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Abstract

Protected areas throughout the tropics face the problem of invasions by people seeking land and natural resources. This illegal exploitation is driven by a wide variety of factors which range in scale from immediate to global. Over the past few decades, government agencies and non-governmental organizations have used many different strategies to address this problem. These tactics include increasing enforcement as well as enlisting the cooperation of local people through integrated conservation/development projects. This paper examines the causes of encroachment on protected areas, as well as the successes and failures of the different ways in which it has been addressed, and makes recommendations for conservationists facing this issue in developing nations around the world. It includes a case study of the Maya Biosphere Reserve (MBR) in Guatemala, and concludes with recommendations for the most appropriate strategy for dealing with encroachment at this site.

1 The Scope of the Problem

In tropical countries around the world, experience has demonstrated that merely setting aside an area of forest does not guarantee its protection. In many cases, extensive destruction is caused by large-scale forestry, oil exploitation, and mining projects, often officially or unofficially sanctioned by provincial or national governments. However, protected areas are also seriously threatened by the actions of individuals and families.

Ecosystem conservation provides many benefits on a global scale. However, it can also represent serious hardships for adjacent communities. Negative impacts of protected areas include damage to crops and humans by growing populations of wild animals; the loss of opportunities for hunting, forest product collection, and livestock grazing; and the loss of economic benefits that could have been derived from cutting the forest for alternative uses such as agriculture or mining (Wells 1992). It is not surprising, therefore, that in nearly every developing nation, various forces have driven local people into protected forests to pursue economic activities which ultimately contribute to environmental degradation.

These small-scale activities include subsistence or commercial crop cultivation, cattle ranching, small-scale mining, hunting, and extraction of fuelwood and other forest products. The damage caused by these activities varies according to the methods used and local ecological conditions, but it can be severe and long-lasting. For instance, small-scale gold and diamond mining involves the digging of pits or craters in stream beds and along the banks of rivers and streams, while gold mining also entails the use of mercury, a dangerous poison (Mogba and Freudenberger 1997; Francis Botchway, pers. comm. 1997).

The most endangered reserves are not those near cities, which are relatively convenient for authorities to monitor, nor those in extremely remote areas where human populations are low. Instead, the most threatened areas lie between these two extremes,

where the forests are accessible to colonists and enforcement is poor (Paulo Prado, pers. comm. 1997).

In some cases, the numbers of colonists are quite significant. For instance, the Côte d'Ivoire government has estimated that 30 percent of protected forests are illegally occupied by up to 450,000 farmers and their relatives, who grow up to 100,000 metric tons of cocoa--a figure which represents one tenth of the country's 1996/97 crop (Bunce 1997). In the Philippines, at least 5.7 million people have encroached upon areas that are supposed to be protected, placing 54,000 ha under cultivation (Harmon and Brechin 1994). Such activities, and the destruction which they cause, have worsened in the past decade (van Schaik et al. 1997). Currently, USAID estimates that in East Africa alone, approximately 20,000 ha of officially protected areas are lost every year (Williams 1997).

Threats to protected areas from human activities occur throughout the tropics and affect all categories of protected areas (van Schaik et al. 1997). However, the types of problems faced vary significantly, according to ecological conditions, political regimes, historical contexts, demographics, socioeconomic conditions, development status, and a wide range of other factors. For instance, a major threat to protected areas in Africa is poaching for ivory and rhinoceros horn (Kouadio et al. 1992; Moussa 1992), while Colombia and Peru face a very different problem: several of their parks have been taken over by drug traffickers (van Schaik et al. 1997; Santiago Carrizosa, pers. comm. 1997). In order for conservation projects to address threats in a meaningful and productive way, it is essential first to know exactly who the actors are and to have a full understanding of the complex and interdependent factors driving their actions.

The next section of this paper describes some of the main reasons why people occupy or extract resources from protected areas. Often complex and interconnected, these causes operate at a variety of levels: immediate and local needs, regional or national government policies, interests of powerful elites, military action, and global economic activities. The following section discusses different methods by which the problem of encroachment has been addressed, and the advantages and pitfalls of each strategy. The tactic of increasing enforcement is compared to that of creating integrated conservation and development projects, which attempt to provide people with alternatives to destructive practices. Finally, based on the preceding research, recommendations are offered for conservationists facing illegal exploitation of the areas they are trying to protect. Next, a case study of the Maya Biosphere Reserve in Guatemala examines encroachment in detail at this site and recommends actions for addressing this problem.

2 Factors Causing Encroachment

The behavior of people toward protected areas takes place within a broad socioeconomic context that involves interactions among various different levels: local, national, and global. It is essential to take into account the interrelationships among these various factors when determining the influences on people's actions and decisions (Ite 1997; Stedman-Edwards 1997). At the most proximate level, demographic conditions, agricultural techniques, cultural attitudes, and the degree of availability of economic alternatives all play a role in environmental decision-making. At the regional or national level, government policies and priorities may create situations in which the

comparative benefits to be gained from exploiting protected areas far outweigh the risk of capture and punishment. Powerful people within the political or economic elite may also create incentives or pressures which encourage entry into protected areas. Macro-level events, such as military conflict or the peace accords following such conflict, often result in the undermining of conservation efforts. Meanwhile, international markets and the perpetuation of global inequalities among nations may exacerbate the poverty which results in invasions of protected forests.

Poverty and a lack of alternative economic options is often a cause of encroachment on protected areas. Ironically, however, economic development can have the same result. For instance, improved road systems allow easy access to forest reserves and thus intensify migration. The problems faced by each protected area are unique, the result of a complex series of interactions among a wide range of different forces.

2.1 Population Growth

As populations grow, per capita available land is further reduced. Where shifting cultivation is practiced, farmers are often forced to shorten the fallow period. By not allowing adequate time for the soils to regain fertility, this practice ultimately results in their degradation and necessitates the abandonment of the fields. In their search for new areas to exploit, farmers may enter protected areas.

Population pressure is a major cause of deforestation in Chiapas, Mexico, where the rate of natural increase has been 3.4 percent over the past 20 years (Nations 1994). In the Philippines, indigenous communities have traditional methods for checking population growth, such as delayed marriages and birth spacing; however, the influence of migrants in these communities has weakened these population control practices (Cruz et al. 1992). The government has not provided assistance in this regard; in the 20 years between 1972 and 1992, the Filipino government spent less than three percent of GNP on health care (including family planning) and on education, both of which are known to be linked to lower fertility rates (Cruz et al. 1992). Although population pressure in Africa is currently low, this continent exhibits the world's highest population growth rates (Hannah 1992), indicating that unless this boom slows soon, protected areas will be increasingly threatened by human activities.

2.2 Inappropriate Agricultural Production

One of the reasons that farmers in many areas of the developing world are constrained by a lack of land availability is that their most common agricultural technique, shifting cultivation, requires large areas of land. This practice involves the rotation of fields through a farm-fallow cycle. With a favorably high forest area to person ratio, fallow periods can be maintained for an adequate length of time. Under such conditions, this system can be sustained indefinitely without damaging the biodiversity of the ecosystem in which it is practiced, and without degrading the ecological resources on which farmers depend (Bayliss-Smith 1994). However, as rural populations grow and governments alienate fertile land for commercial agriculture and other development schemes, farmers are forced to produce more food and animal feed in increasingly restricted and marginal areas. This means that they must reduce the fallow

period, resulting in soil degradation and erosion. Sometimes, these effects are irreversible.

In many areas, farmers do not have access to inputs, such as fertilizer, pesticides, and labor, that are necessary for more intensive forms of cultivation. Nor do they have access to the credit necessary for obtaining these inputs and investing in equipment. Without other means of adding fertility to the soil, shifting cultivators must cut and burn the forest cover to generate nutrient-rich ashes. Thus, they continually search for uncut areas to exploit. This need often causes them to enter protected areas illegally.

Livestock raising also requires large areas of land. When practiced inappropriately, this practice causes soil compaction, leading to increased run-off, while forage grasses have dense root systems which inhibit forest regeneration (Ericson et al. 1997). At Royal Chitwan National Park in Nepal, for instance, local people enter the park in search of grazing lands and fodder for livestock, which are unavailable elsewhere (Sharma and Shaw 1993). At the Zahamena Reserve in Madagascar, a similar situation obtains with local people entering the reserve to graze their cattle, as the forage outside is no longer adequate (CI-Mad 1997).

2.3 Unavailability of Resources Elsewhere

Sometimes it is not the land itself but the resources which the forest contains that prompt local people's entry into protected areas. This can create a conflict if conservation projects attempt to make these resources inaccessible to local people. In Africa in particular, there are large rural populations which are heavily dependent on wild resources (Williams 1997). In West Africa, for example, bushmeat plays an important role in the local diet, and conservation projects are only likely to succeed if they allow a certain degree of hunting (Afolayan 1980). Plant species may be important as well; at the Zahamena Reserve in Madagascar, many useful plant species occur only within the reserve (CI-Mad 1997). In other cases, mineral resources such as gold or diamonds are sought. In Ghana, gold is found primarily in the southern third of the country, which overlaps with the nation’s only remaining extensive area of forest (Francis Botchway, pers. comm. 1997).

2.4 Ignorance of Laws or Ownership

In many cases, boundaries are not well marked and people may not know just where the protected area begins. For instance, many forest reserves in West Africa have suffered damages because the borders were not clearly demarcated (Martin 1991). This problem is considered to be the source of conflict at several of Madagascar’s protected areas (Gezon 1997). For example, at the Ankarana Special Reserve, a recent study found that the boundaries were not marked and none of the project employees knew exactly where they were, nor did the villagers have precise knowledge of the regulations associated with the reserve (Gezon 1997). In Costa Rica few protected areas are clearly fenced and posted, and squatters can argue (whether or not it is true) that they were unaware that they were operating illegally (Strasma and Celis 1992).

Conversely, clear demarcation can significantly reduce illegal entry of this type. At Taï National Park in Côte d'Ivoire, aerial photographs showed that farmers and timber

exploiters did not encroach upon the buffer zone where it was clearly marked by a peripheral road (Martin 1991). However, sometimes the government itself may be unaware of protected area boundaries. For example, Madagascar's Department of Water and Forests (DEF) has granted permits to farm land within the Zahamena Reserve (Lee Hannah, pers. comm. 1997). This is illustrative of the gulf between environmental and public works agencies in many countries, which results in poorly integrated planning (Reid and Bowles 1997).

2.5 Creation of Protected Areas In Inhabited Regions

In many areas of the world, it is extremely difficult to find an area where no humans reside; in the Amazon Basin for example, there is simply no extensive tract of uninhabited land (Southgate and Clark 1993). Therefore, it is highly likely that people will already be living inside the boundaries of a protected area when it is gazetted.

In Costa Rica, the government frequently announces new protected areas before marking the boundaries or determining who already resides there (Strasma and Celis 1992). Often, the government provides only inadequate compensation after long delays. For instance, when the Golfito Dulce Forest Reserve was gazetted in 1978, the government did not plan or fund any resettlement programs despite the fact that communities were already residing within the reserve boundaries (Donovan 1994). At Cahuita National Park on Costa Rica's Caribbean coast, local villagers received no compensation for the alienation of the marine resources within its borders, as there is no legal provision for such compensation (Rodríguez 1997). However, even when the government offered financial compensation for the land within the park, the villagers refused it, preferring to maintain their former way of life (Rodríguez 1997).

These same problems occur in the Philippines, where many of the areas gazetted as national parks lie within indigenous cultural communities' ancestral domains (GEF 1994). These groups' customary rights and tenure systems are usually not recognized by the central authority, leading to overlapping systems of rights (Glenn Morgan, pers. comm. 1997). The resultant confusion, which has been termed "institutional dissonance" (Cramb and Wills 1990), can result in the dissolution of customary management techniques without their replacement by an effective structure based on central authority.

2.6 Loss of Traditional Management Practices

Some of these customary management mechanisms were once quite powerful. Africa is full of examples of such techniques, which have been and are rapidly being destroyed by governments that do not have the resources to replace them effectively (Ramberg 1993). At Amboseli, Kenya, traditional political institutions were once important in resolving resource management questions such as grazing disputes. Now, they are being replaced by often inefficient, official government structures (Western 1994). In West and Central Africa, traditional land tenure systems have long provided security of tenure and encouraged investment in the land (Cleaver 1992). However, most governments and donors, in the belief that these customary arrangements are an obstacle to development, have nationalized ownership and allocated much land to private investors, the political elite, and public projects. Now, people fear that their land may be

taken from them and are unwilling to invest in it through technical improvements (Cleaver 1992).

Socioeconomic and cultural changes also contribute to the decline of traditional management practices. For instance, in East Africa, some forests are protected as sacred or ritual sites, or as water sources (Williams 1997). Ghana also has a large number of Sacred Groves which only priests are allowed to enter for ritual purposes. However, people are now less afraid of divine retribution for the breaking of such rules, and increasing pressures on land encourage them to exploit these formerly protected areas (Francis Botchway, pers. comm. 1997). Similarly, in Nigeria, traditional forest resource administration and management systems in villages were once responsible for decisions regarding rules and regulations on resource use (Ite 1997). Built-in social regulatory mechanisms also played a large role in the use of natural resources. However, these systems are no longer able to exert sufficient control. People disregard customary regulations, and traditional punishments are inadequate in the face of new concerns about making money and reaching higher material standards of wealth (Ite 1997). Around the Boabeng-Fiema Monkey Sanctuary in Ghana, two species of monkey within the sanctuary are completely protected by a taboo associated with local gods; however, in the 1970s, some members of the Savior Church began killing these animals to demonstrate that they were no longer constrained by traditional beliefs (Fargey 1991).

Other examples of traditional management systems and their decline are found around the world. For instance, while the Kuna Indians of Panama have been instrumental in creating nature reserves and spirit sanctuaries within their lands, many of the younger generation are moving away from these traditions (World Bank 1997). Similarly, in Sarawak, Malaysia, longhouse territories are a mosaic of different forest types, including sacred areas from which noone is allowed to extract any resources. However, this system is being undermined by socioeconomic changes such as a loss of social cohesion, improvements in technology, commercialization, privatization, and state appropriation of communal lands (Horowitz, in press).

2.7 Traditions and Religious Practices

In certain cases, cultural practices can pose a threat to protected areas. For instance, in the Periyar Reserve in India, ten to 20 million people enter the reserve for an annual pilgrimage, during which time they camp overnight, cut firewood, enter core areas for ritual hunts, and cause other environmental damage (Lutz 1996). Similarly, at Ankarana Special Reserve in Madagascar, a sacred cave ceremony held once every four to six years involves the entrance of hundreds of people into the reserve to camp for several days, clearing an area of forest and cutting hundreds of saplings for temporary constructions (Gezon 1997).

2.8 Landlessness

In some developing nations, land is concentrated in the hands of a few plantation owners, logging concessionaires, and transnational corporations with large-scale agricultural projects. This leaves the vast majority of citizens with access to only small areas of arable land, which are often in marginal, ecologically fragile zones. People with

only poor lands, or none at all, often migrate in search of land for farming or cattle ranching, and may enter protected areas.

In general, land in Africa is plentiful and equitably distributed (Kasanga 1988). However, transnational corporations develop extensive areas of land for cash crops, thus placing constraints on local food production (Kasanga 1988). Meanwhile, much fertile land is lost to mining concessions (Botchway n.d.). Also, insecurity of tenure is a problem in certain areas, such as the Ankarafantsika Reserve in Madagascar. There, absentee landowners are beginning to monopolize the fertile lands of the surrounding area, forcing landless farmers to migrate elsewhere (CI-Mad 1996). Many of these families have begun farming within the reserve (Lee Hannah, pers. comm. 1997).

In Central America, tenure is highly inequitable. Much arable land remains alienated from the small farmer, in private holdings too large for efficient production. In addition, the absence of a land tax provides an incentive for urban dwellers to own land as a speculative investment or inflation hedge, or for holiday recreation (Strasma and Celis 1992). Wealthy non-farmers bid up the land, pushing prices out of reach of the landless worker or small farmer (Strasma and Celis 1992).

Increased landlessness has been a problem in the Philippines as well, where 56 percent of the agricultural labor force possessed no land in 1980 (Cruz et al. 1992). Landless workers make up a large proportion of the Philippines' migrant population; according to one socioeconomic survey conducted in three regions, more than 40 percent of migrants before 1980 were near-landless, and more than 60 percent of those who migrated between 1980 and 1983 had no access to land (Cruz et al. 1992).

People may enter protected areas not only from desperation because of a lack of land availability, but also to protest the existing land tenure situation. For instance, in Brazil, landless farmers invade parks or private lands to pressure the government for land reform as a result of the government's failure to address the problem of rural poverty (Keith Alger, pers. comm. 1997).

2.9 Influence from Powerful Interests

In Brazil, politicians of opposition parties may encourage landless farmers to invade national parks, hoping thereby to foment popular discontent with the presiding government. At the same time, it is in the interest of large landowners to see farmers invade conservation areas rather than their own lands (Paulo Prado, pers. comm. 1997).

Powerful, wealthy interests encourage the illicit exploitation of protected resources in other contexts as well. For instance, in the Central African Republic, illegal diamond exploitation within protected areas is engineered by wealthy and often foreign interests who sponsor local operations (Zéphirin Mogba, pers. comm. 1997). In Guatemala's Maya Biosphere Reserve, Belizean businessmen offer poor Guatemalans incentives to cut timber (Economist 1993).

Meanwhile, government policies often favor the urban over the rural sector, maintaining low food prices for the elite at the expense of small farmers. In West and Central Africa for example, agricultural research and extension is limited, farm input supplies are inadequate, agricultural product marketing agencies perform poorly, and the rural infrastructure is nearly non-existent. All these factors contribute to the perpetuation of rural poverty and force people to use inefficient production techniques (Cleaver 1992).

Because people are unable to practice intensive cultivation, their need for large areas of land places pressure on protected areas.

2.10 Economic Development and Access to Markets

While poverty and a lack of economic alternatives can lead to encroachment by local communities, economic development can also result in the overexploitation of forest resources. By becoming linked to a market, a community suddenly faces a much larger demand which it can profitably supply with goods. Market forces inherently contain an incentive to over-exploit common resources, since the sellers will gain all of the benefits of exploitation while the costs are diffused over the whole community (Daly and Cobb 1989). Meanwhile, buyers live far from the exploited site and thus bear none of the environmental costs.

Perceived opportunities for economic gain can also encourage immigration to a region (van Schaik and Kramer 1997). For instance, the area around Ankarafantsika Reserve in Madagascar is the country's second most important region for the production of rice, which is sold nationwide through marketing networks. Expectations of opportunities for rice production have drawn immigrants to the area; those who are unable to find employment may then enter the reserve illegally in search of land to farm (Fanja Andriamialisoa, pers. comm. 1997). In the Philippines, government settlement programs as well as employment opportunities from commercial logging ventures pull migrants to frontier areas, which may border on forest reserves (Cruz et al. 1992). Such increases in the human population place greater pressure on protected areas.

In other cases, one illegal activity within a protected area can create markets which precipitate further, more serious overexploitation. At Dzanga-Sangha Reserve in the Central African Republic, the illegal activities of diamond miners and loggers cause environmental destruction. Perhaps more damaging, however, is the cultivation of manioc and corn within the reserve by women from nearby towns who use these crops to produce alcoholic beverages to sell to the workers (Zéphirin Mogba, pers. comm. 1997). The workers have also created a lucrative market for meat and milk, encouraging local residents to clear and sell land to pastoralists and also to hunt wild game for sale (Zéphirin Mogba, pers. comm. 1997).

Ironically, development activities located around reserves as part of an integrated conservation and development project may draw immigrants who then place increasing pressure on the protected area. For instance, at Ankarafantsika Reserve in Madagascar, invasion problems became much worse after the initiation of UNESCO development projects at the site (Lee Hannah, pers. comm. 1997). Similarly, at the Annapurna Conservation Zone in Nepal, employment from ecotourism draws migrant workers who increase pressure on resources such as firewood and forest products (Ericson et al. 1997). At this same site, it is predicted that projects to increase water security will decrease out-migration and may attract more in-migration, with increased pressure on local resources and probable illegal exploitation of the protected area as a result (Ericson et al. 1997).

Often, poverty forces people to exploit protected areas. However, it is a mistake to believe that human desires are finite, and that satisfying basic needs will automatically bring about a reduction in the degree to which protected areas are exploited. Instead, the opposite effect may result. For instance, improvements in agropastoral technology may

provide an incentive to expand production (David Kaimowitz, pers. comm. 1997), which may place greater pressures on protected lands.

2.11 Lack of Enforcement and/or Commitment

There are several reasons why protected areas in developing nations suffer from a lack of enforcement of conservation regulations. First, in many regions, and especially in Africa, governments do not have the economic resources to prevent illegal exploitation (Ramberg 1993). Parks are inadequately staffed, while guards are untrained, unequipped, and unarmed, and are not supported by police forces or the criminal justice system (van Schaik et al. 1997). For example, most African countries spend only one fifth of the annual investment of $230 per square kilometer which is estimated as necessary for effective conservation (Leader-Williams and Albon 1988). Madagascar's entire national park budget in 1987 amounted to less than $1,000 (Hannah 1992). In the Philippines, the government cannot compete with the private sector when hiring lawyers to prosecute violations of conservation laws; as a result, the lawyers who handle these cases are usually young, inexperienced, and lack the necessary connections (Glenn Morgan, pers. comm. 1997).

Even the presence of law enforcement agents does not guarantee protection. Guards may be hesitant to report infractions for fear of retaliation from the local communities, or they may receive bribes or even collaborate in the illegal activities (van Schaik et al. 1997; Wells 1997). In other cases, the guards may be unwilling to arrest members of their own communities for actions which form part of the local traditions. For instance, at Royal Chitwan National Park in Nepal, restricting access to park resources is in conflict with the culture and philosophy of the guards, many of whom are reluctant to enforce these rules (Sharma and Shaw 1993). Similarly, in Africa, scouts hired from local villages have little incentive to enforce anti-hunting laws, which would entail going on patrols, facing armed poachers, and incurring hostility from their own community (Gibson and Marks 1995).

Also, wildlife conservation benefits are long-term rather than immediate, while politicians are under constant pressure from their constituents to generate economic development. Powerful, wealthy interests often demand the downgrading of park status so that they can log, mine, extract oil, clear land for plantations, or build dams or roads (van Schaik and Kramer 1997; van Schaik et al. 1997). In Kenya, political pressure to allow some especially fertile areas to be converted for tea estates or other agricultural projects causes the government to excise an average of 5,000 hectares of gazetted forest every year, in direct contravention of the 1968 forest policy that no more forest be cut (Willams 1997). Similarly, in Madagascar one reserve was declassified to allow commercial exploitation, and portions of the Zahamena Reserve have been degazetted (Sussman et al. 1994). In the Philippines, the government actually amended its legislation governing conservation areas in 1947 to allow, among other activities, logging and establishment of sawmills (GEF 1994).

It is often more politically expedient simply to excise portions of protected areas which have been illegally cut, rather than actually attempting to address the problem. In Malaysia for instance, lands have been excised from several protected areas because they had been farmed by shifting cultivators (Harmon and Brechin 1994).

Meanwhile, park managers are subject to political pressure to ignore violations (van Schaik et al. 1997). At Madidi National Park in Bolivia, for example, the government has not taken adequate steps to prevent logging by small companies (Claudia Sobrevila, pers. comm. 1997). Due to their eagerness for economic gain, often the only circumstance under which governments of developing nations will support conservation is if it generates foreign exchange, such as through tourism or conservation donations (Southgate and Clark 1993).

To please donors, authorities may need to punish some offenders. However, one study in Indonesia found that the government usually aims its efforts at small-scale infractions while ignoring large, well-organized activities by powerful interests (Wells 1997). Often, these civilian elites operate in collusion with military elites to extract resources. Such corruption is apparent in Congo, where the army directs large-scale poaching operations (van Schaik et al. 1997).

Furthermore, unclear laws may generate confusion. For instance, in Ghana, the government "manages" protected areas, but it is not explicit about the ownership of these areas, for fear of angering local people (Francis Botchway, pers. comm. 1997). There is not even any indication in Ghana's statutes that mining is illegal within reserves and in fact, where mining or timber exploitation conflicts with protection, the government tends to side with the economic interests (Botchway n.d.). Operation Halt in the early 1990s, in which people were forcibly removed from protected areas, was a shock to many settlers because the unclear legal status of the reserves had led them to believe they had a right to live there (Botchway n.d.). The Kenyan Forest Department maintains an inconsistent policy toward squatters (Williams 1997). Throughout Africa, complicated administrative cobwebs preclude the participation of the majority of citizens while allowing informed insiders to manipulate the system (Ramberg 1993).

2.12 Hostility to Conservation

Enforcement directed disproportionately at small farmers can only antagonize local people. Many people in tropical countries are wary of the government, which in most cases has historically alienated their lands and disregarded their interests (van Schaik and Kramer 1997). Moreover, local people may understandably resent all conservation action which deprives them of resources, even when the program is designed to include them in the decision-making process (Adams 1990). For instance, a long history of exclusion from wildlife-related benefits has led to a deep resentment on the part of many Africans of what they view as the government's and the First World's concern for animal welfare at the expense of their basic human rights (Sibanda 1995).

Often, attempts at enforcement lead to conflicts between authorities and local people, which may escalate into violence. Sometimes, these acts of vandalism are directed at the protected area, such as the setting of fires and the damage or destruction of park property (Hough 1988). For instance, following the gazettement of Bwindi Impenetrable National Park in Uganda, 16 fires were set in or near the park. Local communities did not help to extinguish these fires, and about five percent of the area burned (Wild and Mutebi 1995). Similarly, near the village of Khawa in India, one man reported having been harshly punished by the Forest Department for cutting a tree in a protected area. He proudly related that he had returned to the forest that night to cut 30

trees, “to teach the Forest Department a lesson,” (Sarabhai et al. 1990). At Gunung Leuser National Park in Indonesia, people defiantly refuse to conceal their illegal activities (Wells and Brandon 1992).

On other occasions, violence is directed at park guards or directors. Hostile acts range from the refusal to sell food to park staff to the murder of park employees (Hough 1988). Natural resource management issues are especially contentious in Africa, where land alienation often results in civil unrest (Peter Veit, pers. comm. 1997). For instance, at Mgahinga Gorilla National Park in Uganda, a delay in compensation for resettlement, a misunderstanding over access to water, damage of crops by wild buffalos and fear of park expansion all led to hostility and even threats directed at park officials (Wild and Mutebi 1995). At the Dzanga-Sangha Reserve in the Central African Republic, where illegal diamond mining is causing extensive environmental damage, the miners are well-armed and highly organized, causing officials to fear violent confrontation (Zéphirin Mogba, pers. comm. 1997). Also in the Central African Republic, poaching has become a highly organized activity, involving gangs with modern firearms (Moussa 1992). Open conflict between game guards and local communities followed the establishment of Bwindi Impenetrable National Park in Uganda, with several incidents of guards being attacked and beaten (Wild and Mutebi 1996).

Similar situations occur in many other areas of the world as well. For example, the gazetting of Cahuita National Park in Costa Rica in 1970 created tense relations among villagers and park officials, with threats of physical harm against park staffers and acts of vandalism against park signs and facilities (Rodríguez 1997). This stand-off lasted five years and only ended when the government agreed to grant several concessions to local people (Rodríguez 1997). In Indonesia, park officials who have reported illegal practices at Gunung Leuser National Park have been intimidated and threatened (Wells and Brandon 1992).

In villagers’ eyes, modern conservation projects designed by external agencies often mirror the preservationist policies of the colonial era in significant ways. First, the planners are usually from former colonial powers, and have the same racial features as the former rulers. Also, their agendas have been set overseas and involve the removal of resources from local people’s access. In addition, the projects often involve cooperation with the national government, which people may have learned to mistrust.

2.13 Military Conflict

Military activity has often undermined attempts at conservation. Such political instability is especially important in Indochina, Central America, and Africa (van Schaik et al. 1997). One source of damage is direct exploitation by soldiers. Armed rebels may use wild resources to finance or subsidize their activities, such as UNITA members in Angola who trafficked in ivory, or Liberian rebels who control Gola Reserve in Sierra Leone and Sapo National Park in Liberia, where they extract timber and hunt (van Schaik et al. 1997). In India, several preserves are used as guerrilla bases (van Schaik et al. 1997).

The administrative chaos created by conditions of war also causes the government to focus on the conflict at hand, while law enforcement around protected areas ceases. For example, in Uganda in the war-torn 1970s and 1980s, destructive activities were

widespread and included large-scale killing of wildlife and cutting of protected forests, as well as intrusion and settlement in buffer zones and corridors around national parks (Ramberg 1993).

In other cases, political unrest and warfare causes people to flee to forested areas. For instance, civil unrest in Colombia was a major cause of invasions of protected areas in the 1950s (Santiago Carrizosa, pers. comm. 1997). In Guatemala as well, during the civil war, the army razed entire villages (CARE and CI 1995). (See the case study of the Maya Biosphere Reserve.) This destruction pushed people to the sparsely populated, forested northern regions (Claudio Méndez, pers. comm. 1997). Some refugees cross the borders into neighboring countries; for instance, Taï National Park in Côte d'Ivoire is an illegal home for many refugees from Liberia (Mari Omland, pers. comm. 1997). Sometimes, the government encourages people to move into forest reserves during times of unrest, as occurred in Uganda's recent civil war (Peter Veit, pers. comm. 1997). Since the end of the war, however, the new government has removed these families (Williams 1997).

2.14 End of Military Conflict

Ironically, the cessation of combat can result in as much or more damage to protected areas as the military activities themselves. Civil unrest has historically restricted development and expansion of economic activities. While this has adversely affected human populations, it has indirectly provided a boon for conservation (Peter Veit, pers. comm. 1997). Another aspect of warfare that has negative consequences for humans but positive ones for conservation is that it maintains human populations at low levels. For instance, tribal warfare with Côte d'Ivoire was part of the reason that the population density of the West Sefwi area in Ghana remained low until the beginning of the twentieth century (Martin 1982).

Also, the treaties and accords written at the end of a period of conflict may include optimistic promises of economic development and land availability. For instance, Guatemala's Peace Accords between the government and rebels guaranteed access to land for small farmers (Claudio Méndez, pers. comm. 1997). Meanwhile, refugees who had fled to Mexico during the conflict and had lost their lands to large landowners during their absence have begun to return to Guatemala in large numbers (Mario Mancilla, pers. comm. 1997). Both of these circumstances are placing a great deal of pressure on the country's protected forests. (See the case study of the Maya Biosphere Reserve.)

3 Attempts to Address the Problem

Efforts to address the problem of the occupation of protected areas by colonists include many different methods, but can be broken down into two main categories. In some cases, the government uses force to evict squatters or to prevent their illegal activities. Another strategy is to develop economic alternatives to destructive practices, and/or to educate people about the importance of conservation. Although these two techniques may appear to be diametrically opposed, both are necessary components of a successful conservation project.

3.1 Use of Force

3.1.1 Resettlement

Whether or not to encourage or require people living in protected areas to relocate is a difficult question. In some cases, communities can be adversely affected by forced resettlement. By contrast, voluntary resettlement, although costly, can be a way to remove threats to a protected area while improving the living standards of the local people.

3.1.1.1 Forced Resettlement

People's lifestyles are often adapted to the area in which they live, and they may have trouble adjusting to a new environment (Singh 1996), especially as the areas to which they are relocated are rarely desirable, productive lands. Severe economic, social, and environmental problems may arise from involuntary resettlement. As documented in a World Bank directive (World Bank 1990: 1),

> production systems are dismantled; productive assets and income sources are lost; people are relocated to environments where their productive skills may be less applicable and the competition for resources greater; community structures and social networks are weakened; kin groups are dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished.

Often, the government promises compensation and aid following resettlement programs but does not follow through. In Costa Rica, for example, the IDA (Institute for Agricultural Development) and the Ministry of Natural Resources removed gold miners and subsistence farmers from Corcovado National Park in 1975 and 1985, respectively, and established settlements for the evicted people in areas where the soils had become compacted by previous large-scale mechanized rice cultivation (Donovan 1994). The government promised assistance which never materialized, and the relocated groups, who had lost their livelihoods and grown dependent on the government, became disillusioned (Donovan 1994).

Moreover, evictions are often carried out in an inhumane manner, with sudden force. In Côte d'Ivoire for instance, the government has repeatedly evicted farmers from protected areas and burned their houses and crops (Bunce 1997; Mari Omland, pers. comm. 1997). With nowhere else to go, the farmers almost always return (Carla Short, pers. comm. 1997). Also, regulations are often sporadically and inconsistently enforced.

Such procedures often have negative effects on the displaced people. For example, the Dumoga-Bone National Park in North Sulawesi, Indonesia was created through the eviction and resettlement of over 400 farmers (Wells and Brandon 1992). Some of the original inhabitants were adversely affected, as they did not adapt quickly to the switch from shifting cultivation to irrigated rice agriculture; some were unable to make a profit and were forced to sell their land, while others sold it immediately at low prices and attempted unsuccessfully to reenter the protected forest (Wells and Brandon 1992). In the end, the original inhabitants were dispersed. While they no longer pose a

threat to the park, little is known of their current living conditions (Wells and Brandon 1992). In Brazil, a coalition of non-governmental organizations (NGOs) bought land to connect the two pieces of the Una Reserve in 1989. Once the landowner had negotiated the sale, he obtained a court order to evict the squatters who were living on this farm. The police then burned their shacks and houses, forcing the squatters to camp along the highway for a few months (Keith Alger, pers. comm. 1997). Several of these families attempted to reenter the reserve a few years later and were again evicted (Keith Alger, pers. comm. 1997).

Besides the fact that it is often inhumane, resettling people outside a protected area does not necessarily reduce the pressure on that area. If people cannot meet their basic needs in their new location, they often move back into the reserve. Angered by their treatment, they may even intensify their destructive activities. At Río Platano Biosphere Reserve in Honduras, a government-sponsored resettlement program backfired when people found their new living conditions inadequate and moved back into the reserve where they increased their holdings, resumed cultivation, and built permanent housing. The residents are now highly suspicious, placing in jeopardy any plans for future resettlement (Seymour and Singh 1995). A similar example comes from India's Ranthambore National Park, where entire villages were removed from the area when the reserve was created in 1973. Unable to find enough fodder, timber and fuelwood in the declared buffer zone, the villagers have become deeply resentful of Forest Department officials and make frequent illicit trips into the park to gather grass and fuelwood, even though they are punished when caught (Seymour and Singh 1995).

3.1.1.2 Voluntary Resettlement

People who have lived in an area for a long time are likely to have made financial and possibly spiritual investments in the land. However, recent arrivals may welcome the opportunity to relocate if enough incentives are offered, such as good land, tenure security, and access to markets and community services. Sometimes, even large stakeholders can be bought out.

Ironically, the practice of compensating people for land or infrastructure within a reserve may create an incentive for further invasion. People may settle in protected areas precisely so that they can receive this compensation (Singh 1996). For instance, in Brazil, squatters can acquire rights to a piece of land which is left unused by an absentee landlord if they can demonstrate that they have made “improvements” such as clearing land or building infrastructure (Keith Alger, pers. comm. 1997; Lou Ann Dietz, pers. comm. 1997). They can then demand compensation in return for moving out of this area. As a result, the Una Reserve in Brazil has been faced with an increase in the numbers of landless poor entering the reserve ever since it began its program of compensation (Seymour and Singh 1995).

Even when successful, however, resettlement programs are very expensive and therefore only accessible to countries with the intrinsic means or the donor funding to implement them. At the Una Reserve, deforested areas have begun to regrow and resettled families have not returned. However, resettlement has been temporarily stopped due to a lack of funding (Seymour and Singh 1995). Similarly, villagers living inside Korup National Park in Cameroon indicated willingness to relocate in return for the

provision of schools, health facilities, community centers, and a road connecting them to markets (Seymour and Singh 1995). However, a lack of funds to build the requested roads made the execution of this plan impossible.

3.1.2 Increased Enforcement

While the issue of resettlement is applicable only to reserves where people occupy land, enforcement of regulations is a necessary part of any conservation project. Except for a few remote areas where local self-regulating resource management is still in place, the resources within a protected area are so attractive that they will inevitably be exploited unless sanctions are enforced (Wells 1997). Punishment for infractions places a cost on illegal activities, creating a negative incentive for destructive behavior (Ferraro and Kramer 1997).

In many cases, people are unaware of conservation regulations and/or boundaries of protected areas, and may act illegally without being aware that they are doing so. In such cases, simply informing people of the rules and the exact location of the reserve may greatly reduce illicit activities. For instance, a week-long major educational effort at Michiru Mountain Conservation Area in Malawi, involving public meetings at primary schools around the mountain and distribution of pamphlets by the agricultural extension service, resulted in a reduction in illegal activities by about 80 percent (Hough 1991). Similarly, at Khao Yai National Park in Thailand, agricultural encroachment ended after trees were planted to mark the park boundary (Wells and Brandon 1992).

In other cases, it is necessary to increase enforcement activities in order to reduce the threats to a protected area. In Central America, for example, military control has played a large role in protecting forests. In the northern Petén of Guatemala before 1987, Panama's Darién Province before 1989, the frontier areas of Río San Juan in Nicaragua during the conflict of 1983-1989, and parts of eastern Honduras in recent years, the armed forces have succeeded in limiting land clearance (Kaimowitz 1996). In the case of Panama, these efforts have also restricted the introduction of cattle (Kaimowitz 1996).

However, restrictions on resource use may adversely affect local inhabitants. Such actions can generate strong resentment, which may undermine conservation goals. In many areas of Indonesia for example, illegal use has become so commonplace that serious police action would face dangerous levels of social unrest (Wells 1997).

Meanwhile, an increase in government intervention is often associated with high levels of corruption. In Central America, the bribery and human rights abuses associated with military control over protected forests has diminished public support for conservation policies (Kaimowitz 1996).

The strategy of increasing enforcement functions best when policy is consistent, with well-established rules and predictable punishments. This requires support from national, local, and provincial authorities. In order to favor conservation over economic activities, local governments usually require some sort of monetary incentive. However, even if they are dedicated to conservation, governments may not possess sufficient resources for adequate enforcement, and often require an external source of funds.

A steady source of funding is crucial to allow the government to maintain a consistent policy; otherwise, initial successes may rapidly lose momentum. For instance, a highly successful program of enforcement coupled with agroforestry projects in Bururi

Natural Forest Reserve, Burundi, met with difficulties once support from the U.S. Agency for International Development (USAID) ended (Hannah 1992).

In some cases, donors can use their leverage to encourage governments to tighten control at protected areas by making the availability of funds for development projects contingent on the prevention of further environmental damage. This was the case in the Dumoga valley in North Sulawesi, Indonesia, where in 1982 the World Bank stipulated as a condition of its loan that the government take action to halt deforestation of catchment areas (Wells and Brandon 1992). Sometimes, however, donor pressure may lead governments to take action in an inhumane manner; for instance, Ghana's Operation Halt, through which the military forcibly evicted people from reserves, was primarily a result of donors' demands (Francis Botchway, pers. comm. 1997).

In order to be accepted with a minimum of social upheaval, enforcement should be increased gradually with adequate advance publicity (Wells 1997). However, this tactic can only succeed if people have alternative sources of resources and income. For instance, Royal Chitwan National Park in Nepal is guarded by large numbers of soldiers of the Royal Nepalese Army (one for every square kilometer) who impose substantial fines for illegal activities (Sharma and Shaw 1993). In 1985, 554 people were fined for collecting firewood and grazing their animals within the park, and 1,306 livestock were impounded (Wells and Brandon 1992). Nevertheless, this and similar actions have not reduced the incidence of illegal activities as local residents have no other source of fuelwood and fodder (Sharma and Shaw 1993; Wells and Brandon 1992).

Finally, enforcement must be an integral component of a larger program which addresses the underlying causes of the illegal behavior. Increased enforcement is especially effective when combined with development activities. For example, at Volcanoes National Park in Rwanda, traditional patrol and arrest tactics were strengthened along with tourism development (see above). As a result, gorilla poaching was almost eliminated, although the setting of snares has not declined (Hannah 1992). At Bururi Natural Forest Reserve in Burundi, enforcement was increased in conjunction with agroforestry projects (Hannah 1992). Within seven years, annual citations had fallen from 1,000 to fewer than 100. This program was successfully replicated at three forest reserves near Lake Tanganyika.

3.2 Financial Incentives

In contrast to tactics involving force, an alternative strategy is to enlist local people's support by providing them economic incentives to cooperate with the conservation program. Some projects aim to improve people's attitudes to a conservation project by providing compensation in the form of cash payments, in-kind substitutes for off-limit resources, infrastructure development, provision of social services, and/or alternative production technologies (Ferraro and Kramer 1997). These activities often improve local people's economic situation and thus encourage positive attitudes toward and relationships with the conservation project. This was the case at Beza-Mahafaly Special Reserve in Madagascar, where a project begun in 1987 initiated small-scale rural development activities such as building a local school, rehabilitating an irrigation canal, and distributing seeds and farm implements (Hannah 1992).

However, people often do not see a direct connection between wildlife conservation and the benefits which they receive. A study of a CAMPFIRE project in Zimbabwe found that, although the local council had used the resources gained by wildlife management to provide community benefits, the majority of the local residents did not even know where the money came from (Sibanda 1995). Education can help to clarify this point, but without the perception of a causal relationship between abstention from illegal activities and economic benefits, people will have no reason to change their practices. Moreover, the benefits provided by the projects are often public goods directed to the community at large, such as infrastructure and extension services. The fact that such goods are excluded to none means that all people can enjoy these benefits, even those who continue to perform illegal actions (Gibson and Marks 1995).

Such compensation also does not address the root causes of the undesirable activities. On example comes from Khao Yai National Park in Thailand where, in exchange for promises to abide by park regulations, the project gave loans to local people and initiated development projects such as a new road to Bangkok and electrification of villages (Wells and Brandon 1992). Individual debt burdens were relieved, and relations with local people were improved. However, there is little evidence that the villagers actually perceived a direct relationship between receiving the economic benefits and protecting the park; poaching and logging were difficult to monitor, so they had few incentives to reduce their illegal activities (Wells and Brandon 1992).

Moreover, local development projects may actually increase people's ability to exploit protected resources. For instance, the creation of roads may encourage immigration to the area (Ferraro and Kramer 1997). Along with new commercial opportunities and technological innovations, infrastructure improvement often increases people's ability to market forest products, thereby providing an incentive to increase harvests to unsustainable levels. This has been the case in East Kalimantan, Indonesia, where villagers have been quick to take advantage of new techniques and marketing opportunities to exploit forest products more rapidly (Vayda 1981; Colfer 1983).

Finally, indirect financial incentives often cause the local community to see the project as a source of benefits rather than a cooperative partner. People may demand more money or services and may even threaten to destroy the protected area if they are not adequately compensated (Ferraro and Kramer 1997). Ironically, such initiatives may also diminish people's incentives to reduce pressure on the reserve by moving away, intensifying production outside the reserve, or searching for alternative employment (Ferraro and Kramer 1997). Finally, when funding runs out and payments cease or services are allowed to deteriorate, no alternative income sources will be left in place, and people may increase their exploitation of protected resources both from need and from disappointment with the loss of benefits.

3.3 Integrated Conservation and Development Programs

Instead of merely attempting to enlist local people's support through economic benefits, some development projects aim to provide alternatives to environmentally destructive activities. These may include extraction and marketing of non-timber forest products, ecotourism, and sustainable agricultural and pastoral techniques.

However, it is often extremely difficult to assure that these new economic opportunities actually supplement the harmful activities (Stocking and Perkin 1992; Southgate and Clark 1993; Glenn Morgan, pers. comm. 1997). Instead, households often have surplus labor, so the new activities are adopted to complement rather than replace existing practices. By contrast, a better option may be the introduction of very labor-intensive, high-value crops such as vegetables, fruits, nuts, flowers, and ornamental plants. Production of these crops is more likely to absorb substantial supplies of labor, thereby reducing pressure on agricultural frontiers (David Kaimowitz, pers. comm. 1997).

In trying to redirect the labor dedicated to environmentally damaging activities, it is often important to target the subsection of the population which performs this labor. Around Batang Ai National Park in Sarawak, Malaysia, the Agriculture Department has initiated fish farming projects in the hope that the fish will provide a source of protein as a substitute for wild meat which is hunted within the reserve. However, a recent study found that in many cases, the women tend the fish ponds and sell the fish for cash, while the men continue to hunt. Conversely, tourism in the area is more effective at reducing hunting because it occupies the men's time (Adrian Nyaoi, unpublished data in Bennett et al. in press). Thus, it is crucial to know details about a community's labor allocation, such as which gender and age groups perform the undesirable activities, as well as the seasons in which people perform them (Ferraro and Kramer 1997). This will enable the project designers to decide what activities will provide true alternatives to environmentally threatening practices.

Another difficulty is ensuring that the new opportunities provided by development projects do not attract more migrants to the region, thus further increasing pressure on the reserve. According to one researcher who studied a number of projects in Indonesia (Wells 1997: 6),

> There is no evidence from Indonesia or elsewhere to support the hypothesis that raising incomes and agricultural productivity in villages reduces the pressure exerted by these communities on nearby parks. In fact, successful interventions might be expected to lead to additional pressure from migrants attracted by the new economic opportunities.

By raising people's standard of living, development projects can also increase their ability to exploit local resources; with more capital, people can expand their economic activities, which may involve further clearing of forest. As one author states, “It is not clear at this stage whether rising farm incomes would slow rates of forest conversion, or the reverse,” (Ite 1997: 54).

Many integrated conservation and development projects lack the financial and human resources to operate on a very large scale and for a long period (Wells 1997). Moreover, poverty is a problem best addressed at the national level (van Schaik and Kramer 1997). To prevent migration to the last remaining areas of forest, governments need to provide opportunities and incentives for people to remain in regions which have already been deforested. Investment in job creation in other parts of the country is one way to achieve this goal. Also, expanding and improving the educational system would

allow graduates to move to urban areas for employment, thus reducing the pressure on protected forests (Ferraro and Kramer 1997; Ite 1997).

In order to provide real alternatives to environmentally harmful practices, economic activities must compete with other forms of land use by generating higher profits per unit of labor (Ferraro and Kramer 1997). As prices for agricultural commodities rise, it becomes increasingly difficult for other activities to compete with cultivation (Peter Veit, pers. comm. 1997). In mainland Africa, some communities are able to make substantial profits from selling hunting permits for large animals. Extraction of non-timber forest products does not generate comparable profits, but still creates significant economic opportunities. Ecotourism is another important source of income for some communities. If the local people have secure rights to the benefits from such alternative economic activities, they may feel that they have a stake in maintaining the protected area and supporting its conservation objectives (Ferraro and Kramer 1997).

Meanwhile, conservationists must ensure not only that the activities they encourage are profitable and provide alternatives to destructive behavior, but also that they are environmentally sustainable. This involves the extensive collection of biological and socioeconomic data before the initiation of the project, as well as continual monitoring once the project has begun (Ferraro and Kramer 1997).

There are many pitfalls to avoid when designing development projects as part of a conservation program. Some can be avoided through careful study of the local communities, while others may not be avoidable. In these cases, the risks must be weighed against the advantages of improving people's economic well-being and enlisting their support for conservation. Nevertheless, the income which integrated conservation and development projects provide can significantly improve local people's attitudes toward conservation activities.

The following sections provide examples of various types of projects designed to integrate conservation with economic development. The sale of hunting permits and the marketing of non-timber forest products are both means of deriving income from resources within protected areas. Another strategy is to increase the profitability of economic activities that take place outside of reserves, such as agriculture and the raising of livestock.

3.3.1 Hunting Permits and Non-Timber Forest Product Extraction

In African savanna ecosystems, substantial revenues can be derived from safari hunting permits. These benefits can be used to provide local people with an incentive to conserve and manage protected wildlife (Peter Veit, pers. comm. 1997). Many examples exist of successful projects of this type. For instance, in the Lupande Development Project at Zambia's South Luangwa National Park, revenues from safari hunting concessions were returned to local villages and local chiefs applied this money to development initiatives (Wells and Brandon 1992). Part of the revenues were used to hire supplementary game scouts from local villages, and further employment opportunities were generated by allowing the community to harvest, process, and market hippopotamus products. This program resulted in strong community support as opposed

to previous antagonism to wildlife personnel. Also, there were dramatic reductions in poaching (Wells and Brandon 1992).

Non-timber forest product harvests have long been used by many communities as a means of income, and generate easy, immediate profits. However, these activities simply cannot create revenue comparable to that produced through management of large African mammals. If the raw materials are transported elsewhere for further processing, local people are likely to see only a tiny fraction of the products' worth (Wells 1992). Moreover, it is often difficult to find markets for these products, which are usually unfamiliar to consumers outside the local area (Southgate and Clark 1993).

For those items which are readily marketable, harvesting requires access to extensive areas of land in order to be sustainable. Otherwise, overexploitation may occur. This is especially a danger where there is no real sense of resource ownership. Around Iquitos, Peru, for instance, large-scale destructive harvesting of aguaje (*Mauritia flexuosa* L.f.) has resulted from strong local demand (Southgate and Clark 1993). Previously, indigenous forest dwellers had secure resource rights and were stewards of their trees, climbing them to pick the fruit. Now, however, group and individual property rights are weak and trees with mature aguaje are simply felled (Southgate and Clark 1993).

Nevertheless, the goal of non-timber forest product harvesting projects is not always, as in mainstream business ventures, to make a profit. Planners recognize that such projects can never create enough jobs to provide alternatives to all destructive economic activities. Instead, they aim “to demonstrate that it is possible to have alternatives, and to build alliances” between local communities and the conservation project (Jim Nations, pers. comm. 1997). One example of this effect comes from Conservation International’s (CI’s) ProPetén project in Guatemala, where small-scale non-timber product harvest and processing has provided some income and has encouraged a positive view of the program (Edward Millard, pers. comm. 1997). (See the case study of the Maya Biosphere Reserve.)

3.3.2 Ecotourism

Unlike non-timber forest product extraction, ecotourism is an environmentally sustainable enterprise that can generate enormous profits for local people. According to The Ecotourism Society’s official definition, ecotourism involves responsible trips to natural areas that help to protect the natural areas and to benefit local communities. These activities represent a significant portion of the foreign exchange earnings in countries such as Kenya, Rwanda, and Nepal (Wells 1992). The tourism industry is especially well developed in Costa Rica, where it is the largest source of foreign currency (Rodríguez 1997).

However, many factors are necessary for an ecotourism initiative to be successful. Most protected areas have limited tourism potential due to "lack of infrastructure, difficulty of access, political instability, ineffective marketing, or simply the absence of spectacular or readily-visible natural features," (Wells 1992). Also, tourism is a very unstable industry; the numbers of tourists often vary widely from year to year, depending on the weather, currency fluctuations, and the political situation (Mathieson and Wall 1982). Moreover, at sites where tourism is in fact profitable, a number of conditions are

necessary for these economic benefits to have a positive effect on conservation. It is important to design the project carefully to avoid negative environmental impacts, and to provide local people with incentives to protect conservation areas.

3.3.2.1 Ecological Concerns About Ecotourism

It is necessary to ensure that a tourism venture be environmentally sustainable. If improperly managed, tourism often places pressure on the local environment by requiring high levels of resources and by generating wastes. As one author states, "when the use of a nature tourism destination is uncontrolled, maximizing net economic benefits may result in irreversible damage to the environment," (Wells 1997: 39).

The infrastructural changes brought by tourism may make the area less hospitable to wildlife. Roads through a reserve or along its edge can act as barriers to animals' travels and migrations (Edington and Edington 1986). When animals refuse to cross the roads, the populations on each side become isolated from each other and are unable to exchange genetic material. When they do cross, animals are often killed. For instance, members of an endangered species of radiated tortoise at Berenty Reserve in Madagascar have been killed by careless drivers (O'Connor 1987). Roads also facilitate forest exploitation by commercial loggers and local residents.

The energy and water demands of tourists are much greater than those of local residents because they are accustomed to a different lifestyle and are able to pay for luxuries such as electricity and running water. Therefore, the presence of tourists often places a strain on the energy-providing and waste-removing infrastructure of an area. In Ladakh, a high-altitude desert in northern India, many tourist facilities have attempted to maintain Western standards (Goering 1990). Their demands on scarce water resources have been far beyond what the community usually requires, and communal water sources have been tapped dry for the exclusive benefit of particular hotels. In order to meet the increased demand for energy, trucks transport fossil fuels over the Himalayas. In the mountains and villages, trekkers use scarce fuel and fodder resources, often without compensating the villagers.

In addition, the exploitation of inappropriate items for sale to tourists can be very detrimental to the environment. At the most destructive extreme are products whose manufacture involves the use of endangered species of fauna or flora. In Mexico, for example, available tourist goods include products produced from officially protected animals, such as tortoise shell jewelry; jaguar and ocelot skin products; stuffed caimans, iguanas, birds, and turtles; and live parrots (TRAFFIC 1989 *in* Healy 1993). Overexploitation of non-endangered wildlife may also become a serious local ecological problem. For instance, in Nepal, severe deforestation has resulted from the sale of firewood to tourists (Jeffries 1982).

The increase in wealth which tourism brings often contributes to environmental degradation. In Nepal, increased revenue from tourism has been used to build larger houses and hotels, both of which rely on increased use of wood for heating and cooking and thus accelerate the exploitation of forest resources. Additionally, members of the local Sherpa community usually convert financial gains into larger herds of yaks, sheep, and goats, which increase grazing pressures on the local ecosystem (Jeffries 1982).

Furthermore, the economic opportunities created by tourism encourage immigration to the area around a park. This increase in human population adds to the pressure on local resources and may lead to the destruction of the forest along the park's perimeter. Thus, immigration accelerates the isolation of the park from other forest parcels, restricting opportunities for wild animals to interbreed with populations in other areas or to follow their normal migration patterns. In East Africa, for instance, the influx of immigrants due to tourism has pushed landless farmers to the roads leading into the parks, where their presence interferes with animal migration (Deihl 1985).

3.3.2.2 Socioeconomic Concerns About Ecotourism

It is also important to monitor the socio-economic effects of tourism. Often, tourism causes or reinforces an unequitable distribution of wealth within the community. Educated people with management skills and language ability may earn disproportionate profits by becoming traders and middlemen (Healy 1993), and some families or groups may monopolize markets for certain items or services (Boo 1990). A guest house project at the coastal village of Tufi in Papua New Guinea presents an example of the economic inequality which tourism can cause. This society traditionally contains leveling mechanisms to ensure equal distribution of wealth; however, profits from tourism have allowed a few families to attain disproportionately high levels of income (Ranck 1987). In addition, the government's donation of two outboard motors to a single guest house greatly widened the gap between that family and its neighbors. In this village, as throughout Papua New Guinea, long-standing rivalries have been exacerbated by recent income disparities.

Such income inequalities can anger local people, and their resentment can turn them against the conservation project. For instance, in the village of Matsaborimanga near the Ankarana Special Reserve in Madagascar, two brothers were chosen to be the guards/extension workers, or Agents for Protection of Nature (APNs) while their cousin was hired as a tourist guide. The villagers' perception that one family is receiving all the benefits has contributed to their reluctance to cooperate with the WorldWide Fund for Nature (WWF) project's goals (Lisa Gezon, pers. comm. 1993). Also, villagers are often envious of the APNs' equipment, which includes a uniform, backpack, and mountain bicycle (Lisa Gezon, pers. comm. 1993; Christian Hussein, APN, pers. comm. 1993). While the equipment may be necessary for their tasks, these material goods also separate the APNs from the other villagers, alienating them from the local people with whom they are meant to communicate freely.

Another concern is that, to provide incentives for local people to conserve the protected area, benefits from ecotourism must remain in the local community rather than being siphoned out of the area to urban-based tour operators. A phenomenon known as leakage occurs when money becomes locally unavailable for new rounds of purchases. This happens when goods and services are bought from local cities or from other countries. For instance, tourism development often involves imports of costly items such as oil and consumer goods, repatriation of profits made by foreign investors, substantial investments for infrastructure, and promotional expenses abroad (Boo 1990). The World Bank estimates that 55% of gross tourism revenues to the developing world actually leak back to developed countries (Frueh 1988 *in* Boo 1990). In general, the smaller and the

less developed an area, the greater will be the leakage, because the area will be unable to produce the goods demanded by the tourist industry. Similarly, workers with sophisticated skills may not be found locally, and may need to be hired from urban areas (Healy 1988). Leakage also affects the tourist-driven handicraft industry, since prices paid to producers are often low and profits accrue mainly to intermediaries (Hitchcock and Brandenburgh 1990).

Many examples exist of ecotourism projects which have not significantly benefited local communities. One of the most well-known cases comes from Amboseli National Park in Kenya, where people were greatly disappointed when the revenue from tourism which they had been promised was not distributed locally (Hannah 1992; Wells and Brandon 1992).

3.3.2.3 Changing Attitudes Toward Ecotourism

If an effort is made to ensure that local people benefit from ecotourism enterprises, however, their attitudes toward conservation projects may be significantly improved. For instance, at Volcanoes National Park in Rwanda, a program to develop ecotourism was combined with conservation education and law enforcement. By 1990, more than 5,000 tourists per year visited the park, generating more than $1 million in revenues (Hannah 1992). These benefits led to a significant improvement in people's impressions of the protected area (Weber 1993). In 1979, less than half of local residents believed that the park had regional benefits; by 1984, more than 80 percent of respondents identified benefits from the park (Hannah 1992; Wells and Brandon 1992). A similar example comes from the Lupande Game Management Area in Zambia (Lewis et al. 1990). Originally, when the government appropriated all of the profits from hunting by tourists within the protected area, the majority of local residents had negative sentiments toward the park and NPWS, the administrative agency which managed it. In 1987, a program was started which employed local residents in the wildlife management effort and provided a significant share of the wildlife revenue to the chiefs in the area affected by the park. A questionnaire survey indicated a positive change in local attitudes toward wildlife resources and NPWS by demonstrating the local residents' approval of the program and desire for its continuation (Lewis et al. 1990).

This change in local residents' attitudes can make a significant difference in wildlife protection. Shortly after the commencement of the project in Zambia, several chiefs took measures against poaching in their areas, and villagers volunteered information which aided officials in arresting poachers (Lewis et al. 1990). The combined efforts of guards and local residents ultimately resulted in a tenfold decrease in the poaching of elephants and black rhinos (Davey 1993). In Rwanda, tourism revenues financed additional guards whose surveillance cut gorilla poaching to zero between 1984 and 1992. As a result, total gorilla numbers increased from barely 260 to roughly 320 during the 10 years since the project's beginning (Vedder 1989 *in* Weber 1993).

Changing attitudes may not be enough, however; it is also important for the tourism project to provide employment which will supplant ecologically threatening activities. At Monarch Butterfly Overwintering Reserves in Mexico, for instance, the

receipt of gate fees from visitors has not prevented local people from cutting trees within the reserve (Wells and Brandon 1992).

3.3.3 Sustainable Agriculture and Pastoralism

Rather than attempting to find a way for people to derive economic benefits from protected areas, some conservation/development projects aim to make agriculture or pastoralism outside the reserves more profitable. These efforts are a reaction to the fact that, in nearly every area of the developing world, demands for agricultural commodities are increasing due to population growth, rising incomes, and/or national efforts to expand export production. Such pressures have led inevitably to land-use conversion (Southgate and Clark 1993), and may drive people into protected areas in search of land.

Intensification of agriculture and pastoralism in the area surrounding a reserve renders these activities more productive per unit area. This can reduce local people's need for land because, if yields are increased on existing fields, people will have less need to clear new land in order to produce adequate food. This in turn may diminish pressure on the protected area. For instance, many conservationists working in Madagascar believe that a switch from swidden to paddy cultivation "would relieve the pressure on the remaining forest, halt soil erosion and degradation, and enable farmers to produce a surplus which would help to raise their incomes and feed the urban areas," (Oxby 1985: 42). For such efforts to succeed, however, several conditions are necessary.

First, when designing the project, it is important to collect information about people's farming practices and their economic and social needs. This information gathering must take place before the project is designed, in order to determine which practices should be changed as well as to find appropriate substitutes. It is important to allow the local people to participate in these appraisals. This will ensure that the choices made reflect their interests, and that they have a stake in the project from the very beginning. Local people's interest in and cooperation with these projects is essential. Thus, it is critical to gain their trust. If they are consulted at every stage, farmers are more likely to feel involved in the program.

Such consultations will provide a means for researchers to harness local people's ecological and agricultural knowledge. They will also allow researchers and farmers together to formulate technologies which are appropriate to local socio-economic conditions and which farmers will be interested to adopt. Continual monitoring is also necessary in order to ensure that goals are being met and that people's concerns continue to be addressed.

Secondly, the farmers must consider non-destructive techniques preferable to existing practices in order for these new methods to be attractive (Ferraro and Kramer 1997). This may be difficult in some cases, especially when the new techniques require increased labor. Some communities may not wish to allocate more of their time and energy to farming or animal raising, especially if they also pursue other economic activities or cannot afford to hire additional workers.

At Royal Chitwan National Park in Nepal, for instance, conservationists hypothesized that if local people were provided with a source of fodder for stall-feeding, they would reduce the illegal grazing within the park (Sharma and Shaw 1993).

However, in Nepal, grazing is supervised mainly by children and the elderly, while fodder-cutting requires the labor of strong adults (Fox 1983 *in* Sharma and Shaw 1993). Thus, a survey showed that if restrictions were modified to allow fodder-cutting in the park, more than 42 percent of the respondents were not sure that they could promise to stall-feed livestock throughout the year (Sharma and Shaw 1993).

A similar story holds true for attempts to introduce agroforestry systems as a means of increasing agricultural yields. For instance, the prime reason given by farmers for their failure to adopt agroforestry techniques in projects in Nigeria and Benin was the time and hard work required for planting and especially for pruning (Whittome 1994 *in* Bayliss-Smith 1994).

Finally, people often do not have access to the resources necessary for alternative methods of agriculture. Land appropriate for irrigated cultivation is often unavailable to many small-scale farmers, and inputs such as fertilizer and mechanical tools are too expensive as farmers have neither adequate funds nor access to credit. Another major obstacle is the poor state of market systems in rural areas.

Simply providing a resource as a one-shot deal is not a long-term solution, however. In the past, development projects would often attempt to improve people's standard of living through the construction of infrastructure such as dams, water pumps, or irrigation systems. However, once the builders had terminated the projects, these structures would fall into disrepair; without the materials or the skills to fix them, the local people would have no choice but to return to their former practices. For instance, a pipeline was built to provide water to a group of Maasai people living around Amboseli National Park in Kenya so that they would not need to enter the park to obtain water for their cattle (Wells and Brandon 1992). However, since 1981 this pipeline has not been fully functional, and the Maasai still use the springs inside the park (Hannah 1992; Wells and Brandon 1992).

There are several risks associated with making agriculture or pastoralism more profitable in regions surrounding protected areas. For instance, new technology which is introduced to sustain existing pastures, with the aim of lowering expansion, may actually make livestock production in those areas profitable for the first time. Like a price increase, this will provide an incentive for expanding the area under production (David Kaimowitz, pers. comm. 1997). Increased profitability may also draw immigrants.

Moreover, economic benefits are often difficult to measure and assess, and it is difficult to determine whether or not they are actually reducing the incentive to use natural resources from the park (Wells and Brandon 1992). In some cases, people may be able to adopt the new techniques while still continuing their former practices.

Finally, intensification carries some environmental risks. For instance, fertilizer use can contaminate groundwater or escape to bodies of fresh water.

Nevertheless, some studies have found that where crop and livestock yields have been improved, there is very little encroachment on protected areas by farmers and ranchers (Southgate and Clark 1993). This points to the necessity of a country- or region-wide approach, involving research and extension, policies favoring the rural sector, and investments in irrigation and other infrastructure. Unfortunately, due to political reasons, lack of funding, or an inappropriate North American/European model which emphasizes site-specific, strict preservation rather than a more integrated

approach, most organizations and donors are too focused on the immediate circumstances surrounding reserves (Southgate and Clark 1993).

3.4 Improving Relations with Communities

In addition to providing economic alternatives, another of the most important elements of a successful conservation project is the interest and cooperation of the local people. It is important to inform people about the functioning of an ecosystem and its importance for human health and well-being so that they can understand the benefits of conservation to their daily lives. It is often effective to work with school children, who can then spread the message to their parents, siblings, and extended families.

However, it is even more important to incorporate local people's input in the design and implementation of conservation projects. Empowering communities to have a direct say at every stage not only ensures that the projects are tailored to their needs and aspirations; it also gives them a sense that they are important players in the process of designing and monitoring the projects. This can encourage cooperation with conservation goals. One of the key components of involving local people is effective communication between communities and conservationists.

3.4.1 Involving Local People in Decision-Making

Encouraging local people's participation in the design and management of a project is an important way to enlist their support and to ensure that their needs are being addressed so that they are able to comply with the rules and regulations. Participation will also guarantee that the project will be tailored to the local culture and socioeconomic conditions. A study of 68 rural development projects found that those which were socioculturally appropriate were twice as likely to achieve economic success as those which gave inadequate attention to local customs and norms (Kottack 1990).

When projects intended to benefit local communities are created without consulting them, the effort may backfire. Some examples of inappropriate activities by conservation and development agencies come from Beza Mahafaly Reserve in Madagascar. The project introduced new crops which are not used by the local people and which are harvested in the dry season, when food is ample anyway; distributed new corn seed which did not store well during the rainy season; and did not pay adequate attention to major constraints and concerns facing the local people (Sussman et al. 1994). At Amboseli National Park in Kenya, a school built for the community was located in an area considered dangerous because of wildlife, and few families sent their children to it (Hannah 1992). Similarly, a water supply system was built by outside consultants with little consultation with the local communities. Due to lack of maintenance, it operated irregularly and ultimately failed in the early 1980s. Finally, because people were treated as "beneficiaries" rather than participants in the process, they demonstrated little commitment to the project (Hannah 1992).

Involvement must be more than simply "token" participation, which may merely provide an opportunity to express frustration; it should be a real effort to encourage a sense of ownership and investment in the project (Hough 1988). Although project directors may find it difficult to relinquish some authority, they should give a measure of

real power to the local people. This might involve the creation of a joint management committee, a legally constituted association including both local people and park authorities, through which local communities can play a role in management of the protected area (Hough 1988). This committee should meet at times, seasons, and places that ensure effective participation by local people (Hough 1988).

It is also essential, albeit extremely challenging, to ensure that the people chosen to represent the community do in fact act in accordance with the community's interests and views. Communities are not homogenous and may include a range of different minority groups, each with its own interests and values (Hough 1988). Usually, projects choose to work with local leaders and members of local elites; however, these people may act to enhance their own wealth and power at the expense of those they claim to represent (Colchester 1994). For instance, a World Wildlife Fund project at Ankarafantsika Special Reserve in Madagascar enlisted the cooperation of the local political and religious leader by naming him honorary president, encouraging his participation in conservation planning, and sending him to a conference on conservation and development in Uganda (Gezon 1997). The leader developed close ties to the project, but disregarded the concerns of the members of his community, who resisted his prohibitions (Gezon 1997). Moreover, this relationship with the project disintegrated when the leader realized that only half of the profits from tourism would be channeled back to the area, and that he was not being given true decision-making power. He then began to undermine or ignore the project's efforts in order to exert his own authority (Gezon 1997).

In some cases, a community's aspirations and priorities may conflict with the goals of the project. In these situations, project planners may need to decide whether and how much to compromise on some issues in order to maintain good relations with the community. At Ankarana Special Reserve in Madagascar, for instance, a local leader announced his intentions to carry out a ceremony within the protected area during which hundreds of people would camp within the reserve, clearing an area and cutting hundreds of saplings (Gezon 1997). The project chose to maintain good relations with the leader and the community rather than to attempt to enforce its own rules (Gezon 1997).

Finally, it is important to ensure that initiatives taken by the community to protect their resources receive an adequate degree of support from external authorities. For instance, through a program in the Philippines, communities are encouraged to protect their natural resources by reporting outsiders' illegal use to the appropriate authorities; however, the government does not always respond by taking action against the illicit activity, thereby undermining this initiative (Glenn Morgan, pers. comm. 1997).

3.4.2 Effective Communication

In order to enlist local people's cooperation, a relationship based on trust must be established between the project managers and the community. Project activities and goals should be made clear from the beginning. Appropriate communication methods must take into account the community's culture and values, which may be quite different from those of the project planners. One way to achieve this goal is to enlist members of the community to spread the message of what the project is aiming to achieve. For instance, at several protected areas in Madagascar, community members are chosen to

monitor activities within the reserve and to inform their peers of the rationale behind the project (Gezon 1997).

4 Addressing the Problem of Encroachment

The problem of encroachment on protected areas is a complex issue. First, there are limits to what NGOs can achieve independently; government action is required in order to address the root causes of the problem and to maintain an effective enforcement program. Even in the spheres where NGOs can have significant impact, they must choose from a wide range of possible activities designed to prevent or discourage people from illegally exploiting protected areas.

Ecological and socioeconomic conditions vary greatly from site to site. Therefore, a conservation strategy must be tailored to each individual case. However, conservationists can draw useful lessons from the collective experience of their colleagues around the world.

4.1 The Necessity of Action by National and Local Governments

As the above analysis shows, invasions of parks and reserves by small-scale actors are largely driven by poverty and economic inequality as people migrate to frontier areas in search of land and opportunities to earn a livelihood. Therefore, this problem needs to be addressed at the national level, through policies designed to provide opportunities and incentives for people to remain in regions which have already been deforested. This can be achieved by government-sponsored land reform that provides equitable access to land for the rural poor, and by large-scale support for environmentally sustainable economic development outside of protected areas. Meanwhile, governments must avoid favoring wealthy interests. Such a bias perpetuates rural poverty, and can generate resentment when small farmers perceive that they are targeted for punishment while members of the elite commit illegal actions with impunity.

Efforts by national and local governments are also necessary for a successful enforcement program. Enforcement must be supported by a consistent policy in order to avoid confusion, and should be increased gradually and with advance publicity in order to minimize local people’s resentment, which can lead to vengeance.

4.2 Enforcement and Resettlement

Despite the fact that enforcement relies heavily on government initiative, this is a sphere where NGOs can provide support. A steady supply of funding is necessary to allow governments to maintain a consistent enforcement policy. Donors and conservation projects are often an important source of foreign currency. Control over the availability of these funds allows donors and NGOs to influence the government’s conservation efforts.

Resettlement is another issue over which NGOs can have influence, by researching the potential effects on the local populations and by encouraging or discouraging such action. As the examples in this paper have demonstrated, involuntary

resettlement is often inhumane and should not be supported by NGOs. Voluntary resettlement is less objectionable from an ethical standpoint, but is very costly. Both tactics may backfire if the resettled communities are given inadequate assistance to support themselves in their new environment and are forced to move back into the reserve.

4.3 Providing Alternatives

Both resettling communities and increasing enforcement can only promote conservation if people have alternatives to environmentally destructive activities. NGO-sponsored conservation projects can make a positive contribution in this regard by providing economic incentives for local people to support conservation efforts and to comply with regulations. However, these projects can only promote conservation if implemented in conjunction with increased enforcement. Also, there must be a direct link between conservation and development activities so that people have genuine reasons to cooperate in the conservation of protected lands and wildlife. Finally, these enterprises should be designed so as eventually to become able to function independently of the NGOs' presence.

One strategy is to compensate local communities for the reduced availability of forest resources through cash payments, in-kind substitutes for off-limit resources, or economic development assistance. These initiatives may significantly improve the living standards of the local people. However, they often do not serve the interests of conservation, as people do not perceive a direct link between the benefits they receive and their compliance (or lack thereof) with conservation regulations. There is an inherent incentive to cheat by accepting the benefits and continuing illegal activities. At the same time, compensation does not address the root causes of the harmful activities. Moreover, economic development may actually increase local people's ability to exploit protected resources. Therefore, compensation is not usually a useful strategy and, in most cases, should not be supported by NGOs.

A more effective tactic is to design integrated conservation/development projects that create new economic opportunities to replace harmful practices. In order to ensure that the newly introduced activities provide true substitutes, conservationists must be aware of the labor allocation patterns within a community, particularly the age and gender distribution and seasonality of different means of livelihood. This will allow the projects to determine the subsection of the population which performs the harmful activities, and the time of year at which they are performed. Conservation/development projects should ideally target the labor used in environmentally destructive practices and divert it to other, environmentally sound activities.

Also, in order to compete effectively with other forms of land use, the new economic activities must generate higher profits per unit of labor or land devoted to them. Finally, the activities chosen as substitutes must, of course, be environmentally sustainable.

One example of an economic alternative to environmentally destructive practices is the sale of safari hunting permits for wildlife in protected areas. These sales can generate significant income for local communities and can provide a direct link between conservation and development. However, these activities must be closely monitored to

avoid overexploitation. Also, this is a realistic option only in African countries with large mammals desired by hunters.

Another way to earn profits directly from the resources within protected areas is through non-timber forest product extraction. This can never be nearly as profitable as the extremely lucrative sale of hunting permits. However, projects to support such activities can win local communities' support for conservation. For extraction to be environmentally sustainable, people need access to large areas of land, as well as secure rights to the resources which the land contains. Both non-timber forest product collection and wild animal harvests must be carefully controlled to avoid overexploitation.

Another way to obtain direct profits from protected areas is through ecotourism, which can generate huge profits for local communities. It can often provide an effective substitute for destructive behavior such as poaching, by occupying the time of the young men who perform such illegal activities. Also, it is directly linked to conservation as tourists are attracted by intact areas of forest and the presence of wild animals. However, to be successful for conservation, ecotourism projects must be carefully designed as environmentally sound enterprises. It is also important to monitor their socioeconomic effects to ensure that local people receive most of the benefits, and that income and employment opportunities are evenly distributed throughout the community.

An alternative approach to encouraging people to conserve protected areas is to increase the profitability of activities performed outside of reserves, such as agriculture and pastoralism. This is another area where NGOs can play a role, by increasing access to inputs such as fertilizer and pesticides and to mechanization. Alternatively, conservation projects can promote organic agriculture. In either case, it is important to identify markets for the products. However, conservation projects should also be careful not to make the farmers and pastoralists dependent on them, as this is not a long-term solution. One way to promote sustainable agropastoral development is to provide small loans to be repaid once the farmer has been able to use this capital to make a profit.

4.4 Education

Another way of assisting people to adopt new technology is through education. Pilot projects are useful in demonstrating the value of certain techniques. Education is also important in promoting conservation. Often, people perform illicit activities without being aware that they are breaking the law. Simply increasing awareness of the rules and the reserve boundaries may greatly reduce illegal behavior. Also, informing people of the reasons behind the designation of a protected area and the importance of a healthy ecosystem for human welfare can improve people's attitudes toward a conservation project. Often, the most effective technique is to enlist members of local communities to spread the message to their peers.

4.5 Working with Local Communities

On the other hand, sometimes conservationists can learn from the local people. In some cases, traditional resource management practices and belief systems are important in conserving areas of forest or certain species. Such local management minimizes bureaucratic inefficiency and is able to adapt quickly to subtle changes. It is also more

likely to be accepted by local people than rules and regulations imposed by a distant central authority. However, these customary management arrangements are rapidly being destroyed due to socioeconomic and cultural changes. Where they are still in place, conservationists should attempt to work with the traditional institutions, reinforcing them if possible.

Even where community-based management systems are not already in place, the support of local leaders and community members is always important in encouraging cooperation with conservation goals. Local communities' input ensures that the projects are designed to address their needs. It also makes the people feel that they are partners in the project, with a reason to participate and invest in it. One option is to create a joint management committee, through which representatives of the community and project managers can collaborate in the design and implementation of conservation projects. Effective communication between project officials and local people is also essential in promoting cooperation.

In summary, no-one has yet designed the perfect strategy for preventing encroachment on protected areas by small-scale actors. Any conservation project attempting to address this problem faces a number of difficult issues. Nevertheless, helpful lessons can be drawn from experiences around the world.

5 Case Study: The Maya Biosphere Reserve in Guatemala

5.1 Background

Central America has one of the highest rates of deforestation in the world (Sader et al. 1994). Northern Guatemala's Petén region has been experiencing particularly serious deforestation, which has been accelerating in recent years. From 1970 to 1990, the percent of the Petén under forest cover dropped from 70 or 80 percent to about 50 percent (Schwartz 1990). Currently, much of the southern two thirds of the Petén has been cut and the remaining forest is seriously fragmented (Whitacre 1996). The Department of Petén estimates that 100,000 hectares of forest in this region are lost every year (CARE and CI 1995).

In an attempt to save the last remaining areas of forest in the Petén, the Maya Biosphere Reserve (MBR) was created in 1990 by the Guatemalan Congress. This extensive reserve covers an area of 21,130 square kilometers, including the 15 kilometer wide Buffer Zone to the south and east of the reserve (see Figure 1).

About 36% of the reserve, or 767,000 hectares, comprise the eight "core" zones. In these five national parks and three biotopes, only scientific research and low-impact tourism are permitted by law. In practice, however, many of these areas face permanent human occupation and extraction of petroleum and other resources. At 340,000 hectares, Laguna del Tigre National Park and Biotope is the largest core zone in the MBR and the most extensive national park in Guatemala (Sader 1996). Overall responsibility for the reserve lies with the National Council on Protected Areas (CONAP) and the National Commission on the Environment (CONAMA), but the three biotopes are administered by the Center for Conservation Studies (CECON) at the University of San Carlos.

The Multiple Use Zone covers 848,440 hectares, or 40 percent of the reserve, and is an "extractive reserve" where various environmentally sustainable land uses are allowed, such as controlled timber harvests, ecotourism development, and non-timber forest product collection. Oil development is also permitted. To the south of the reserve is a 15 kilometer wide Buffer Zone of 497,500 hectares which comprises 24 percent of the reserve. Here, economic activities are not restricted but several conservation projects attempt to reduce the extent and spread of environmentally harmful activities.

Many conservation organizations have projects within the MBR. The four organizations with the strongest presence are Conservation International (CI), The Nature Conservancy (TNC), CARE, and the Rodale Foundation. TNC works in Sierra del Lacandon National Park, where its activities center around creating economic alternatives and strengthening park protection. CentroMaya is a project run by the Rodale Foundation which works primarily with a few cooperatives along Río Usumacinta in the Multiple Use Zone, where it has established integrated resource management projects. This project also provides technical assistance to the cooperatives bordering Sierra del Lacandon National Park and the Usumacinta River. CARE works in the Buffer Zone and the Multiple Use Zone. Its main activities are environmental education, teacher training, community agroforestry, and income generation. CI is based at Laguna del Tigre National Park, where its ProPetén project is involved in developing management plans for Special Use Zones for communities residing within the park. This project is also working with communities in the Multiple Use Zone to establish and manage Community Management Units, and in the Buffer Zone to develop economic alternatives such as ecotourism and non-timber forest product marketing.

5.2 Threats to the Maya Biosphere Reserve

Although much of the MBR is still inaccessible, some areas are experiencing rapid deforestation, especially areas near watercourses (Whitacre 1996; Conrad Reining, pers. comm. 1997). The Buffer Zone is undergoing a particularly high rate of forest loss. Recent satellite imagery shows that along the western and southern boundaries of the reserve, forest clearing is substantial and accelerating (Sader et al. 1994). The southern part of this zone demonstrates the highest rate of loss, with up to 25% of its forests cut between 1986 and 1990 (Sader et al. 1994). Deforestation rates in the Buffer Zone during this period were over 4% on average, with some localized areas exhibiting rates exceeding 9% and one even greater than 20% (Sader et al. 1994). These trends have continued and probably accelerated (Whitacre 1996). While this zone is not under strict protection, it is still important as a barrier to human impacts on the reserve; if these forests disappear, people may turn increasingly to the Multiple Use Zone and core areas for materials (Whitacre 1996).

Despite the reserve's protected status, other areas are under threat as well. The Multiple Use Zone and even core areas have been subject to illegal deforestation. International experts estimate that in 1996, forest loss in the MBR as a whole reached an annual rate of 3% (Latin America Data Base 1997).

Another threat is the taking of wild animals and plants for the pet and floral trades (Whitacre 1996). Nestling parrots are often taken, the most affected species likely being

the scarlet macaw (*Ara macao*). Bromeliads and orchids are also probably collected, but no studies have been conducted of this trade or its ecological implications. Hunting for subsistence, sale, and sport is also practiced within the Multiple Use Zone, largely by people living at temporary camps from which they gather non-timber forest products (Whitacre 1996). This activity could be sustainable, but is currently uncontrolled and even occurs within core areas (Beavers 1994).

Another, potentially more serious threat comes from oil and gas exploration and extraction. An oil concession was grandfathered into Laguna del Tigre National Park because it was granted in 1985, five years before the MBR was created. Since that time, the International Finance Corporation (IFC)—the private sector lending arm of the World Bank—has financed expansion of oil production as well as construction of a pipeline from the oil fields to the refinery (CI 1997). Although Guatemala's civil war slowed oil exploration in the mid- to late 1980s, increasing political stability in the 1990s led the Guatemalan Ministry of Energy and Mines to pursue bids for new oil exploration and development. Despite the fact that oil development is technically only permitted in the Multiple Use Zone and the Buffer Zone, oil concessions that overlap with core protected areas have recently been granted (CI 1997).

Illegal logging also takes place within the MBR wherever there is access to remaining stands of mahogany and cedar (Beavers 1994). Uncontrolled commercial logging has increased tremendously since the late 1960s (Schwartz 1990). Domestic and Mexican organizations are responsible for some of this activity (Latin America Data Base 1997), but much is done by small-scale loggers who cut trees with chainsaws to supply sawmills located just over the international borders (Norman Schwartz, pers. comm. 1997; Beavers 1994). Much of this wood is transported through Belize to Mexico, and the Guatemalan government claims that Belizean businessmen offer poor Guatemalans incentives to chop the trees (Economist 1993). Meanwhile, corrupt factions of the army and government actually facilitate or participate in these illegal activities (Economist 1993; Beavers 1994). However, since 1995, the increased presence of CONAP and the army has reduced the illegal trade in wood (Conrad Reining, pers. comm. 1997).

Perhaps the greatest threat posed by both oil development and logging activities in the Petén, however, is the creation of roads. For instance, the oil pipeline constructed in 1995 cuts through previously undisturbed forest, wetlands, rivers and streams in Laguna del Tigre National Park and the Multiple Use Zone (CI 1997). Roads have also been built by logging companies in order to extract timber and by the Guatemalan army searching for leftist guerillas (Sader et al. 1994). These routes have opened the area to uncontrolled colonization by the rapidly expanding local population. Satellite imagery shows that more than 90 percent of all recent deforestation occurred within two kilometers of roads (Sader et al. 1994).

By allowing access to previously untouched areas, roads facilitate the expansion of shifting agriculture and cattle ranching. These are the two greatest threats to the MBR (CONAP et al. 1996; Whitacre 1996). Usually, a pattern occurs whereby loggers build roads, shifting cultivators take advantage of this access to cut forest for corn cultivation, and ranchers then consolidate farm holdings and remove the remaining forest to create cattle pasture (Whitacre 1996). This ranching was promoted by FYDEP until the agency's dissolution in 1987 (Schwartz et al. 1996). Cattle ranching is increasing especially quickly in the Buffer Zone (Whitacre 1996).

Currently, it is estimated that between 1,000 and 1,500 families illegally occupy the MBR. Some are seasonal farmers who cross the border from Mexico, while others remain year-round (Norman Schwartz, pers. comm. 1997).

5.3 Organized Invasions

Because it has historically had a low population density, the Petén has traditionally served as a "safety valve" for landless migrants (Claudio Méndez, pers. comm. 1997). Kekchí Indians, a Maya group indigenous to Guatemala's highlands, have been migrating to the Petén since precolonial days. In recent times, the speed of this movement has been increasing rapidly due to socioeconomic factors. It is encouraged by the fact that many Kekchí interpret the 1996 Peace Accords as guaranteeing them a right to land in the Petén (Norman Schwartz, pers. comm. 1997).

However, by granting large tracts of land in the Petén to military commanders and creating the Maya Biosphere Reserve, the Guatemalan government has made most of this district off-limits to poor farmers (Economist 1993). In response to their land tenure insecurity and lack of economic alternatives, local groups have pulled together in a new department-level umbrella organization, the Peasant Union of Petén (UCP), which helps to organize land invasions throughout the department (Latin America Data Base 1997).

The UCP supports squatter settlements in the MBR, many of which have occurred in or around Laguna del Tigre National Park. It argues that, due to the concentration of land in the hands of a wealthy minority in the Petén, poor farmers are forced to occupy state lands, including the MBR which covers a large proportion of the arable land in that department (Latin America Data Base 1997). As UCP leader María Abregon de Che stated (*in* Latin America Data Base 1997),

> The situation in El Petén is very sensitive. The local population cannot continue to tolerate the government's acquiescence to wealthy landowners, who are permitted to amass ever greater extensions of land, while poor *campesinos* [small farmers] don't even have a square inch of land to farm....We have no choice but to occupy whatever lands are available. Even if the government continues to throw us out by force and burn our houses down, we will still return to scrape out a living on those lands.

5.4 Violence

Sometimes, these demands for reform turn violent. Arms are prevalent in the Petén, due to the presence of smugglers who facilitate the passage of narcotics or illegal immigrants across the Mexican border (Economist 1993). The former insurgency wisas also a source of modern guns. Moreover, Guatemala's civil war led to anger towards the government and promoted violence as a way to resolve problems. During the period of conflict, the army razed entire villages; the Petén was one of the most affected areas (CARE and CI 1995). The war also fostered poverty, corruption, and mistrust (Schwartz et al. 1996).

In 1992, CONAP decided to build up its presence in the MBR. In response, local people chased CONAP officials out of various towns or even burned their posts, making it highly dangerous for them to return (Beavers 1994). For instance, when CONAP began monitoring activities at El Cruce a Dos Aguadas in 1992, the officials never made attempts to become integrated into the community, and the villagers viewed them as outsiders imposing alien rules and restrictions which negatively affected their quality of life. An angry mob burned the post, marched the officials out of town (Beavers 1994), and threatened to destroy a CATIE research facility (Schwartz 1994). In late 1992, townspeople in El Naranjo attacked the CONAP guardpost and visiting journalists. This attack was probably fomented by illegal traders who wished to exploit local people's ignorance and fear. CONAP has been unable to reestablish presence in this community until recently (Conrad Reining, pers. comm. 1997).

On March 6, 1997, 500 armed UCP members ambushed police officers and held a number of hostages, including park guards, national police, judicial authorities and CONAP officials, for two days. This action was a response to the eviction of 42 families from a settlement known as Santa Amélia, deep within Laguna del Tigre National Park. During the eviction, CONAP officials had ordered the squatters' huts and installations burned. The crisis ended only after a five-hour period of negotiations, at the end of which the government agreed to perform no more evictions.

Local people apparently deemed this venture a successful strategy, and worthy of repetition. On March 31 of the same year, at least 60 heavily armed men from the mainly Kekchí communities of Buen Samaritano and Paso Caballos, illegally located within the Laguna del Tigre National Park, forcibly invaded CI's Biological Station "Las Guacamayas". They took 13 workers hostage, holding them for 48 hours, and burned down the Biological Station, causing losses of around $200,000 (Chris Rader, pers. comm. 1997). As a result of subsequent negotiations, the government agreed to allow the settlers to remain in the park.

Such attacks are organized and/or supported by the UCP. The National Revolutionary Union of Guatemala (URNG), a former guerrilla group, also promotes invasions and hostage-taking. In addition, there is no doubt that illegal loggers and others trafficking in illegal goods have exhorted and perhaps led attacks while even more powerful interests condoned the violent activity (Schwartz 1994).

Nevertheless, the angry farmers needed very little encouragement (Schwartz 1994). These incidents occurred as the product of a long history of violence in Guatemala. Small-scale farmers have been marginalized and mistreated by the government and have grown highly wary of outsiders. Meanwhile, other factors have operated at a local, national, and global scale to push people into protected areas.

5.5 Causes of Encroachment

5.5.1 Population Growth

One of the most important pressures on the MBR comes from a rapidly increasing human population. The population in this district has expanded from about 20,000 in

1960 to over 400,000 in the mid-1990s (Reining et al. 1997). The annual rate of growth in this district is currently between 9.6 and 10.5% as opposed to 2.9% for the country as a whole (CONAP et al. 1996). Only about a third of this growth can be attributed to births, however; the far greater part comes from migration (Reining et al. 1997).

Road creation is partly responsible for some of this immigration, which has accelerated since the 1970 construction of an all-weather dirt road between Río Dulce in southern Guatemala and Flores in central Petén (CONAP et al. 1996; Schwartz 1990). Government colonization programs are another important factor.

In the early 1960s, Guatemala's agro-export economy came under pressure from worsening land scarcity and burgeoning populations in the highlands (Schwartz 1987). The government realized that it needed to increase production of food staples, exploit more raw materials, and ease political tensions. Foreign experts such as the Food and Agriculture Organization of the United Nations (FAO) advised that the Petén's fragile forests and many of its thin soils were better suited to logging, non-timber forest product collection, and cattle ranching than farming. However, rather than address the difficult issue of land reform, the Guatemalan government opted to open the Petén to colonization by distributing land to farmers from the crowded highlands and the Pacific coast (Schwartz 1990). The government put so much pressure on its agency, the National Enterprise for the Economic Development of Petén (FYDEP), to colonize the area rapidly that by 1966 the scramble for land had spun out of control (Schwartz 1990). So far, 60,000 people have been relocated in the Petén, and FYDEP's successor, the National Institute for Agrarian Transformation (INTA), has proposed resettling 100,000 more (Harmon and Brechin 1994).

Almost half of the immigrants to the Petén are *ladinos* (people of mixed Spanish and Indian heritage) from the eastern highlands, known as the "*Oriente*" (CONAP et al. 1996). Another 15 percent are landless farmers from the south, and 12 percent come from the coast (CONAP et al. 1996). While Kekchí Indians from the adjacent district of Alta Verapaz have been moving to Petén over the past few centuries, after 1966 the pace of their immigration increased markedly (Schwartz 1987). Accounting for 20 percent of current immigration to Petén, this group is becoming one of the most important sources of population growth in the district (CONAP et al. 1996).

5.5.2 Repatriation

During Guatemala's civil war in the 1980s, many people escaped to Mexico. While there, their populations increased rapidly. The rate of growth for refugee groups is between 3.76% and 4.25% per year (CARE and CI 1995). Currently, over 42,000 refugees, 93 percent of whom are farmers, are returning to Guatemala (CARE and CI 1995).

After the war, many small farmers found that they had lost the lands they had traditionally farmed. Most only possessed customary rights to lands without a formal title, and in their absence, wealthy landowners and others had acquired legal rights to those lands (Mario Mancilla, pers. comm. 1997). Also, a few of the cooperatives bordering Sierra del Lacandon National Park and the Usumacinta River were

depopulated during the war. When the refugees returned to the Petén, they found that the MBR encompassed land to which they had legal title (Whitacre 1996).

In the Peace Accords signed between January 1994 and December 1996, the Guatemalan government agreed to resettle population groups uprooted by the armed conflict (Government of Guatemala 1996). European governments, as well as the United States, the United Nations, and several NGOs, are supporting these people's return from Mexico by paying for their journeys, setting up organizations to assist them, and pressuring the government to accept the returnees (Mario Mancilla, pers. comm. 1997).

In search of available lands, the government has turned to the only largely uninhabited region of the country, the Petén. However, many of the farms which they bought are on land which is only marginally suited for agriculture and probably more appropriate for forestry. Moreover, the newcomers are not familiar with the ecological conditions of the area, and thus their farming techniques are sometimes environmentally damaging. According to the Special Commission for Attention to Refugees, Repatriated and Displaced People (CEAR), resettlement programs are exceeding the carrying capacity of the chosen sites (CARE and CI 1995). Meanwhile, these initiatives place the newcomers into conflict with existing residents for land, public services, and other shared resources (Mario Mancilla, pers. comm. 1997).

Another, smaller group of immigrants comes from Mexico (CONAP et al. 1996). Some are Mexican nationals fleeing land distribution problems and resource depletion, but many more are refugees from Guatemala's civil war who fled across the border and now hope to return (Harmon and Brechin 1994).

5.5.3 Unequal Distribution of Wealth and Land

The end of the war has also provided a favorable environment for development in the Petén. There is no longer the threat of attack from both left-wing guerrillas hiding in the forests and from the Guatemalan army seeking to destroy guerrilla outposts. Also, the economy has once again begun to grow rapidly as logging, oil exploitation, ranching, and population movement can continue more safely (Economist 1993; Beavers 1994). Much of this development in the Petén has further concentrated wealth in the hands of the elite. The growing inequality between rich and poor is a trend in recent Guatemalan history which, both directly and indirectly, has been one of the primary causes of encroachment on the MBR.

With the expansion and modernization of plantations and ranches throughout Guatemala in the 1960s and early 1970s came the displacement of smallholders. The proportion of small farms grew while their average size decreased, and the number of landless rural households increased nearly 150% between 1964 and 1979 (Schwartz 1990). Most of this expansion occurred in southern and central Guatemala, where indigenous communal lands had been enclosed in the 1870s. Currently, a small economic elite owns large plantations oriented towards export agriculture, employing local and migrant labor at very low wages. Many of these marginalized people have been pushed north to the Petén (Reining et al. 1997).

Although the state no longer answers demands for economic and political reform with the strong measures employed from 1954 to the mid 1980s, it continues to favor the

elite (Schwartz 1990). In the Petén, upper sectors have benefited at the expense of poor colonists and native Petenero farmers (Schwartz 1987). From the 1960s through the 1980s FYDEP sold relatively large, well-located parcels to affluent Peteneros and outsiders for artificially low prices and overlooked, or was inadequately equipped to monitor, flagrant disregard for its own regulations limiting estate size (Schwartz 1990). Meanwhile, it has offered little assistance to small-scale farmers and has even discouraged them in subtle ways from acquiring land titles (Schwartz 1987).

Speculation also drives up prices, making it more difficult for poor farmers to buy land. Ironically, the government's initiatives to buy large areas of land for refugees have also led landowners to speculate, making it harder for small farmers to buy or rent land and forcing them to migrate to more marginal lands or to enter protected areas illegally (CARE and CI 1995). Meanwhile, many people, including those who have already been given lands by the government as part of the agrarian transformation, clear areas within the MBR in order to sell this "improved" parcel at a higher price (CONAP 1996; Mancilla 1997). Such illegal buying and selling of land is common within the MBR (Norman Schwartz, pers. comm. 1997).

5.5.4 Lack of Alternatives

Adding to the problem of insecure land tenure is the fact that there are often no alternatives to shifting cultivation and cattle ranching (Beavers 1994). Very few industries in the Petén provide stable employment (Schwartz 1990). In the rest of Guatemala, the demand for labor is being reduced by mechanization and the adoption of higher-yielding and less labor-intensive crops (Amilcar Corzo, pers. comm. 1997; Jim Nations, pers. comm. 1997). The government has not invested enough in the southern and central regions to absorb the rapidly rising numbers of unemployed workers and to remove the incentive for people to migrate north in search of land (Claudio Méndez, pers. comm. 1997). In any case, most of the immigrants to the Petén are subsistence farmers with few other skills; farming is the way of life with which they are familiar, so they seek land rather than other means of income (Claudio Méndez, pers. comm. 1997).

Both shifting cultivation and cattle ranching require large areas of land and ultimately cause soil degradation, thereby reducing the amount of available arable land. With little access to technical assistance and credit, farmers are unable to purchase the inputs necessary for other forms of agriculture. In addition, they have few markets for products other than corn, beans, and beef (Reining et al. 1997), because the government has failed to invest in frontier development such as transportation and market facilities (Schwartz 1987).

Moreover, settlers are not accustomed to the lowlands ecosystem. Thus, they do not intercrop properly or maintain the necessary crop-to-fallow ratios, and thereby accelerate soil degradation (Schwartz 1990). Millions of ancient Maya lived successfully in the area for centuries, although today the region’s much smaller population is seriously threatening the ecological integrity of the region (Sader et al. 1994). This fact indicates that current agricultural practices are inappropriate to the local ecological conditions in the Petén.

5.5.5 Poor Community Relations

In the Petén, both immigrants and long-term residents believe that CONAP favors wealthy sawmill owners, large-scale ranchers, and large landowners. Fearful and mistrustful, they are convinced that the government, allied with the elite, will harm their interests at every opportunity (Schwartz 1994).

When the Maya Biosphere Reserve was established in 1990, the conservationists who designed it believed they had a narrow window of opportunity in which to act (Schwartz et al. 1996). Therefore, decisions were made in a hasty, top-down manner, without adequate participatory socio-economic surveys or other input from local people (Amilcar Corzo, pers. comm. 1997). Boundaries were drawn without adequate research so that some settlers found themselves living within the reserve (Schwartz et al. 1996). Also, people were confused by the sudden change in government policy. Previously, FYDEP had stipulated as a condition of selling land that the buyers convert at least 80 percent of their parcel to cropland or pasture, threatening to rescind the sale if this did not occur. Now, the authorities were instead prohibiting the expansion of ranches or agricultural fields. This rapid shift in policy left people confused and suspicious (Schwartz et al. 1996).

CONAP took a very authoritarian stance to the protection of the MBR, restricting forest use without leaving room for compromise. Also, it did not make enough effort to communicate its intentions or listen to the concerns of local communities. Native Peteneros and immigrants—already mistrustful of government intervention—felt that the reserve had been imposed on them by foreigners and members of the elite in Guatemala City. Meanwhile, illegal loggers, and other industries that wanted open access to timber and land within the reserve's boundaries, spread misinformation and tried to undermine CONAP's position (Beavers 1994; Schwartz et al. 1996).

CONAP has suffered from the lack of a continual presence in the Petén, which has prevented the establishment of relationships with communities and encouraged an image of CONAP employees as outsiders who do not understand local needs (Beavers 1994). Also, there are inadequate funds for extension and educational activities. One result is that many boundaries in the MBR are poorly marked, and local people often do not know where the core areas are (Oliver Hillel, pers. comm. 1997; Conrad Reining, pers. comm. 1997). This lack of communication has created a vicious cycle whereby guards are unable even to visit certain areas because they have received threats from illegal loggers and other community members (Beavers 1994), thereby undercutting their ability ever to establish a positive relationship with the community. However, CONAP and its partner NGOs have made successful efforts in 1996 and 1997 to counter these problems through better institutional presence, a coordinated education and public relations campaign, and better and more frequent interactions among government, NGO, and community representatives (Conrad Reining, pers. comm. 1997).

NGOs working in the MBR have made efforts to establish effective communication with the communities with which they work, and ProPetén has been successful in most cases (Norman Schwartz, pers. comm. 1997). However, at Laguna del Tigre National Park, the government urged ProPetén to work quickly, so the project did not have time to develop a close working relationship with the invader communities (Norman Schwartz, pers. comm. 1997). This rapid start was also due to the need to show

donors tangible results in the short term (Conrad Reining, pers. comm. 1997). The task of communicating effectively with communities is made all the more difficult by the fact that newcomers who have no familiarity with the project are constantly moving into the reserve (Carlos Soza, pers. comm. 1997).

Also, many local people associate ProPetén with the central government, which they do not trust (Mario Mancilla, pers. comm. 1997; Claudio Méndez, pers. comm. 1997). They see NGOs as part of a powerful, elitist international conservation "monster" that deprives them of resources (Carlos Soza, pers. comm. 1997). Thus, when protesting their inadequate access to land, they do not distinguish between government and non-governmental organizations. For example, by burning the Biological Station at Laguna del Tigre National Park on March 31, the attackers targeted the ProPetén project in order to pressure the government to provide land tenure security.

Another problem was the fact that the Biological Station itself was perceived as a threat by the local communities. Located very near the settlements, it was a constant reminder of their illegality (Carlos Soza, pers. comm. 1997). The communities did not want witnesses who might communicate their illicit activities to the government. After the station was burned and the ProPetén presence temporarily removed, the communities brought in many new settlers to join them (Carlos Soza, pers. comm. 1997).

5.5.6 Lack of Enforcement

The Maya Biosphere Reserve extends to two international borders and is an important agricultural frontier. Its large size, given CONAP's limited budget, makes it impossible for the agency to maintain a presence in every area of the reserve. This constraint seriously restricts CONAP's ability not only to build up good community relations, but also adequately to monitor and police the protected area. A lack of personnel and resources for transportation means that guards can only enforce rules at communities close to their stations. For example, the eight park guards stationed at the cooperative of Bethel, on the border of Sierra de Lacandon National Park, patrol their area of control—which extends over 60 kilometers—on foot only (Beavers 1994).

In some people's opinion, the central government does not grant adequate resources to CONAP because it is not strongly committed to conservation. Because of the low priority given to conservation, the agency has historically had difficulty in obtaining all the money allocated to it. Further troubles occured when USAID cut funding to CONAP in 1994, when all U.S. government support to Guatemala was temporarily suspended in response to the president's actions (Keith Kline, pers. comm. 1997).

Rather than being a full-fledged ministry, CONAP is housed within the president's office and is therefore dependent on the whims, interests, and relative power of the presidency (Conrad Reining, pers. comm. 1997). Meanwhile, the various branches of the government are often uncoordinated; for instance, the Ministry of Energy and Mines has granted oil exploitation concessions within the MBR's core zones. The

presidency has not stopped such actions because, since the peace treaty was signed, the government's primary goal is economic development through an increase in productivity.

By contrast, the authorities have been quick to evict invaders of private farms. This indicates that while NGOs undeniably have a strong influence on the government, private interests may enjoy more power (Norman Schwartz, pers. comm. 1997). Moreover, many officials are originally from the business community, a fact which increases its influence over the government (Conrad Reining, pers. comm. 1997).

Corruption takes many forms. For example, the National Institute for Agrarian Transformation (INTA) gave some people illegal but official titles to land within the MBR (Conrad Reining, pers. comm. 1997). Also, officials often collaborate with illegal loggers (Economist 1993; Schwartz 1994). For instance, two logging firms that were found to be operating illegally in Sierra Lacandon National Park in 1992 continued to carry truck loads of mahogany from the forest for months, despite the fact that there is only one possible point of exit (Beavers 1994).

Finally, the government's policy in the MBR has been inconsistent, and there is no clear vision of the reserve's purpose (Keith Kline, pers. comm. 1997). This, in turn, has hindered conservation action by NGOs because they do not know how much support they will receive (Conrad Reining, pers.comm. 1997).

5.6 Strategies to Address the Problem

5.6.1 Resettlement

Within the MBR, government attempts to evict illegal settlers from core zones have repeatedly spawned violent attacks by community members. As a result, the government has renounced involuntary resettlement. Voluntary relocation, on the other hand, has been successful in certain cases. For instance, some of the families who had invaded the El Zotz biotope agreed in 1996 to relocate to land outside the protected area. In 1997, a new settlement of a few farm families at Rancho Chocop within the Laguna del Tigre National Park also agreed to be resettled. In both instances, CONAP organized the resettlement and USAID helped to finance it. ProPetén offered some funds as well, but because this is an issue involving national sovereignty, NGOs can only assist with finances and logistics (Carlos Soza, pers. comm. 1997).

Because these two cases involved voluntary resettlement, the relocated families have cooperated with the effort and have not moved back to their former sites. However, many families are not interested in moving. Moreover, there is simply not enough land available for resettling the large numbers of families now residing within the core areas (Carlos Soza, pers. comm. 1997).

In early 1997, a study was undertaken to determine the various options for dealing with a community known as Paso Caballos (Mancilla 1997). Over the past three years, this group of indigenous Kekchí shifting cultivators has established itself in the eastern part of the Laguna del Tigre National Park and now numbers about 600 people. The study determined that evicting and punishing the settlers by virtue of a court order would greatly exacerbate social tensions and might lead to violent confrontation with security

forces. Because of the recent signing of the Peace Accords, the government was eager to improve its image. Meanwhile, foreign governments and NGOs were providing an "avalanche" of assistance for repatriating refugees, and would oppose any action taken against local people. Finally, eviction would require resources, personnel, and political will which the local authorities did not possess (Mancilla 1997).

However, simply recognizing the community and modifying the park boundaries to accommodate it would not prevent it from expanding further into the park; instead, such action would serve to encourage other groups to enter the protected area. By contrast, granting land outside the park to the community in return for a commitment to leave the protected area would be socially acceptable and would relieve the pressure on the park (Mancilla 1997).

Even this option, however, proved too politically controversial. First, the destruction of the Biological Station made it clear that local communities could be extremely volatile in reaction to any efforts to keep them out of the protected area. CONAP refuses to endorse any resettlement programs for fear of causing another uprising or of causing any hostility to counteract the good will generated by the Peace Accords. It is especially wary of being perceived as displacing indigenous people (Conrad Reining, pers. comm 1997). The agency is not even taking action against the men who have used violence in protest of CONAP's activities.

Instead, the government has decided to allow the communities to remain within Laguna del Tigre National Park and hopes to prevent any further invasions by increasing enforcement and not providing any services which might attract immigrants to the park (Conrad Reining, pers. comm. 1997). Conservation projects in the Multiple Use Zone are attempting to help people remain there, rather than moving into the core areas, by providing sources of employment. Finally, by granting the communities rights to the natural resources within the park, conservationists hope to encourage them to manage the forests and to prevent outsiders from entering.

5.6.2 Increasing Enforcement

At Laguna del Tigre National Park, there is currently almost no enforcement in place. However, the Guatemalan government has recently committed more funds to conservation and is contracting more park guards. In 1997, CONAP was able to access more funds than in previous years, and the budget for 1998 is nearly three times that for 1997 (Keith Kline, pers. comm. 1997). Meanwhile, CONAP is gaining stature within the government and experience in handling illegal activities (Conrad Reining, pers. comm. 1997). The government has also more clearly defined its policies concerning the MBR, thus allowing NGOs to formulate a stronger position (Keith Kline, pers. comm. 1997).

CI is playing an active role in helping to increase enforcement in the MBR. First, ProPetén is making efforts to increase municipalities' involvement in enforcing conservation regulations (Conrad Reining, pers. comm. 1997). Also, the project has entered into an agreement with CONAP whereby it will provide guard posts, communications, and training, while the government agency will hire, outfit, and pay the guards (Chris Rader, pers. comm. 1997). By January of 1998, the team of CI, CONAP, and USAID will have established three to five guard posts around Laguna del Tigre

National Park, and actions will be taken to demarcate its boundaries (Conrad Reining, pers. comm. 1997).

Most guards are from the Petén, although it is often difficult to hire people directly from communities surrounding the national parks because most lack the required educational background (Keith Kline, pers. comm. 1997). Nevertheless, providing employment would encourage a positive view of the project, and some guards may be recruited from local communities in the future (Conrad Reining, pers. comm. 1997).

5.6.3 Strengthening Community Relations

ProPetén has always emphasized the necessity of building strong community relations, but is now redoubling its efforts. Since the burning of the Biological Station, ProPetén has initiated education and health projects in Buen Samaritanos and Paso Caballos, two communities which might pose a future threat to the station (Chris Rader, pers. comm. 1997). It also plans to employ local villagers to construct a Visitors' Center at El Naranjo, the entrance to Laguna del Tigre National Park (Chris Rader, pers. comm. 1997).

ProPetén has a strong presence, and consequently a positive relationship with the community, at El Cruce a Dos Aguadas (Norman Schwartz, pers. comm. 1997). This community, located in the Multiple Use Zone and the Buffer Zone, chased government officials out in 1992. However, CI began gradually to build good will, starting with a potpourri production project, provision of potable water, a community center for children, a medical post, and other community development projects.

5.6.4 Non-Timber Forest Products

Non-timber forest product extraction has long been practiced by many rural families in Guatemala. In the Petén, the three main forest products are chicle, a tree gum used for chewing gum; xate, leaves used for floral arrangements; and allspice. Harvest of these commodities provides employment for more than 7,000 Guatemalans and brings in four to seven million dollars of foreign exchange to the country every year (CONAP et al. 1996). Most residents of the MBR participate in these industries; for many families who practice subsistence agriculture, forest product collection is the source of the majority of their cash income (CONAP et al. 1996).

However, there are signs that these products are being overexploited. The chicle harvest per tree in the Multiple Use Zone is only half as much as in Tikal National Park, where collection is prohibited; this indicates that the trees are being tapped too frequently (CONAP et al. 1996). Similarly, people are taking xate from increasingly marginal areas, probably because production in traditional locations has fallen (CONAP et al. 1996). As Petén's population continues its rapid growth, the risk of overharvesting increases and the percentage of families that can make a living from forest products falls (Whitacre 1996).

Most of the profit from these products accrues not to those who gather the natural resources, but to those who process or trade them at various steps along the value chain from harvest to final purchase (Edward Millard, pers. comm. 1997). Therefore, CI's

ProPetén project trains local groups to add value to the forest products. Examples include the production of potpourri as well as the processing of leaves to be sent to the United States where they are dipped in gold to create jewelry and ornaments (Schwartz et al. 1996). Meanwhile, researchers are investigating new potential products and new uses for traditional ones, while monitoring and evaluating the impact of extraction on the local biodiversity (Schwartz et al. 1996).

Non-timber forest product harvesting in Petén does not have the potential to generate huge profits or to employ large numbers of people. Nonetheless, such projects can be an important way to gain the support of local communities. In Guatemala, these enterprises have paved the way for working closely with local people on conservation issues (Edward Millard, pers. comm. 1997).

5.6.5 Ecotourism

Unlike non-timber forest products, tourism can generate large profits (Whitacre 1996). These sums can provide a strong incentive for the government to enforce conservation regulations. For instance, due to its archeological value, Tikal National Park receives far more tourists than any other area in the MBR (CONAP et al. 1996). This is also the only protected area in the complex to receive a high level of enforcement. Guards have maintained a presence there since the 1950s; they are armed and have been known to shoot at intruders (Beavers 1994).

Currently, the average tourist visiting the Petén stays only one day (CONAP et al. 1996). Thus, the direct benefits to the region are relatively small and almost none accrue to the inhabitants of the MBR (CONAP et al. 1996). CI's ProPetén project is working to increase ecotourism activity in the MBR through the creation of enterprises that are ultimately owned and operated by MBR residents (Schwartz et al. 1996). This largely involves capacity-building and development of tours and other services (Oliver Hillel, pers. comm. 1997). Two primary examples are the EcoEscuela, an ecologically-sound Spanish language program located at San Andrés, and the Scarlet Macaw Trail, a path through the MBR along which local guides lead groups of tourists. CI's activities have also included training local groups to monitor their own tourist routes (Schwartz et al. 1996).

Although ecotourism has the potential to generate large sums for local communities in certain cases, it is not a feasible option in many instances. For instance, Laguna del Tigre National Park is in a remote location; a large investment of time and money would be needed to build the necessary infrastructure such as access roads and to train guides (Carlos Soza, pers. comm. 1997).

Also, it is important to consider the distribution of profits from ecotourism. For this activity to provide a true alternative to other, harmful practices, benefits must accrue to a large number of local people rather than to outside tour operators (Whitacre 1996). Meanwhile, antagonisms among community members may be created if the benefits are not equitably distributed.

In addition, tourism can have negative effects on the environment. For instance, Tikal is beginning to exhibit damage caused by heavy visitation, such as pollution, soil compaction on the trails, and deterioration of archeological structures (CONAP et al.

1996). Also, the presence of large numbers of humans may inhibit some species from frequenting certain areas. Infrastructure development can also cause problems; for instance, wildlife are killed by cars on the entrance road to Tikal. Perhaps most importantly, accumulation of refuse has led to increased populations of black vultures (*Coragyps atratus*) at both Tikal and the ruins of Calakmul, where they displace the rare orange-breasted falcon (*Falco deiroleucus*) (Whitacre 1996).

Nevertheless, tourism can be managed in order to minimize its negative environmental and social impacts. Because of the enormous profits from this activity, the ratio of economic gain to environmental damage is much greater for ecotourism than for probably any other economic activity in the MBR (Whitacre 1996).

5.6.6 Community Management Units

Much of the overexploitation and resultant degradation which occurs in the MBR is due to the fact that people have no secure rights to land or natural resources. In the Petén, no one has any control over forest resources or feels responsible for ensuring the sustainability of harvests, nor do they feel that authorities will support them if they protest illegal activities (Beavers 1994). In this open access situation, it is in each person's interest to take as much as he or she can before others do so. Meanwhile, communities have no reason to attempt to halt illegal logging in local forests (Beavers 1994).

By contrast, when a clearly defined group of co-owners has exclusive rights to an area of forest, they will have an incentive to manage their resources so as to ensure steady harvests over a long period. Examples of successful systems of common property resource management come from both the developed and developing world (NRC 1986; Berkes 1989; Ostrom 1990).

Conservationists have decided to apply this idea to the MBR by creating Community Management Units. Communities sign contracts with the government whereby they are guaranteed access and usufruct rights to an area of forest. In return, the community must create a management plan for sustainable harvesting and must monitor its concession to prevent entrance of outsiders (Conrad Reining, pers. comm. 1997). CI, CentroMaya, the Wildlife Conservation Society, and CATIE are all working with various communities to help them to design appropriate management plans for small-scale timber and non-timber forest product harvest.

So far, four Community Management Units have been authorized with one more solicited; several other communities have also expressed interest (CONAP et al. 1996). These concessions range in size from 7,043 hectares to 53,775 hectares (CONAP et al. 1996). CI is involved with two of these Community Management Units, at Carmelita and El Cruce a Dos Aguadas. The former is based mainly on forestry, while the latter combines agriculture, forestry, and ranching. In return for assistance with technical inputs, agricultural extension, credit, and access to markets, the communities have agreed to monitor their borders and prevent the entry of outsiders (Conrad Reining, pers. comm. 1997).

Also, CI is working to establish Special Use Zones within Laguna del Tigre National Park as a result of the decision to allow people to remain within the park. Similar in concept to the concessions, these represent an attempt to give the communities

a sense of stewardship over their natural resources in the hope that they will prevent additional people from entering the protected area (Norman Schwartz, pers. comm. 1997).

The concessionaires have been highly successful in keeping outsiders from extracting resources from their areas, by putting up signs, maintaining vigilance, and reporting any infractions to the appropriate authorities (Conrad Reining, pers. comm. 1997). However, some communities may be reluctant to guard their concessions. At San Miguel for instance, villagers have allowed their neighbors to poach in order to minimize conflicts and possible violent confrontations (Beavers 1994).

Also, the success of such ventures may depend on the degree of similarity to the original situation. For some communities, the concessions merely formalize an existing system (Conrad Reining, pers. comm. 1997). However, others are accustomed to private rather than communal parcels and may have trouble working together harmoniously (Beavers 1994).

Environmental and economic sustainability of concessions is also an issue. Because communities must pay for concessions, they may be forced to log or to produce non-timber forest products intensively and even unsustainably in order to make the payments (Beavers 1994). Communities are also heavily dependent on NGOs for the technical expertise and funds necessary to manage and monitor their area of forest. Thus, these activities are intensively subsidized, and there are not enough organizations to create a concession for every community (Beavers 1994). Finally, if the contract is broken, it is difficult to revoke user rights. Unlike an industrial concessionaire, the community cannot simply be removed from the area, and assigning rights to another group could cause friction and conflict between previous and current users (Beavers 1994).

Concessions may also disadvantage users who live outside of the community and yet depend on the forest resources (Beavers 1994). For each area of forest, there are many different groups that enter it to extract resources; one of the primary challenges of these projects will be to accommodate all users with traditional rights (Conrad Reining, pers. comm. 1997).

5.7 The Future of the Maya Biosphere Reserve

In the dry season, shifting cultivators search for forested areas to cut and burn to create new fields for their crops. As February approaches and the dry season draws nearer, the core areas of the MBR will face increasing threats. This will be the real test to determine whether or not ProPetén's initiatives have succeeded in protecting Laguna del Tigre National Park.

There are several reasons to be hopeful, however. First, the Guatemalan government has a much stronger commitment to, and clearer policy on, conservation in the Maya Biosphere Reserve (Norman Schwartz, pers. comm. 1997). Enforcement is being increased, but at the same time, the government is more interested in working closely with local communities to enlist their cooperation, rather than taking an authoritarian stance (Oswaldo Morales, pers. comm. 1997). It has also recently launched an information campaign to spread the message that the Petén does not contain good

agricultural land, and that much of it is officially protected (Oswaldo Morales, pers. comm. 1997).

Also, ProPetén has been conducting discussions with the UCP and now has much better relations with this organization. Violent invaders no longer have the advantage of novelty and surprise. Moreover, with a stronger negotiating position, the project will no longer be caught off guard if hostilities do again occur (Conrad Reining, pers. comm. 1997).

6 Conclusions: Addressing the Problem of Encroachment in the MBR

Conservation in the Maya Biosphere Reserve depends to a large extent on the Guatemalan government. The root causes of core zone invasions--poverty and inequality of land distribution--are large-scale problems which only the government can address effectively. Also, enforcement and resettlement are the central authorities' responsibility. NGOs can, therefore, have only a limited impact on conservation in the MBR; the real actors are the Guatemalan government and the local communities. However, NGOs can act as intermediaries between the two groups, influencing government policy to promote conservation while finding ways to encourage local people to support and comply with regulations.

6.1 Restricting Development

The government must regulate large-scale development activities so they do not undermine conservation. CONAP has expressed a commitment not to allow oil and mineral exploration or production in core zones. However, the Ministry of Energy and Mines has already granted several concessions in these areas to oil companies, while other concessions overlap with Community Management Units (Conrad Reining, pers. comm. 1997). This is a serious conflict which the government needs to resolve.

Also, more research is needed on policies toward agriculture and cattle ranching in the Buffer Zone. This area has not been a priority for the government and donors, yet it plays a very important role in preventing the spread of environmentally damaging activities into the MBR. Meanwhile, large farmers and ranchers have been consolidating their holdings in this zone, pushing smallholders into the protected area (Conrad Reining, pers. comm. 1997).

Recommendations for NGOs:

1) Encourage officials to resolve mineral exploration/conservation conflicts in the interest of conservation.

2) Conduct research on agriculture and cattle ranching in the Buffer Zone, in order to provide policy advice to the government.

3) Collaborate with officials to devise a strategy to manage and restrict development in the Buffer Zone, perhaps by limiting the permitted size of landholdings and by denying loans and technical assistance to large-scale ranching or monocropping operations.

6.2 Resettlement

The core areas of the Maya Biosphere Reserve have been designated as off-limits to human presence because of their importance to the biological integrity of the reserve. People should not be permitted to settle within the boundaries of national parks and biotopes. However, growing communities in these areas already pose increasing threats to the forest and its wildlife.

In the negotiations following recent violent incidents, the Guatemalan government has yielded to the demands of the attackers, allowing communities to remain within the core areas. These decisions are likely to exacerbate the problem by encouraging other illegal residents of national parks and biotopes to take similar violent action in order to acquire land rights. On the other hand, if officials take an authoritarian stance, they face the risk that the attackers may follow through on their threats to harm their hostages or to commit further acts of violence.

The answer is to find a solution which meets the needs of the communities, yet also serves the purpose of conservation. This can be achieved through attractive offers of land and assistance for communities willing to resettle. If the government makes a commitment to this process, it will be able to locate unused lands possessed by large landholders which it can then purchase and redistribute to illegal settlers. If they combine this offer with the realistic threat of punishment of illegal activities, it is likely that the communities will choose to move out of the protected areas (Norman Schwartz, pers. comm. 1997).

Recommendations for NGOs:

1) Help the government to locate lands for resettlement.

2) Offer access to credit and technical assistance for communities willing to relocate.

3) Design resettlement programs in a manner appropriate for the culture of each targeted group.

6.3 Increasing Enforcement

Only the Guatemalan government has the authority to create laws and punish offenders. Also, CI does not want to be viewed as providing guns to law enforcement officers or encouraging them to shoot offenders. However, ProPetén is supporting enforcement efforts by providing indirect assistance such as administrative support.

Enforcement is a crucial part of conservation efforts in the MBR; without it, people will have very little incentive to obey laws and stay out of protected areas. However, these efforts can only succeed if NGOs provide local people with economic alternatives to illegal activities. Also, the violent uprisings of communities in the MBR have demonstrated that people will not meekly follow government directives. Instead, it is essential to win their support for conservation through programs designed to provide them with opportunities to earn income in a non-destructive manner.

Recommendations for NGOs:

1) Continue to provide support for enforcement efforts.

2) Continue to initiate programs to provide economic alternatives and to enlist people's support.

6.4 Providing Alternatives

In the Multiple Use Zone and the Buffer Zone, projects to provide economic opportunities for local people include ecotourism development and the harvest, processing, and marketing of non-timber forest products. By providing a source of income, such projects have encouraged people to remain in these areas rather than migrating to core zones (Norman Schwartz, pers. comm. 1997, Carlos Soza, pers. comm. 1997). However, these projects can only help to prevent invasions of core zones, not to solve the problem once it has occurred.

Recommendations for NGOs:

1) Continue to develop economic opportunities such as ecotourism and non-timber forest product marketing.

2) Make sure that the activities will provide substitutes for environmentally damaging activities rather than merely supplementing them, by researching each community's time and labor allocation patterns.

3) Choose activities that will provide incentives for conservation.

4) Link these efforts to an educational program aimed at discouraging people from migrating to core zones.

6.5 Education

Many of the communities living within the MBR are not aware of the boundaries of core areas. Informing them of these boundaries is one step in preventing illicit entry; however, it cannot stand alone. Even where people are fully aware of the location of the core zone boundaries, their desire for land still causes them to enter these protected areas (Carlos Soza, pers. comm. 1997). In some cases, people use their knowledge of the boundaries to assist them in illegal exploitation of protected resources (Norman Schwartz, pers. comm. 1997). Therefore, education efforts in local communities can only be successful if implemented in conjunction with enforcement and provision of economic alternatives.

An education and public relations campaign should also be directed at the rest of Guatemala. There, people are not directly affected by the restrictions on land use within the reserve. However, informing them of the existence of the reserve and also of the

poverty of its soils for agriculture can play a role in discouraging them from migrating to the protected area (Oswaldo Morales, pers. comm. 1997). Also, promoting a positive image of the MBR will help to put pressure on the government to strengthen its commitment to conservation of the reserve (Norman Schwartz, pers. comm. 1997).

Recommendations for NGOs:

1) Design an environmental education program to inform local people about the location of the core zones' boundaries and about the importance of conservation for human welfare.

2) Create a public relations campaign to disseminate information about the MBR and its importance throughout Guatemala.

6.6 Coordinating Efforts

When the Maya Biosphere Reserve was gazetted in 1990, the participating conservation organizations agreed to specialize in their areas of expertise, such as environmental education, park protection, or economic alternatives, applying these skills to projects throughout the reserve. However, as the project progressed, each organization focused on a particular geographical section of the reserve and took responsibility for all activities there (Amilcar Corzo, pers. comm. 1997). This strategy is inefficient as it results in duplication of services (Norman Schwartz, pers. comm. 1997).

Recommendations for NGOs:

1) Coordinate efforts by sharing ideas, experiences, and plans.

2) Each NGO should specialize in its area of expertise and create materials and programs which can be used throughout the reserve.

6.7 Decentralizing Authority

One way to promote such collaboration and information sharing is to decentralize decision-making power (Norman Schwartz, pers. comm. 1997). Workers on the ground are familiar with other projects in the reserve. They also often have a clearer picture of the local situation than do directors in distant city offices. With more authority and fewer bureaucratic obstacles, they will be able to tailor their projects to respond immediately to local events and conditions.

Meanwhile, the conservation projects should involve more local-level participation at all stages, from planning to implementation to monitoring (Norman Schwartz, pers. comm. 1997). This participation is especially important in view of the fact that most of the NGOs are planning to phase out or reduce their operations in the next few years. The only way to ensure that their efforts will continue to assist in conserving the MBR after they have left is to give local people a sense of ownership of

the projects. If they are willing to invest in these activities, then the communities will have an interest in maintaining these initiatives over the long term.

Recommendations for NGOs:

1) Allow field staff more decision-making power.

2) Involve local people more in all stages of the projects.

6.8 Allowing Time

However, enlisting the support of local people takes a great deal of time. Building a positive relationship with communities is especially important in the Petén, where a long history of violence has created an atmosphere of mistrust of the government. Communities such as El Cruce a Dos Aguadas, where ProPetén has made an effort to establish close ties with the local people, demonstrate high levels of support for the project, as opposed to others such as Buen Samaritanos and Paso Caballos where CI was pressured by the government to act quickly. Establishing strong community relations causes long delays, yet building support is an investment which produces important returns in the long run.

Recommendations for NGOs:

1) Invest time in establishing a strong relationship with each community.

2) Be willing to accept delays in order to build support.

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