"Wildlands" Conservation in Central America During the 1980s: A Geographical Perspective

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ABSTRACT
The number and area of parks and protected areas in Central America has increased over the past decade. Many of these "wildlands," as defined by the International Union for the Conservation of Nature, are home to the region's most important remaining indigenous populations and tropical rain forests. With deforestation pressures ever present throughout the region, these "cultural parks" offer great potential to conserve regional natural and cultural heritage. Indeed, these areas represent the largest surviving tracts of forested lands in the region. Yet, while past conservation efforts have focused largely on the identification, environmental deterioration, and establishment of these areas, new research needs to focus on collecting the data and developing the management strategies that can guarantee the preservation of habitats within the boundaries of these protected areas. Geographers have played a role in past efforts, but can do much more. A variety of innovative approaches toward wildlands development and conservation in Central America, including biosphere reserves, comarca Indian homelands, and land-titling schemes, can be implemented.

"Wildlands" are relatively unaltered terrestrial or aquatic environments with features of regional or global importance. Many are forests, legally protected or managed for a variety of purposes, be they resource exploitation, recreation, education, or absolute protection (Hartshorn et al. 1982; Goodland and Ledec 1989). All wildland areas are not alike. The International Union for the Conservation of Nature (IUCN) has divided the world's wild and protected areas into ten broad categories, each of which has a distinct natural and cultural characterization (IUCN Commission 1982). Although relatively undisturbed, wildlands are often exploited by indigenous or tribal peoples for traditional activities. Indeed, seven of the ten IUCN wildland categories recognize the presence of indigenous or local populations living or exploiting lands within the limits of their boundaries. These so-called "cultural parks" or "ethnic wildlands" contain villages, towns, communication networks, and on-going economic activities that, in many cases, have been functioning for centuries. The indigenous subsistence activities include farming, hunting, fishing, gathering, and even some livestock raising. National or provincial parks and other protected areas in Central America house many of the region's surviving indigenous populations. Exact population statistics on the native groups in these cultural parks are presently unknown, but they are clearly significant. A common perception of these wildlands is that the traditional peoples they support do not act as environmentally destructive agents. Yet, even subsistence agriculturalists can mismanage their surroundings. While ethnic groups have been sustained on certain areas for centuries, it has become increasingly clear that, with ever-increasing population and resource pressures, the cultural parks cannot be maintained over the long term without addressing the needs of the peoples living within them.

This is a review of the progress of wildlands conservation in Central America during the 1980s. It outlines the land use characteristics of the region's ethnic wildlands, noting the variable nature of the population and settlement patterns found within them. Three new and positive conservation strategies that are sensitive to the human/environment interface are outlined for the decade. Recommendations are made for future geographic research on cultural parks.

WILDLANDS CONSERVATION IN CENTRAL AMERICA

The processes of identifying and establishing wildlands in Central America progressed considerably during the 1980s. Owing to a growing concern with deforestation and its associated environmental degradation (Denevan 1981, 1982; Hecht 1981; Hecht and Cockburn 1989), most Central American countries took action during the decade to establish reserve systems to protect forest resources. Costa Rica set a good example earlier in 1969-1970 when it enacted its forestry and wildlife conservation laws (Hartshorn et al. 1982; MacFarland et al. 1984). Belize passed the National Park System Act in 1981 (Hartshorn et al. 1984). Panama developed a national system of protected areas several years later (INRENARE 1988) and Guatemala passed a protected areas law at the end of the decade (CONAP 1990). During this period, most governments in the region expressed, at least outwardly, their concern that certain environments -- especially tropical rain forests -- are unsuitable for certain types of development.

The number and area of legally established wildland territories in Central America increased substantially during the decade. The most complete cataloging of the region's protected lands has been compiled by the Centro Agronómico Tropical de Investigación y Enseñaza (CATIE) in Costa Rica, working in collaboration with the IUCN and the World Wildlife Fund (CATIE 1989). In 1980, 129 protected areas covered about 9 percent of the region (IUCN Commission 1981:155). By 1990, the number of legally established wildlands had increased to 240, covering 13.1 percent of the total land area of Central America (Table 1). Costa Rica, with 26.3 percent, Panama, with 25.8 percent, and Guatemala, with 21.7 percent, have the highest proportions of protected lands while El Salvador with only 0.7 percent has the regional low. These figures should be considered estimates, because many of the parklands are not well delimited and accurate large-scale maps of their boundaries do not exist. As a result, calculations of reserve sizes vary from source to source. Nevertheless, it appears that over 70,000 square kilometers of wildlands had been assigned protected status by 1990 (Table 1). Over 100 additional potential wildlands are presently under consideration for legalization in the region (CATIE 1989).

Table 1: "Wildlands" and Indigenous Populations in Central America, 1990

	All Wildlands - 1990			Wildlands with Indigenous Use - 1990			
	Total Number	Total Area Protected (km^2)*	Percentage of Country Protected	Total Number	Total Area Protected (km^2)*	Percentage of Country Protected	Percentage of Protected Wildlands
Belize	10	1,321.5	5.8%	0	0	0%	0%
Guatemala	54	23,589.9	21.7%	21	23,438.8	21.5%	99.4%
Honduras	41	8,317.1	7.4%	16	7,335.0	6.5%	88.2%
El Salvador	6	167.0	0.7%	1	56.0	0.3%	35.5%
Nicaragua	30	4,134.3	2.8%	6	2,540.0	1.7%	61.4%
Costa Rica	74	13,325.2	26.3%	21	8,560.4	16.9%	64.2%
Panama	25	19,867.4	25.8%	10	18,337.0	23.8%	92.4%
Total	240	70,722.4	13.1%	75	60,267.2	11.1%	85.2%

*Total area includes only protected areas with established land areas.

WILDLANDS WITH INDIGENOUS USE IN CENTRAL AMERICA

A large number of Central America's wildlands are home to indigenous peoples. The determination of exactly which protected areas house native populations is a difficult task. Precise data upon which to base an accurate assessment of the present distribution of the region's Indian populations are unavailable in most cases. Geographers Davidson and Counce (1989) have produced the best map of the overall distribution of Indians in Central America, but they pointed out that most attempts at mapping these populations only approximate group boundaries. For this study, field observations, ethnographic accounts, and census data were used to supplement existing map distributions for each country. Nevertheless, coupling this problem with the imprecise delimitations of the wildland areas in the region (as noted above), the data mapped and presented in this study can, at best, be considered only an approximation and initial step towards understanding the relationships between the wildlands and their native inhabitants.

At least 75 of Central America's 240 wildlands are settled or exploited by indigenous populations (Tables 1 and 2). These ethnic wildlands include some of the largest protected areas in the region. For example, in eastern Panama, Indian populations inhabit the Darién National Park/Biosphere Reserve (see P4 on Figure 1) and the overlapping Comarca Emberá (P17); these combined areas include nearly 9,000 square kilometers (Herlihy 1989a, 1986).

Numerous indigenous groups also live in the La Amistad Biosphere Reserve that covers over 6,000 square kilometers of eastern Costa Rica (Guevara 1989) and the Río Plátano Biosphere Reserve that covers over 5,000 square kilometers of eastern Honduras (Glick and Betancourt 1983). Combined, the cultural parks account for an astonishing 85 percent of the total area under protected status in Central America, covering about 11 percent of the region (Table 1); they represent the largest surviving tracts of forested land in the region.

Table 2: "Wildlands" with Indigenous Populations in Central America, 1990

Map*	Number of Areas	Hectares	Indigenous Inhabitants
Belize			
0	0	0	0
Guatemala			
	Dirección General de Bosques (DIGEBOS)		
G1	Río Dulce	9,610	Garífuna, Kekchí Maya
G2	Atitlán	3,250	Cakchiquel, Tzutuhil Maya
G3	Conos de los Volcanes	N/A	Cakchiquel Maya
G4	El Rosalia	1,105	Kekchí Maya (?)
G5	Santa Rosario	1,000	Pokomchi Maya (?)
G6	Cerro Miramundo	902	Chortí Maya
G7	Cerro Baul	240	Maya (?)
G8	Lachua	10,000	Kekchí Maya
	Universidad de San Carlos (CECON)		
G9	Biotopo de Chocon	7,000	Kekchí Maya
G10	Biotopo de Cahui	700	Itzá Maya

	Instituto de Antropología e Historia (IDAEH)		
G11	Aquateca	1,700	Kekchí Maya
G12	Dos Pilas	3,100	Kekchí Maya
G13	Ucanal	2,200	Mopan Maya (?)
G14	Sacul	300	Mopan Maya (?)
G15	Xutilha	269	Mopan Maya (?)
G16	Naranjo	-0-	Mopan Maya
G17	Machaquila	2,500	Kekchí Maya (?)
G18	Yaxha	-0-	Mopan Maya
G19	Río Azul	-0-	Río Azul
	Areas Potenciales (Decreto 4-89)		
G20	Maria Tecun	N/A	Quiché Maya
G21	Tecpan	N/A	Quiché Maya
G22	Cuchumantanes	N/A	Mam Maya
G23	Yolnabaj	N/A	Chuj Maya
G24	Caba-Bisis	N/A	Kanjobal Maya
G25	Polochic	N/A	Kekchí Maya
G26	Santa Cruz	N/A	Kekchí Maya
G27	Samuc-Champey	N/A	Kekchí Maya
G28	Chinaja	N/A	Kekchí Maya
G29	Reserva de la Biósfera Maya (Includes G16, G18, G19 areas)	1,500,000	Mopan, Yucateco Maya
G30	Reserva de Biósfera de Sierra de las Minas	800,000	Maya
Total	.....	2,343,876	
Honduras			
	Parques Nacionales		
H1	**Islas de la Bahia (39,160 HA)	-0-	Garífuna
H2	**Punta Sal (1,300 HA)	-0-	Garífuna
H3	Montaña de Cusuco	18,000	Garífuna
H4	Pico Bonito	68,000	Garífuna
H5	Pico Pijol	11,400	Tolupan (?)
H6	Montaña Yoro	15,500	Tolupan
H7	Celaque	18,000	Lenca
	Reservas Biológicas		
H8	**Guaimoreto (5,000 HA)	-0-	Garífuna
H9	**Capiro Calentura (2,000 HA)	-0-	Garífuna
H10	**Caratasca (120,000 HA)	-0-	Miskito
H11	Opalaca	14,500	Lenca
H12	Montecillos	12,500	Lenca
H13	Montaña San Pablo	N/A	Lenca
H14	Guajiquiro	7,000	Lenca
H15	Chiflador	N/A	Lenca
	Reservas de Vida Silvestre		

H16	Barras Cuero-Salado	12,300	Garífuna
H17	Santuario Texiguat	10,000	Tolupan
H18	Puca	4,900	Lenca
H19	Montaña Verde	8,300	Lenca
H20	Mixcure	8,000	Lenca
	Reserva de la Biósfera		
H21	Río Plátano	525,100	Miskito, Pech, Garífuna
H22	**Reserva Tawahka (233,142 HA)	-0-	Tawakha Sumu, Miskito
Total	.....	733,500	
El Salvador			
	Parques Nacionales		
E1	Hacienda El Imposible	5,600	Pipil (?)
Total	.....	5,600	
Nicaragua			
	Parques Nacionales		
N1	Salaya	12,000	Sumu (?)
	Areas Silvestres		
N2	Bismuna-Pahua- Cayos Miskitos	80,000	Miskito
N3	Cerros de Bana Cruz	56,000	Sumu
N4	Laguna Wounta	30,000	Miskito
N5	Lagunas de Wancarlaya	8,000	Miskito
N6	Boca del Río Grande de Matagalpa	68,000	Miskito
N7	**Reserva de la Biósfera Bosawas (1,100,000 HA)	-0-	Sumu, Miskito
Total	.....	254,000	
Costa Rica			
	Parques Nacionales		
CR1	Tortuguero	18,947	Miskito, Sumu, Rama Refugees (?)
CR2	Cahuita	1,068	Bribri (?)
CR3AB	La Amistad (A & B)	193,929	Cabécar, Bribri
CR4	Chirripó	50,150	Cabécar
CR5	Corcovado	41,789	Guaymí
	Reservas Biológicas		
CR6	Hitoy Cerere	9,154	Bribri, Cabécar
	Zona Protectora		
CR7	Barbilla	12,830	?
CR8	El Rodeo	2,200	Huetar (?)
CR9	Cerro Turrabares	2,340	Huetar (?)
	Reservas Forestales		
CR10	Las Tablas	19,602	?
CR11	Río Macho	77,632	Cabecar (?)
CR12	Golfo Dulce (Osa Reserve 2,703 HA)	70,000	Guaymí
	Refugios de Vida Silvestre		

CR13	Barra del Colorado	92,000	Miskito, Sumu, Rama Refugees (?)
CR14	Gandoc-Manzanillo	5,013	Bribri (?)
CR15	Tapantí	5,131	(?)
	Reservas Indígenas de Talamanca		
CR16	Chirripo	96,756	Cabécar
CR17	Tayni	16,216	Cabécar
CR18	Telire	16,260	Cabécar
CR19	Cabecar	22,729	Cabécar
CR20	Bribri	43,690	Bribri
CR21	Ujarraz-Salitre Cabraga	58,600	Bribri, Cabécar, Teribe
	Reserva de Biosfera la Amistad-Talamanca (Includes areas of CR3 a & b, CR4, CR6, CR7, CR10, CR11, CR15, CR16-21 covering 622,679 HA)		
Total	.....	856,036	
Panama			
	Parques Nacionales		
P1	Chagres	129,000	Emberá, Wounaan
P2	La Amistad	207,000	Bribri, Nogbe Guaymí
P3	Cope-Omar Torrijos	N/A	Buglere Guaymí
P4	Darién	555,000	Emberá, Wounaan, Kuna
	Reservas Forestales		
P5	La Fortuna	26,000	Nogbe Guaymí
P6	Canglon	31,650	Emberá, Wounaan
P7	Bayano	N/A	Kuna, Emberá, Wounaan
	Refugios de Vida Silvestre		
P8	**Estero Río San Juan	N/A	Bribri
P9	**Cienega de Changuinola	N/A	Nogbe Guaymí
P10	**Peninsula Valiente	N/A	Nogbe Guaymí
P11	**Cienega de Urey	N/A	Guaymí
P12	**Estero Golfo de San Miguel	N/A	Wounaan, Emberá
	Bosques Protectores		
P13	Palo Seco	240,000	Teribe
P14	**Serranias de Maje	N/A	Wounaan
	Monumentos Nacionales		
P15	Cayo Tigre	N/A	Guaymí
P4	Biósfera Darién (P4; area covers part of P17)	-0-	Emberá, Kuna, Wounaan
	Tierras Comarcales		
P16	Comarca Kuna Yala	320,600	Kuna
P17	Comarca Emberá (432,600 total)	324,450	Emberá, Wounaan
P18	**Comarca Guaymí (475,900 HA)	-0-	Ngobe, Buglere Guaymí
	**Comarca Teribe (144,700 HA; not mapped)	-0-	Teribe
Total	.....	1,833,700	

*Boundary limits are approximate and while accurately mapped in some areas, in many others they show only the approximate

location of the protected area.
** = Potential areas
(?) = Uncertain of indigenous population status

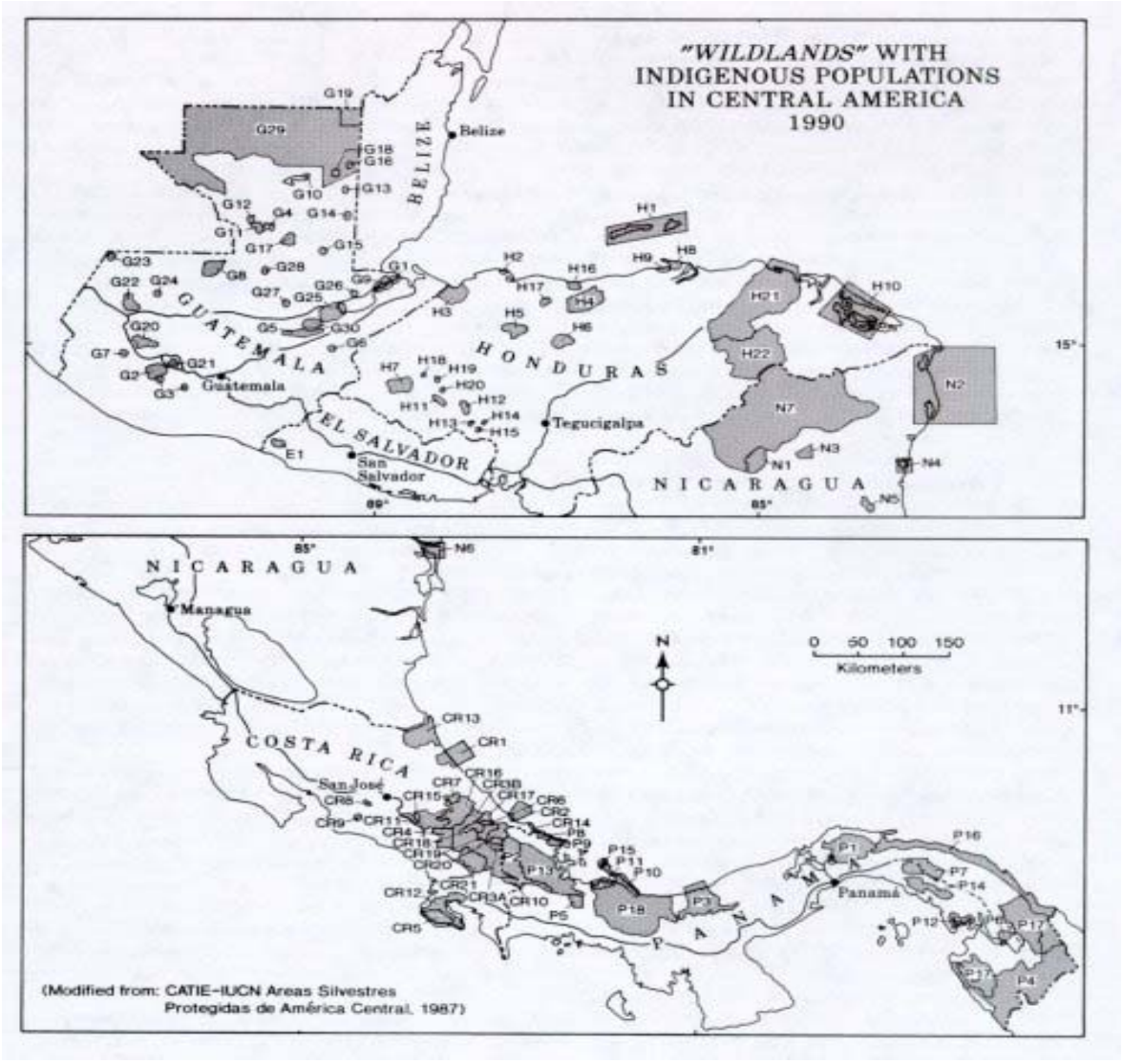

Figure 1

The size of the indigenous population and density of settlement vary greatly from one wildland to another. In no case are tribal groups settled throughout the entire protected area. Rather, they exploit resource areas within the boundaries of the wildlands. Such exploitation is, in much of Central America, guaranteed through legal or constitutional rights. In the Comarca Emberá (P17), which covers over 4,000 square kilometers of rain forest in eastern Panama, over 8,000 Indians are settled in 35 villages that are restricted to the margins of rivers. The Indians farm the natural levees and bordering bottomlands and range over the interfluvial lands to exploit forest resources. Still, while this is one of the most densely populated rain forests in Central America, only about half of the Comarca's area is actually exploited for agriculture (11 percent of the area), hunting, fishing, or collecting (combined about 40 percent) (Herlihy 1989c). Wildlands in other rain forest areas of Panama (P2, P5, P13), Honduras (H21, H22), and Nicaragua (N1, N7) are not as densely settled by indigenous populations and experience even less exploitation. One of the least densely settled zones is in the Petén where the new Maya Biosphere Reserve (G29) has

comparatively few settlers.

GEOGRAPHICAL STUDIES RELATED TO WILDLANDS

Geographers have contributed much valuable research related to wildland conservation, especially to those aspects that address relationships between natural resources and indigenous land use. These studies and those made by scholars in other disciplines during the decade of the 1980s fall into three broad thematic categories: resource inventories, destructive exploitation, and constructive exploitation.

Baseline resource inventory studies made during the 1980s of Central American countries included the scholarship of a number of geographers. Hartshorn, who worked on wildland conservation in several parts of the region (Hartshorn 1983), teamed up with Tosi, Morales and other scholars to inventory the forests of Costa Rica (Hartshorn et al. 1982); he also collaborated with Davidson and others to inventory the resources of Belize (Hartshorn et al. 1984). Dickinson (1982) was responsible for putting together the country resource profile for Honduras. Hoy (Cooley et al. 1981) worked on the environmental profile of Guatemala. Budowski (1982) and Incer (presently director of Nicaragua's Instituto de Recursos Naturales y del Ambiente) played instrumental roles in conservation efforts throughout the entire region during the decade.

Geographers also documented the destructive exploitation of wildland areas that occurred throughout Central America during the 1980s, much of it associated with land colonization (Porras y Villarreal 1986; Heckadon 1982, 1984; Heckadon y Gonzalez 1985; Leonard 1987). Frost (1981) assessed the impact of deforestation on wildlife in Belize. Nietschmann (1980) documented the depletion of the green turtle in the Nicaraguan Mosquitia region. Hoy and Belisle (1984) described the environmental problems associated with development projects in Guatemala's western highlands. Augelli (1987) detailed the ill-advised government policies for planned colonization and the wasteful pioneer attitude towards the exploitation of forest resources along the Costa Rican frontier. Holz (1980) and Herlihy (1989a) observed the removal of Darién's unique forests by spontaneous and uncontrolled colonization along the Gap Highway. Deforestation and other destructive trends associated with the development of recent penetration roads continue to threaten the region with the most severe losses in the Petén of Guatemala, the Mosquitia region of Honduras and the Darién of Panama.

A number of geographers have written on constructive exploitation. In doing so, strategies have been identified that are specifically designed to promote the sustained use, conservation, or preservation of natural habitats. Place (1985, 1988) linked wildland conservation with rural economic development in Costa Rica's Tortuguero National Park by suggesting that the region's inhabitants can replace income generated by exploiting rare and endangered biological resources with income generated by a sustainable program of tourism. Indeed, Corcovado, Santa Rosa, Palo Verde, Tortuguero and Isla del Coco have become veritable "Meccas" for ecotourists, naturalists and researchers who study Costa Rica's natural riches (Boza 1984:6). Nietschmann (1990) described a radical view of natural resource conservation that resulted from the settlement abandonment of the Nicaraguan Mosquitia region during the Contra-Sandinista conflict.

It has become increasingly clear that ecologically sound and economically sustainable development strategies can be learned from the indigenous inhabitants themselves (Hecht 1982;

Posey et al. 1984; Browder 1989). Denevan et al. (1984) were among the first to focus attention on this research theme by demonstrating that the swidden-fallow management practices of indigenous populations in Amazonian Peru constituted sustainable and productive components of a cash-oriented subsistence economy. Gordon (1982) provided the most detailed geographic study of traditional agroforestry practices for Central America from his work among the Panamanian Guaymí Indians. Many other anthropologists, botanists and ecologists have also contributed to this literature (see Nations and Komer 1983; Clay 1988).

EMERGING WILDLAND CONSERVATION STRATEGIES

During the 1980s, the Central American Republics initiated three innovative strategies towards wildlands management that are sensitive to the human/environment interface. All three offer promise for the future conservation of regional resources.

The first was the establishment of biosphere reserves. Biosphere status provides for the protection of not only natural habitats and their genetic riches, but also for the indigenous inhabitants and their cultural traditions (Droste zu Hulshoff and Gregg 1985; Halffter 1985). The program provides a conceptual link between the need to establish parks and other wildlands and the recognition of the lands and traditions of indigenous cultures (Houseal et al. 1985). Central America's first biosphere reserve was established in the Río Plátano region of northeast Honduras in 1980 (Glick and Betancourt 1983). Since that time, four others have been created. The biosphere reserves are the five largest protected areas in Central America today; combined, they cover about 40,000 square kilometers, accounting for over half the lands under protected status in the region.

The five biospheres contain a large portion of the region's remaining indigenous inhabitants. In the establishment of the reserves, there has been a tendency to consolidate other wildland categories, including Indian reserves, within their delimited regions. The Río Plátano Biosphere (Figure 1, H21) in the Honduran Mosquitia is home to about 5,000 Miskito and Pech Indians and to hundreds of Garífuna, or Black Caribs. The Biosphere La Amistad was established in 1982 as an amalgamation of many smaller protected areas around the borderlands between Costa Rica and Panama in the Talamanca Highlands. It is inhabited by some 8,000 Cabécar, 6,500 Bribri, and smaller numbers of Teribe and Guaymí Indians (Tenorio Alfaro 1990). The Darién Biosphere Reserve (P4), established in 1983 in the remote Darién region of eastern Panama, contains over 2,000 Emberá and Wounaan Indians and a few hundred Kuna Indians (Herlihy 1986, 1989a). The remaining two reserves, the Maya Biosphere (G29) in Guatemala's northern Petén region (Houseal 1990) and farther to the south in Sierra de las Minas (G30), are settled by an unknown number of Mayan speakers. Combined, Central America's biosphere reserves include 65 percent of the total area of cultural parks, or ethnic wildlands, in the region today. Two other biosphere reserves are presently proposed: the first is in the Comarca Kuna Yala (P16), the recognized homeland of the Kuna Indians of Panama (Wright et al. 1985, discussed below), and the other, called Bosawas (N7), is proposed for the Nicaragua borderlands along the Río Coco where the Miskito and Sumu Indians live.

The establishment and recognition of a biosphere reserve does not necessarily assure the protection of its natural resources or cultural heritage. Thousands of agricultural colonists have invaded the Río Plátano Biosphere Reserve along its southern (from Culmí down the Río

Wampú) and western (along the Río Paulaya) boundaries. The appearance of this colonization front has not only caused the destruction of massive expanses of pristine tropical rain forest, but it places the native Pech (Kolankiewicz 1989), Miskito, and Garífuna at odds with these advancing colonists over issues of land tenure and resource exploitation. The Darién Biosphere experiences similar problems around its southwestern boundary in the Río Sambú area. Each of Central America's biosphere reserves is threatened by similar pressures of destructive exploitation to greater or lesser degrees.

A second management strategy originated in Panama with the establishment of comarcas. A comarca is an Indian homeland with semiautonomous political organization under the jurisdiction of the national government. Under the comarca system, the state recognizes those features of Indian society which distinguish it from the national culture. The Indians accommodate certain state interests with respect to sovereignty, security, and resource exploitation while retaining authority over most of their internal cultural, economic, and political affairs. An underlying philosophic feature of the comarca is that the natives are entrusted with the management of endangered environments while retaining access to resources needed for their cultural and economic well-being (Herlihy 1989b). The first comarca in Panama was established for the Kuna Indians in 1938 (Breslin and Chapin 1984; Howe 1986). Kuna Yala (P16), as the comarca is now called, contains about 45,000 Kuna and some of the most beautiful rainforested coastlands in all of Central America. The success of this reserve has demonstrated how indigenous resource management systems can effectively conserve the natural heritage of Panama while, at the same time, insuring the cultural heritage of the Kuna Indians. Beyond natural and cultural heritage conservation, however, the comarca model shows how reserve lands can also insure frontier security and economic growth while promoting scientific research. Following the Kuna success, a comarca was established for the Emberá and Wounaan Indians in Darién Province in 1983. Emberá-Wounaan Drua (P17), as the comarca is called locally, contains over 8,000 Indians in what may be the most isolated and unique rain forest environment in Central America (Herlihy 1986, 1989c). Panama's two comarcas include over 7,500 square kilometers, or about 12 percent of the total area of cultural parks in Central America today. Two additional comarcas are presently proposed: one for the Teribe Indians around the Río Changuinola of western Panama's borderlands with Costa Rica, and the other (P18) for the Guaymí Indians in their territory south and east of the Chiriquí Lagoon.

The decade's final positive approach for the conservation of wildlands and Indians in Central America is land-titling. The task of obtaining legal title to the lands traditionally occupied by indigenous groups is an important consideration, as is the basic assumption that landlessness or a lack of land tenure and the destruction of forest resources go hand in hand. The greater the economic insecurity of a farmer, be he Indian or colonist, the more likely he is to destroy -- for the short-term gain -- the resources around him. Presently, land legalization is being implemented among the Miskito, Sumu, and Pech of the Honduran Mosquitia by Mopawi (Mosquitia Pawisa), a non-profit, grassroots development organization. The program is important because large numbers of ***ladinos*** are moving into the region and clearing the forests. Mopawi is trying to implement a new approach towards Honduras' policy of agrarian reform that normally allocates only small plots of land to individual farmers. Recent field studies have shown that the Indians of the region have overlapping spheres of resource use where different villages hunt, fish, and farm (Herlihy and Leake 1990). The new approach adopted by Mopawi discards the old government

policy of allotting to native farmers individual family plots and it adopts a view of Indian land use from an interrelated, communal, or regional perspective, much like that found in the study by Veblen (1975) that also demonstrated the connection between communal land tenure and the conservation of forest resources from highland Guatemala. The land legalization program has achieved remarkable acceptance and success since its establishment in 1988, acquiring provisional guarantees from the National Agrarian Institute to two communal areas, each covering about 7,500 hectares, for a Tawahka Sumu and a Miskito Indian community, respectively, along the Río Patuca, and another area of about 3,600 hectares for a Pech community along the Río Plátano (Herlihy and Leake 1990:16). Mopawi's land legalization program has led to the inception of an indigenous forest reserve for the Tawahka Sumu Indians along the Río Patuca, covering about 2,300 square kilometers. This reserve (H22) would ideally connect to the southern limits of the Río Plátano Biosphere Reserve (H21) on the north and link with the proposed Bosawas Biosphere Reserve (N7) to the south in Nicaragua. The establishment of this corridor of reserve lands will serve as a deterrent against the eastward advancement of the colonization front while placing much of Mosquitia's rain forest under the stewardship of its indigenous inhabitants.

DISCUSSION AND FUTURE RESEARCH

Resource conservation in Central America's cultural parks is essential for the maintenance of the region's natural and cultural heritage. On the one hand, conservation of the wildlands depends on their rational exploitation by the indigenous inhabitants; on the other, the native populations rely on the natural resource conservation in these protected lands. It seems possible that, given the on-going deforestation and agricultural colonization of the Caribbean lowlands, uncut rain forests and relatively undisturbed Indian life will ultimately survive only in protected wildland areas. Costa Rica, for example, has at present almost no forested land outside its protected wildland units, which also contain most of that nation's surviving indigenous population.

One important consideration for the cultural and natural conservation and preservation of Central America's wildlands concerns indigenous resource use within the protected areas. Clearly, Indian populations tend to be less destructive of natural resources than other culture groups in the region. Their population densities are low, and they exploit intensively only small parts of their homelands, nor are they as heavily involved in market production as other ethnic groups. It is erroneous to suggest, however, that they cannot deplete or mismanage their resources. In the forests of the previously mentioned Darién Biosphere Reserve and Comarca Emberá, the Indians historically moved their family settlements whenever their riverine sector became over-hunted or game-scarce. Today, villagers in some of the more densely settled areas of these parks, being unable to relocate in new resource-rich zones, have all but extinguished most game animals from nearby hunting lands (Herlihy 1986, 1989c). It is important, therefore, to detail the indigenous human/environment interface for each wildland area without assuming that natives necessarily maintain a sustainable relationship with their surrounding resources.

The three conservation strategies outlined in this study have experienced considerable success in Central America. Governments have recognized the potential of these strategies for the protection and conservation of natural and cultural heritage. The biosphere, comarca, and land-titling programs each assumes, to greater or lesser degrees, a connection between the conservation of natural resources and the recognition of lands and subsistence traditions of

indigenous populations. Providing native peoples with legal titles to their communal resource-use regions within Central America's wildlands has not, as yet, become an acceptable strategy to safeguard the natural resources of the reserves. There is little doubt that, while Indians do exploit their surrounding natural resources, their stewardship has maintained pristine rain forests throughout much of the Caribbean lowlands for centuries. It is also clear that, whether by native groups inside the wildlands or by agricultural colonists on the periphery, the lack of land tenure and deforestation are inevitably linked. A positive relationship would appear to exist between indigenous land tenure and the conservation of natural resources. Evidence from the land-titling efforts and the comarca system suggests that communal land ownership among tribal groups promotes the long-term conservation of regional resources.

Much innovative thinking still needs to be done in order to implement fully these three new strategies. While management plans express the widespread desire to protect Central America's natural and cultural heritage, the wildlands and Indians remain threatened today. The conservation of a wildland can be achieved only through a detailed understanding of the "social use" of its land and resources. Surprisingly few parklands have been studied in detail. Specific information on local inhabitants and their resource use is largely unavailable. One notable exception is the management plan for the Darién Biosphere Reserve (INRENARE 1988). To date, interpretations of most wildland areas have been based on limited field investigations that present only gross regional land use patterns, based on soil, elevation, and landform features. Wildland management plans and related development strategies are often characterized by simplistic overgeneralizations that establish protected zones more from a planner's or developer's conception of the region than from existing cultural and natural conditions. In the Río Plátano Biosphere Reserve, for example, two general management goals are to use the area as a model for studying the human impact on the tropical forest and to identify sustainable practices. Now, a decade after this park's establishment, no such research has been undertaken, and cultural conditions -- including ethnic composition, population, settlement distribution, and the social use of the lands -- are poorly known. Most wildlands in Central America have been created without adequate ecological or cadastral studies. The establishment of biosphere reserves, stimulated by voluntary pressure groups to protect "what's left" has been a haphazard process and there has been little systematic planning of what, where, and how to conserve (de Castri and Robertson 1982). In Costa Rica, except for the new La Amistad park, "the management objectives and categories, geometric shape, boundaries and justification for most (wildland) units do not coincide with the area established" (Hartshorn et al. 1982:3). Accordingly, the land use classification categories, their boundaries, and indeed the wildland boundaries in general, do not coincide with the natural and cultural characteristics of a given area.

New research should focus on collecting the data and developing the management strategies that can guarantee the preservation of pristine habitats within the boundaries of the protected areas. Many of Central America's wildlands, especially those inhabited by indigenous populations, need boundary changes, management plans, and development strategies that reflect the reality of the conditions in the area. Glick (1982) pointed out early in the 1980s that the study of the native uses of natural resources is needed, as is the assessment of their ecological impact. The collection and assessment of data on Indian land use remains an important management priority today, a decade later.

Individuals need to be sent into Central America's wildland areas to discuss land use needs with tribal and other local inhabitants. Halffter (1985:15) noted that "only in a few cases have we analysed how these (wildland) areas should be established and how they can co-exist with the needs of increasing human populations." Field research needs to be undertaken to determine the social use of the land within these reserves. Field geographers are in a perfect position to collect this information. As researchers with language competence and field orientations, they can supply the necessary information policymakers need to make informed decisions about resource management. Indian regions within wildland units need to be defined on the basis of local use. Historical claims must be established first, and population distributions need to be mapped. Few indigenous areas in Central America are mapped at scales large enough to make acceptable appraisals of resource use. Only when precise field observations about the distribution of an indigenous population are recorded and only after the social use of the land by these populations is delineated can policy makers consider drawing lines to zone reserve areas as the first step towards insuring their future conservation.

Four geographic research priorities for Central America's wildlands include:

1) Reserve boundaries need to be accurately described, delimited, and demarcated to ensure their future protection against exploitation from land-hungry colonists and other profiteers from afar. Large-scale maps need to be drafted to show the relationship of protected areas to the surrounding lands.

2) Patterns of land use and ownership need to be documented within the boundaries of the wildland units. A first important step should be the field study of the ethnic distribution of settlements. Then, the details of resource uses within the reserves should be based on careful documentation of field observations. This information will be useful to develop realistic land use maps that delimit cultural resource areas within the wildlands. There is an urgent need to incorporate indigenous peoples into the collection of this data, as well as to integrate them into long term management strategies for the wildland units.

3) The areas of undisturbed habitats within these boundaries need to be defined for preservation and protected from future exploitation. Those areas not exploited by the native inhabitants need to be delimited on large scale maps of the wildland unit.

4) Sustainable management strategies need to be defined that are appropriate for the natural and cultural conditions found in each reserve in order to promote the long-term economic development of the inhabitants and the conservation of their resource base. Wildlife projects that call for the semidomestication of native species, such as peccary, paca, and iguana may help to supplement protein levels in some parks without depleting wildlife habitats. In other cases, the development of crafts, ecotourism and other educational facilities might be more useful to help provide the natives with income that does not require the extraction or destruction of local resources.

The best hope for the preservation of natural and cultural diversity in Central America lies in protected wildlands. It is within the largest ethnic wildlands that the genetic diversity of the region's forests and native peoples remains largely intact. Given the trends of destructive resource exploitation, however, it appears highly likely that, in the not too distant future, wilderness areas

-- with few exceptions -- will exist only in protected areas. In the areas outside the guarded zones, deforestation pressures and economic "development" will destroy most natural habitats, ultimately threatening the surviving wildland forests and the peoples within them. As geographers, we need to get out into the field, get our boots muddy, and supply policymakers with the appropriate data base needed to ensure the future conservation and preservation of the diverse natural and cultural heritage of Central America's wildlands.

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