

The Tropical National Parks of Latin America and the Caribbean: Present Problems and the Future Potential

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Abstract

The development of national parks in tropical Latin America and the Caribbean is reviewed. Data are presented on 168 parks in 22 countries within the American tropics. Eighteen of these are 'paper parks' or parks in name only. Detailed synopses of seven selected national parks provide examples of the critical problems parks face and the degree to which management goals are being realized and the problems overcome. Critical problems include inappropriate forms of administration, insecurity, encroachment, and the effects of increasing human intervention. The potential of tropical national parks to combine the twin goals of environmental conservation and public access for enjoyment and recreation is discussed.

Key words: *national parks, environment, tropics, Latin America, Caribbean.*

WHY STUDY NATIONAL PARKS?

The interest of geographers in tropical national parks, as distinct from biologists who describe the living things within them, is comparatively recent. It is an outgrowth of the recognition that all the tropical biomes are under threat from a variety of human impacts and that the role of parks in the maintenance of overall environmental health--locally, nationally, regionally and even globally--may be crucial.

Geographers were directly involved in preparing the report and recommendations of the International Commission on National Parks in 1971. The rationale behind the creation of national parks as an important element in landscape is threefold. First, being "national", they are conceived as political entities, with the sovereign state deemed as ultimately responsible for their success or failure; in the case of World Heritage parks, the national state is deemed to be trustee for the world community. Second, they are defined as large areas which scientists have researched and found to be deserving of conservation, for local, regional or global reasons. Finally, they are "parks" in the sense that their management must include provision for human aesthetic enjoyment and recreation.

Experience in the management of national parks, in both rich and poor countries, supports the view that in practice these goals are always in some measure incompatible. Control of a park may be strictly national, but the visitors targeted may be principally foreign tourists. Creating an infrastructure to support aesthetic enjoyment is frequently at odds with the strict conservation ethic, and may very easily jeopardize the very attractions of landscape and wildlife which are being promoted.

How successful are national parks in tropical Latin America and the Caribbean in achieving the goals which the scientists and politicians have sought for them? McMichael (1986, 35) considers that the question as to whether today's national parks can play "the central role which was once envisaged for them" is "still unanswered." Pritchard (1990,5) states plainly "national parks are facing a bleak future." This article seeks to answer, in part, that question in regard to the Latin American and Caribbean tropics.

The paper reviews the commonly accepted definition of national parks, the need for them, and their status in tropical Latin American and the Caribbean. It also examines seven case study national parks reviewing their present conditions and future prospects and then summarizes a number of key problems common to most national parks in the region.

THE NEED FOR NATIONAL PARKS

The urgent need for national parks in Latin America and the Caribbean is no longer questioned among scientists. They are unanimous in acclaiming their value in the race against time to forestall climatic change (Prance 1986) and also save the genetic diversity of the hemisphere and the planet. There is a critical need to conserve those extensive areas of tropical rainforest which are "magnificent in stature and in biotic diversity" (Woodwell et al. 1986, 23). Dodge (1990, 3), commenting on the mounting evidence for the decline of migratory passerine populations throughout the Americas, insists that national parks in Central and South America "have a critical role to play in providing a safe haven for beleaguered songbirds."

Two hundred million urban dwellers now inhabit the Latin American tropics and are increasingly determined to seek out natural environments for recreation. North American and European tourists seeking the exotic experience add their quota to the increasing human pressure on the many fragile ecosystems enshrined in the region's existing national parks, and encourage the establishment of new ones. Elites and intellectuals, native and foreign, feel that the creation of national parks in the New World tropics will be a means to hold back the wave of settlement and exploitation that has steadily moved across the continent in the second half of this century.

The dictum of Brown (1987,89,90) that there is an "urgent need" to relate national parks to "the wellbeing of the community", recognizing that "the needs of all the people of the country are to be taken into account", poses a serious dilemma for Latin America. The population of the region is heavily concentrated in huge cities. In theory, the millions of urban poor would benefit from access to large national parks. In practice, the cost of providing the kind of access they can afford is normally prohibitive. Furthermore, as the park service director in one country told the author from his air-conditioned city office, "these people are intellectually incapable of appreciating and enjoying a park environment anyway. In fact we want to keep them out!"

A number of international organizations are urging the view that the establishment and proper management of national parks can be a useful, even crucial, strategy towards the attainment of permanently sustainable development over a significant portion of the global environment. As long ago as 1976 Poore contributed to this theme with his useful *Ecological Guidelines for Development in Tropical Rain Forests*. Jacobs and Munro (1987) present more than 30 contributions on this theme, including those by Osvaldo Simkel and E. Leff specifically on Latin America. The actual implementation of such an approach is inevitably complex, involving cooperation between government agencies and the private sector and among the agencies themselves.

NATIONAL PARKS: AN INTERNATIONAL DEFINITION

At the General Assembly of the International Union for the Conservation of Nature (IUCN) in New Delhi in 1969, the following definition was approved:

"A national park is a relatively large area (1) where one or several ecosystems are not materially altered by human exploitation and occupation, where plant and animal species, geomorphological sites and habitats are of special scientific, educative, and recreative interest or which contains a natural landscape of great beauty, and (2) where the highest competent authority of the country has taken steps to prevent or to eliminate as soon as possible exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphological, or aesthetic features which have led to its establishment, and (3) where visitors are allowed to enter, under special conditions, for inspirational, educative, cultural, and recreative purposes" (IUCN 1971, 13).

Excluded were restricted scientific reserves, private natural reserves, forest reserves, game reserves, bird sanctuaries, and "naturparks" where mass recreation, rather than conservation, is dominant. This definition has continued to be internationally acceptable and has remained the basis of national park legislation throughout Latin America and the Caribbean. There have been only two modifications. First, the vague phrase "relatively large" has since been clarified: "10 km² has been widely accepted as the minimum size of a national park" (Reti 1986, 18). The present author has accepted this lower limit throughout. Second, the conception of usage has been expanded and given more positive direction: "the use by the public is encouraged as part of management policy" (Brown 1987,88).

UNESCO furthered the cause of national parks by its World Heritage Convention in 1972 under which governments are encouraged to establish and maintain "properties forming part of the cultural and national heritage which it [UNESCO] considers as having outstanding universal value" (UNESCO 1978, 1). There is now a prestige attached to, as well as responsibilities resulting from, World Heritage listing. The results of the Convention in general have been positive. It has heightened awareness of proper environmental standards, even if in some cases there have been shortcomings in their application.

THE CURRENT STATUS OF NATIONAL PARKS

It will come as a surprise to some that Tijuca National Park in Brazil has existed as an extensive conservation area, though not of course as an official 'national park', since 1862. Momentum to establish parks slowly increased in the 1960s and the situation in 1971 is indicated in Table 1 and in Figure 1.

Table 1. Number and area of national parks in tropical Latin America and the Caribbean, 1971 and 1990 by country, size category, and status.

Country	1971 Num- ber	Area km ² (ap- prox.)	1990 Num- ber	Parks 1990						
				10- 100 km ²	Area km ²	100- 500 km ²	Area km ²	500- 5,000 km ²	Area km ²	>5,000 km ²
Bahamas	0	0	1	0	0	0	0	1	743	0
Bolivia	0	0	5	0	0	0	0	2	2,800	0
Brazil	7	833	25	2	109	8	1,991	10	23,940	0
Virgin Is. (UK)	0	0	1	1	33	0	0	0	0	0
Colombia	13	14,455	26	8	496	14	2,820	2	5,030	0
Costa Rica	0	0	14	6	216	5	1,682	2*	2,440	0
Cuba	0	0	4	0	0	2	605	1	1,870	0
Dominica	0	0	1	1	69	0	0	0	0	0
Dominican Rep.	1	50	5	0	0	4	1,017	1	550	0
Ecuador	1	100	7	0	0	3	781	2	4,340	1
Grenada	0	0	1	1	11	0	0	0	0	0
Guadeloupe	0	0	1	0	0	1	300	0	0	0
Guatemala	4	400	5	3	230	0	0	2	1,306	0
Guyana	1	113	1	0	0	1	113	0	0	0
Honduras	0	0	3	1	15	2	500	0	0	0
Mexico	13	1,867	30	11	550	15	3,270	3	2,350	0
Neth. Antilles	0	0	2	2	35	0	0	0	0	0
Nicaragua	0	0	2	1	30	0	0	0	0	0
Panamá	0	0	4	1	12	1	173	2*	3,800	0
Peru	0	0	2	0	0	0	0	0	0	2
Virgin Is. (USA)	1	41	1	1	41	0	0	0	0	0
Venezuela	7	14,217	27	2	28	9	1,842	12	20,362	1
TOTALS	48	32,076	168	41	1,875	65	15,094	40	69,531	4

* La Amistad is shared between Costa Rica and Panamá; area included in Costa Rica.

* Sin-a-Paz is shared between Nicaragua and Costa Rica; area included in Nicaragua.

Source: From IUCN and the national park administrations of individual countries. Computations are the author's.

Table 1. Extended.

Parks 1990				
Area km ²	Area Total km ²	'Paper Parks' Number	Area km ²	Area All Parks km ²
0	743	0	0	743
0	2,800	3	19,803	22,603
0	26,040	5	95,500	121,540
0	33	0	0	33
0	8,346	2	16,790	25,136
0	4,338	1*	0	4,338
0	2,475	1	5,280	7,755
0	69	0	0	69
0	1,567	0	0	1,567
6,730	11,851	1	8,050	19,901
0	11	0	0	11
0	300	0	0	300
0	1,536	0	0	1,536
0	113	0	0	113
0	515	0	0	515
0	6,170	1	557	6,727
0	35	0	0	35
0	30	1*	6,000	6,030
0	3,985	0	0	3,985
20,100	20,100	0	0	20,100
0	41	0	0	41
30,000	52,232	3	31,390	83,622
56,830	143,330	18	183,370	326,700

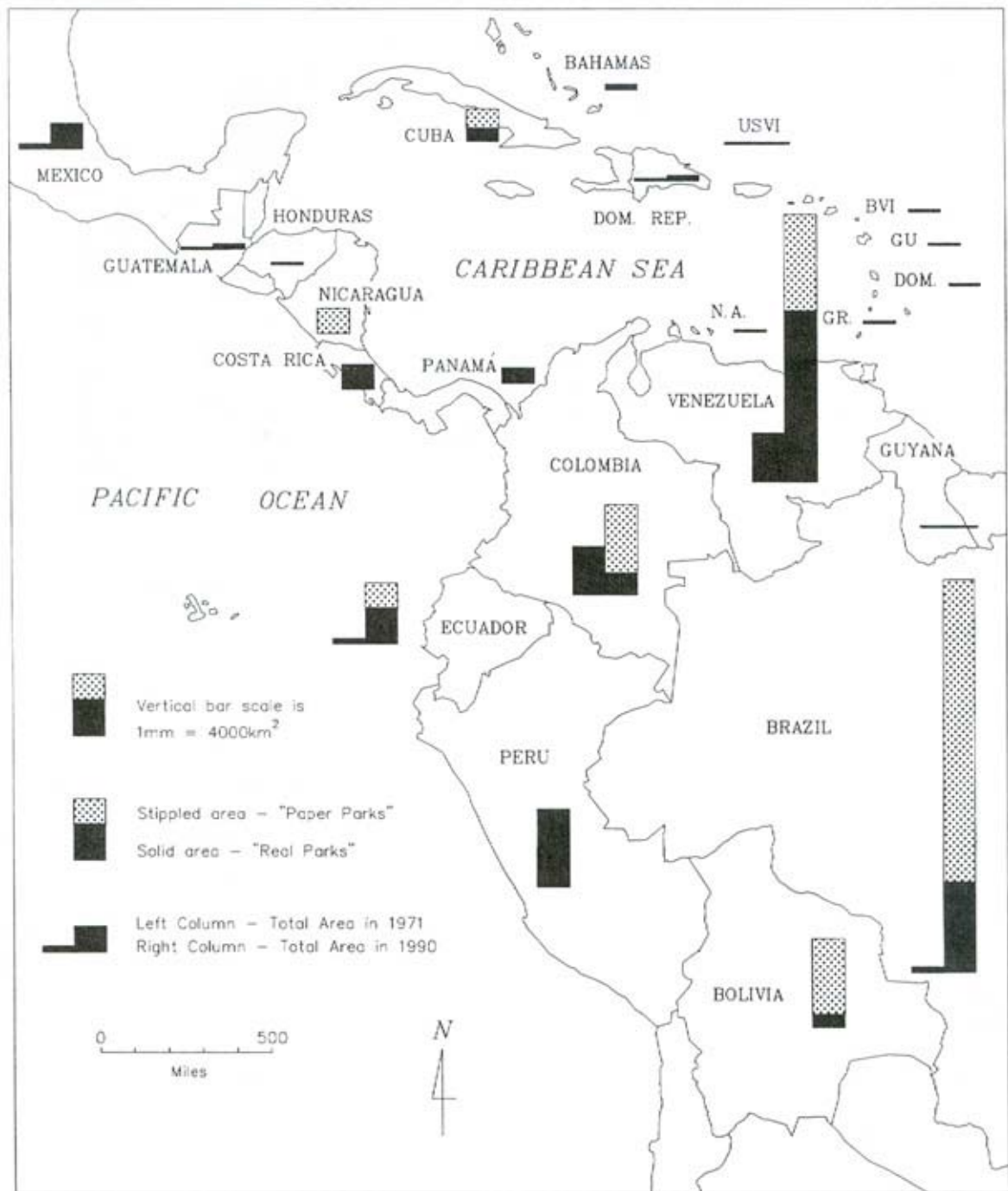


Fig. 1. Total area in national parks in the Caribbean and the Latin American tropics, 1971 and 1990.

Table 2. Percentage of national territory in national parks for selected countries.*

Country	Area of National Territory km ²	Area of National Parks km ²	Percentage
Brazil	8,511,965	26,040	0.3
Colombia	1,138,618	8,346	0.7
Costa Rica	51,100	4,338	8.5
Dominica	289	69	23.9
Ecuador	283,520	11,851	4.2
Grenada	120	11	9.2
Guadeloupe	1,720	300	17.4
Guatemala	107,627	1,536	1.4
Mexico	1,949,706	6,170	0.3
Panamá	82,860	3,985	4.8
Venezuela	912,050	52,232	5.7

* Paper parks excepted.

Source: IUCN and the national park administrations of individual countries. Computations are the author's.

A great deal of progress has been made in the past two decades. The total area in all parks has increased tenfold, the number of countries possessing parks more than doubled, and the total number of parks in the region has increased from 48 in 1971 to 168 in 1990 (Table 1). Some of the smaller countries, such as Ecuador, Costa Rica and Guadeloupe now have a remarkable proportion of their national territory under the protection of national park status, and even giant Venezuela can take justifiable pride in the fact that its percentage of 5.7 is more than five times that of the United States (Table 2).

Although the statistics in Table 1 may look quite impressive, it should be noted that a quarter of all parks are less than 100 km² in area. Many scientists consider this to be below a size which will be successful from a conservation point of view. Many parks exist in name only and are known as "paper parks". Excluding these paper parks, only four parks make up 40 percent of the total area of the 168 parks. Fortunately, these four parks, Canaima (Venezuela), Huascarán (Peru), Manú (Peru), and Galapagos (Ecuador) incorporate some highly significant environments in terms of both landscapes and biology.

There are nine World Heritage parks in the region at the present time (Table 3). Since many Latin American and Caribbean governments consider the notion that any part of their territory should be deemed the property of all humanity an abhorrent infringement of absolute national sovereignty, perhaps this small number is not surprising. Venezuela, unfortunately, has not yet agreed to World Heritage listing for Canaima. Also, in the case of a number of major parks, neither the infrastructure nor the enforcement meet the guidelines of the World Heritage Convention.

Table 3. World Heritage parks supported by UNESCO in tropical Latin America.

Park	Country	Area (km ²)	Features
Palenque	Mexico	170	Mayan ruins, rainforest
Tikal	Guatemala	576	Mayan ruins, rainforest, wildlife
La Amistad	Costa Rica–Panamá	3,000	Mountain forest, orchids, insect fauna
Darien	Panamá	3,800	Rainforest, wildlife, Indian culture
Portobello	Panamá	173	Historic
Galapágos	Ecuador	6,730	Wildlife, volcanic landforms
Sangay	Ecuador	3,700	Volcanic landforms, endangered fauna
Huascarán	Peru	5,000	Cordillera Blanca, avifauna
Manu	Peru	15,000	Rainforest, endangered wildlife

Source: UNESCO 1989.

Parks in several countries in the American tropics have the potential to enter the "big league" of national parks, exemplified elsewhere in the tropics by the great game parks of East Africa, Kakadu in Australia, and Kinabalu in Malaysia (Table 4). But aside from having large areas designated as parks, this potential is still a long way from being realized.

Table 4. Giant world-class parks in tropical Latin America.

Park	Country	Area (km ²)	Features
Developed or being developed			
Canaima	Venezuela	30,000	Rainforest, Angel Falls, Gran Sabana, wildlife
Manu	Peru	15,000	Rainforest, endangered wildlife
'Paper Parks' with little protection, infrastructure, or adequate legislation			
Amazonia	Brazil	20,000	Rainforest, endangered fauna
Duida-Marahuaca	Venezuela	12,100	Unexplored watersheds, Indian culture
Jau	Brazil	11,000	Rainforest
La Macarena	Colombia	11,310	Unique mountain forest
Serrania de la Neblina	Venezuela	13,600	Highest mountain in South America outside Andes
Pico da Neblina	Brazil	18,000	Rainforest, Indian cultures
Xingú	Brazil	c. 40,000	Indian cultures, rainforest

Source: IUCN and the national park administrations of individual countries.

PAPER PARKS

The conservation spirit may be willing but the political will is weak, and the coffers often empty. The international science journalist Catherine Caulfield has written:

About 2 percent of the world's rainforests have been declared nature reserves or national parks. The vast majority of these are completely unprotected, and some are leased for logging or other disturbing activities. Brazil has one of the most impressive systems of protected areas of all rainforest countries. But only one of the national parks has a director, guards, rangers, and the money to carry out essential works, such as marking the boundaries. The rest are what is known in the trade as paper parks" (Caulfield 1984, 234.).

The perjorative term, paper park, may be defined as one which has been officially gazetted by government but for which criterion 2 or 3 or both in the 1969 IUCN New Delhi definition have not even been partially met. Often no "steps" at all have been taken; and no "special conditions" for visitation are in place (Table 4). Caulfield (1984, 235) quotes Brazilian environmentalist Jose Lutzenberger: "All our parks are in a shambles: there is not a single one that is protected." A former director of Brazil's national park system Maria Tereza Padua once ruefully commented that it is one thing to create a national park, to negotiate the minefield of objections from other government agencies, and quite another thing to make it work.

It could be argued that the establishment on paper of huge new parks in remote areas before development

reaches them is a wise, preemptive strategy, aimed at forestalling destructive exploitation. If it does so, all well and good. There is, however, reason to believe that merely carving up vast tracts of thinly populated wilderness into giant national parks that exist only on maps, as has been done in the least accessible parts of the Amazonia-Guyana region, may be counterproductive (Figure 2). Mere designation, without likelihood or means of implementation, can suggest that no one in central government takes the reality of national parks seriously, and exploiters in the wings are quick to get the message. Lappe and Collins (1989, 91) are even prepared to call the designation of paper parks a fraud.

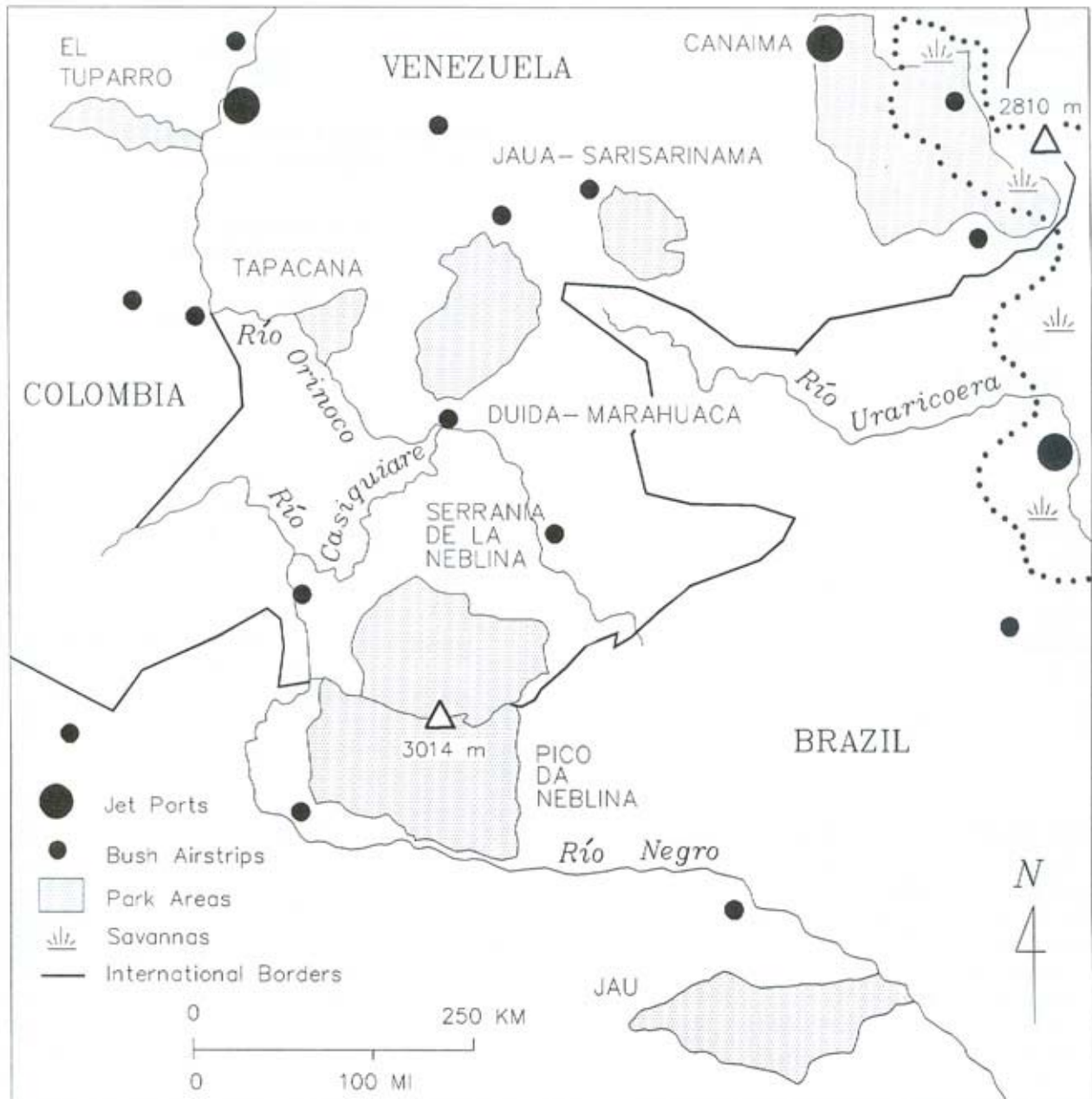


Fig. 2. The eight large national parks in the Amazonia-Guyana region (Venezuela, Colombia, Brazil), totalling 100,000 km². All except Canaima are paper parks. Ninety-seven percent of the area shown is rainforest.

The IUCN withholds approval from most paper parks, especially where efforts at serious conservation are lacking. One instance is Bolivia's Mount Sajama National Park, "because the highest forest in the world (*Pohlypis tarapacana*, at 4,000 m) was handed over to the charcoal burners to satisfy the needs of La Paz", and because no

effective protection was given to the last remaining population of the chinchilla (*Chinchilla laniger*). It was also agreed that Xingu (Brazil) could be "a great park but not under present conditions" (IUCN 1971,116).

The dividing line between national parks as defined by the IUCN and national properties which either do not meet all its criteria or the names of which do not follow IUCN nomenclature is admittedly vague. Thus this article, and the tables, omit from consideration the biological reserves of both Belize and Suriname, which, despite small populations and difficult security problems, have endeavored to establish park-like reserves of considerable ecological, and (in the case of Belize) archeological, significance.

Indeed, Belize has achieved a first in Latin America and the Caribbean with its Community Baboon Sanctuary, which, with guidance from the organization Howlers Forever, successfully coordinates eight villages and over 100 landowners in the management of their lands to protect howler monkeys and other wildlife.

LAGGARD COUNTRIES

There are a number of laggard countries that do not appear in the tables--notably Jamaica, Trinidad and Tobago, Haiti, and El Salvador. Surprisingly, neither are there any national parks in Puerto Rico, a U.S. Commonwealth territory.

The reluctance of political leaders to implement park establishment is sometimes hard to understand. Jamaica's minister in charge of the environment was actually the author of a published article "National Parks: A Vehicle for Sustainable Development" (Patterson 1989). Yet, despite years of pressure and intense lobbying by non-governmental organizations, and the specific offer of funding by bilateral and international donor agencies with specialists actually on the ground, he has not gazetted one single national park (Figure 1). The Cockpit Country of Jamaica, proposed as a park, has most, if not all, the qualifications of a World Heritage Park, but it will not have them for long. Between 1981 to 1987 the proposed park area lost 14 percent of its world-class forest cover. Ironically Patterson (1989, 2) ends his article:

"If we have no other responsibility to posterity, we owe it to those who follow behind us, to leave the earth and its amenities in at least as good or better physical and aesthetical condition than we inherited it. There is an urgent need for (us all) to develop a higher degree of consciousness about the environment. The initiatives of voluntary groups will help to ensure that this generation succeeds in welding a coalition of forces, determined to preserve and bequeath a rich diverse natural heritage to successive generations."

NATIONAL PARK CASE STUDIES

Selection of Parks

Seven national parks have been selected for the purpose of this article for detailed examination on the basis of four criteria. These are: (1) a range of park size from Grand Etang in Grenada, at 11 km², just qualifying for national park status under United Nations criteria to huge Canaima, at 30,000 km² one of the world's largest operational parks; (2) a wide spectrum of problems encountered; (3) a variety of management solutions; and (4) special familiarity on the part of the author and some fellow geographers. The seven brief synopses will endeavor to focus on the degree to which their park management objectives are succeeding. Most of the problems common to tropical parks in Latin America and the Caribbean are exemplified in one or more of the seven parks (Figure 3).

Grand Etang National Park, Grenada

This park has an area of 11 km² and was established in the late 1980s. Grand Etang itself is a crater lake formed about 12,000 years ago after a Plinian explosive eruption. There are two smaller dry craters of similar type within the park area.

It is fortunate that the rainforests within the park have been protected from exploitation for nearly a century. Government officials assert that very little illegal utilization of the biotic resources has taken place during that time. However, it is evident that hunting has been a tolerated activity and many species of birds and animals are now very rare in the park, including the *tatou* (*Dasybus novemcincus*), *agouti* (*Dasyprocta sp.*), and the greater and lesser opossum (*Didelphis spp.*). Most of the fauna and much of the flora are endangered, vulnerable or rare, according to international criteria, and the park is serving a vital conservation role, which will undoubtedly increase during the decade.

Although showing little sign of degradation due to human interference, most of the forests in Grand Etang were devastated by hurricane Janet on September 22, 1955. The mature Dacryodes-Sloanea association, with its emergent species, were particularly affected, and even after 35 years the entire forest is far from recovery to climax. Indeed, within the hurricane-prone belt of the Caribbean, it is difficult to see how a true rainforest climax is possible, or could be maintained for any lengthy period. It is likely that the forests of Grand Etang have shown, and may be expected at any time to show, evidence of past cyclone damage as a normal feature (Eyre 1989).

There are four principal features of interest within the park, and each of these has been developed imaginatively by the National Parks Unit: the crater lake itself; the volcanic mountains landforms and their panoramic views; the forest and its fauna; and historical sites and associations. Boating and fishing are permitted on the etang; a boat is provided by the National Parks Unit and visitors may bring their own boats (Gideon 1988). There is a well-constructed landing. The lakeshore is rimmed with sedges which are posted as protected, but the area and depth of the lake are being very slowly reduced by runoff and siltation from friable volcanic material. At present there is no evidence of excessive pressure of use, although the picnic sites, when visited by the author, were badly littered and in need of cleaning and minor repairs. Provision for solid waste in the form of bins and notices is adequate but is obviously ignored by many users.

Well constructed and graded foot/bridle trails have been completed to maximize the potential of the volcanic mountains, the panoramic vistas and the forests. These trails are properly maintained. Well-written interpretative self-guiding brochures with maps are available. Rangers can be hired as guides, if advance notice is given, and riding animals are kept at the visitor center.

Grand Etang National Park includes an area of great historical interest. Its hills and ravines were the scene of bitter fighting during the so-called Fedón Rebellion of 1795-96 (Brizan 1984). The inclusion of sites associated with a major anti-imperialist struggle is viewed in Grenada as an important cultural component of the environment (Jules 1986).

The visitor center is not a new building and evokes an impression of shabbiness. Being in an area with 4,000 mm of rainfall annually, and with very high humidity year round, many of the exhibits and library books look very much the worse for the climate and benign neglect. The staff insists that few visitors make effective use of the center, although there is some recent interest by school parties.

By and large, Grand Etang National Park is attractive, reasonably well maintained, and has evident ecological integrity. It is a testimony to the environmental consciousness of the government and people of Grenada.

Virgin Islands National Park, St. John, Virgin Islands, USA

Signed into law by President Eisenhower on August 2 1956, the 41 km² Virgin Islands National Park seeks to manage in perpetuity a small piece of the Caribbean "as it was" --a living museum of the tropical paradise image, preserved from hyper-development and open for public appreciation and enjoyment.

The physical texture of the park is fine, and its treasures spread on a small scale canvas. For that very reason they are difficult to protect and very fragile. Visitor pressure is intense, more in fact than any other national park in Latin America and the Caribbean. It is very easy of access. Rental cars cruise its network of winding roads. The

volume of boat traffic poses another set of problems.

The park management has several very daunting tasks. One of these is "the question of what steps to take, if any, to encourage a return to vegetative types similar to those existing before European intervention" so that the park would be "managed back towards the pristine condition" (Robinson 1982,44). This is somewhat controversial, since the climate and many other facets of the total environment have radically changed since Arawak days. For example, annual average rainfall has apparently dwindled by at least 6 percent since records were first kept in the 18th century.

Another requirement is the avoidance of disruption of the traditional life-style of the islanders while permitting park development. There is no way this can be achieved to the satisfaction of all parties, and landowners and residents get the priority in a major conflict of interest. Indeed, the concept of a 'traditional' island life-style is hardly valid any more, in view of the increasingly ostentatious affluence of the Virgin Islanders.

The many attractions of this colorful, highly photogenic park include rugged mountains, world-famous coral reefs, crystal offshore waters, historic and archeological sites, incomparable coastal, island, sea, and cloud vistas. The predictable climate ensures superb marine recreational opportunities almost every day of the year. The weather is tropical in the trade wind belt--alleged by some to be the perfect combination.

A sound and complex infrastructure has been built up over thirty years to ensure the environmental integrity and economic viability of the park. And make no mistake about it--the Virgin Islands National Park is profitable, highly profitable, even by the most direct of commercial equations. The park employs 61 full time staff and has an annual budget of US\$ 2 million a year from concessionaires alone. With multiplier effects estimated at 11: 1, the overall benefit/cost ratio (monetary values only) is so embarrassingly high it is not usually referred to in polite circles (O.A.S. 1988). As a model for making tourism in general and national parks in particular lead the economy in appropriate areas of Latin America and the Caribbean, the Virgin Islands National Park is an outstanding success.

There is an inevitable ecological cost, none the less, and a worrying one. No one can possibly call this park seriously degraded, despite the three quarters of a million visitors a year. Yet there is some evidence that its fragility is being damaged and the symptoms of overuse are apparent. As the O.A.S. (1988, 136) summarizes the problems crisply:

"Development of private in-holdings; ineffective coastal zone management; rapid development of island; road cuts for development inside and outside park boundaries; run-off from development; visitor overuse; poaching of turtle eggs; coral collecting; loss of habitat and decreased species diversity; anchor damage to reefs and seagrass beds; plastic garbage; disease on corals; endangered species need protection; introduction of exotic animals."

The early 1990s will see 20,000 people a week drive, sail, or walk through the Virgin Islands National Park. It will require the best science and management skills, and the most delicate law enforcement to ensure that this truly tropical park will survive the decade in even better shape than it is now.

Kaieteur National Park, Guyana

This 113 km² park, established in 1929, epitomizes all the allure and all the frustrations of national parks in the Third World tropics. It is spectacular. Centerpiece of the park is the 228 m sheer fall of the 88 m wide Potaro River. Trinidadian naturalist Nicholas Guppy unashamedly describes Kaieteur as "surely the world's most beautiful major falls." No other in the world he feels, has "such perfection of form or setting" (Guppy 1973, 181). Many others share his opinion.

But even without the falls Kaieteur National Park would be spectacular, providing what one of the classic travel guides calls "an exceptional, otherworldly stay" (Birnbaum, Hunt and Goldberg 1988, 636). Apart from the

"primeval rain forest" (Orbis Books 1974, 177), which has either attracted or repelled nature lovers since wandering scientist Charles Barrington-Brown discovered it less than 130 years ago (Barrington-Brown 1876), the park contains two other falls which would be of considerable fame in their own right were they not overshadowed by their giant neighbor: these are Tukeit Falls and Waratuk Fall. Between them Mount Yaki towers over the Potaro Gorge.

With riverine rain forest below and a variegated green bush stretching to the horizon in every direction, uninhabited except by miners' camps along streams and creeks, the park still teems with wildlife. This is a list provided by one two-page guide to the park:

"Living in and around the national park are various monkeys: sakis, howlers, capuchins, the squirrel monkey, and the spider monkey. Other mammals includes giant anteater, taamandua, dwarf anteater, sloth, armadillo, ocelot, margay, tiger cat, jaguar, otter, coati, kinkajou, tayra, grison, opossum, brocket, tapir, peccaries, tree porcupine, capybara, paca, agouti, acouchi, spiny rat, and bats. Birds include toucans, parrots, macaws, trumpeters, anhingas, eagles, hawks, falcons, caracaras, hoccas, tinamous, curassows, chachalacos, guans, owls, swifts, trogons, kingfishers, woodpeckers, manakins, flycatchers, tanagers, orioles, and finches."

The Guyana government would appear to possess a world-class jewel of unsurpassed biological significance and great economic value.

However, at present the frustrations far outweigh the potential achieved. Guyana is a small, poor country, deep in debt. The area is remote, almost 180 km from the nearest main road, and the surrounding terrain is difficult to traverse. Any construction in the vicinity of the park is appallingly difficult to carry out, astronomically expensive and would be difficult to justify given the present economic state of the country. The airfield is hazardous, aircraft are small and the schedules inconvenient. The airline stewardess doubles up as park guide. The so-called park "rest house" at Tukeit Falls and the condition of some of the supposed trails require much improvement to be serviceable. And obtaining the "special permit" from the Minister of Home Affairs to enter the park any way but by air can be a lengthy and frustrating process.

One might have thought that there would have been enough national and international pressure for the Guyana government to have already provided this potential money-spinner with enough basic infrastructure to make it a world destination, at least for the serious eco-tourist. But presently it is far from that, and perhaps one can see why. Providing the kind of support system required--first-aid, rescue, food, interpretative and ranger services, for example--for the world-class park Kaieteur ought to be, is quite beyond the means or logistics of the Guyana government now or in the foreseeable future.

Ixtaccihuatl-Popocatepetl National Park, Mexico

This 257 km² park ought to be well managed and jealously conserved--one of the world's great natural treasures. It has every advantage. It is little more than an hour drive from Mexico City. Between one and two million visitors a year use the Amecameca entrance, many of them in luxury automobiles. The two principal natural features are the towering snow-clad volcanic peaks of Popocatepetl (5,542 m) and Ixtaccihuatl (5,386 m), pride of all Mexicans. Between them is one of the country's most historic sites, Paseo de Cortés, from which the conquistadors first viewed in awe the golden city of Tenochtitlán in its fruitful plain. In 1521, four Spanish survivors of the siege of Tenochtitlán climbed Popo during an eruption, and were lowered by ropes into the crater to mine sulfur so as to provide Cortés' forces with gunpowder. This remarkable exploit still provides a keen incentive for the more adventurous visitor. The park includes the world's highest pine forests (4,000 m). The avian fauna displays exceptional diversity, since the park straddles the transition between the Atlantic and Pacific provinces.

In no aspect are these advantages optimized. Cutting of the unique pine forests is still permitted. The main park entrance building is not staffed. Waste disposal and sewage facilities are poor and overtaxed on weekends. Trails,

even those to major sites, are poorly marked or not marked at all. The information booth is inadequate, being poorly stocked with interpretative material on various aspects of the park, foreign language publications and good maps. Uncontrolled roadside food vending is permitted within the park. The Las Cruces shelter, nearest to the summit of Popo, has long been ruinous. Shelters on the trail to Ixta are dirty and virtually unusable. It is a truly sorry story of neglect and lack of appreciation of the value of Mexico's natural endowment.

The source of the problem seems to be the overwhelmingly urban cultural orientation of Mexico's intellectual elite, and their gregarious character. Unpublished sample surveys by Boo and the author indicate that the great majority of Ixta-Popo's visitors come by auto, bringing relatives, friends, food, and loud radios. The purpose is primarily a social occasion, at a locale away from the pressure and crowds of the great polluted metropolis, not the conservation or enjoyment of nature.

Forest trees are often cut down by visitors for their family and group barbecues. Garbage is not adequately disposed of. In fact, little attention is paid by these groups to even the most basic rules of park behavior. However, one can hardly fault groups from the city when even the park lodge simply throws away refuse into a gully polluting the park's own water supply (Boo 1990)!

Such heavy use by short-term motorized visitors of very limited areas of the park seriously taxes both the limited infrastructure and the hard-pressed park staff. Indeed, without very substantial reorganization and upgrading of facilities, staff and attitudes, an increasingly mobile population of 30 million within an easy two hour drive of this park is certainly going to pose enormous problems of management and seriously threaten the environmental integrity of its two dominant features, Ixta and Popo, the two classic symbols of Mexico.

Tikal National Park, Guatemala

The master plan describes Tikal National Park as "one of the great natural preserves of the world" (Consejo Nacional de Planificación Económica 1971, 41). In addition, the centerpiece of the 576 km² park is the ruins of the great Mayan cult center of Tikal. This combination of nature and culture is quite unique among Latin American national parks. Other Mayan cities are better preserved, and other tropical forests are more exciting and varied. But nowhere else are the two attractions so interestingly and effectively combined.

As a Mayan relic, Tikal is immense, and only superlatives are adequate. Once the teeming home of one hundred thousand people, in the 8th century it was the metropolis of the Petén. It served as a religious and market center for the entire lowland region. Palaces, ball courts, market halls, 'sauna' baths, wide streets and highways, large reservoirs holding millions of gallons of rainwater are there amidst the forest tangle. The greatest interest, of course, centers on the four great pyramid temples with their precipitous stairways and associated skullracks. Temple IV, built in 741 A.D., at 65 m high is by far the tallest Mayan structure and one of the largest man-made structures in the ancient world (Morley 1946; Instituto Guatemalteco de Turismo 1970).

In addition to Tikal proper, the substantial ruins of Volantún and El Encanto are within the park boundary, and the major city of Uaxactún is a five mile hike north of it.

The park now protects a mosaic of mahogany, zapote, ramon, logwood, palm, and pine forests. Strikingly, even after a thousand years without human encroachment, these forests are conspicuously different from a 'virgin' forest climax (Lundell 1937).

The forest that began to engulf abandoned Tikal more than a thousand years ago is exceptionally rich in neotropical flora and fauna, and has attracted many naturalists. The fauna is rich and attractive to visitors. The more popular species include both spider and howler monkeys-- both very obviously present in considerable numbers--tamanduas, coatimundis, squirrels, and armadillos. Visitors who stay to explore may see deer, tapirs, kinkajous, snakes (27 species), turtles, and evidence of the big cats. Frank Smithe compiled *Birds of Tikal* in the 1950s, recording more than 200 permanently resident and many migratory species (Smithe and Paynter 1953). All in all, as Brooks, Candy, and Box express it (1989, 1078), Tikal is a "marvelous place for seeing animal and

bird life of the jungle."

With Tikal, the park service has at present achieved an excellent balance. It is accessible, but not too much so. The hand of management upon the environment is light but adequate. The visitor center and museum has well-informed staff and accurate publications. If not yet a model, Tikal National Park is certainly one of the better-managed national parks in Latin America.

Galapagos National Park, Ecuador

The Galapagos National Park (6,730 km²) was established in 1959. It was established in the nick of time, with the support of some eminent scientists including Sir Julian Huxley. Most of the wonderful endemic wildlife was on the brink of extinction. Very generous international donors brought much of it back from the edge thirty years ago, only for it all to face the new threats of group tourism today.

However, for the present, one of earth's strangest landscapes and greatest open zoos is there for any and all to see--giant tortoises, multi-colored iguanas, soaring albatrosses, Darwin's finches, sea-lions, fur seals, flightless cormorants, and all the incredible array of unique avian shore and marine life. They make a visit to Galapagos National Park an unforgettable experience. The park also includes some of the world's most active volcanoes. As recently as 1968 the caldera floor of Volcan La Cumbre, after a massive Plinian eruption, subsided about 300 meters.

Administering paradise is no easy task. Indeed, the Ecuadorian national park service admits that the park sells itself and no promotion is needed. Its fame has in fact resulted in an overwhelming tourist boom. There were two tiny villages prior to establishment of the park. There is now a new jetport and eight sizable towns, with pizzerias, T-shirt shops, and noisy nightclubs. Visitors use buses to visit the tortoises and high speed water taxis to observe the birds on Plaza Sur. Three large cruise ships tour the various islands for periods varying from three days to two weeks. When the new San Cristobal airport was opened in 1986, nearly 50,000 visitors "flooded the islands ... far beyond the officially established carrying capacity limit" (Boo 1990, vol. 2, 99). There are nearly fifty key visitor locales within the park where various faunal associations are abundant, and careful controls on use of these is a growing imperative. Ominously, litter and even unsightly graffiti at some of these sites are a new part of the park scene!

Unfortunately, the usual tough budget constraints besetting all Latin American park administrations are particularly manifest here, and while many private persons are making money handsomely from the ecotourism boom, the vital conservation is distressingly inadequate. All park guides must be university graduates, and attend a special park service course--an exemplary arrangement which shows that standards in tropical national parks need not be low. On the other hand, despite the fact that the park consists of eleven large and numerous tiny islands, the park service lacks even a patrol boat (Salwen 1989)!

Migration to the islands from mainland Ecuador, inadequate control of the introduction of exotic flora and fauna (such as dogs and cats), and a chronic financial crisis all pose serious threats. In 1989 the Director of the Darwin Foundation, which works closely with the park management, admitted that 30 years of hard work is presently in very serious jeopardy. Once again, it is the same old question: how can we learn to enjoy paradise without destroying it?

Canaima National Park, Venezuela

Canaima is vast. At 30,000 km², it is three and a half times the size of Yellowstone and ten times the area of Yosemite. It comprises, includes, and flaunts just about everything the tropical world is supposed to be. It is, without contradiction, the tropical park par excellence (Instituto Nacional de Parques 1983).

No public relations are needed; every amateur video raises gasps of wonder and awe. The world's highest waterfall, Angel Falls, plunges from its most famous mountain, Auyan-Tepui, but there are uncounted others along all the great rivers that tumble and glide ceaselessly through the park's vast canopy of rainforests (Whelan

1977). In the northwest section of the park, the high forest teems with wildlife, active especially at night when most visitors do not see it. Yet the Gran Sabana section is eerie in its silence, one of the most lonely and silent environments on the planet.

From being one of the most remote and inaccessible spots on earth, wonderful Canaima has been suddenly propelled into the jet and highway age, and one seriously wonders what the effect will be during the 1990s. Daily, Avensa DC-9s swing around Angel Falls, weather permitting, to land at the park airport (Figure 4). The Pan-American Highway linking Venezuela and Brazil is now paved for most of its length through the park, and international bus travelers on the Caracas-Santa Elena-Manaus-Brasilia route are treated to a spectacular four-hour bonus: 1,100 m up La Escalera (The Staircase), then 100 km across the Gran Sabana along the eastern boundary of the park.



Fig. 4. An AVENSA jet makes the world's most spectacular landing approach at Canaima. Venezuela's airlines are active in promoting Canaima National Park in North America and Europe.

The major attractions of Canaima are all now accessible by air, road, or motorized canoe, and tourism to and within the park is big business. The relative isolation of the park's location, the overwhelming vastness of the landscape and the number and variety of the park's features make it unlikely that visitor pressures on management will be severe in the immediate future. The abundant insect life, and the need for such protection as is available against both yellow fever and malignant malaria, may tend to limit park use, even by Venezuelan nationals. A substantial, steady rise rather than a spectacular one, is likely. This will probably be fostered by airlines and tour companies outside Canaima rather than by the park itself or those who visit it (Castner 1990).

Canaima is one of the last extensive 'primeval' tropical environments left on our planet, still enormously rich in flora, fauna and breath-taking geomorphology. It is impossible for wardens to police more than a minuscule fraction of this vast terrain and protect it from the parrot poachers, miners, and potential despoilers. But as its permanent custodian, in the author's view the Venezuelan government and its agents on the spot shoulder a very

onerous responsibility for all mankind.

SERIOUS PROBLEMS FOR NATIONAL PARKS

The apparently encouraging picture of progress since 1971 is clouded at present by a whole host of very serious problems. **The Development Imperative**

It was Brazil's political leaders who at international fora in the mid-1980s, presented the world's wealthy nations with the phrase 'the development imperative'. Poor, debt-burdened, tropical countries have no choice, it is said; they simply have to develop whatever the cost. Taken up by other nations, the phrase points up the dilemma of a country like Ecuador, where oil company Conoco Ecuador has discovered and is eager to exploit a giant oil field in Yasuni National Park. In August 1990 protests were made by Amazonia Por la Vida, and members of the organization even briefly occupied Conoco's Quito headquarters. But the Government, in granting Conoco oil field development rights, has reluctantly had to settle for the company's vaguely worded promises that it will accept satellite monitoring of its operations within the park. There is no way at the present juncture that the Government dare forego the foreign exchange earnings potential of the oil development (World Rainforest Report 1990).

The IUCN, one of the organizations promoting national parks, is attempting to assist several countries in this dilemma, believing that in some instances development and conservation need not be incompatible.

A project, as a result of which La Tigra National Park, Honduras now provides wildlife conservation, recreation, and water supply for the capital city at less than a twentieth of the previous cost, is cited as an outstanding example (McIntosh 1990). In the Caribbean, seven local and international organizations are participating in the Cabrits National Park project in Dominica, which seeks to protect a unique island ecosystem while continuing to provide a sustainable livelihood for local islanders. It is still much too early to judge whether this new concept of sustainable development without degradation will be successful in the specific area of national parks.

Inappropriate Administrators

The success of some national parks is jeopardized because an inappropriate government body is used to administer them. Several of the seven parks described suffer from being under ministries low in the government's funding hierarchy. Cuba's huge Gran Parque Nacional Sierra Maestra (Table 1) will remain a paper park as long as it is under the aegis of the Ministry of Agriculture, whose portfolio in the region is more concerned with coffee quotas under the country's centrally planned economy than with the ideals of environmental conservation. In fact, when national parks are under the jurisdiction of agriculture ministries, this conflict always seems to arise. In Brazil even FUNAI, the agency for Amerindians, found itself guardian of large tracts designated as national parks (Branford and Glock 1985).

Insufficient Area

Very often the designated area of a national park has been far less than the minimum required to maintain ecological integrity. There has been lengthy and often acrimonious controversy in international fora over the minimum size consistent with habitat sustainability, and the question is still unsettled. It is, however, certainly much larger than hard-pressed government agencies are usually prepared to designate (Saunders et al. 1987).

There are many examples in Latin America of this concept of using "left-overs" for national parks, long recognized as an essentially shortsighted approach. Lee Durrell (1986) has pointed out the Emas National Park in Brazil, a vital wintering habitat for migratory birds, had 90 percent of its area burned by six separate fires in 1980. Giant anteaters were burned to death, together with a great deal of the gallery forest, with a consequent reduction in the numbers of insect-eating warblers in the USA. It was the vulnerability of inadequate size which led to this devastation.

One of the initial, and continuing, attractions of the Organ Mountains National Park in Brazil is the wealth of spectacular, endemic orchid species, hundreds of them maybe even thousands (Richter 1958). The limits of the park, established in 1939, were the absolute minimum to contain and ensure the survival of a representative

sample of orchid species. It has since been recognized that these limits were inadequate, even for the original purpose. How many species have gone into extinction will never be known.

Illegal Activities

In the current state of insecurity in Latin America and the Caribbean, it is not surprising that many national parks are plagued by crime, the drug trade, and insurgency (Rachowiecki 1987). Most of the parks offer both room to maneuver and camouflage, as well as being poorly policed. Park guides in Mexico routinely warn visitors that it is ill-advised to leave anything in a vehicle anywhere. In some cases the parks themselves are areas of direct conflict between factional interests, such as those described by Branford and Glock (1985) in Araguaia National Park in Brazil. The pages of the *South American Handbook* (1989,15,515,780,788, 790) are replete with scores of bold warnings against self-appointed tourist guides who charge very highly for their services, and can turn nasty if thwarted; kidnappers; thieves; muggers, especially in isolated places; *guerrilleros*; highway robbers; and rapists.

Some of the parks are actually battle zones. The magnificent northern section of the Huascarán National Park in Peru is infested with the Sendero Luminoso guerrillas, and many rainforest parks are hideouts for coca growing or trading. La Macarena National Park in Colombia, hailed by scientists as one of the most exciting biological preserves in the world, is too dangerous to enter, and a tragic casualty of drug-related insecurity. When the author attempted to visit in 1988, he was informed by Colombian scientists that much of the park is already damaged beyond repair.

Some of the proposed solutions, such as aerial spraying of defoliants to destroy enclaves of illicit drug cultivation in the rainforest, are unlikely to assist in the long-term goals of park management. The present drug war benefits only the bandits, the corrupt, and the powerful. It brings a few national parks directly into the firing line, and severely restricts potential development of many. Only the eventual de-criminalization of narcotics is likely to improve this situation and save vast areas of habitat for the future.

Bullying Tactics by Big Wealthy Nations

The wealthy countries of the world have environmental problems more serious than those in the tropics. Yet the same wealthy countries are not averse to using bully tactics on small tropical countries struggling to establish national parks and educate their peoples to accept them and the readjustments in life strategies that will be required.

The files of the Rainforest Action Network based in San Francisco and the Rainforest Information Centre in Lismore, Australia include many reports from conservationists which document the intense pressures brought to bear upon Latin American politicians and park administrators by governments and private business interests in the wealthy countries. Also, rich national elites in the poorer countries are often in league with these interests abroad. Methods routinely used include bribes and threats, and in many cases involve deliberately encouraging park officials to condone or turn a blind eye to illegal activities.

In the case of a few parks, particularly in Central America and the Caribbean, intervention by the USA in particular has been even more direct, and has involved the military or the Drug Enforcement Agency. The Rainforest Action Network (1989) claims that "under the guise of a program called 'Roads for Peace', US military forces are destroying Costa Rica's rainforest-rich Osa Peninsula, home to Corcovado National Park." Over the past few months US soldiers have systematically burned, bulldozed, and paved a vast tract of Osa rainforest. US troops have virtually taken over the peninsula. The purpose of this particular intervention is not known, but local conservationists believe that it is a part of a modified US strategy for maintaining its hegemony after the war in Panama. Heavy use of the hazardous chemical herbicide 2,4-D in a locality where dispersal into this park is almost inevitable, has been heavily criticized in Costa Rica, and as vigorously defended by US business interests¹ (APRASUR 1990).

In another of Costa Rica's national parks, Braulio Carrillo, near San José, US soldiers carry out military-style anti-

narcotics training, including the firing of automatic weapons, eject tourists from the park, and refuse requests from Costa Rican park officials to leave (Rainforest Action Network 1989).²

Encroachment

In the Corcovado National Park, the Costa Rican Government's latest report admits that "the 1980s has been a decade of encroachment, stress and a changing policy of relaxed visitor control." Gold miners entrenched in the southern third of the park have dynamited river beds "that will take more than a lifetime to reestablish" (Govorchin n.d., 4). The dilemma this posed for the Government is indicated by the fact that the National Park Service put everything on the line to save Corcovado. It ran a military-style operation to evict the gold miners which cost the Government political good-will.

Ferguson (1988, 18) has stated: "All the rainforest national parks in Ecuador are suffering colonization, as are the 16 major parks of the Amazonian Andes from Venezuela to Peru. These precious areas are all under threat unless they are surrounded by armed guards or sustainable agricultural systems."

It is, of course, impossible to surround a ten thousand square kilometer park with "armed guards," while the gross inequities in land tenure characteristic of Latin America, the burdens of debt, and the absence of strategies to promote sustainable agricultural systems all continue to provoke encroachment (Figure 5).



Fig. 5. The summit of Volcán Irazú, 3,432 m, Irazú National Park, Costa Rica. All the major volcanoes in tropical America are now national parks, but the attraction of rich volcanic soil encourages settlement on the upper slopes.

Health Problems

Three-quarters of the parks and more than nine-tenths of the total park area pose an appreciable health hazard to visitors and park personnel. All the Amazonian parks are affected by endemic amoebic and bacillary dysenteries, yellow and blackwater and dengue fevers, malaria, cholera, typhoid, rabies, hepatitis, tuberculosis, Chagas' disease, and leishmaniasis, which is carried by sand flies and infects eighty percent of Brazilian troops on exercise in the jungle in the rainy season (O'Hanlon 1988). Smaller animals can also be annoying, including mosquitoes, blackfly, tapir-fly, chiggers, ticks, scabies-producing *Tunga penetrans* and *Dermatobia hominis*, the human botfly, the candiruú or the toothpick-fish, and the notorious piranha.

Immunization against yellow fever, cholera, and tetanus, and prophylactics against malignant malaria are advised for all the rainforest and llanos parks. Notwithstanding all the visitors and staff in many parks report some consequential ill-health, especially inflammation from bites and fungal infections.

A serious problem, however, is the fact that while these environmental health hazards are serious deterrents to park managers and visitors, they rarely deter the despoilers. Desperate squatters, illegal lumberjacks, miners and wildlife poachers, with big financial stakes involved, are unhindered by the discomforts and press on regardless with their invasion and illicit utilization of all the more remote, and even many of the accessible parks.

Effects of Tourist Development

Paradoxically, improving park management can have some deleterious side-effects upon the environment. In an effort to increase funds available for management, tourist facilities have been upgraded and access improved. Shy wildlife has subsequently withdrawn farther into the remote parts of the larger parks, encouraging in turn deeper penetration by humans. Canaima, Manú, and Tikal have all been affected by this trend. Looting of artifacts is also very rife in Central American parks so that, as one harassed Panamanian curator put it recently, "just visiting some areas can pose a problem!"

CONCLUSION

Unless there is a very dramatic reversal in attitudes at the very highest level, a conversion which is then convincingly communicated to the small farmers, landless migrants, cattle barons, and the military, the future potential of the region's national parks will be very circumscribed. To be sure, they will hold back doomsday for a while, until scientists have cataloged and photographed and analyzed and marveled. Some scientists have higher hopes (Boo 1990; Brookfield 1988; Denslow and Padoch 1988; Perry 1986; Prance and Lovejoy 1985; Reader 1988; Salwen 1989; Silcock 1989), and that the conservation ethic may 'trickle down' from tertiary institutions to the ordinary citizen in time to save those environments in the region which are so increasingly at risk. Sadly, I do not share this sanguine outlook. The beer-cans and loud radios at Ixta-Popo do not suggest that this process is either rapid or very effective.

Despite the inadequacies and the limitations to which national parks are subject, they will likely remain one of the few hopeful efforts to check detrimental global change. At the very least, they slow down the trend of degradation and promote a greater consciousness of its effects. However lax enforcement may be, and with the possible exception of some big paper parks, their existence is a deterrent to the grossest forms of resource exploitation.

The international travel industry is placing increasing emphasis upon the promotion of 'exotic' locations. Central and South American national parks are high on the agenda of an increasing number of tour operators and travel agents who specialize in eco-tourism. User fees from nature-conscious travelers in search of the exotic and the culturally unusual are increasingly seen as offering a more abundant and reliable source of finance for park maintenance than funding from hard-pressed taxpayers in the countries where the parks are located (Rachowiecki 1987, 306).

Ultimately, the potential resolves itself into a numbers problem. As Sastrapradja (1988) points out, natural parks can make money but they only attract, by their very nature, small numbers of people. Mass tourism requires infrastructure, and will inevitably kill the goose that lays the golden egg. Pressure in the near future to reduce the paper parks (Table 4) to manageable size is likely; perhaps a better product will result. However, scientific knowledge as to the minimum viable size will have to be taken into account; in Amazonia, for example, Lovejoy (1985, 336) insists that this "should be on the order of millions of hectares." The temptation to limit park area to the absolute minimum must be resisted. The use of buffer zones, used in some countries, is worth considering.

Collier et al. (1985, 33), while recognizing that exploitation and development still dominate land utilization in Latin America and the Caribbean, see hope in changing attitudes, and believe that the "new national parks ... established in recent years" are signs of a genuine conversion of outlook. Ratcliffe (1990, 144) urges conservationists to come to terms with Third World realities, where "conservation pleas may be seen as neo-colonial postures on the part of wealthy countries to hold back the alleviation of widespread distress, or [to] deliberately resist ... economic growth in undeveloped countries."

The recommendations of Chinner, made in 1974 after a study of national parks in Mexico, are as valid as ever: provide more detailed interpretative material and better centers for its distribution; move park administration out of inappropriate ministries; and improve policing and control of illegal activities, if necessary with a special parks security service.

Whether under international pressure or voluntarily through conviction, some governments have in fact been far more courageous in dealing with encroachment, paying a heavier economic and political price in the short-term than the western media give them credit for, and indeed braver in grasping this nettle than their wealthier counterparts. Most Latin American nations have a substantial permanent military establishment with few functions in the international sphere. Let it be used more frequently in protection of the national heritage!

Barring some unforeseen economic, military or other catastrophe of global proportions, the growth of ecotourism seems assured and is likely to outstrip both that of world population and tourism in general. Observation in all seven selected parks indicates that increasing numbers of intelligent, environmentally conscious travelers will visit even the most remote national parks of the region, and they will be willing to contribute significantly to their cost. This trend should be encouraged.

National park administrations must lead the way in successfully combining tourism, conservation and sustainable resource utilization. With persistence, and a measure of luck, some of the parks may retain sufficient ecological integrity to check the wave of species extinction which is currently sweeping the planet.

Greater efforts must be made to convince governments that national parks, once gazetted, will not maintain themselves. They must be managed like any other valuable real estate or business asset. The cooperation of local residents, who may expect to benefit, must be sought. In Latin America and the Caribbean, infrastructure maintenance, control of concessionaires and garbage collection do not yet meet international standards and need to be upgraded.

The view is widespread that the tropics of Latin America and the Caribbean need national parks more urgently than anywhere else in the world. The pace of development and landscape change is so rapid, the presence of land (and profit) hunger so intense, the total physical environment so severely threatened, that it is in this region that the utility of national parks as a strategy of environmental conservation will be most severely tested.

NOTES

1. 2,4-D, even "in very low concentrations" is "harmful to aquatic life" (Weiss 1987,977). It causes "malfunctions in plant growth" (Dept. of Primary Industry 1978, 31), and is subject to a partial ban in some countries (Parliament of Australia 1982). Its use in tropical rainforests, especially in or close to important national parks, is totally irresponsible.

2. For a recent, comprehensive documentation in Spanish of the effects of drug-growing, trafficking, and attempted control operations upon environment and society in Latin America, see the special issue of *Revista Occidental* 7(3):251-392. (1990).

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REFERENCES CITED

Asociación de Productores Agropecuarios del Pacífico Sur (APRASUR) 1990. Costa Rica: Deforestation

- November 20, 1989. *World Rainforest Report* 15: 21.
- Barrington-Brown, C. 1876. *Canoe and Camp Life in British Guiana* London: Edward Stanford.
- Birnbaum, S., Hunt, C. and Goldberg, B. 1988. *South America 1988*. Boston, MA: Houghton Mifflin.
- Boo, E. 1990. *Ecotourism: The Potentials and Pitfalls*. Washington, D.C.: World Wildlife Fund (2 vols.).
- Branford, S. and Glock, O. 1985. *The Last Frontier*. London: Zed Books.
- Brizan, G. 1984. *Grenada, Island of Conflict*. London: Zed Books.
- Brookfield, H.c. 1988. The new great age of clearance and beyond. In *People of the Tropical Rainforest*, eds. J.S. Denslow and C. Padoch, 205-224. Berkeley, CA: University of California Press.
- Brooks, J., Candy, I. and Box, B. 1989. *South American Handbook 1989*. London: Trade and Travel Publications.
- Brown, L. 1987. *Conservation and Practical Morality*. London: MacMillan.
- Castner, J. L. 1990. *Rainforests: A Guide to Research and Tourist Facilities at Selected Tropical Forest Sites in Central and South America*. Gainesville, FL: Feeline Press.
- Caufield, C. 1984. *In the Rainforest*. Chicago, IL: University of Chicago Press.
- Chinner, D. W. 1974. *Innovations in National Parks Management: Report on a Study of the Administration of the National Parks of Canada, the United States of America and Mexico, With Particular Reference to Arid Zone and Tropical Areas*. Alice Springs, Australia: Northern Territory Reserves Board.
- Collier, S., Blakemore, H., and Skidmore, T. E., eds. 1985. *The Cambridge Encyclopedia of Latin America and the Caribbean*. Cambridge: University Press.
- Consejo Nacional de Planificación Económica 1971. *Master Plan for Protection and Use: Tikal National Parks*. Guatemala City: CNPE.
- Denslow, J. S. and Padoch, c., eds. 1988. *People of the Tropical Rainforest*. Berkeley, CA: University of California Press.
- Department of Primary Industry. 1978. *Aerial Agriculture Chemical Rating Manual*. Canberra: Australian Government Printing Service.
- Dodge, S. E. 1990. Editor's Note. *National Parks* 64(11-12):3.
- Durrell, L. 1986. *State of the Ark*. London: Gaia Books.
- Eyre, L. A. 1989. The changing Caribbean: National park development in Grenada. *Caribbean Geography* 2(4): 268-279.
- Ferguson, D. 1988. Rainforest Information Centre in Ecuador. *World Rainforest Report* 1 1: 18-19.
- Gideon, D. 1988. Pearls Beach and Crater Lakes. *The Greeting* 1, 2: 46-47.

- Goborchin, R. n.d. *The National Parks of Costa Rica*. San José: Instituto Costarricense de Turismo.
- Guppy, N. 1973. *A Young Man's Journey*. London: John Murray.
- Instituto Guatemalteco de Turismo 1970. *La Ciudad Maya de Tikal*. Guatemala City.
- Instituto Nacional de Parques (INPARQUES) 1983. *Los Parques Nacionales de Venezuela*. Caracas: Fundación de Educación Ambiental.
- International Union for Conservation of Nature and Natural Resources (IUCN) 1971. *United Nations List of National Parks and Equivalent Reserves*. Morges: Hayez.
- Jacobs, P. and Munro, D.A, eds. 1987. *Conservation with Equity: Strategies for Sustainable Development*. Gland: IUCN.
- Jules, D. 1986. A note on environmental and conservation policy in revolutionary Grenada. *Medio Ambiente Caribeño* 2:279-290.
- Lappe, F.M. and Collins, J. 1989. Population pressure on the environment. In *Thinking Green*, ed. M. Allaby, 85-91. London: Barrie and Jenkins.
- Lovejoy, T.E. 1985. Amazonia, people and today. In *Key Environments: Amazonia*, eds. G.T. Prance and T.E. Lovejoy, 328-338. Oxford: Pergamon Press.
- Lundell, c.L. 1937. *The Vegetation of Peten*. Washington, DC: Carnegie Institute.
- McIntosh, P. 1990. Embracing dilemmas the world over. *International Wildlife* 20(6): 12-15.
- McMichael, D. F. 1986. An international perspective. In *The Value of National Parks*, ed. Australian Conservation Foundation, 33-37. Hawthorn, Vic.: Australian Conservation Foundation.
- Morley, S.G. 1946. *The Ancient Maya*. Stanford, CA: Stanford University Press.
- O'Hanlon, R. 1988. *In Trouble Again: A Journey between the Orinoco and the Amazon*. New York, NY: Random House.
- Orbis Books 1974. *National Parks of the World*. New York, NY: Orbis Books.
- Organization of American States 1988. *Inventory of Caribbean Marine and Coastal Protected Areas*. Washington, D.C.: OAS Department of Regional Development.
- Parliament of Australia. 1982. *Hazardous Chemicals*. Canberra: Australian Government Printing Service.
- Patterson, P.J. 1989. National parks: A vehicle for sustainable development. *Tody News* 1 (2): 1-2.
- Perry, D. 1986. *Life Above the Jungle Floor*. New York, NY: Simon and Schuster.
- Poore, D. 1976. *Ecological Guidelines for Development in Tropical Rainforests*. Morges: IUCN Books.
- Prance, G.T. 1986. *Tropical Forests and the World Atmosphere*. Washington D.C.: American Association for the Advancement of Science.
- Prance, G.T. and Lovejoy, T.E., eds. 1985. *Key Environments: Amazonia*. Oxford: Pergamon Press.

- Pritchard, P.c. 1990. An appeal for action. *National Parks* 64 (11-12): 5.
- Rachowiecki, R. 1987. *Peru: A Travel Survival Kit*. South Yarra, Vie.: Lonely Planet Publications.
- Rainforest Action Network 1989. U.S. military innvades Costa Rican rainforest. *RAN Action Alert* 43.
- Ratcliffe, D.A. 1990. Conserving wild nature: Purrpose and ethics. In *Australian Tropical Rainforests: Science, Values, Meaning*, eds. L. J. Webb and J. Kikkawa, 142-145. Canberra: CSIRO.
- Reader, J. 1988. *Man of Earth: A Celebration of Mankind*. New York, NY: Harper and Row.
- Reti, I. 1986. Resolving conflicts between traditional practices and park management. *Parcs* 11, 1: 17-19.
- Richter, W. 1958 *Die schonsten aber sind Orchideen*. Radebeul: Neumann Verlag.
- Robinson, AH. 1982. *Virgin Islands National Park*. Las Vegas, NV: KC Publications.
- Salwen, P. 1989. *Galapagos: The Lost Paradise*. New York, NY: Mallard Press.
- Sastrapradja, S. 1988. Perspective on Conservation in Indonesia. In *People of the Tropical Rainforest*, eds. J.S. Denslow and C. Padoch, 197-206. Berkeley, CA: U ni versity of California Press.
- Saunders, D.A, Arnold, G.W., Burbidge, A.A, and Hopkins, AJ.M., eds. 1987 *Nature Conservation: The Role of the Remnants of Native Vegetation*. Chipping Norton, NSW: Surrey Beatty and Sons.
- Silcock, L. 1989. *The Rainforests: A Celebration*. London: Barrie and Jenkins.
- Smithe, F.B. and Paynter, R.A 1953. *Birds of Tikal*. Cambridge, MA: Museum of Comparative Zoology at Harvard College.
- UNESCO 1978. *Convention Concerning the Protection of the World Cultural and Natural Heritage*. Paris.
- _____. 1989. *The World Heritage*. Madrid: Incafo. Weiss, G. 1987. _____. *Hazardous Chemicals Data Book*. Park Ridge, NJ: Noyes Data Corporation.
- Whelan, IR. 1977. Angel Falls: Or is it Tarzan's lost world? *Signature* 12(11): 28-61.
- Woodwell, G.M., Houghton, R.A, and Stone, T.A 1986. Deforestation in the Brazilian Amazon Basin measured by satellite imagery. In *Tropical Rain Forests and the World Atmosphere*, ed. G.T. Prance, 23-32. Washington D.C.: American Association for the Advancement of Science.
- World Rainforest Report 1990. Ecuadorians Heat Up Campaign against Du Pont, Conoco Oil. *World Rainforest Report* 6(4): 1-6.

Resumen

El desarrollo de los parques nacionales en la América Latina tropical y el Caribe han sido tratados. La información está basada en 168 parques en 22 países en el trópico Americano. Dieciocho de ellos son parques solo en nombre. Sinopsis más detalladas de siete parques escogidos proveen ejemplos del grado hasta el cual los metas de la directiva han sido realizados y los problemas han sido resueltos. Los problemas críticos incluyen formas inapropiadas de administración, inseguridad, violación de ellos, y los efectos del aumento de la intervención humana. El potencial de los parques tropicales nacionales para servir el doble propósito de la

conservación del medio ambiente y el uso de ellos para la recreación por parte del público son discutidos.
Palabras claves: *parques nacionales, medio ambiente, la zona tropical, América Latina, el Caribe.*