

**WILDLAND  
CONSERVATION  
IN  
CENTRAL AMERICA**

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# WILDLAND CONSERVATION IN CENTRAL AMERICA

## Introduction

*The countries of Central America are similar to many other developing nations around the world in experiencing an expanding technology, rapidly increasing population, and threatened environments. A great need exists to protect the natural renewable resources. All human beings, and the small landowner in particular, are extremely dependent on self-sustaining, natural, life-support systems. These include watersheds which provide clean water for families, domestic stock, and wildlife; healthy forests managed on a sustained-yield basis for firewood, lumber, and by-products; fish and wildlife populations as supplemental food, skins, and by-products; and, soils free of erosion and compaction for crops, rangeland, and forests.*

*Furthermore, conservation areas such as national parks, wildlife preserves, and equivalent reserves, are extremely valuable. They normally provide jobs and training to nearby inhabitants, and offer recreation and environmental education to local and foreign visitors. Most importantly, these protected wildlands guarantee the future existence of sound ecosystems and vital natural resources.*

*Yet, almost all ecosystems in Central America are subject to an increasing number of environmental problems and threats. In every country one can find instances of degradation. Watersheds and water supplies are suffering from erosion and land slippage due to the uncontrolled cutting of forests, compaction of soils from livestock or*



*Rampant deforestation —a major threat to Central America's remaining wildland areas.*

*heavy machinery, and poor agricultural practices. The introduction of exotic plants and animals is causing competition with native populations on occasion, and, in some cases, the extinction of certain species. The transfer of infectious diseases and parasites across national borders, for the contamination of ecosystems and poisoning of people from the misuse of chemical pesticides and the contamination of ecosystems and poisoning of people from the misuse of chemical pesticides and fertilizers is a growing danger. Another insidious threat is the gradual destruction of scenic sites which have a high intrinsic value for tourism and recreation. Their disappearance can mean a loss of potential economic benefits.*

*A few specific cases may help clarify the scope of Central America's environmental problems. In El Salvador, whose population density is one of the earth's highest, firewood is becoming scarce. People are finding it more and more difficult to cook or warm themselves without this essential resource. Nicaragua's cotton-growing belt has been persistently and widely contaminated with pesticides. Fish and shrimp in the Pacific mangrove spawning and nursery grounds have diminished, as have water-birds and terrestrial wildlife. People have died.*

*At Lake Atitlán, Guatemala, the introduction of large-mouth bass in 1960 upset the aquatic ecosystem. As a result, the resident Indian inhabitants experienced a severe protein deficiency and the rare, flightless, endemic Atitlán grebe was almost exterminated. A similar phenomena took place at Lago Yojoa in Honduras. Logging, wildfires,*



*Wildfires have resulted in the destruction of vast areas of forested lands in the Mesoamerican region.*

*and ranching at higher elevations on Volcán Barú in Panama have caused considerable erosion, severe flooding, and a decrease in water quality and quantity downstream. Meanwhile in the Petén jungle region of Guatemala, an area of about 40,000 km<sup>2</sup>, enormous deforestation projects have already changed one-third of this area from dense, broad-leaved tropical forest to second-rate pastures and farms, much of it already reverting to useless brushland.*

*The Wildlands and Watershed Unit within the Natural Renewable Resources Program at CATIE (Centro Agronómico Tropical de Investigación y Enseñanza, or Tropical Agricultural Research and Training Center), is dedicated to prevent the kind of environmental damage described above. It assists the governments of the Central American Isthmus —Guatemala, El Salvador, Nicaragua, Costa Rica, Honduras, and Panama— in the management of their natural and cultural resources. Wherever possible, the Unit collaborates with and advises the institutions within each country so that as they become strengthened they may manage and utilize their own wildland resources more affectively.*

*The Wildlands Unit is engaged in providing support services for conservation activities including national park and reserve planning, surveys, development, and management. It arranges regional conservation meetings; conducts workshops, seminars, and training courses; and furnishes an international liaison and communications network with governments and conservation organizations. It is also fostering biological and sociological research in Central America which is also pertinent to preserving the diversity and integrity of natural ecosystems in the Caribbean, Mexico and South America.*

*All of the above projects are financed through a grant from the Rockefeller Brothers Fund (RBF) and financial contributions from The World Wildlife Fund (WWF), The International Union for Conservation of Nature and Natural Resources (IUCN), and CATIE. The Unit was established in July 1976 and began the RBF project activities in January 1977 under the leadership of Mr. Arne Dalfelt. The work is now (as of July 1978) being continued under Mr. Craig MacFarland, also an international wildland planner and manager.*

*The Wildlands and Watershed Unit functions through the Natural Renewable Resources Program at CATIE. This program (formerly known as the Department of Forest Sciences) is one of four main research and educational thrusts at the Center. The other three are the Perennial Plants Program, Annual Crops Program, and Animal Husbandry Program. All maintain a close working relationship with the Natural Renewable Resources Program and the Unit itself is fully integrated into these other programs.*

*CATIE is a non-profit, scientific and educational civil association, being international and regional (Central America) in character. In all its activities, it tries to improve the economic and social conditions of the small farmer and rancher in Central America. In its own way, the*

*Unit strives to produce long-term benefits for rural populations from the wise use of wildlands and watersheds.*

*The Wildlands Unit receives excellent logistical and technical support from CATIE which provides vehicles, housing, travel services, library and laboratory facilities. A close collaboration also exists between the Unit and many other organizations. It maintains flexible relations with the International Union for Conservation of Nature and Natural Resources, the World Wildlife Fund, the U.S. National Park Service, the Food and Agricultural Organization of the United Nations (FAO), the United Nations Environmental Program (UNEP), UNESCO, the Smithsonian Institution's Peace Corps program, Great Britain's Fauna Preservation Society, and others, and with several Central and North American universities. Staff is composed of four permanent members, but is greatly enlarged and enhanced by independent consultants, visiting scientists, Peace Corps volunteers, and post-graduate students from time to time.*

*Although Central America is the main focus of Unit interest, support is extended to Caribbean and South American nations whenever and wherever feasible. Given the scope of its activities, the Wildlands and Watershed Unit is probably the leading force in natural resources planning and management in Central America today.*

## NATIONAL PARKS SUPPORT SERVICES

The narrow, 1,600 kilometer bridge of land connecting North and South America contains an incredible variety of ecosystems. These range from dry zones edging the Pacific Ocean to tropical rainforests cloaking the Caribbean slopes. They include the tangled mangroves of Nicaragua and Honduras, the misty pine and cloud forests of Guatemala and Costa Rica, and the temperate-zone tops of numerous volcanos where a light etching of frost is common at dawn.

These ecosystems are increasingly subject, as explained, to population pressures and ecological abuses. Therefore, the Wildlands Unit's chief concern lies in trying to maintain ecological diversity and stability, protect the genetic resources, safeguard local Indian populations and cultures, conserve the fauna and flora, and generally preserve scenic and historical attractions.

One of the means by which it acts is to promote national parks and equivalent reserves which will save samples of ecosystems and serve as nuclei of natural resources. Work may take the form of researching, creating, developing, or managing Man and Biosphere (MAB) biosphere reserves, frontier or international parks, multiple use reserves, pilot national parks, and other types of conservation areas.

As stated, the Unit's emphasis is regional (Middle America) with a strong stress on the rural scene. However, it also takes a global view. It strives to fulfill international agreements and obligations in nature

conservation. This includes support of UNESCO's Man and Biosphere Program, IUCN/WWF promoted international activities, such as conventions to protect endangered species and the United Nations' monitored system of national parks.

The most vigorous aspect of the Central American national park program has been the establishment of a "pilot" park in every country for demonstration purposes. This idea was agreed upon at the 1974 conference—the Central American Meeting on the Management of Natural and Cultural Resources—held in San José, Costa Rica. Because it is not yet possible financially or logistically to develop all the needed parks and reserves simultaneously; and, because there are not enough areas set aside for open air recreation, research, tourism, and environmental education near the capitals and large cities, it was decided that each nation should choose and develop one pilot national park to show the value and importance of conservation to the public.

The main criterion of these pilot parks are easy access from metropolitan areas, and the protection of outstanding natural and/or cultural resources. Since this meeting was held, all six countries have taken the initial steps to create their prototype. This remarkable initiative has formed the beginnings of a Central American system of national parks.

Other types of conservation areas proposed or already started are a few very large "frontier" parks, smaller wildlife reserves, biosphere reserves, marine national parks, multiple use reserves, and archeological parks.

In the following section, the current state of park planning and development is briefly described for each Central American country, plus Belize and southern Mexico. The pilot parks are described as well as other major conservation areas. The main resources of each area are pointed out along with the environmental dangers facing them.

## PANAMA

The pilot national park for Panama is *Altos de Campana* which lies about one hours drive west of Panama City and the Canal Zone. It was decreed Panama's first park in 1966, but no serious effort was made to protect the area at that time. The 4,800 hectare park comprises at least five ecosystems, ranging from dry tropical forest to cool cloud forest. Several new species of fauna and flora have been found here during the past years, such as the unique golden frog. Altos de Campana contains unique geological formations, and its mountains are high and knobby. This gives the skyline a dramatic look and the climate a pleasant tone, in comparison with the low hills and plains and the enervating heat and humidity around Panama City.

One unfortunate circumstance is that subsistence farmers have already cut over and cultivated a large part of the park area. RENARE (Panama's Department of Natural Renewable Resources within its

Ministry of Agriculture) has recently begun planning and marking the park boundaries more clearly, and contacting illegal settlers.

RENARE originally requested and received assistance from the FAO project on Wildlands Management in Guatemala –the Unit’s predecessor– in formulating a management plan for Altos de Campana. A park administrator has been assigned and work is underway on basic visitor facilities. CATIE’s Wildlands Unit is supporting the park by designing and supplying buildings and interpretive displays, with training sessions, and in consulting services.

The second national park to be decreed (1976) is *Volcano Barú* in the extreme western part of Panama. This lofty mountain (3,478 m) is the country’s highest point. Both oceans can be seen from its rocky summit on a clear morning, and views along the steep trail are glorious.



*A hiker approaches the summit of Volcán Barú, highest point in Panama and one of the first national parks established in that country.*

The volcano’s ecosystems range from low montane rainforest up to very humid montane forest, and including cloud forest and elfin woodland. A goodly population of Quetzals, one of Central America’s most beautiful yet endangered birds, exists on the western and northern slopes. Near the peak, a fascinating complex of craters makes this volcano park a mountain climbers’ and photographers’ joy.

Although Barú is well-forested above 2,700 m, below this elevation clearing for food crops, flowers, lumber, and cattle has been so extensive as to result in severe erosion and land-slides at lower



elevations. Streams have silted up and at least one disastrous flood has caused serious damage and loss of human lives. The watershed and woodlands of Volcano Barú need active protection. RENARE is presently trying to clarify the ownership status and boundaries within the park. One park administrator and guards have been assigned. CATIE is assisting RENARE in elaborating the master plan for Barú.

*Bocas del Toro*, also located in western Panama, is the natural coastal counterpart park to lofty Volcano Barú. It is a group of islands in the Caribbean sea with corals, mangroves, white beaches, crystal clear water, and a rich marine life. The only access to Bocas del Toro is by small plane so recreational use has been light. However, sea turtles are being slaughtered by the local people for food and tortoise-shell. Since the area is not yet declared a national park, there is not legal protection or control. There is a strong possibility though that this area will soon be established as a marine/coastal national park.

In the *Canal Zone*, high interest is currently centered on forming at least two national parks. They would be close to the two major population centers, Panama City and Colón, and to two distinguished research centers, Gorgas Memorial Laboratory and Smithsonian Tropical Research Institute (STRI). The key reason for establishing parks in this area is to protect the existing rainforest and to prevent deforestation, the resulting erosion, and eventual siltation of the Panama Canal. Sedimentation of this world-important commercial waterway would lead to inestimable cost for dredging and maintenance.

In addition, a very high tourism potential exists. Few places are found in the world today where one can drive right through a tropical rainforest within minutes of a city center. In most places, a lengthy hike or jeep ride is necessary. Also, just along the "Pipeline Road" near Panama City, a total of 285 species of birds have been recorded. Thus, this area is most popular among bird-watchers and wildlife photographers.

Out in the Pacific, some 25 to 75 kilometers from Panama City, lie *Las Islas de Las Perlas (The Pearl Islands)*. Several small, dry, rocky islands with sheer cliffs and curving beaches attract large colonies of sea birds. These would make another superb marine national park. Most impressive is the sight of hundreds of Man-O-War, or Frigatebirds soaring above their flimsy nests on Pacheca Island during the breeding season. Brown pelicans, brown boobies, and various species of seagulls also use these islets for nesting and roosting.

Apart from a few scientific studies, no step has been taken to make Las Perlas a national marine park. However, one or two islands are already favorite tourist resorts, so it may not be too difficult to attain park status. This new role would surely give Las Perlas more protection and glamour for visitors.

*Portobelo National Park*, decreed in 1976, is perhaps the most important colonial historical setting in the Americas, along with Mexico and Santo Domingo. It lies within a protected bay and coastal strip of



*One of the most important historical sites in the Americas, the Spanish colonial fort Portobelo, is now protected by the Panamanian Department of National Parks.*

about 10,000 hectares, facing the Caribbean. Historically, Portobelo played a major role from the time of Columbus, through the era of pirates and Spanish plate fleets, until it was destroyed by the English in 1739. At one time it was considered the “key to two oceans” because of its strategic position on the main gold route between Peru and Spain. From 1574 to 1702, 45 armadas of galleons and other sailing ships left Portobelo. Given their collective cargo, it averaged out to about 10½ million ounces of silver per year! Clearly, this was one of the most active commercial colonial centers in the New World.

Ecologically-speaking, there is great diversity in this new national park. The nearby mountains rise to about 1000 m and are covered with humid tropical forest and premontane rain forest. Most woodland is little disturbed at higher elevations. The park coastline contains various islands, reefs, mangrove swamps, bays, beaches, and a few old fishing settlements (total population about 5,000). Very recently, some settlement has occurred inland along the lower valleys.

This encroachment gives cause for concern because the Portobelo watershed is a critically situated hydrological regime. It divides the Atlantic Ocean from Madden and Gatún Lakes. Thereby, it partly provides water for the operation of the interoceanic canal, and somewhat controls the quality of this water which is also the domestic source for Panama City. Mostly, though, it regulates river flows down to the sea. Excessive siltation and erosion on this side of the watershed could kill marine corals and fill the bays and mangrove swamps.

IPAT (Panamanian Tourist Agency) and RENARE are presently collaborating in managing this area. Earlier, the FAO project in Guatemala prepared a management plan for Portobelo. RENARE has placed a few guards in the park, and IPAT is working on the restoration of the fortresses and other ruins with a loan from BID (Inter-American Development Bank). The Unit is giving continuing consultant services to the park.

The *Darién National Park*, consisting of about 450,000 has, is at once the largest proposed conservation area, the most ambitious plan, and perhaps the most important biological region in all Central America. The Darién is one of the last three great tracts of undisturbed tropical forest in the Isthmus. The other two are the Mosquitia jungle of Honduras and Nicaragua, and the Chiapas-Petén area of southern Mexico and Guatemala. These wildlands have scarcely been explored by scientists and are legendary.

The Darién receives a high yearly rainfall (2000 to 5000 mm), thick evening fogs, and high temperatures and humidity. All these combine to produce a lush growth with dense rainforests up to 400 m, and verdant premontane and cloud forests on up to the mountain tops. The highest peak, Tacarcuna (1,875 m) is considered sacred by the Cuna Indians.

Since the early 1500's, this wild region has tolerated sporadic use by the early "conquistadores", colonial Spanish dwellers, English and other pirates, escaped African slaves, native Indians, and most recently, legal and illegal colonists. This human impact has diminished some of the forests at lower levels and also certain wildlife species. However, the prospect of far greater impacts lie ahead.

Tremendous attention and land use pressures will soon be focused in the Darién upon completion of the Pan American Highway. At present, the only stretch missing between Alaska and Tierra del Fuego is in the Darién Gap. Once finished, as is expected in the 1980's, the region will become dangerously vulnerable to ecological abuses, loss of cultural values now represented by the unspoilt native tribes, infiltration of squatters, and the spread of human and animal diseases.

Moreover, the Darién Province covers 22 per cent of Panama's Territory, but holds a mere 1.6 per cent of its population. With the predicted increase of Panama's population to 3.1-4.1 million by 2000 A.D., and the expected rise in land settlement schemes and tourism, the Darién faces an invasion of people and tough choices between exploitation and careful natural resource management.

For these reasons, the proposed Darién National Park has been given top priority. Its goals are multiple. They include saving representative samples of terrestrial, aquatic, and marine ecosystems; protecting the many watersheds; safe-guarding the future scientific, aesthetic, historical, and educational values of this wildland region; preventing the spread of hoof-and-mouth disease from South America north into Central America; eliminating the illegal entry of immigrants from Columbia into Panamá; and preserving the indigenous cultures and life

styles of the Choco and Cuna Indians (about 6,000) who inhabit the area.

One of the saddest events that could happen would be to lose the colorful and independent Cuna and Choco Indian cultures. Few other tribes in the Western Hemisphere present such a strong life-style as the Cunas with their bright molas, gold nose-rings, beaded leg-bands, and democratic government; or, the Chocos with their bare-breasted women, long shiny hair, black body paint, and hunting-fishing-gathering society. Both tribes are “ecosystem people”, living in stable harmony with the land and the jungle.



*The creation of the Darien Gap National Park in Panama will help to preserve the unique cultural traits of the Choco Indians which inhabit that region.*

Given all the above, it seems that a large, tightly-controlled national park with a cultural zoning system is the most feasible way to protect the Darién and its inhabitants. Fortunately, an important law formulated in 1972 declares the “Alto Darién”, (High Darién) as a Protected Forest. This will be of considerable help in establishing the legal groundwork for the national park. With little exception, the boundaries of this Forest encompass the proposed park. Nevertheless, this initial protection will barely be sufficient against the pressures soon to start. A master plan for the national park has been completed by CATIE’s Wildlands Unit, following a request from the Ministry of Agriculture in Panama.

## COSTA RICA

Costa Rica has become an outstanding example in Central American conservation for its system of national parks and reserves. It is probably the most advanced country in conservation-education, public awareness, number of protected areas, and park management in Central America. All of its major ecosystems are represented by parks or equivalent reserves. Fourteen wildland areas have been protected and are described below. For further information, the reader is referred to the excellent Costa Rican National Park Service's publications.

*Volcano Poás National Park.* This park was already developed in 1974, and now is a pilot national park. It has received a loan of \$1,800,000 U.S. from the Central American Bank for Economic Integration for construction of facilities. This bank loan sets an extremely important precedent for conservation work in Central America.

*Santa Rosa National Park.* This is another pilot national park and Costa Rica's only historical one. It contains the only protected example of Pacific dry tropical forest as well. One of its beaches, "playa Nancite" is world-famous for the massive arrival at the same time of over one hundred thousand female turtles, the Pacific Ridley, which have since immemorial times used the sandy shores to lay their eggs.

*Tortuguero National Park.* The beaches of this section of Atlantic coast are important for nesting of Green and Carey sea turtles. The coastal swamps and wetlands are also manatee habitat. Palm forests and Caribbean lowland rainforest are found here.

*Corcovado National Park.* This is the Costa Rican Park Service's "ecological showpiece". The unusually high investment of about \$5 million U.S., however, is resulting in good educational, scientific, and economic pay-offs. Many endangered species such as the jaguar live in this Pacific coastal park, and there are rich archeological remains on Isla del Caño.

*Chirripó National Park.* The highest peak in Costa Rica and southern Central America (3,820 m) offers splendid views, cloud forest, paramos, an interesting flora and fauna and evidence of glacial formations.

*Beaches of Manuel Antonio National Park.* Tropical forest edges three broad, white, curving beaches in one of the most beautiful recreational areas of Costa Rica. Wildlife and sea birds are abundant.



*One of Costa Rica's most beautiful Pacific beaches, Playa Manuel Antonio, is one of the many scenic areas managed by the Costa Rican National Park Service.*

*Rincón de la Vieja National Park.* This active volcano is located in the Guanacaste Range (1,898 m) and contains 9 eruptive points, fumaroles, and hot mud pools. Thirty-two rivers originate on its slopes, making it an important watershed for the region.

*Tempisque National Wildlife Reserve.* Costa Rica is proud to declare its first wildlife preserve. Tempisque is probably Central America's key waterfowl swamp area and comprises over 11,000 hectares of protected land.

*Cahuita National Park.* The only significant coral formation on the Atlantic coast of Costa Rica is found here. Forests of palms edge gorgeous white beaches, making a most picturesque landscape.

*Barra Honda National Park.* While legally established, Barra Honda is still not implemented or ready for the public. It is a system of caves and caverns of great beauty with populations of bats. Much of this subterranean world is yet to be explored.

*Cabo Blanco Absolute Nature Reserve.* This is the oldest reserve in Costa Rica. It is situated at the very tip of the Nicoya Peninsula and has a rocky, sinuous coastline attractive to sea birds and marine life. Cabo Blanco has excellent examples of dry tropical forest species.



*Costa Rica's first National Wildlife Refuge, Tempisque will protect valuable habitat for a number of migratory and resident bird species.*

*Islas de Guayabo, Negritos, and Pájaros Biological Reserve.* These small isolated islands in the Gulf of Nicoya serve as nesting and roosting sites for colonies of frigate birds, brown boobies, and brown pelicans.

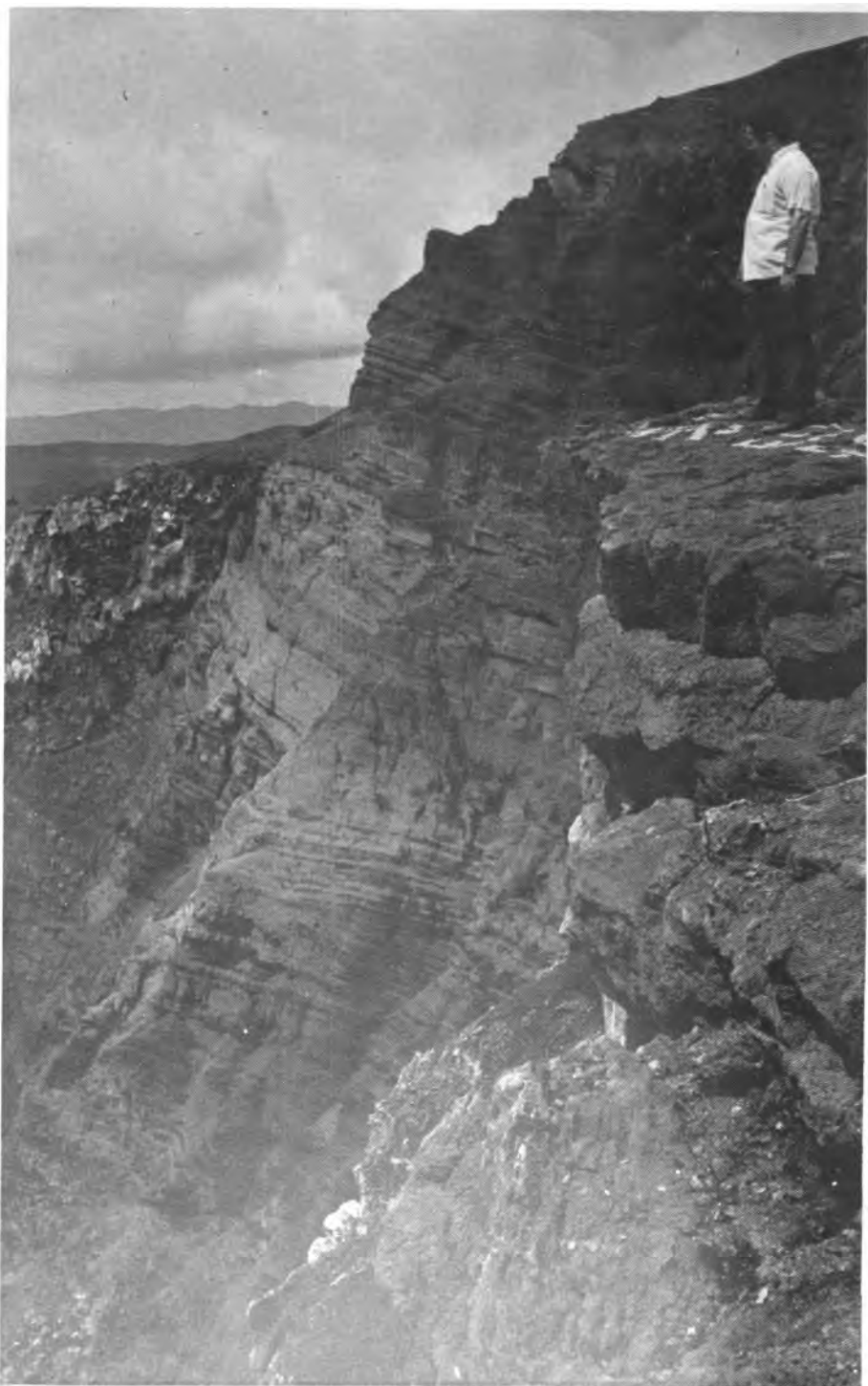
*Monteverde National Biological Reserve.* A prime sample of virgin cloud forest stands high in the central mountains of Costa Rica. It possesses the largest population of Quetzals in the entire country.

*Guayabo National Monument.* This is the most important archeological site in Costa Rica, with ancient paved roads, monuments, and aqueducts. It is located on the slopes of Volcano Turrialba.

Future work in Costa Rica should probably be concentrated on consolidating the existing park system and on furthering conservation education. For these reasons, the Wildlands Unit at CATIE performs a rather low-key function in Costa Rica. Its main service has been in funding, training, and consulting.

## NICARAGUA

Nicaragua began a land use and capability survey which includes wildlands after the San José natural and cultural resource meeting in 1974. The plan for the Pacific region (first phase) has been completed.



*Volcán Masaya Pilot National Park, one of the fastest developing parks in the Isthmus, is Nicaragua's first.*



The second phase for the northwest and central area is presently underway. Meanwhile, the highest priority is being given to implement the *Volcano Masaya Pilot National Park*. All attention is focused here—one of the fastest developing parks in the Isthmus. After its completion, work will shift to other wildlands, principally Saslaya National Park and a huge wilderness area north of it of 12,000 square kilometers. Also, two more volcanoes may be developed. One is *Volcano Momotombo*, including its lagoons and the nearby shore of Lake Managua; the other, *Volcano Mombacho* which has two patches of rare elfin forest and lakes with aquatic bird life.

In one way, planning activities are hampered by the lack of an institution with specific responsibilities for national parks, and by a general lack of public understanding and support for environmental conservation. On the other hand, an impressive effort has arisen for the *Masaya Volcano National Park* project. The Central Bank of Nicaragua has set aside 1 million dollars U.S. for its development and land purchases. The Central American Bank for Economic Integration has promised another \$800,000 U.S. so far, if the national planning organization gives Masaya top priority. This pilot park with its ready access to Managua's population, and its high educational values, should soon be ready.

The volcano has an active crater with a view into a burning lava lake. Somewhat below the crater complex lies a blue lagoon, Laguna de Masaya, a unique caldera lake. Ecologically, this pilot park is intriguing because of its various successional stages, starting with pioneer plants on bare lava flows to dry tropical forests on more mature soils at lower elevations. Views from the summit road onto the surrounding plateau are most photogenic.

The Wildland Unit's main function with Volcano Masaya National Park is in training, consultant services, planning assistance, and providing interpretive expertise. Unit personnel will continue to visit the project and local conservationists, as well as the financial contributors. It will generally support new conservation interests and park proposals in Nicaragua.

Saslaya National Park, 11,800 hectares of rugged mountain terrain in north central Nicaragua, represents the only officially declared National Park in this country. The expanses of primary rainforests encompassed by park boundaries provide suitable habitat for a variety of wildlife species such as jaguar, margay cat, boas, deer, peccary and others. Although the area has tremendous potential for scientific, recreational, and educational uses, it has not yet been developed. This is mainly owing to its isolated location. It is certain though that much more attention will be given to this outstanding natural feature in the near future.

The reefs, sandbanks, and islands of Nicaragua's Caribbean region are as wild and fascinating as any part of coastal Central America. Two spots of exceptional interest are the *Pearl and Miskito Cays*. These

remote islets are surrounded by fertile feeding grounds of green and carey sea turtles, as well as colorful marine fishes. The Miskito Indians, who are virtually unknown to the world, live spread out along the coast and on these keys. They have practised a subsistence turtle hunting and fishing for centuries.

Unfortunately, just a few years ago, two plants for processing turtle meat were opened in the keys. Enough meat was handled in one week to equal what the Miskitos had taken during an entire year. Not only was the turtle population practically destroyed, but the Indians' main supply of protein was drastically reduced. Thanks to conservation pressures, a complete ban was eventually passed on turtle marketing. Now the processing plants have turned to shrimp and other shellfish as their main products.

Nevertheless, a certain urgency exists to give more permanent protection to this island-reef-sandbank area. In addition, research should be conducted on the local turtles since they are an important segment of the Caribbean populations. These efforts need to be coordinated with the Costa Rican National Park Service because many of these animals use both Nicaraguan and Costa Rican feeding grounds and nesting beaches, particularly Tortuguero National Park.

Future park planning, in which the Wildlands Unit may take part, include potential areas in the extensive jungles of central Northern Nicaragua, which is still only scantily explored, and in the *Golfo de Fonseca* (Gulf of Fonseca). This huge natural harbor is one of the few protected landfalls along the Pacific coast from Baja California to the Panama Canal. Fonseca has offered semi-safe anchorage to sea-farers for centuries. It is an arid, hot region studded with numerous small volcanoes and islands, and is shared with Honduras and El Salvador. Along the indented shoreline, the explorer-naturalist can still find isolated mangrove stands with winding creeks and brackish lagoons. Such areas are excellent habitat for herons, egrets, parrots, howler monkeys, crocodiles, waterfowl, and even occasional deer which wander out of the dry adjacent woodland.

#### EL SALVADOR

The Central American country with the smallest land space, highest population density, and most industrialization is El Salvador. Very few wildlands still exist, and those that do are under extreme pressure and usually are greatly disturbed. Nevertheless, the Salvadorean National Park Service is moving ahead on its own. It has chosen its pilot park and at least three other potential areas.

*Montecristo* (called "Trifinio" in Guatemala and Honduras) lies on the border of these three countries. It is found within an extensive region of broken mountains, much of them covered with primary premontane rainforest and cloud forest. In such cover, fogs, mists, and rain are common, creating a dim and mysterious atmosphere. This environment provides a perfect habitat for Quetzals, and a healthy population of these endangered trogons exists in the 800 hectares of

climax cloud forest at Montecristo. Another great attraction is the large number of orchids and bromeliads. Over 200 species of orchids have been recorded, at least one-quarter of them endemic to El Salvador. A small orchidarium has been constructed at Montecristo in order to instill a new appreciation for these plants in the visiting public. In the pine and oak forests, two-toed anteaters, spider monkeys, peccaries, and, occasionally, pumas roam.

Development of an international park was originally discussed at the San José meeting, and further plans are now being made to attempt to establish a truly tri-national frontier park. In El Salvador, the Montecristo area covers about 2,000 hectares. And, the Trifinio wildland area in Guatemala and Honduras amounts to several thousand more. Although Montecristo is still not yet legally declared a national park, the watershed is well protected having been officially declared a forest reserve by the government.

Park guards are already on duty. The Unit has helped out with some equipment and training sessions.

*Lago Jocotal*, a very shallow, eutrophic, 1,000-hectare body of water, is receiving considerable attention. Large numbers of native and migrating waterbirds use Jocotal. In the past, the lake was extremely popular with duck hunters. All four species of Central American ducks, including the rare Masked duck (about 100 pairs), are found here, plus teals, ruddies, shovellers, and other northern species between October and April. Herons, egrets, coots, anhingas, blackbirds, crocodiles, and others make themselves at home here throughout the year. Without doubt, Jocotal is the richest fresh-water area in El Salvador.

This abundance of waterfowl, however, proved too tempting to sportsmen. Until recently, it was common to hear of incidents such as the three hunters who shot 400 ducks in three days at Eastertime! Lago Jocotal's birdlife was being decimated, and already nearby Lago Olomega had been cleaned out.

In one bold stroke, the Park Service closed the area to hunting. It has held this ban effectively. However, a new, more insidious, threat has appeared -pesticides, mostly from nearby cotton fields. During the rainy season, large die-offs of birds and fish have taken place. The Park Service is making a strong effort to work against these degrading uses by improving its management of the lake.

Meanwhile, the aesthetic qualities of Lago Jocotal are being enjoyed and promoted. It is enchanting to boat quietly through narrow channels among lilies, water hyacinth, and rushes at dusk under the shadow of Volcano San Miguel (2,164 m). Or, to watch a flock of ducks silhouetted against a flaming sunrise and hear their wild calls. Jocotal deserves to be part of an international system of wildlife reserves which will ensure our migrating waterfowl safe, uncontaminated resting and wintering grounds.

Another area of recent interest is "*El Imposible*" Forest. It is named for a tortuous mountain pass, and contains a larger diversity of tree

species than any other forest in El Salvador. Over 300 kinds are known. Many of its orchids and air plants are different from those growing at Montecristo. Furthermore, some of its fauna occurs nowhere else in the country, for example, the tayra, three-toed anteater, ocelot, and crested hawk-eagle. And, of course, many other animals such as butterflies, tree frogs, and parakeets move through the green glades of El Imposible. Curiously enough, the area was scarcely if ever visited by naturalists or scientists until 1975, perhaps because it had been rather inaccessible and in private ownership for so long.

Nevertheless, the region has been known to professional sportsmen for decades as being a fine hunting ground. They have eliminated the large cats, white-tail deer, collared peccary, and probably the great currawow. Currently, pressures are mounting to cut the trees and turn the area into coffee plantations.

The Park Service is making flora and fauna studies, and checking out the land tenure and proposed park boundaries. Money was allocated by the government in 1978 for buying El Imposible. Meanwhile, several park guards have been stationed here to protect the 4,000-hectare forest against illegal squatters and timber cutting.

## HONDURAS

One of the three great wild tracts referred to earlier is the *Mosquitia*—a region of legends, teeming wildlife, trackless jungles, and little-known bands of Indians. Quite aptly it is called “Central America’s Little Amazon”. From the coasts of Honduras and Nicaragua, where broad lagoons border pine savannahs, up the rapid-strewn rivers, to the tops of the watersheds, this area is practically unexplored by scientists.

Here, rivers are the roads. A few small teams have gone out to determine the most valuable areas to be conserved within the Honduran *Mosquitia*. And, in May, 1977, a full-fledged expedition supported by the Honduran Natural Resources Division (DIGERNARE) of the Ministry of Agriculture, and by the Wildlands Unit, conducted a preliminary ecological inventory. It spent a month travelling by dugout up the Río Plátano, least disturbed of all watersheds in the *Mosquitia*.

The expedition found most of the endangered species of animals in Central America—tapirs, jaguars, manatees, harpy eagles, crocodiles, otters, and others—in the rainforest. Moreover, it reported splendid scenery. One exquisite waterfall drops about 500 m from the top of Cerro Mirador. It may well be the highest in Central America. The river itself roars through a short canyon, spreads out in peaceful shallows, and foams over numerous rapids. Many peaks rise to over 1,000 m, forming a jagged and unusual skyline.

The native population is scattered and sparse—no more than 2,000 Payas, Miskitos, and a few ladinos. However, the pre-Columbian population must have been far larger. Like Belize and Guatemala’s



*Portaging rapids in the headwaters of the Río Plátano, Honduras, one of Central America's most spectacular wild regions.*

Petén area, the Mosquitia has an abundance of archeological ruins. Weird petroglyphs are found carved on giant river boulders. And, the fabled "White City" is marked on the maps, but still waiting to be found. This legendary Indian retreat is responsible for having the area declared a National Archeological Park in 1969. The existing legal framework will make implementation of a national park far easier. Actually, a very good case can be made for setting the 200,000 hectare watershed aside as a MAB Biosphere Reserve.

Despite the total primitiveness and isolation of the Río Plátano area, logging interests will soon approach dangerously close to the watershed's upper ranges unless hard decisions are taken soon. DIGERENARE is trying to bring these about by collaborating with COHDEFOR, Honduras' Forestry Department, as the two organizations have successfully done in Lago Yojoa and La Tigra National Park.

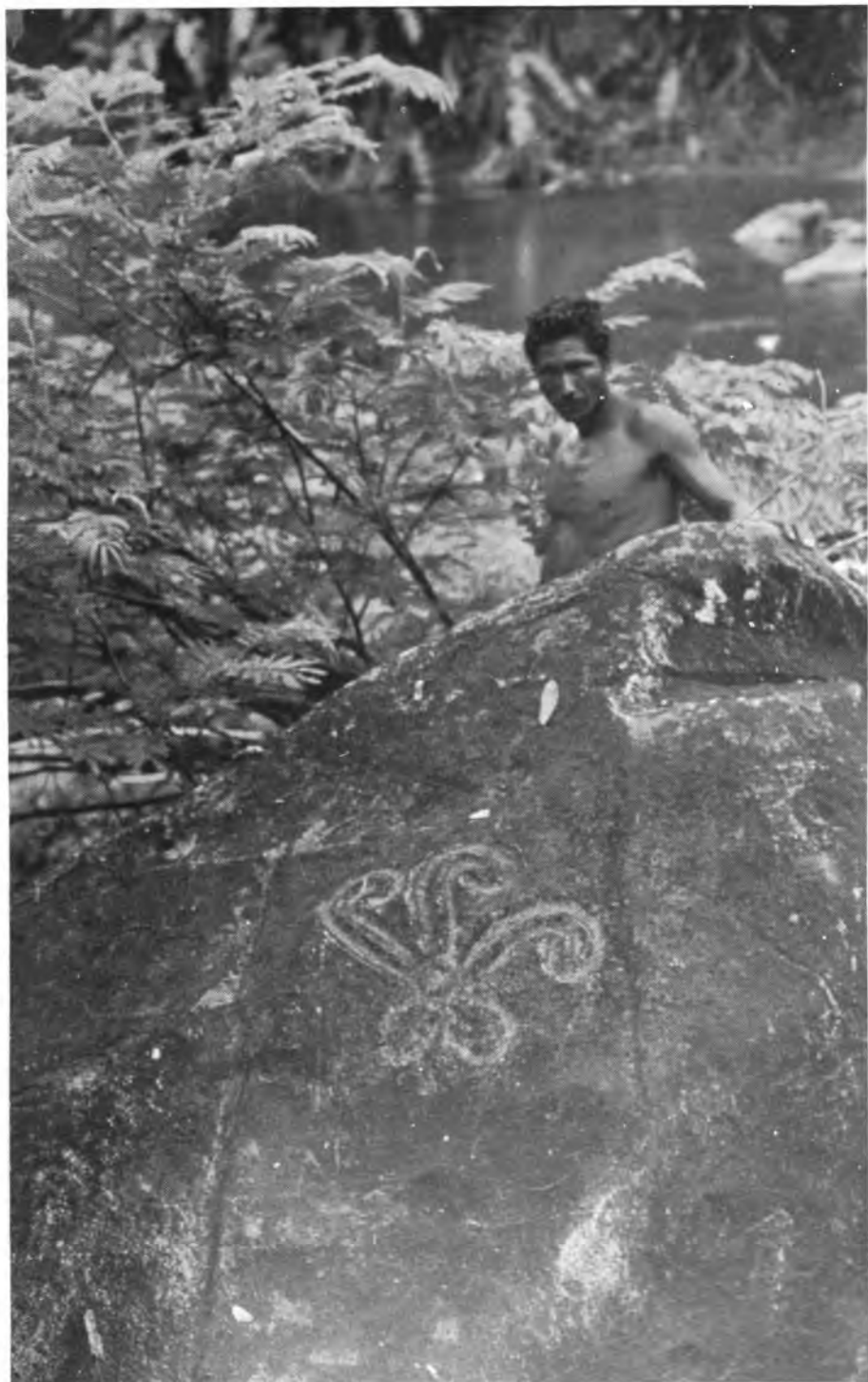
The Wildlands Unit is working closely with DIGERENARE and the Anthropological and Historical Institute of Honduras in furthering the inventory and planning of the Mosquitia park.

In complete contrast to the Mosquitia, yet making an ideal juxtaposition, are the *Bay Islands*. Like the two other "park packages" discussed here –Volcano Barú/Bocas del Toro and the Maya Mountains /Belize Barrier Reef– this combination offers the same mix of forested mountains and a marine environment.

The Bay Islands are said to have some of the finest coral reefs in the Western Hemisphere. They also have sand beaches, cliffs, mangrove swamps, and sand flats distributed between the three major islands of Utila, Roatan, and Guanaja. These tight little island communities are equally fascinating sociologically. One can guess at the influence of



*Pico Dama, a 150 meter spire of rock, towers above the tropical rain forests of the Río Plátano watershed.*



*Petroglyphs found on the Río Plátano offer a unique insight into the cultural heritage of Honduras.*

English pirates, African slaves, and Spanish colonists upon seeing and talking with the inhabitants. Their light-colored eyes, fair skin, kinky hair, and lilting English speech are unique to Central America. Many Bay Islanders make their living fishing, shrimping, and lobstering. Therefore, a national marine park would help protect these resources for a long-term future sustained yield.

A recent study made for the Central American Bank for Economic Development considers this area as having great tourist potential, and recommends making the reefs around Roatan into a marine national park.

Honduras shares the same proposed *Montecristo/Trifinio* park (described under El Salvador) with that country and with Guatemala; also, the *Golfo de Fonseca* with El Salvador and Nicaragua. The political situation with the former nation, however, has stalled park development at this time.

The pilot park chosen by Honduras is *La Tigra*, located less than an hours drive from Tegucigalpa (15 to 25 km). It is receiving high priority from the National Parks Division of DIGERENARE. *La Tigra* stands like a cool, green world apart from the bustle, noise, and heat of the capital. The range rises to 2,310 m and is clothed in oaks, liquidambar, and pines, with a type of cloud forest at the summits. Through these forests flash quetzals, peccaries, rabbits, whitetail deer, squirrels, and an occasional puma or ocelot.



*The multiple use concept of natural resource management has been chosen as the most appropriate strategy for managing the Lago Yojoa Watershed in Honduras.*



This mountain range is critically important as the watershed which gives a constant supply of potable water to the capital and suburbs. Fortunately, much of the land belongs to the National Hydrological Institute of Honduras, thus restricting private ownership. A cause of considerable consternation, however, to hydrologists and city planners is that the quantity of water released from La Tigra's watershed has dropped slightly over the past 60 years.

Years ago, mining for silver and gold occurred on a large scale in these mountains but is mostly abandoned now. But a few squatters have made recent inroads into the reserve. The old mining camp located half-way up the mountain road offers splendid panoramas over the valleys and will probably be restored as an unusual type of visitors' center with educational displays. Once roads are improved, La Tigra should become a popular pilot national park and feature on a pleasant half-day circuit for vacationers and tourists from Tegucigalpa.

*Lago Yojoa (Lake Yojoa)* is not a national park, but it qualifies as a Multiple Use Reserve. The main road linking Tegucigalpa with San Pedro Sula, the second city in importance, borders its shores for a considerable distance. A variety of uses, many with direct economic benefits to the rural population, take place here. Therefore, the main goal is to manage the lake and its watershed according to modern sustained yield principles.

For one thing, Yojoa has a thriving large-mouth bass fishery introduced in 1952 (at the expense of the smaller native species of fish). It is world-famous among sport fisherpeople. In addition, local subsistence fishermen take an estimated 80,000 pounds of fish from the lake annually. This forms an important source of protein for its inhabitants.

Another aspect is that Yojoa is a favorite among vacationers who come from the city of San Pedro Sula to enjoy the picturesque landscape. High mountains cup the lake basin and valley, and their aspect changes hourly as clouds and sun shift across the sky. The fact that Lago Yojoa is the only large body of fresh water (outside of the remote Mosquitia) in the nation is much appreciated.

Yojoa is used as a hydroelectric reservoir as well, supplying many Honduran cities with power. The farmland surrounding the lake is grown to sugarcane, coffee, bananas, and horticultural crops by both small and large producers. On the lower slopes, there are limited forestry operations underway, as well as mining for silver, cadmium, lead, and other minerals. The entire valley is dotted with well-known archeological sites such as tombs and ancient villages.

Above all these human activities stand the mountain ranges and their forests which form a vital watershed for Yojoa. Peaks rise on both sides of the lake to 2,104 and 2,835 m, respectively, and are still cloaked in wild forest. These woodlands are an interesting mix of northern and southern species which meet here and include hardwoods, oak, pine, fir, and liquidambar. On the highest slopes are about 7,000 hectares of



*Besides providing suitable habitat for the rare Quetzal bird, the cloud forests of La Tigra Pilot National Park in Honduras also play an important role in providing potable water for the capital city of Tegucigalpa.*

virgin cloud forest. These forests protect the lake and lower slopes from erosion and landslides, and they guarantee for the most part a clean and constant flow of water. Without this healthy watershed, the hydroelectric plant, fisheries, agricultural lands, mining operations, tourists and domestic users would be in jeopardy.

A certain amount of siltation, eutrophication, and contamination is occurring in Lago Yojoa. But, it is still minimal and can be controlled if squatters and cattle, slash-and-burn agriculture and wildfires can be kept from encroaching up the slopes.

The Lake Yojoa project is complex and will take years to finalize. A master plan for the rational use and conservation of the lake was requested from the FAO project in Guatemala earlier, and completed. A second phase has recently been terminated and implementation is in progress. A video tape show was recently produced with good public reception and several meetings have been held for interested parties. Good possibilities exist for having a long-term interdepartmental cooperative project at Lago Yojoa.

Ideally, the reserve should be handled by one administration composed of all the various land users, and with firm guidelines for management and protection against future damages. The successful integration and operation of this multiple use reserve can demonstrate to Hondurans and other Central Americans the importance and benefits of natural resource planning and management.

## GUATEMALA

This gloriously scenic country has a high potential for a diverse system of national parks and reserves. But, population pressures and agricultural-industrial activities are increasing rapidly and destroying many of the existing wildlands and natural resources (refer to Introduction).

*Volcano Pacaya* was chosen as the pilot national park after the 1974 San José conference. It is among the best examples of an active stratovolcano in Central America. The ragged steep mountain mass lies close enough to Guatemala City to see the frequent explosive outbursts of lava and burning gases at night. Pacaya is also near Lago Amatitlán, a popular weekend resort for Guatemalan families.

Pacaya was already decreed a national park in 1963. Later, the FAO Wildlands project in Guatemala made up a master plan in cooperation with a team of wildland managers from Central America. This was followed by further planning, assignment of personnel, and training activities. However, by an unhappy set of circumstances, including the 1976 earthquake, the project was discontinued.



*Lago Atitlán, one of the world's most beautiful lakes, is in desperate need of controlled management if its high scenic quality is to be maintained.*

The *Trifinio (Montecristo)* cloud forest “frontier” park between Guatemala, El Salvador, and Honduras (described under El Salvador) deserves swift development on an international level. However, no roads penetrate the area from the Guatemalan side, and all travel must be by foot or horseback. It appears that little can be done for the time being, other than to declare this part of the forest a primitive zone and leave major developments to El Salvador.

*Lago Atitlán (Lake Atitlán)* is believed to be one of the most beautiful bodies of water in the world. The 340 meter deep, aquamarine lake is ranged by three majestic volcanoes which reach a maximum height of 3,510 m. This purple-blue backdrop forms a dramatic frame for the clear water and numerous Indian villages along the shoreline. During the day Atitlán changes from a powder-blue, satin-smooth surface to a blue-black, wind-swept sheet. An estimated 50,000 Mayan Indians live within the watershed and many still wear their traditional hand-embroidered costumes and speak in local dialects. They can be seen fishing in tiny dugout canoes or carrying huge loads of pottery or vegetables to market. The aesthetic and recreational qualities of Lake Atitlán give it an extremely valuable touristic potential.

The lake was decreed a national park –the water surface only– some years ago. Since then, Presidential decrees have been made to protect the rare, flightless, endemic Atitlán grebe, and the reed-cattail beds which serve as the chief habitat for grebes, waterfowl, fish, frogs, and other aquatic life. Technically, the lake’s watershed and shoreline are far too populated and utilized to qualify as a national park. In addition to the high Indian population, the number of hotels, restaurants, vacation homes, and condominiums has jumped considerably. Real estate prices have risen fantastically. The ideal status for Lake Atitlán, therefore, would be a Multiple Use Reserve, the same as Lago Yojoa in Honduras.

This watershed needs the most careful, early attention in order to protect the jewel-like quality of the lake water (Secchi disk readings to 10–15 m in dry season). Only the upper reaches of the watershed are still maintained in wild forest and harbor populations of quetzals, peccaries, the rare horned guan (Volcano Atitlán only), and a few deer. Of equal importance and urgency is the need for a land use plan and controls, especially against contamination of water by sewage. The popularity of Lake Atitlán will undoubtedly continue to grow, and unless regulations are designed to protect its natural beauty and quality, irreversible processes and environmental destruction will occur.

A vigilant eye must also be kept on the proposed hydroelectric plant and river diversions. Not only would these cause a large draw-down of water which could eliminate the aquatic shoreline vegetation and fauna, but would result in a complete turnover and change of water quality and color within an estimated 70 to 80 years. The loss to tourism and recreation would probably have an incredible economic impact.

*Tikal National Archeological Park* in the Petén jungle is legally established and functioning. It covers about 600 km<sup>2</sup> of undisturbed tropical humid and dry deciduous forest with the Mayan city ruins at its center. Thanks to the protection afforded here, wildlife is plentiful. Few other archeological sites exist where one can get off a plane and minutes later wander past imposing white limestone temples with spider monkeys swinging through the trees overhead. Or, climb around a 1000 year-old plaza and hear doves, motmots, tinamous, and perhaps even the roar of a jaguar far away. Considering that one-third of the Petén has already been grossly disturbed or destroyed by ranching, lumbering, and colonizing, this makes Tikal National Park a remarkable experience for visitors.

Management at Tikal is principally through the National Institute of Archeology and History (INAH) and the National Tourism Institute (INGUAT). A \$13 million U.S. loan has been provided by BID for construction of tourist facilities in Flores (about 30 km south of Tikal) on the shores of Lake Petén-Itzá, and for improving access roads to the Park. No further lodging or dining will be encouraged at Tikal itself.

Many examples of Guatemala's rich natural heritage, including her national symbol, the Quetzal, are being protected and studied in a special biotope reserve which has been established by the University of San Carlos. The 670 hectares of protected cloud forests not only harbor a wide variety of endemic plant and animal species but also serve as a unique outdoor laboratory for both students and visiting scientists. Efforts are currently being made to enlarge the size of the biotope to, among other things, ensure that sufficient habitat is maintained to sustain sizable populations of these magnificent birds.

The Unit currently is trying to increase its technical assistance and financial support activities in Guatemala in order to back several solid moves towards wildland conservation being carried out by Guatemalans.

## BELIZE

Belize is another tiny country, yet it has significant natural and cultural resources and plenty of wildlands. Population numbers and pressures are still quite low, and the British colonial system left a fairly well-organized forestry management program. In comparison with El Salvador, for example, Belize has a high percentage of wilderness with abundant wildlife. Moreover, strict hunting regulations are in effect.

Two areas are worthy of the greatest protection. One is the *Chiquibul/Maya Mountains* region. Undisturbed broadleaved and pine forests cloth these ranges, including the only existing cloud forest in Belize. It is still possible to hear the low grunting roar of jaguars in the Maya Mountains, or see an ocelot slipping through the trees. Belize



*A rare combination of natural and cultural splendors are preserved in the Tikal Archeological Park where impressive Mayan ruins rise dramatically above the jungle canopy.*

believes it has the highest density of spotted cats left anywhere in Central America. Another attraction is the number of Mayan ruins dating from about 800 to 1200 A.D. which are still shrouded in jungle growth. Given adequate study, some may prove to have the same importance as Tikal in Guatemala. On archeological grounds alone, the Chiquibul/Maya Mountains region deserves protection. Ideally, it should be made a MAB Biosphere Reserve which would include Victoria Peak (1,115 m), Belize's highest point.

The other area of world importance is the barrier line of coral reefs and coral complexes stretching along the entire coastline of Belize from Yucatán, Mexico, to Guatemala. It has often been compared to the Great Barrier Reef of Australia. Not only is it second in size, but the *Belize barrier reef* is certainly a close runner-up in the richness and diversity of its marine life. The incredibly clear blue water, shading to turquoise over the sand flats and to ultramarine above the deeper channels, contains fantastic coral formations and colorful tropical fishes. Not only is Belize a diver's paradise, but international marine scientists consider these reefs to be of world significance.

The two finest areas actually lie outside the barrier line and are self-contained coral complexes similar to the atolls found in the south Pacific. Lighthouse Reef complex shelters American crocodiles and provides nesting sites for redfooted boobies. Here, too, is found the deep Blue Hole made famous by Jacques Cousteau's films and studies. The Glover's Reef complex probably has the best coral formations in the whole chain.



*One of the many reef encircled keys that dot the blue Caribbean waters off the coast of Belize.*



## SOUTHERN MEXICO

Although Mexico does not belong politically to the Central American Isthmus, its southern area of Chiapas is ecologically contiguous and similar to Guatemala's Petén and Belize's western limestone section. As already described, the Chiapas/Petén/Maya Mountains tropical lowland forests are some of the very few remaining extensive tracts of wilderness in Middle America.

In southern Mexico, the Lacandona region of Chiapas is the last refuge of broadleaved tropical forest. Yet here, as in the Mosquitia of Honduras and Volcano Barú of Panama, loggers are threatening the trees and squatters are slowly encroaching into the area.

Luckily, 300,000 hectares of Lacandona have been decreed a MAB Biosphere Reserve (1978). The land is a limestone base with numerous small lakes, rivers, and hills. The unusual aspect of Lacandona is the intensely turquoise color of its streams, perhaps due to some abnormally high concentration of carbonates, and the hazy blue tinge of its mountains when seen from afar. This probably accounts for the name, "Montes Azules" (Blue Mountains) which rise here.

The Lacandona is densely forested and quite inaccessible save on foot or horseback. The region still harbors a tiny population of Lacandon Indians. They are considered the original ancestors and remnants of the Mayan race which reached its zenith before the Spanish conquest. The Lacandons are of great interest to ethnologists and conservationists striving to prevent the extinction of "ecosystems people". According to rumor, the Indians still dress in simple, home spun, white tunics and wear their hair long. They practise a subsistence-style living, mainly hunting and fishing with bow, arrow, and spear.

The Wildlands Unit strongly supports protection of this MAB Biosphere Reserve is collaborating (or advising) with the Mexican government on protection and management plans for the Lacandona region.

## REGIONAL MEETINGS AND SEMINARS

In addition to promoting a system of national parks and reserves, the Wildlands Unit is also working to strengthen regional services and cooperation among the Middle American countries. Ways in which it works include regional meetings and consultancies, park training seminars and workshops, field research projects, communications and conservation education.

The first time that world attention was focused on the rich heritage in the Isthmus, the growing environmental threats, and the necessity of preserving and managing the resources was in San José, Costa Rica, during December 1974. The Central American Meeting on

the Management of Natural and Cultural Resources was held at that time, and sponsored and attended by CATIE, Rockefeller Brothers Fund, IUCN, WWF, FAO, UNEP, and UNESCO. It was also well-represented by delegates of Government agencies, conservationists, and resource planners from each Central American country, certain South American nations, and the international organizations mentioned above.

The delegates agreed upon the following resolutions:

1. To propose a system of regional parks and equivalent reserves which will protect the full range and diversity of ecosystems, cultural, historic, and educational treasures, and potential tourist attractions.
2. To establish a "pilot national park" as a model in each country.
3. To promote interest in "frontier parks" where two or more nations share valuable resources.
4. To guide the educational efforts and technical training in conservation at all levels.
5. To create a Regional Committee for the Conservation of the Natural and Cultural Heritage of the Central American Isthmus.
6. To establish or strengthen existing national and regional organizations dealing with conservation of natural resources.
7. To seek financial means for the rapid development of all these above activities.

An important spin-off of the San José conference was the genesis and formation of the Wildlands and Watershed Unit at CATIE, thanks to the generosity of the Rockefeller Brothers Fund.

In 1975, a second, follow-up meeting was held in Managua, Nicaragua (again sponsored by RBF and FAO), in which representatives of the six countries revalidated the goals stated above. The urgency of starting a regional project to protect these resources was stressed. At this time, a temporary committee was formed for the conservation of the natural and cultural heritage.

A third cooperative regional meeting on Wildland Management took place in Altos de Campana pilot national park in Panama, September, 1977. This was sponsored by the Wildlands Unit, of CATIE. National park and conservation area directors from all six nations attended with the objective of discussing their current programs and problems. This meeting allowed the Unit to formulate future activities for the region. Three useful recommendations came out of this gathering. One was to urge the ratification of the trade convention on endangered species by those nations which had not yet signed. The second, to establish a national park in the Darién of Panama. Third, to agree to temporarily disband the Regional Committee on the Conservation of the Natural and Cultural Heritage and ask the Unit to perform this function.

Future plans call for a regional conference in Nicaragua entitled, "First Central American Meeting on Wildlife". It is hoped to evaluate the status of fauna in each country, determine which species are

endangered and why, and to seek ways of preventing the deterioration of this resource.

Another type of regional involvement in which the Unit participates is accepting requests for consultancies. Actually, the FAO project on Wildland Management in Guatemala began this consulting work and produced several documents on proposed national parks, i.e. master plans for Altos de Campana, Lago Yojoa, Portobelo, Trifinio, etc.

Since its inception at CATIE, the Wildlands Unit has continued this service. It is a consultant on Central America for IUCN. Examples of its work are the master plan for Morrocoy National Park in Venezuela as a UNEP consultancy; a survey of conservation units in Guayana as a Caribbean Conservation Association job; and representation at the IUCN Caribbean Program Commission which deals with parks and reserves in the Caribbean. The Unit plans to expand these activities in the future.

### **Park Training Seminars and Workshops**

A major thrust of the Wildlands Unit is to provide training for administrators and technicians working with conservation areas and watersheds in Central America and abroad. This is being accomplished through a series of workshops and seminars. Perhaps the most exciting and innovative is the *Mobile Seminar on National Parks Management*. It is modelled after the University of Michigan's International Seminar on National Parks and Equivalent Reserves, but has been modified to fit the region.

The first session took place November 28 – December 10, 1977, originating in Managua, Nicaragua, and ending at Portobelo National Park in Panama. The students' twelve days and 2,500 kilometers of travel were jam-packed with discussions, visits to six parks in three countries, and fruitful interchanges with professionals at each location. Additionally Mexican and Colombian professional consultants augmented the exchange of professional information.

The six parks visited – Volcano Masaya, Santa Rosa, Volcano Poás, Altos de Campana, Volcano Barú, and Portobelo— are each in various stages of development. Thus, they offer a wealth of information on management techniques, problems, and solutions. A stop was also made at CATIE so that the participants could learn more about the Unit's role in coordinating wildlands systems and management. Twenty park planners from ten nations took the Mobile Seminar. All expressed satisfaction with the rapport it created and strengthened among Central American professionals.

A second Mobile Seminar in the northern part of the Isthmus (Guatemala, El Salvador, and Honduras) will be conducted later in 1979. Both are financed by RBF.



*Participants of the Mobile Seminar on National Parks Management prepare to board small boats in order to gain a better perspective of Portobelo National Park in Panama.*

Another workshop took place during 1978 at Rincón de la Vieja National Park. The Unit worked with the Costa Rican National Park Service in running this training session for the park administrators and resource managers of all 14 areas in its system.

A Watershed and Wildlands Workshop was held at CATIE in May–June, 1978, sponsored by UNESCO and UNEP. A regional seminar on fauna management and another for non-governmental conservation associations are planned for later the same year.

## **Research Projects**

A number of research projects have started which indicate the rather varied and international scope of Unit concerns. In all such endeavors, an effort is made to determine the cause-effect of environmental damages; to assess the rate of deterioration to the environment and the social costs involved; to find solutions to major conservation problems; to help decision makers and rural inhabitants alike to realize the benefits of wildland areas; and to develop useful methodologies for wildland management in the tropics. Ultimately, it is expected that

these strategies will lead to each nation undertaking most of their own wildlands management. And, hopefully, this will be done along lines which will improve the quality of life, particularly in rural areas.

One on-going field research project involves a Peruvian post-graduate student in forestry investigating the rate of destruction of the natural forest and similar habitats in Costa Rica and Nicaragua. Another is a social scientist from the University of Honduras in Tegucigalpa, studying the attitudes and beliefs towards conservation among subsistence farmers. Questions deal with firewood and erosion problems, how fish and wildlife figure in local diets, and contamination of rivers. Also, the effects of conservation activities on the rural populations around Lago Yojoa and San Pedro Sula are being examined.

A regional wildlife management and conservation program for Central America, with emphasis on endangered species, is under preparation in coordination with IUCN. Field studies will concentrate on the status of crocodiles, manatees, Pacific coast marine turtles, tapirs, and jaguars.

Still another fascinating piece of research under preparation is a five-year joint project between the Unit and the National University of Heredia, Costa Rica. It will compare the differences in precipitation and runoff in primary cloud forest against two disturbed forests at Monteverde National Biological Reserve in Costa Rica. One area will be clear-cut and spontaneous regeneration allowed; the other, clear-cut and seeded to pasture. It is hoped that the hydrological effect of "horizontal precipitation" *i.e.* clouds, fog, mist, and its interception on foliage can be calculated. The value of such intercepted moisture is clearly that it contributes a significant amount to the annual water regime. Translated into downstream water quantity, quality, and timing, this has a direct influence on people, stock fish and wildlife living below cloud forests.

Future research plans are to bring in a mathematician to develop a model for optimum multiple resource use in tropical reserves.

## **Communications and Miscellaneous Activities**

The Unit is rapidly expanding its communications system and network. It regularly contributes information to CATIE's bulletin, "Activities at Turrialba", and recently began publication of its own newsletter, "Wildlands in Mesoamerica". Published in both Spanish and English, it goes out to over 900 institutions and persons on roughly a quarterly basis.



*The Misquito Cayes of Nicaragua, an important component in the life cycle of the Caribbean sea turtle populations.*

Another aspect is the world-wide communications maintained with international organizations and environmentalists. This plays a large part in informing the scientific community about happenings in Central America.

Two communications campaigns which the Unit has strongly supported are promoting the Convention on Trade in Endangered Species, and encouraging establishment of pilot national parks. Partly due to these efforts, Panama ratified this Convention not long ago.

In all its field activities, meetings, workshops, and research, the Unit attempts to obtain a photographic record of slides and films for its library at CATIE. Furthermore, the results of these activities are written up and deposited in the library.

Close by its offices, the Unit and Natural Renewable Resources Program maintain a nature trail known as "Las Espaveles", (*Anacardium excelsum*), after a giant forest tree. Thanks to a grant from World Wildlife Fund, Switzerland, the Unit is working on an interpretive display which will educate visitors. It will teach them about the local ecology and alert them to immediate environmental problems. The loop trail is 700 meters long and winds down through primary, then second-growth, and finally gallery forest along the roaring Reventazón River. A look-out, outdoor teaching hut, picnic tables, and possibly a tower are planned.

Members of both the Wildlands and Watershed Unit and the Natural Renewable Resources Program frequently attend conferences, present papers, and publish articles dealing with the current status and needs of conservation and wildlands in Central America and elsewhere.

Although the Unit is still young and growing, it has taken long strides towards consolidating conservation interests in Central America, and in organizing feasible methods of preserving, integrating, and managing wildland areas. In all its efforts, of course, the Unit is dependent upon the receptive and cooperative attitude of the governments, personnel, private organizations, and financial contributors with which it works and collaborates.

Hopefully, in the not too distant future, the seeds that have been sown will bear their first fruits. The early conservation efforts will be visible not only by the physical presence of parks and reserves, but also in the psychological state of the public towards environmental matters. Public appreciation and concern towards natural resources and wildlands will result in a better quality of life for all Central Americans.