Patterns in Natural Resource Destruction and Conservation in Central America: A Case for Optimism?

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Introduction

The world community is alarmed about the destruction of tropical rainforests because of species extinction, depletion of genetic resources and possible worldwide climatic change (Myers 1986, Prescott-Allen and Prescott-Allen 1983, Wolf 1987) The statistics are not encouraging: about 110 acres (50 hectares) of rainforest are destroyed every minute, totalling 73,000 square miles (190,000 km^2) yearly (Myers 1986). Fifty percent of the remaining rainforests in the world will likely be eliminated by the year 2000 (United States Department of State 1981) Developed countries are pressuring developing countries, which own the rainforests, to protect this world heritage. Unfortunately the factors responsible for rainforest decline are very complex and linked to ecological, social, economic and political problems which vary from country to country. Developed countries share responsibility for the present crisis, making reversal of destructive policies in Third World countries difficult. They have promoted armed conflicts in Third World countries, failed to restrict the accumulation of international debts, and promoted unsound agricultural, development and environmental strategies with financial and technical assistance. In this paper, I will discuss the causes behind the present environmental crisis in Central America, present four successful Central American conservation projects and suggest general solutions to the environmental crisis.

Central America: Its Resources and Problems

The Natural Resource Base is Deteriorating

Central America is made up of seven countries (Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica and Panama), covers 208,150 square miles (541,190 km^2), or about 75 percent the size of Texas. The region stretches 900 miles (1,440 km) north to south and 300 miles (480 km) at its widest point and contains about 25 million persons. It has extremely diverse natural environments with a unique combination of flora and fauna because of its landbridge position uniting two continents and their migrating biota, its tropical setting between two oceans, and great varieties of climates, slopes, altitudes, and soil formation. Although tropical lowlands make up most of the region, the majority of the human population lives in the temperate volcanic, mountainous areas. The human cultures of Central America are also diverse. All Central American countries include people of European, Indian and African extraction, but the mixture of cultures and races varies from country to

country. Although most countries are strongly influenced by Spanish culture and tradition, Belize is predominately of African descent with English colonial tradition. Guatemala and Panama have large indigenous populations and cultures strongly influenced by them.

Despite its cultural, geographical, biological, political and social-economical heterogeneity, Central American countries share a dynamic interrelationship between natural resources, population and economic development. The region has a rich renewable natural resource base that is susceptible to natural disasters and human overexploitation. The economies of all Central American countries still depend heavily on the utilization of renewable natural resources.

Unfortunately, the natural environment is deteriorating rapidly in Central America. Most countries have suffered loss of agricultural productivity due to soil erosion. In El Salvador, more then 50 percent of all arable land is badly eroded. Although development plans in the region and international loans stress agricultural production (Costa Rica received approximately 26 percent of foreign loans in 1989 for agriculture), virtually all optimal agricultural areas are now under cultivation. Emphasis on agricultural development frequently exacerbates ecological problems by subsidizing clearing of steep terrain or high-rainfall areas subject to erosion.

Less then 40 percent of Central America's original forest remains, and over two-thirds of the loss has occurred since 1950 (Figure 1) (Leonard 1986). With deforestation rates increasing every decade since 1950, up to 4 percent of remaining forests are destroyed yearly. Only a small portion of cut trees are utilized commercially. Most are burned or left to rot. Reforestation is usually carried out with exotic species and accounts for less then 10 percent of the deforestation levels. Exported lumber is usually not processed in Central America, so employment potential from forestry is low. At present exploitation rates, no commercial forests will exist in most Central American countries outside of the national parks and equivalent reserves by the year 2000 (Nations and Komer 1983). Wood and wood products are often exploited in these wildland areas and pressure will undoubtedly increase when important areas are stripped. Marine ecosystems are also being stressed by overexploitation, situation due to deforestation, pollution by agricultural chemicals and destruction of mangroves. Lobster and conch harvests have decreased by 41 and 27 percent, respectively, and smaller and second choice species are now dominant species caught by local fishermen (Leonard 1986).

Deforesting watersheds and misuse of agricultural lands on the Pacific slopes of the region has increased costs for dredging sediments in hydroelectric projects, reduced generating capacity and shortened useful life of reservoirs. Finally, coastal ports and important marine life breeding grounds in mangroves and coral reefs are being destroyed and altered by increasing amounts of silting and pollution.

Wildlife species have suffered greatly by habitat loss and overexploitation for meat, skins, eggs and other products. Endangered species lists for some countries now number 100 or more. Vaughan (1983) estimated that in 1983, only 28 percent of original forested habitat remained for 28 endangered species in Costa Rica. Areas available for these species decreased 40 percent between 1940 and 1983. Species most affected at a Central American level include: jaguar (*Panthera onca*), ocelot (*Felis pardalis*), tapir (*Tapirus bairdii*) and the hawk and hawk-eagles (*Accipitridae*). Species with potential for recreation or subsistence exploitation, such as the white-tailed deer (*Odocoileus virginianus*), are frequently rare or absent in suitable agri-

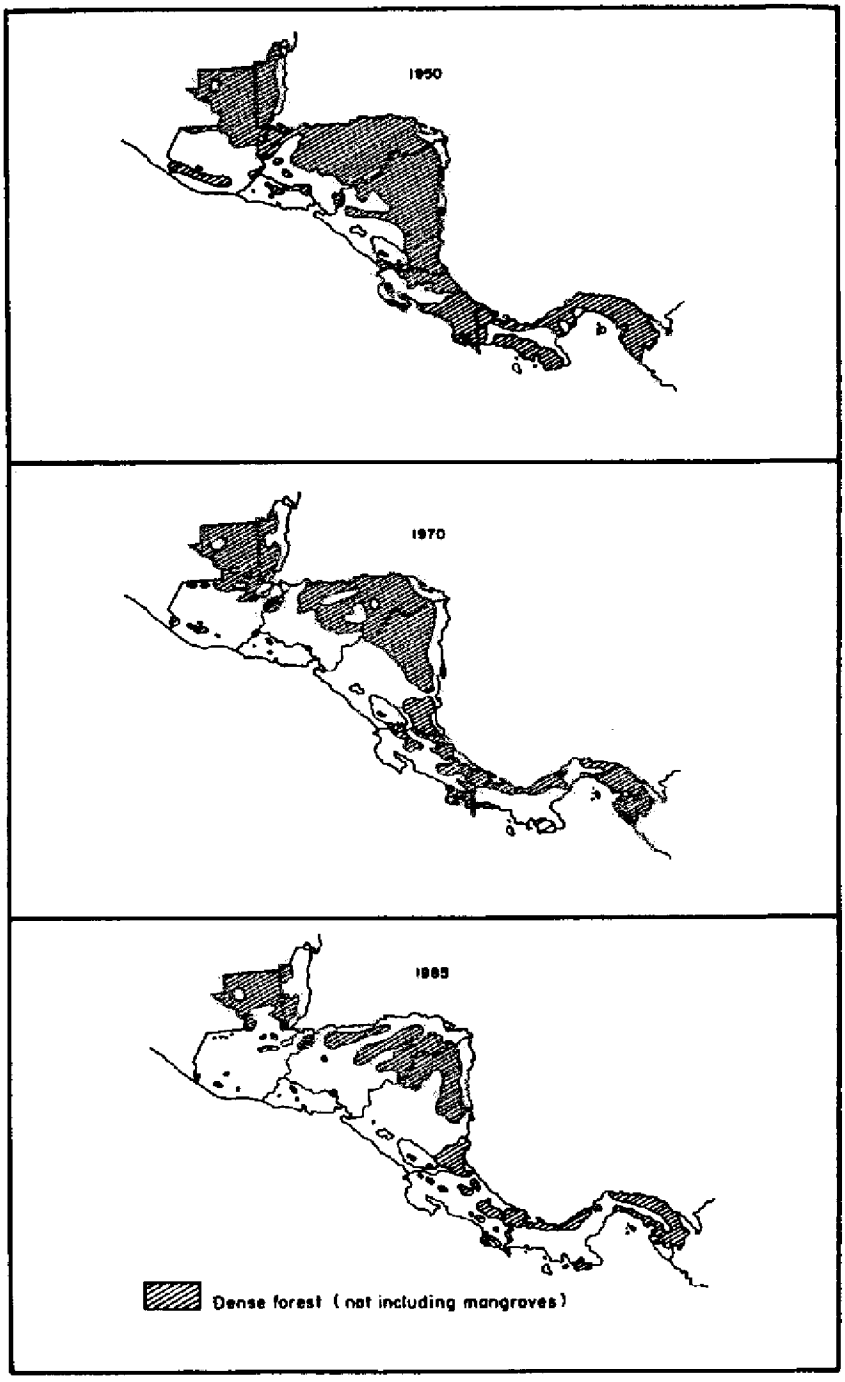

Figure 1. Deforestation in Central America 1950–85.

cultural habitats because of overhunting (Vaughan 1987, Vaughan and Rodriguez in press)

Hidden costs linked to this environmental degradation include lower agricultural yields on eroded soils, increased health problems because of inadequate diets and water contamination, reappearance of malaria and poisoning by pesticides restricted in developed countries. The highly inefficient pillage of natural resources in recent decades for short-term economic gain, has created an ecological crisis. Environmental problems, however, are intimately interrelated with problems within the social-economic-political framework of each country and are oftentimes of international origin, which will be discussed below.

World Champions in Population Growth and Very Rich and Very Poor

The Central American region exhibits wide differences in human population and density distribution, level of economic development and access to resources. Over two-thirds of Central Americans live in the deforested highlands. The slightly populated lowland Caribbean region has 80 percent of the remaining forests and most of the water potential. During the last two decades, human populations in Central America grew more rapidly than in any other region in the world, spurred by Latin cultural values and failure of the Catholic church to recognize the dangers of excessive growth. If it continues growing at the present 2 8 percent average annual rate, it could double its 25 million population in only 25 years (Population Reference Bureau 1986). El Salvador is one of the most densely populated countries in the world. Belize, eastern Honduras and eastern Nicaragua have some of the lowest densitites of humans in the Eastern Hemisphere Excessive human growth rates have caused migrations to already overpopulated urban areas and the scarcely populated and forested areas in the Atlantic zone. Both migrations negatively affect natural resource management. Urban migration has increased public health problems, crime and drug use, and pollution Rural migrations, oftentimes with governmental support to reduce pressure on large land holdings and urban migration, have resulted in deforestation and erosion in watershed areas and inadequate soils for agricultural use (Leonard 1986).

Distribution of wealth is very unequal among and within countries. Panama and Costa Rica have three times the per capita income of Honduras or El Salvador. During the 1970s, only 5 percent of the population of Central America received a yearly salary of US$17,600 The average annual salary was about US$200, and half of the Central America population received less then US$74 a year (Torres-Rivas 1983). In some countries, fewer then 2 percent of the population controls nearly all the fertile soil and 60 percent of all the land (LaFeber 1984). The skewed distribution of wealth tends to foment instability in the lower classes. The lower classes are particularly vulnerable to inflationary price increases in essential commodities (electricity, water and food staples) and cutbacks on social services. These are promoted or "dictated" by multilateral financing agencies, such as the International Monetary Fund to "stabilize" debtor countries (Barry et al. 1982). Instability of outlook often leads to destruction of natural resources, such as deforestation, overhunting or soil erosion, because a long-term view is difficult to maintain under crisis conditions.

External Debt Crisis

Large foreign debts incurred by Third World countries, especially those during the 1970s, sought to keep economies growing and to offset increased oil prices (Barry et al. 1982). The bottom line is that they haven't been succeeding in developing these countries, but instead have played an important role in tropical deforestation and environmental degradation (Gradwohl and Greenberg 1988) The combination of rising interest rates and global recession have made it almost impossible for Central American countries to meet payments. In 1985, the external debt of Central American countries totaled US$16.3 billion, in 1988 it was US$19.5 billion and it is expected to total US$23.8 billion by 1992, or US$900 for each Centroamerican (Varas 1988) Many governments are driven to exploit their natural resources to raise capital Increased debt leads to increased exploitation of lumber products, seafoods, agricultural products and minerals. Unfortunately, the billions of dollars in multilateral, bilateral and private commercial financing has not been evenly distributed, and instead has gone to the privileged sections, depending not on need, but on creditworthiness (Barry et al. 1982). Food crops for local consumption are lower priority then cash crops for export (Timberlake 1986) Ironically, many of the loans which created debt burden were obtained to promote development projects that accelerated the conversion of the tropical rain forest to agricultural lands, usually pastures for cattle. Even defaulting on loan payments can contribute to natural resource destruction because government economic measures associated with rescheduling payments can result in cutting back on low priority environmental programs in debtor countries (Gradwohl and Greenberg 1988). There are no easy solutions for debtor countries.

Armed Conflict and the Environment

During the Vietnam war, 44 percent of that country's rainforests and mangrove swamps were defoliated with herbicides, and 25 million bomb craters moved an estimated three billion cubic meters of soil. Central America is on the same path of military buildup and environmental destruction as Vietnam in the 1960s. Military expenditures in Latin America rose 75 percent in a decade, from US$8 billion in 1974 to US$14 billion in 1986 (Varas 1988). Men in uniform increased from 47,730 to 207,350 between 1977 and 1985. In 1980 there were 14 tanks, 114 artillary pieces and 223 military planes in Central America, while in 1985 this had risen to 138, 302 and 413 respectively (Gallardo and Lopez 1986). This military buildup took place in a region where in 1980 about 42 percent of the population was in a state of extreme poverty (Torres-Rivas 1983). In addition to transfer of military hardware, military build-up in Central America has been to train police and military and through civic action, intelligence work and coordination with programs (Barry et al. 1982). Part of this military assistance to the region comes in the form of loans, which must be paid back as external debt. Thus, this "assistance" not only destroys human beings and the environment, but must be repaid with interest, creating the problems common to a debtor country (Westling 1986).

Warfare in Central America in the 1970s and 1980s has been restricted to a low intensity strategy by the developed countries (Pearce 1982). Its impact on the environment and human lives is similar to that observed in Vietnam. Agent Orange and Round Up have been reportedly used to defoliate vegetation in Guatemala. Over

3,000 tons of bombs were dropped by the Salvadorean Air Force between 1980–85 on Massachusetts-sized El Salvador (Perez 1987). Up to 10 percent of the coniferous forests in southern Honduras were destroyed as a result of joint manuevers between Honduras and the United States. In Nicaragua, 250,000–350,000 Nicaraguans have fled from their homes and are forced to deforest for firewood, hunt and in other ways exploit the environment (G. Ruiz pers. com.). Other environmental impacts resulting from warfare in Central America include: (a) attacks on or death of researchers, students or governmental employees (guards, administrators) in natural areas; (b) disruption of administration and protection of wildland areas; (c) forest fires, deforestation, erosion, agriculture loss and illegal hunting by soldiers on manuevers; (d) blocking international support for environmental projects; (e) restricting national budgets for conservation work because of defense budgets; and (f) exodus of the best trained professionals in natural resource management from a country because of personal security problems (an estimated 25 percent of Central American university and technical school graduates are living outside the region) (Leonard 1986).

Case Studies of Successful Conservation Projects

Optimism

Given this dreary picture, optimism may seem out of place, but there are enough examples of successful programs in Central America to give some hope for the environmental future of the region. The following case studies were selected to illustrate approaches that have been successful in Central America.

Kuna Yala Biosphere "Comarca" (Panama)

Forest conservation goes hand-in-hand with cultural survival of indigenous cultures in tropical areas. Unfortunately, rights of the approximately 3 million Central American Indians distributed in over 55 settlements (Davidson and Counce 1989) have been largely ignored. Although improvements in treatment of some Indians have occurred, others have been dispossessed from their lands, massacred, and denied citizen status, even in the 1980s (Chapin 1989). The relationship between the Kuna Indians and the government of Panama provides an ecologically sound alternative. The Panamanian government under General Omar Torrijos (late 1960s and 1970s) provided indigenous groups with governmental assistance in welfare, education, and public health. As part of this program, the Kunas organized themselves and established a "comarca," or Indian homeland. This homeland was designed as a semiautonomous political organization under the jurisdiction of the federal government. The Panamanian federal and Kuna governments negotiated agreements that allow the Indians to govern themselves. The federal government does not interfere with decisions concerning cultural, economic and political matters which affect the Kunas and their land. The Kuna, in turn, acknowledge allegiance to the state in other matters (Herlihy 1989).

Threats of clearing and burning the 1,230 square miles (3,206 km^2) Kuna "comarca" by non-Kunas, were successfully met by the Kuna in the last decade. The internally well-organized Kunas: (a) lobbyied for legal land rights within state ministries and lawmaking bodies; (b) developed a forest reserve and management plan

for the reserve, called the Kuna Wildlands Project or PEMASKY, to promote sustainable use of ecotourism, medicinal plants, game, fresh water and construction materials; and (c) focused much of the Kuna community economic activities around the PEMASKY project—for example, all guards, construction workers, technicians, fund raisers, tourist guides, airplane pilots and hotel owners are Kunas (Gradwohl and Greenberg 1988).

Today the Kuna experience with their "comarca" is a successful example for the three other Panamanian Indian groups and other Central American indigenous groups to emulate. For over half a century, the Kuna have maintained this ribbon of rainforested coastlands and islands which extend some 110 miles (175 km) along the Caribbean coast. There are over 40,000 inhabitants today, or about 95 percent of all Kunas in Panama. If the Emberá Chocó, Ngawbere Guaymí and the Teribe are likewise successful in establishing "comarcas," over 3,850 square miles (10,000 km^2) of land, including the largest tracts of rainforests remaining in Panama and among the largest in Central America, would be added to these "comarcas" (Herlihy 1989). The "comarca" legislation, as practised by the Kunas, may be the best hope for integrating centuries-old subsistence economies into the modern world while maintaining ecosystem integrity. Certainly, this successful 50-year project is an outstanding example of Central America conservation

National Service for Conservation Areas and the National Biodiversity Institute (Costa Rica)

Few countries worldwide can boast of Costa Rica's success in wildland conservation and management. Two decades ago, conservationists were faced with tremendous economic pressures, the world's highest deforestation rate, one of the world's highest population growth rates, land-hungry rich and poor, a legal system which promoted deforestation and high international debt. These visionaries changed public and political opinion, captured large sums of international financial and political support and established a model system of 34 national parks and biological preserves which covered over 2,240 square miles (5,730 km^2) and some 12.5 percent of the national territory. With over 30 other wildland areas (wildlife refuges, forest reserves and indian reserves), by 1985 Costa Rica had 22 percent of its national territory in protected areas (Boza 1988).

Proclamation of 60 protected areas, however did not insure protection of resources Most wildland areas were "paper parks" and had no boundaries established. Protection was sporadic; personnel were scarce and, in general, not very motivated; no biological inventories had been done in the majority of the areas; funding was almost nonexistent, and coordination of management was lacking between neighboring wildland areas.

Beginning in 1986, the concept of Regional Wildland Units began. Efforts were made to insure protection of representative samples of all ecosystems in Costa Rica. The 144,000-acre (70,000 ha) Guanacaste National Park was created from several adjoining wildland areas and privately owned cattle farms (Janzen 1988). The 60 odd wildland areas were combined into eight regional conservation units, in most cases with one common boundary and an integrated administrative body per unit (Figure 2). Shifting the administrative bodies of these wildlands to the Natural Resources, Energy and Mines Ministry, and strengthening its political position within

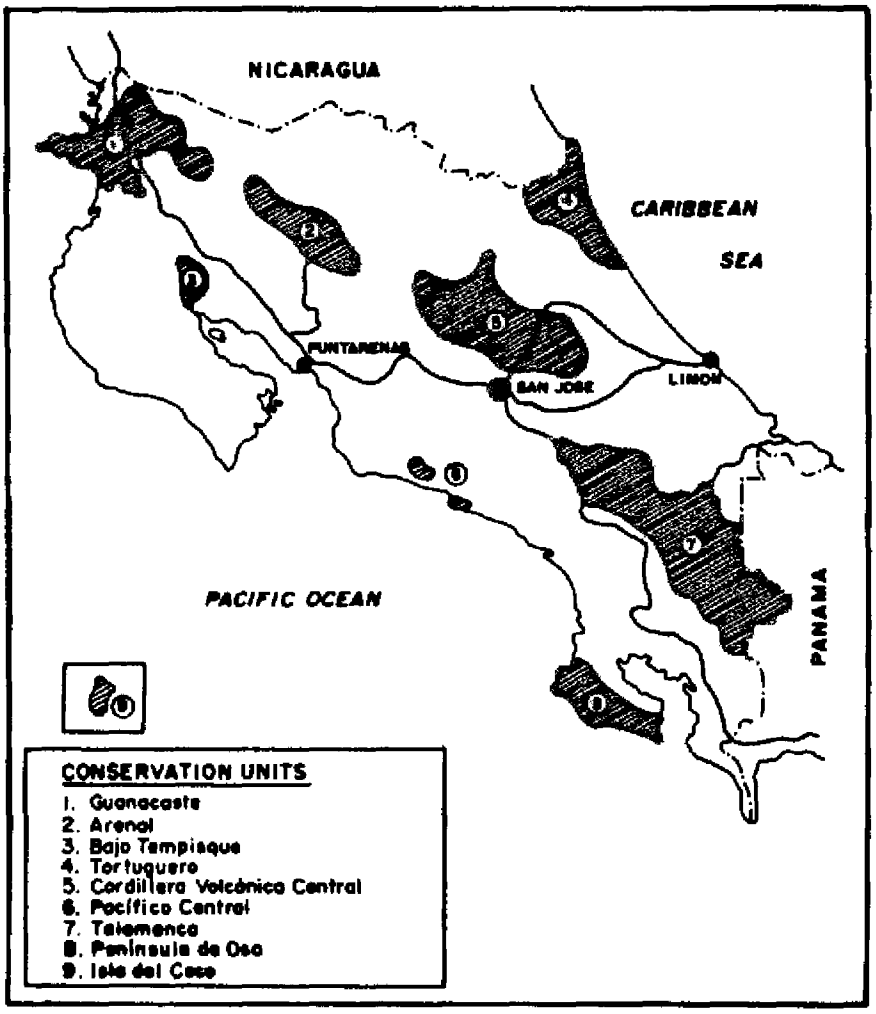

Figure 2. Regional conservation units in Costa Rica

this Ministry, has been a positive change. Recognizing the magnitude of financial and human resources needed for adequate functioning of this system and setting up private organizations for the administration of human and financial resources destined for management of the wildland units will insure a certain autonomy. In addition, descentralization of the decision-making process in each regional conservation unit by involving local public and private institutions in the directive councils ensures localized participation, as does searching for mechanisms to assure integration of the surrounding human population in each regional conservation unit so they share in the tangible benefits it produces. Finally, utilizing science and research in the establishment and management of these regional conservation units for the benefit of

future generations has begun (Costa Rica, Ministerio de Recursos Naturales, Energia y Minas 1989).

The integrated management practiced in individual units will be supported by a newly created Costa Rican National Biodiversity Institute. The National Biodiversity Institute will focus on collecting, cataloging and storing, organizing, identifying, and putting to work for Costa Rica and the international society plant and animal collections from the regional wildland units. This inventory will be the first complete effort for a species-rich tropical country (Lewin 1988) in which the entire biodiversity offerings will be organized. It is envisioned that the Institute will aid social processes such as agricultural and medical manipulation of identified pests, new crops and ornamental species, phytochemical extractions from known plants, gene exploitation from known organisms, management of wildland ecosystems for conservation or material production, intellectural stimulation in education, and research (Janzen 1989). The National Service for Conservation Areas and the National Biodiversity Institute work together in conserving the Costa Rican biota in an intelligent way.

Regional Wildlife Management for Mesoamerica and the Caribbean (Central America)

Many wildlife management problems must be addressed on a regional basis because species and habitats are shared by countries, funding is limited and technical training is most efficiently approached on a regional basis. To increase regional coordination, representatives of governmental wildlife institutions from Panama, Costa Rica, Nicaragua, Honduras, El Salvador, Guatemala and the Dominican Republic unanimously approved the formation of the Regional Wildlife Management Program for Mesoamerica and the Caribbean during a meeting held in Panama in October, 1984. The major objective of this regional program is to provide a body of well-trained professionals in the wildlife-natural resource field who will plan, develop and carry out research, extension and management projects.

Three regional priorities were identified in the Panamanian meeting: (a) training at the graduate and workshop level "in situ"; (b) developing a regional wildlife documentation center; and (c) developing model wildlife management projects in different countries. The Universidad Nacional in Heredia, Costa Rica was chosen to host this program because it was the principal regional institution with a technical and scientific capacity in teaching, research and extension in the wildlife field. Also, university officials at the Universidad Nacional pledged support for the program. Costa Rica was a logical country to host the program because of its peaceful and democratic traditions and history of political stability.

In 1987, the first regional wildlife program in Latin America began the first graduate program in wildlife management in Latin America. Highest priority within the regional program has been establishing the masters degree program in wildlife management. A report on training needs in Latin America estimated that by the year 2000, over 400 professional administrators and 3,400 researchers, teachers and managers would be needed for wildlife and related programs (World Wildlife Fund 1980). Central America currently has only five Latin American professionals trained at the graduate level in a wildlife-related field; 15 Central Americans will graduate in 1990 from our program. To date, 33 Latin American students from 13 countries (Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia,

Venezuela, Ecuador, Bolivia, Paraguay and Argentina) are studying in the graduate program, chosen from more than 140 applicants.

Students and staff feel that training in Latin America has advantages over training in First World countries. Training in Central America prepares the student for the socio-economic-political-ecological context within which wildlife management must be addressed in Latin America. Coursework not only includes the traditional core wildlife courses, but biological conservation, two rural sociology courses, a 42-day field ecology course, a 35-day field integrated management course, a wildlife diseases course, and an environmental education-communications course. The M.Sc. degree is awarded after 27 months of graduate study, which includes three months of preparatory courses, 12 months of graduate course study and 12 months of thesis work. Almost all students have guaranteed jobs upon completion of the program and will return to their countries as trained university professors or governmental or private conservation agency employees. Students average 30 years of age and have an average six years of professional experience before entering the graduate program (Vaughan and Cornelius 1988).

Another priority of the regional program is to distribute technical wildlife information. In Latin America, wildlife study and management has been handicapped because researchers do not have access to scientific literature. Private collections and specialized libraries are uncommon because they are expensive to establish and maintain. Access to "gray" or unpublished literature is also limited. To solve this problem, the regional program inaugurated the first wildlife documentation center in Latin America in 1988. This documentation center maintains over 9,000 reprints in a computerized system, 13 complete journal collections and 400 books, all related to wildlife. It serves as a library for the graduate students, staff and visiting researchers at Universidad Nacional. It will conduct free computer searches for wildlife related work in Central America and is presently involved in compiling "gray" literature from throughout Central America (Vaughan and Cornelius 1988).

Funding for the graduate program and the wildlife documentation center has been provided by the Universidad Nacional, U.S. Fish and Wildlife Service, World Wildlife Fund—US, German Academic Exchange Service, Jessie Smith Noyes Foundation and the Organization of American States.

Model Wildlife Management-Green Iguana Farming (Central America)

The third priority of the Regional Wildlife Management Program is to preserve native habitat and promote research and management projects on exploitable wildlife species found throughout the region. A species where this strategy is working is the green iguana (*Iguana iguana*), which has been used as a source of protein by man for over 7,000 years (Cooke 1981). Meat and eggs from this species is a traditional protein source for many rural poor throughout its range (Mexico to Brazil) (Etheridge 1982, Fitch et al. 1982). However, iguana populations are dwindling due to overexploitation and destruction of their rainforest habitat (Fitch and Henderson 1977). In many countries, it has been declared an endangered species (Fuller and Swift 1985) and, thus, denied to rural people as a legal food source.

The Iguana Management Project, conceived and initiated in 1983 by Dr. Dagmar Werner, staff member of the Regional Wildlife Management Program, is developing the scientific and technical capacity to increase iguana numbers and thus provide

both income and protein from eggs and meat for campesinos (Werner 1984) Management of iguanas is compatible with forest conservation and reforestation Dr. Werner's project combines an economically viable management scheme with appropriate technology transfer, while respecting cultural attitudes.

Iguanas have several biological characteristics which make them a desirable forest species to manage. They are poikliothermic herbivores, with an efficient conversion of plant materials to protein. They consume roughly 10 times less then an equivalent-sized mammal or bird (Gradwohl and Greenberg 1988). They also are highly productive, the females laying an average 35 eggs yearly, or about 300 eggs in an average lifetime. On the negative side, the grow more slowly then chickens, and it would make more economical sense to raise them in forested areas than in cages Also, in the wild, only an estimated 2.5 percent of a clutch hatch and survive to one year because of high predation. The management program developed by Dr Werner compensates for high predation by raising young iguanas from eggs and releasing them into forests (Werner in press).

To date, the Iguana Management Project has been very successful. Research has increased hatchability of eggs and hatchling success from 2 5 percent to 95 percent, with young at densities in cages of up to 30 juveniles per square meter. By experimenting with improved nutrition and selecting those animals with rapid growth rates, it has been possible to improve iguana growth rates, and thus egg and meat production. Also successful reintroduction and establishment of iguanas into depleted areas has been carried out with the cooperation of local human communities. Finally, Dr. Werner has determined that iguanas can produce meat at about half the cost of most domestic animals and produce the same amount of protein after a three-year period in a forested area that cattle would produce in a deforested area, without the added benefits of the forest products (Werner 1989).

Epilogue

At present, no region in the world is in greater ecological, political and economic turmoil than Central America. And no region is more vital to United States security, with two-thirds of all U.S. trade and the nation's oil imports and many strategic minerals passing on the Caribbean sea lanes (LaFeber 1984). Washington, D.C. is closer to Nicaragua than to San Francisco. It is a paradox that the vast majority of United States citizens are ignorant about this tropical region, where high diversity of natural and human resources contrasts with stark poverty, inequality in resource distribution and environmental degradation (LaFeber 1984).

With expanding human populations and legitimate expectations for a better lifestyle in Central America, and with mounting armed conflicts and rising external debt crises both nutured by outside sources, current evidence suggests that man's actions in Central America are reducing productivity of natural systems. This trend brings increased risk to the environment and its people. The health of the environment is closely tied to political upheavals, fluctuating worldwide economic forces and endemic poverty in the region (United States Agency for International Development 1989). Natural resource exploitation cannot be sustained at its present level: even with decreases in exploitation pressure as resources become more limited and harder to reach, future opportunities and options for rational natural resource utilization will

be lost or reduced (Leonard 1986). Central America is a timebomb whose explosion could have international consequences

Local governments are limited in confronting deterioration of the natural resource base. Isolated conservation organizations, universities and occasionally government agencies press for sound environmental policies, but they have little political clout. They are not usually unified; they do not have adequate budgets and there are rarely sufficient trained professionals. In the past, most major "resource development" projects with international support have been initiated to bring about short-term increases in agriculture, forestry, fisheries and hydroelectric production by opening new lands, constructing dams and roads, and cutting forests. Very few of these projects have been reviewed for their effects on long-term and sustainable utilization of natural resources. Projects with long-term prospects, such as reforestation, ecotourism, soil conservation, integrated pest control, wildlife management and watershed management, are very rare.

Despite the overwhelming weight of these problems, I believe there is hope. Successful conservation projects are possible and I discussed only four of these Successful projects generally incorporate local needs, traditions and participation, and international agencies should analyze these aspects of a project before offering funding and technical assistance (Timberlake 1986). Developed countries can assist Central America in lessening environmental impacts by cutting off military aid and reducing external debt by promoting such innovative projects as the "debt swap for nature" (Sevilla and Umaña 1989). Socio-economic-political problems such as high population growth and unequal land distribution must be addressed within national planning agencies. First World countries can assist Central American countries in developing environmentally sound policies Educating the public and policy makers of developing and developed countries as to the real issues involved in rainforest destruction and environmental degradation in tropical countries is long overdue. Then, with a proper attitude and concrete actions, I believe that Central America, its people and resources will have a chance.

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