 commercial fishing operators. Exports include marine/aquaculture products, gifts, toys and housewares, furniture & wood products, oil, chrome, nickel, and silica sand. Its natural parks, St Paul Subterranean River, El Nido Marine Park and Tubbataha Reef, attract a growing number of local and foreign tourists.

In 1966, agricultural land occupied barely 5% of the total land area. By 1995, it accounted for 16% of total land area, about 245,400 ha. Palawan's medium-term development plan (1996-2000) identified 454,408 ha (30% of total land area) as potential agricultural land. Between 1991 and 1995, virgin forests were disappearing at an average rate of 10,666 ha annually[61], primarily because of agricultural development and land settlement. Cultivated areas and pasture areas grew at an average of 2,744 ha a year. Most of these were cleared from the forests in small patches, except for the government land settlement projects and penal colonies. The increasing conversion of forest to agriculture could also be due to the unsuitability of the lowlands for agriculture and to the fact that the indigenous communities have been pushed up to the mountains by the lowland migrants.

Palawan's forests provide apitong (*Diptercarpus grandiflorus*), narra (*Pterocarpus indicus*) and ipil (*Intsia bijuga*) for local and export furniture markets. Palawan forests, while called dipterocarp forests, do not have the usual species composition of such forests; apitong is practically the only dipterocarp species in Palawan. Most of the apitong-rich forests in Palawan

[60] J.F. Eder and J.O. Fernandez, in " Palawan, A Last Frontier".
[61] BFD. The reported figures were based on the comparison aerial photographs taken at different dates on the same areas.

have already been logged over[62]. The remaining old growth dipterocarp forests are rather heterogeneous[63], and the majority of commercial species are non-dipterocarp hardwoods[64]. Commercial logging in Palawan started in the 1960s. Products were used locally as well as exported to Japan. TLAs, issued for commercial logging, limit the area and the volume that can be logged by the TLA holder. In the 1970s, TLAs could be canceled if production fell below 50% the annual allowable cut[65]. The policy clearly encouraged cutting of trees, especially when the allowable cut was set at a relatively high level. Other important Palawan forest products with world markets are Manila copal, used in the manufacture of varnish, and various kinds of rattan used in the manufacture of furniture[66].

In the 1960s to 1970s, government policies encouraged the expansion of aquaculture. In the 1980s, a ban on further conversion of mangroves to fish pond was imposed. However, some mangroves are still being converted into fish ponds, despite the ban. On the national level, from 1918 to 1970, mangrove area decreased at 3,116 ha per year; and at 3,700 ha from 1980 to 1991. This decline parallels the increase in the fish pond area[67]. However, an aerial survey of mangrove in Palawan[68] showed very little degradation. The comparatively low rate of decrease can be attributed to Palawan´s extensive coastal area.

The Philippines still has the most extensive coral reef system in the world[69], an area of 27,000 km^2. The largest area, about 10,206 km^2, is located in Palawan[70]. While there is no official data on its status, concerns have been raised about the disappearance of coral reef ecosystems. Dynamite and cyanide fishing are the main causes of coral reef destruction, along with ineffective management for conservation and protection. The local government has undertaken some efforts to prevent further loss of corals. In 1993, the Palawan provincial government imposed a five-year ban on coral fishing in the province. Also in 1993, the Puerto Princesa City government prohibited the shipment of live fish and lobster outside the provincial capital. The Supreme Court has upheld both actions, dismissing a suit brought by a group of fishermen[71].

The fact that Palawan got into the mainstream of development only a few years ago, later than most provinces, explains its being the “last ecological frontier” in the country. Now that it is engaged in mainstream development, its natural resources are being reduced substantially. The

[62] Zamora
[63] Schade et. al.
[64] DANR-BFD
[65] Vitug
[66] Eder
[67] White 1987
[68] Almec & Seastems 1996
[69] Philippine Council for Aquatic Marine Research and Development (DOST-PCAMRD)
[70] Fernandez 1997
[71] Aquino

loss of biodiversity as measured by the indicators--forest, mangroves, coral reefs--can be traced mainly to the increase in population. The causal loop for the loss of forest cover in Palawan identifies crucial variables, namely the low initial population density and access factor, in-migration, and environmental and socioeconomic policies. Low population density and the low population pull of Palawan were the reasons why a significant fraction of its forest cover is still intact. Conspicuous by their absence are variables related to the role of the elite. Spanish influence in Palawan was minimal compared to the other parts of the Philippines. Although the Spaniards settled in Puerto Princesa, it remained a thinly populated frontier town up to the last decade of the 19th century. Palawan was a place of exile for criminals and political prisoners. It was constantly under threat of invasion by the Muslims. Over the years, various government regimes and private companies in mining, logging, and tourism built ports, airports, and roads. These contributed significantly to access to the biodiversity-rich areas and made immigration to the island easier. Today Palawan has the highest rate of in-migration in the country.

Settlements on the island have brought a slow conversion of forests into agricultural land. People came to Palawan for the same reasons people migrated to other frontier places in the country at earlier times. Although "seen more critically, Philippine land frontiers have historically served as politically convenient 'safety valve' to relieve some of the pressures caused by government inability or unwillingness to control population growth or to resolve agrarian problems in the densely populated lowlands"[72]. As in past decades, the larger share of migrants to Palawan have been farmers. The activities of these farmers and those of the loggers are responsible for the conversion of Palawan's one-time tropical forest landscape into an agricultural one.

The Palawan case study provided the following insights for the national biodiversity loss model:

- Civil society can challenge the power of the elite. In Palawan, NGOs were able to convince the government to impose a total ban on logging.
- Under the right circumstances, an ecologically sound development plan can attract political support.
- Population growth induces migration to areas with rich biodiversity and low population densities.

National and International Context

At the national level, rapid population growth, in conjunction with economic policies favoring exploitation of natural resources by a wealthy minority, and with continued control of

[72] Eder 9

government policy and relations with international markets by that minority, have been the root causes of destructive use of natural resources. Current patterns of resource use are deeply rooted in the history of Spanish and American colonial rule in the Philippines

Population

The best estimate of the population of the Philippines at the beginning of the Spanish Colonial period in 1565 is about 1 to 1.25 million. In the census of 1903, the population was recorded at 7.6 million. Today, the population is 70 million. In the study period (1890-1990) the population of the Philippines increased by roughly a factor of ten. The loss of forest cover is significantly correlated with population size. In the study period, forest cover in the Philippines dropped from 70% of total land area to 20.5%. The accelerated loss of forest occurred in the 30-year period of 1960 to 1990.

Policy failures in the population program have contributed to population growth, while policy failures in resettlement and land distribution programs for the landless have increased the environmental impacts of population growth. Land availability is affected principally by population density and agrarian reform policies. In the American period and during the first five years of the Philippine Republic, the response to high population density, poverty, and landlessness in some areas was resettlement to Palawan and Mindanao. The seriousness of the high growth rate has never been fully appreciated by the government. The Catholic Church has successfully blunted efforts to establish an effective population program. Until the administration of President Ramos, who is a Protestant, politicians did not have the resolve to go against the policies of the Catholic Church. By the time the population issue entered the public policy arena, population growth had already gained serious momentum. High population densities push landless farmers to biodiversity-rich areas such as the lowland forests, the coastal areas, and the uplands where they can eke out a living, and thus contributes to biodiversity loss.

Economic Factors

Commercial logging, community logging, *kaingin*, and the conversion of forest lands to agricultural lands are all influenced by economic policies. These policies have penalized agriculture and the rural population in the post-war period. The government overtly encouraged public and private monopolies in the major export crops. These policies led to the accelerated growth of poverty especially in the rural areas. This situation naturally led to the migration of the rural poor to biodiversity-rich areas and the cities. Government investment policies partially explain migration. Economic policies favor investments in urban areas at the expense of the rural sector because of urban political clout and urban access to mass media. These urban investments attract the rural unemployed, which contribute further to the relative political power of the urban community. This is one of the reasons behind poverty in the rural areas. While migration to the

urban areas reduces the flow of new migrants to the uplands, the persistence of rural poverty contributes heavily to illegal logging and timber poaching.

Economic policies from the 1960s to the 1980s did not generate significant industrialization or non-agricultural employment. Investment policy took the form of heavy implicit subsidies and market protection with the granting of tax and tariff incentives, which favored large, capital-intensive enterprises. Trade policy included a system of import licensing that bestowed lucrative profits on a few "crony" entities, but thereby penalized downstream industries with higher input prices. The exchange rate policy maintained an overvalued currency that effectively penalized export-producing and import-substituting activities. Financial policy favored bigness, as interest rate ceilings on loans and deposits forced banks to ration credit, which meant lending mainly to a few trusted clients.

Some economic policies have contributed directly to forest cover loss. One such policy was the unrealistically low stumpage fees common before the 1990s. This allowed loggers huge profits that not only encouraged them to accelerate cutting but also gave them the financial clout to bribe officials to relax some conservation regulations. World demand for timber and agricultural commodities were rapidly increasing in the 1970s and 1980s because of the economic expansion of Japan. The Philippines, under the corrupt martial law regime, took this opportunity to offer large tracks of forest land under concessions without regard to environmental impact. At about the same time, the pace of corporate farming accelerated and more forests were converted to agriculture. Commercial logging and the conversion of forest land to agriculture provided increased access to the public forests which stimulated upland migration and hence *kaingin*. Commercial logging was the major force in driving the positive feedback loops leading to the rapid decline of forest cover.

Foreign debt service was an important item in the Philippine economy from the mid-1980s to the early 1990s. During this period, debt service consumed some 40% of the national budget. Foreign debt service would be an important factor in the loss of forest cover if it provoked economic policies that encourage larger GDPshares for logging and agriculture. These exports are heavily based on natural resources, in the form of logs and agricultural commodities from newly opened agricultural land. However, the data do not suggest this was the case in the Philippines. Agriculture has maintained its relative share in GDP while forestry declined continuously in importance from 1970 into the 1980s and 1990s, although the last decade was the period of ballooning debt service. However, the absolute size of agriculture continues to expand in response to the growing economy and population. From the 100-year perspective of this study, the debt service period is a transient phenomenon which occurred in a period when most of the forests were already gone.

Political Factors

"Oligarchic politics" and "feudal society" are phrases that describe the Philippines during the century under study. The elite was created by the Spanish colonial encomienda policy, which distributed land to those who helped subjugate the country. At the beginning of the 20th century, the elite class of land-owning families was well entrenched. In fact, the elite is so deeply entrenched that, even after several wars and numerous agrarian rebellions, it still wields major influence in state policy-making. With political control in its hands, the oligarchy has preempted any major structural reforms. The landed elite dominated the emergent manufacturing sector, stunted the industrialization potential of the import-substitution industrialization phase in the 1950s and 1960s, and blocked the shift to export-oriented industrialization in the 1970s. They railroaded attempts at land redistribution, thus stunting the development of a domestic market needed to absorb local production. They also used their influence to divert massive state resources to traditional sectors, including sugar and coconut milling. Moreover, rather than invest in industrialization, this class was predisposed to use its agricultural surpluses for real estate speculation and consumption of luxury goods.

Despite numerous attempts since the turn of the century, particularly since 1960, agrarian reform efforts have not had substantial success in providing land for the rural poor. The elite has maintained its hold on prime agricultural land through various loopholes in agrarian legislation, which they themselves formulated. The target set by the Comprehensive Agrarian Reform Program (CARP) of 1987 is only 41% accomplished after ten years. Plantation owners continue to hold on to their property but, with the threat of CARP, tenure has become uncertain. The consequence is a general slow-down in investments in agriculture. The ranks of underemployed farmers swelled and headed for the uplands for their subsistence. In view of the rapidly increasing population, an ineffective agrarian reform has had no significant impact on land availability for farmers, and it lowers the productivity of agricultural land by discouraging investments. The two principal results of agrarian policies are continuous migration to the uplands and conversion of forest land for agricultural use.

The political variables which influence economic and agrarian policies are involved in self-sustaining positive feedback loops. The greater the share of wealth held by the elite, the more they are able to capture elective posts and hence, political power. Political influence has also enabled the elite to obtain highly profitable forest concessions. This added income not only enhanced their political power but also bolstered their ability to corrupt government officials. Thus, commercial logging expanded exponentially beyond the regulatory control of government. Political factors working in synergy with the huge demand for timber from Japan were the principal drivers of commercial logging (legal and illegal), and were the main reason for the rapid decline in forest cover from the 1970s to the 1980s. The concessionaires effectively dictated forest policy.

Conclusions

For the Philippines, the very high population density of 243 persons per km^2 is undoubtedly the single most important contributor to the loss of forest and biodiversity in general. The immensity of this number becomes apparent when compared to the world average of 59 persons per km^2. Migration has been one important consequence of high population density. The movement of people is a natural response to population pressures. Areas of low density attract migrants and high densities push them away. Biodiversity-rich areas, such as lowland forest and mangrove areas, are easy targets for in-migration. When these areas became unavailable, the stream of landless and unemployed sought refuge in the highlands, where they practice *kaingan*. The demographic history of the three island ecosystems we studied showed much larger increases in terms of rates and absolute values for forest cover loss for Cebu and Negros than Palawan. Within the study period, Cebu and Negros have lost their forests, whereas Palawan maintained a minimal loss and still yielded 56% forest cover in 1990. Because agrarian

reform has been ineffective, the requirements of a growing population for food are met more by agricultural expansion than by increasing efficiency or by the introduction of new technologies. With uncontrolled population growth, the incremental gains of the Green Revolution were washed away in a few years. New forest lands had to be converted to agriculture either by corporate farming or by *kaingin* practiced by the new settlers in the uplands.

		Percent	Percent
	Target(has)	Accomplished	Balance
	1987	1996	
Philippines	4,428,357	59	41
Palawan	39,666	88	12
Negros Occidental	272,356	26	74
Negros Oriental	118,934	40	60
Cebu	22,905	39	61

Source: Planning Service, Department of Agrarian Reforms

Lands Distributed in Hectares through Agrarian Reform (1986-1996)

The feudal political economy of the Philippines is responsible for the persistence of poverty that causes deforestation. The system was started by the Spanish colonization of the country when they imposed the encomienda system which created an enduring elite class. The American occupation of the Philippines supported the elite and did not attempt to redistribute land to landless farmers. With their wealth and education, the elite maintained their hold on political power. And with it, they were to gain a relatively large share of land and other natural resources. This phenomenon induces a positive feedback loop where most of the wealth, power, and privilege remained with a few families. This class dominated the agrarian and socio-economic policies, with the expected result of increasing the elite's share in the national wealth while increasing the poverty of the masses.

It is interesting to note that in the provinces that were influenced more strongly by colonial policies, agrarian reform is being resisted successfully by the landlords. In contrast, Palawan, which was not touched by the encomienda system, has already met 88% of its target. In Negros Occidental, which has most of the sugar plantations, agrarian reform is not proceeding as fast in Negros Oriental. These figures provide further support to observation about the Philippine political economy, that the landed rich wield tremendous political influence.

Some issues arise from a comparison of the three island cases. First, we know that some islands were already severely deforested before the beginning of the study period. For instance, in Cebu, the early Spanish conquerors already noted that there were not many trees in the island. A

detailed study of Cebu could yield insight into forces other than the current political economy that could lead to total deforestation. Cebu also presents an interesting case of the process of urbanization. Second, because of the significance that we have ascribed to the political economy, Negros Island is a good case study for this feature of the model. There, an elite has emerged out of a single industry: sugar. The conversion of public forests into sugar lands and the increasing demand for sugar at the beginning of the 20th century made the elite of Negros very wealthy and politically powerful. It is also interesting that the industry is linked not only to national politics but also to US colonial and trade policies. Negros is also a good place to look at massive land conversion to support a monocrop economy. Third, environmental activism has been on the rise in the Philippines since the early 1980s. As demonstrated in Palawan, environmental activism can play a role in changing policies when the environmental lobby acts as a counter force to the elite. As result of the work of NGOs, logging was banned in Palawan. Furthermore, Palawan is the only province with a national legislation for a strategic environmental plan. Yet, even with a strong clamor from planners and environmentalists, there is no specific law on land use for the Philippines. Although this is indeed happening in the country, there is very little forest left to warrant a good fight. However, efforts could be important in areas where some good forests remain such as Northern Sierra Madre, Palawan, and isolated areas in Mindanao.

Economic policies that promote logging; the conversion of forest land to agriculture; high poverty incidence in the rural areas; under-valuation of forest resources; and migration to upland and rural areas are all important to the loss of forest cover. Although logging has been diminishing in importance since the 1970s, its effects on the remaining forest cover continue to snowball because of the positive feedbacks that enhance the access factor and increase logging. Similarly, the failure of economic policy to reduce the absolute number of the rural poor provides the big push in *kaingin* and its associated feedbacks. Even if commercial logging were to stop today, the loss of forest cover would continue until most of the forest cover is gone unless two things happen. One, if the rural poor are totally prevented from gaining access to the remaining forest and, two, an immediate economic miracle reduces the absolute number of the rural poor to insignificant levels. The causal loop for root causes contains numerous feedback loops that suggest that the disappearance of one factor such as commercial logging or conversion to agriculture could stop the loss of forest cover.

Recommendations

* **Population Growth:** The burgeoning population of the Philippines results in the invasion of biodiversity-rich areas. The slow decline in Philippine fertility levels compared to those of its neighbors can be traced to low levels of contraceptive use, especially of the more effective methods of contraception. Under the Ramos government, the population program is addressing such issues as universal access to family planning information and services, especially to poor families and marginalized communities; community-managed services for family planning; closer

linkage and broad participation of NGOs, private and government organizations; and more sustainable and effective programs run by local governments. But much remains to be done.

The Catholic Church continues to be vigilant in its fight against artificial birth control. Thus, despite the strong latent demand for family planning services, access to such services remains a problem. Factors promoting fertility reduction are well-known: poverty reduction, female education and labor force participation, and an effective family planning program that offers a wide menu of choices of contraceptive methods. The Philippines scores relatively well on the first two counts, but fares poorly on the last, mainly because both the national and local leaderships are afraid to incur the ire of the Church.

* **Population Density:** Even if the population growth rate were to fall significantly, localized pressure on biodiversity would continue if population movements remains concentrated in a few areas. The review of the three island economies has shown how Cebu suffered from high population density over centuries. The Negros population boom has been relatively recent, but the economic activities that came with it have caused considerable damage in terms of loss of forest cover and consequent biodiversity loss. Palawan has thus far survived the migration onslaught, and constant vigilance has to be maintained to prevent further damage.

For the same level of population, a more even distribution across areas would be supportive not only of biodiversity objectives but of socio-economic and equity objectives as well. But how can the dispersal of people and economic activities across space be effected? This study has given us some negative examples. With uneven distribution of access to land, population pressure has forced people to migrate not only to the cities but also to the uplands. Obviously, the best solution is land reform, and the Philippines is not lacking in such efforts. However, problems remain despite the ambitious land reform program launched in 1988. The program should be completed swiftly or scrapped, since slow implementation creates uncertainty of tenure that leads to faster degradation.

Poverty and Inequality: Poverty and inequality are important national concerns, independent of their negative effects on biodiversity. Studies of Philippine poverty show that policies and programs which are supportive of over-all growth, such as improvements in rural infrastructure, reduce poverty more than those which try to tilt market forces in favor of the poor, such as price controls and food subsidies. There is room, however, for using market-based incentives to induce the upland poor to support environmental objectives. The social forestry program, for example, has the potential to involve upland communities in forestry conservation. The community-based resource management program, if properly designed, also has great potential. Since each community faces a different market environment, the decentralization and devolution of such programs will enhance their chances of success.

* **Market Failures and Policy Failures:** The government has failed to apply sufficient charges on logging activities. The government has not been "setting the prices right". Huge surpluses accruing to the private loggers have encouraged them to cut timber at rates higher than the social optimum. The problem has been exacerbated by uncertainty in tenure. The logger who expects to lose his concession in a few years' time is apt to cut the trees faster and is discouraged from engaging in reforestation. Stumpage fees and other forest charges were raised in the early 1990s, but the change may have come too late. One pricing issue seldom mentioned in the literature on deforestation is the cost of public funds. Because of the high discount rate applied for public investments, environmental projects with long gestation periods are placed at a disadvantage, as the the present net benefits of such projects are dragged down.

With respect to recent trends toward globalization, what policy initiatives would help towards the protection of the country's already fragile environment? Initiatives for eco-labelling would certainly be a step in the right direction: importing countries would become partners in directly monitoring the Philippine environment. However, environmental concerns must not be used by developed countries to camouflage new protective measures.

* **Political Economy:** The increasing political influence of civil society is a potential counterforce to neutralize the political power of the elite. The Philippine Congress is still dominated by relatives of the land-owning class. Civil society should go beyond environmental advocacy and attempt to capture elective posts. That this is happening at an increasing pace provides a measure of optimism. "Traditional politics" is becoming an increasingly undesirable label in the country. One hopes that we are seeing the decline of feudal politics.

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Appendix

Diagram: Causal Loop Diagram for Forest Cover in Cebu
Diagram: Causal Loop Diagram for Forest Cover in Negros
Diagram: Causal Loop Diagram for Forest Cover in Palawan

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