Indigenous Peoples and Neotropical Forest Conservation:

Impacts of Protected Area Systems on Traditional Cultures

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Abstract

In the race to protect remaining tracts of neotropical forests and the resources harbored therein, the Western concept of biological conservation has heretofore been the dominate *modus operandi* for protecting natural areas in Latin America. Through the establishment of first-world style protected area systems, indigenous cultures and traditional resource-uses have historically been considered only in light of how they may affect biodiversity and ecosystem function within protected areas. Case studies of various indigenous cultures onto which protected areas have been superimposed demonstrate the documented and potential negative effects on both biological and cultural systems, and the connection between the two. An understanding of these effects is important in cultural preservation and biodiversity conservation. These factors should be considered in the design and management of inhabited protected natural areas. The unique bottom-up management of the Kuna and Kayapò reserves may provide insight in the establishment of more effective conservation areas that meet the needs of indigenous peoples in an ever-shrinking world.

Introduction

The intensity and rate of tropical deforestation in Latin America in recent years has engendered a sense of urgency in the creation of protected areas, sometimes at the exclusion of circumspect consideration and recognition of socio-economic realities. Presently, eighty percent of protected areas in Latin America are inhabited by indigenous peoples. Some of these areas are amongst the most biodiverse systems on earth (Colchester and Gray 1998). Since the frequent synergism of indigenous rights and environmentalism began in the 1980s, much debate has occurred regarding the extent to which the two agendas are compatible. Within the community of Western conservation biologists, this debate has largely centered on the extent to which indigenous inhabitants impact biodiversity and ecosystem processes in designated protected areas, particularly as they become increasingly acculturated (Peres 1994). Albeit critical in the race to preserve remaining tropical forests, the resolution of this question represents only part of the requisite insight needed to promote effective conservation. Forest-dwelling indigenous peoples possess vast knowledge of the natural systems in which their cultures evolved, much of which is unknown or undocumented in modern science. Moreover, some indigenous cultures demonstrate an ethical commitment to the preservation of these natural systems. Western conservationists may begin to recognize this characteristic as an increasingly important paradigm in light of limited defensibility of existing and proposed protected areas. Given that protected area systems are, ironically enough, a form of regional development, an understanding of the ways in which they impact indigenous peoples may be important for both cultural and biological conservation.

Deforestation in Latin America

The effects of deforestation occur along a continuum of intensity: complete destruction in the cases of clear-cutting, to unsustainable extraction practices, to alteration of ecological characteristics within remaining intact forest stands due to edge effects (Smith et al. 1995). In 1995, forests in Latin America and the Caribbean comprised 27.5 percent (950 million hectares) of the global forest cover, representing a 9.7 percent decrease from 1980 (FAO 1999). Species extinctions through tropical deforestation are thought to exceed 27,000 per year (Myers 1993), representing losses that are difficult to quantify and interpret. These losses include those of alpha diversity; genetic diversity within and among species; potential agricultural crops;

botanical medicines or chemical derivatives thereof; regional and global ecosystem services such as carbon sequestration; and the local resource bases of forest-dependent peoples.

The remaining vast stretches of neotropical forests, such as those of the Amazon Basin, have come to represent perhaps some of the last frontiers of nature untouched by humanity. While vast tracts of the neotropics may seem pristine relative to many forests of industrialized nations, many of the forests of tropical America have served as the resource base for hunters, gatherers and farmers for much of recent history (Smith et al. 1995). In fact, much of the Brazilian Amazon is now thought to have been transformed over millennia by indigenous cultures managing and manipulating critical resources to support themselves. Balèe (1989) estimates that at least 11.8 percent of the *terra firme* (permanent high ground) in this region is anthropogenic.

Indigenous Peoples of Latin America

A population of approximately 40 million descendents of the original inhabitants of Latin America still occupies this vast geographic region (Brysk 1994). Though the groups comprising this population can be distinguished using countless criteria like linguistic patterns, belief systems, and resource use, they are generally referred to as "indigenous peoples." This sweeping designation serves to obscure differences with regard to their respective histories, beliefs, varying degrees of political access and acculturation, and differing future goals among and within indigenous groups. However, the groups can be united on the basis of several broad generalities. Indigenous peoples have largely been marginalized from the national economic and political systems superimposed on their territories and cultures. For example, until the ratification of the 1988 constitution (Allen 1989), indigenous peoples in Brazil were legally orphans of the state with political status equivalent to that of children and the mentally ill (Seeger 1982). Another commonality indigenous peoples share is that of subsistence economies intimately dependent on the specific environment in which they evolved. Thus neotropical indigenous cultures generally represent a tremendous knowledge-base on forest resources, their uses and the natural processes that regulate them.

Given this intimate relationship with natural systems, indigenous peoples often bear the burden of Western stereotypes which depict their traditional practices and cultures as being harmonious with nature. While this stereotype may be valid in some cases, indigenous peoples are not homogenous in this respect; some traditional cultures are more sustainable than others. Many aspects of resource management practices of the Machiguenga of the Peruvian Amazon,

for example, have been described as similar to industrialized forest resource exploitation (Johnson 1989).

The Foreign Concept of Western Conservation

The relatively sparse indigenous populations now found in forests of Latin America are an artifact of the population decimation that occurred upon contact with European colonizers. In Brazil, for example, there are currently only 250,000 indigenous inhabitants, comprising 0.2 percent of the population (Leitao 1994). Some Amazonian peoples, however, were known to support densely populated civilizations prior to European contact (Smith et al. 1995). So the struggles of sustainability and conservation are not unknown. But the Western conceptions thereof, and the mechanisms by which these objectives may be achieved, often are. In fact, there is quite possibly no translation of Western-trained biologists' concept of "conservation" in any non-European language (Alcorn 1993). Similarly, the foreignness and confusion over the concept of sustainable development in Latin America at-large can be illustrated with its two Spanish translations: "sostenible" and "sustentable" (IWGIA 1998).

The Creation of Protected Area Systems: An Inherently Western Paradigm

Historically, protected areas in the third world have been modeled after those of industrialized nations (Cox and Elmqvist 1991). In developed countries a number of factors contribute to the feasibility and moderate success of such a system, where large tracts of depopulated land are protected and managed by the state. One such factor is that their diversified economies, fully integrated into the global market, nearly exclude the practice of land-based subsistence. And some argue that this system has been possible at least in part because first world countries have– and use– the capability to exploit natural resources elsewhere, like in developing nations (Alcorn 1991).

As in the U.S. and Europe, land for protected natural areas in Latin America is acquired in any combination of three ways (Cox and Elmqvist 1991): executive order or legislative action used to declare government land a protected area; state purchase of private land; and debt-for-nature swaps, in which a sum of international debt is remitted based on land area set aside for protection. After land acquisition, any number of management strategies from top-down to bottom-up approaches may be employed. The strategy selected depends heavily on the primary purpose of the protected area and by whom it will be managed. Once selected, this strategy, among myriad other variables, is important in determining the impacts of a given protected area system on indigenous cultures. The potential negative effects of protected areas can be broadly

categorized as either directly undermining a people's means of subsistence or by the indirect impact through influencing conventional cultural characteristics.

Case Studies of the Effects of Protected Area Systems

The Top-Down Management Approach

The case of Bolivia's Noel Kempff Mercado National Park is classically illustrates a protected area that impairs a pre-existing community's ability to provide for itself. The managing agency of the park, Fundaciòn Amigos de la Naturaleza (Friends of Nature Foundation or FAN), operates a very expensive, exclusive, and low-impact form of ecotourism to help finance the Park's operations. In 1988 FAN received permission to extend the boundaries of the park to encompass land that was being used by local forest-dwellers for logging and harvesting heart of palm (Wheat 2000). The local residents have not been given the option to participate in the design, management, or ecotourism enterprises of the Park (Wheat 2000). Hence, they may be driven to economic activities that are possibly even less sustainable than those of their former livelihoods in effort to meet their basic needs. The circumstances of this specific case have heretofore precluded the involvement of outside support, perhaps largely because the livelihoods of the local residents do not match the romantic notion of "the ecologically noble savage" (Redford 1990). In any case, their livelihoods have been disrupted and the conflict of interests may ultimately challenge the efficacy of the park, given the reality of limited defensibility of protected areas (Peres and Terborgh 1995).

Another case illustrating the impact of protected area systems on indigenous residents via a strict top-down management approach can be found with Panama's Darien National Park along the Colombian border. Created in 1980, the land of the park was home to three indigenous groups: the Embera, the Wainan, and the Kuna. Several years after its creation, the area also received the distinctive designation of "United Nations World Heritage Site" (1981). Then with the incorporation of existing indigenous reserves in 1993, the area became a Biosphere Reserve. The first major jolt to indigenous communities during the implementation of the National Park was the management plan's recommendation to relocate selected villages and prohibit hunting and fishing activities in certain areas of the park incidentally critical to the livelihoods of these longtime residents (Dalfelt and Morales 1978). The plan was later modified to merely encourage the voluntary relocation of select Embera villages to sites with greater infrastructure, which in turn facilitated the loss of their native language and other manifestations of acculturation (Houseal et al. 1994). A substantial blow to both Embera cultural traditions and the environment

occurred with the park's prohibition of all hoofed animals within twenty-five miles of the Colombian border. The Embera largely subsisted on integrated, low-impact swine production in community forests. With the exclusion of their staple commodity and principal source of income, the group quickly evolved–at the behest of the national government no less– into a logging-dependent culture (Houseal et al. 1994).

Copious evidence exists to verify that even the more sustainably-minded indigenous groups are not beyond liquidating natural resources (Zimmerman et al. 2001). However, in such cases of seemingly inevitable environmental destruction, at least the indigenous groups would reap the short-term benefits of unsustainable logging activities. The Brazilian Kayapò, for example, earned an unbelievable sum of $33 million in logging profits from mahogany extraction in 1988 alone (The Economist 1993). While certainly inconsistent with the romantic notion of indigenous culture as the embodiment of purity, such figures underscore the tentacles of the global market and the ever-shrinking world in which indigenous cultures are responding to and evolving in.

Biosphere Reserves: Concept Versus Reality

The next model of protected area systems considered is UNESCO's international network of Biosphere Reserves, part of the Man and the Biosphere Program (MAB). In theory, this model falls somewhere between the top-down and bottom-up approaches to biological conservation, with an emphasis on the preservation of traditional land-use systems. Launched in 1971, the Biosphere Reserve program was possibly the first large-scale initiative to emphasize the integration of human populations in protected natural areas (Gregg 1991). As such, one of its positive effects has been to underscore the need for more collaboration amongst all stakeholders in protected area management. The spatial organization of Biosphere Reserves includes different zones which are regulated on the basis of how the land and resources may be used. Each reserve must contain a core area which is generally pristine or "old growth" biological communities and strictly protected from economic activity and extraction. This core is surrounded by a buffer wherein traditional land and resource uses, scientific investigations, and limited human settlement are permitted. The final layer is a transition zone: an open-ended area where the bulk of human population resides.

While representing an important paradigmatic shift in protected area systems, its implementation in many cases has demonstrated that the MAB Biosphere Reserve program may still exhibit a largely top-down approach. A case in point is that of the La Amistad Biosphere

Reserve in the Talamanca region of Costa Rica and Panama. The reserve is occupied by six indigenous groups who share the uncertain fate of all indigenous cultures in Costa Rica. Though indigenous reserves represent approximately 6.3% of the nation's territory, only sixty percent of this area is actually controlled by the indigenous (Segura 1998), exemplifying their lack of political voice in the national system.

One indigenous group of the La Amistad reserve holds that their God, whom they call Sibö, created the natural world and placed it in their care (Palmer et al. 1991). These Bribri have historically possessed intimate knowledge of, and demonstrated commitment to, the conservation of both wild and cultivated diversity. Though they formerly occupied the lowlands of the Talamanca region, along with the indigenous Cabècar group, colonization forced them into higher elevations and harsher agricultural conditions (Houseal et al. 1994). Despite this topographical shift, the Bribri long maintained ethical stewardship of the land through ecologically-sound forest management and agricultural practices (Posas 2001). They also preserve forests critical to the protection of their watershed by designating them as sacred places (Posas 2001). However, the infiltration of foreign values through both outside religious influences and increased urbanization of young Bribri and Cabècar, has facilitated the erosion of cultural traditions and beliefs (Segura 1998). Traditional food-production systems are being increasingly converted to monoculture systems. Clan marriage practices are being disrupted. Finally, the traditional "classrooms," whereby the young are trained to fulfill vital cultural and ecological functions, are disappearing (Segura 1998).

Due to the difficult terrain, limited social and political organization, and general suspicion of outsiders, the indigenous communities within the La Amistad reserve play virtually no role in the planning or management of the Biosphere Reserve (Houseal et al. 1994). Given Costa Rica's well-developed system of protected natural areas, one may have expected a more effective implementation of the Biosphere Reserve program in attempt to integrate human and natural systems. It is arguable that the high profile of the international MAB Biosphere Reserve program has usurped the place of a possible alternative protected area design that may have better catered to the needs of local indigenous groups facing, at least to some degree, inevitable acculturation.

The story of the Bribri and Cabècar highlights another overarching weakness of existing protected area systems, particularly those inhabited by indigenous populations. These systems have, by and large, failed to consider conservation beyond the "natural" environment and wild

genetic diversity. Western conservationists have historically perceived the *in situ* preservation of cultivated diversity to be either subordinate to, distinct from, or incompatible with that of natural systems (Oldfield and Alcorn 1991). Scientists are thought to be responsible for a mere one percent of experimental trials with new crops, intercropping systems, and agroforestry techniques. Rather, indigenous peoples may take the lion's share of credit in this area (Cultural Survival Quarterly 1991). Although the MAB program in theory recognizes the significance of traditional uses of landscapes and resources, the case of the Bribri's disappearing agricultural knowledge demonstrates that a more effective approach to achieving this goal in its buffer and transition zones merits consideration within the conservation arena.

Indigenous Management of Conceptually Western Protected Area Systems

Moving a step closer toward a bottom-up approach to protected area management is the case of the Kaa-Iya National Park in the Chaco region of Bolivia. Within the Chaco, South America's second largest biome, the indigenous Guarani can be divided into several groups including the Izozogans. With a population of approximately 8,000, this sub-set of the Guarani has managed the Kaa-Iya National Park since 1995 with assistance from the North American based Wildlife Conservation Society (Arambiza 1998).

The Izozog people are primarily an agricultural people who also depend heavily on the forest for daily supplements to their diet. The various Guarani groups throughout the southern cone of South America have until recent years remained closely linked through their religion (Leitao 1994). Like the Bribri, the Guarani also believe their lands have been given to them as gifts from God and individual groups demonstrate deep ties with specific tracts of land (Arambiza 1998). They view control of their native territory as a guarantee of the continuation of their people and their way of life. Threats to this guarantee abound, however. Many of their traditional territories in the southern cone of South America have been impacted by tea extraction activities; real estate speculation in conjunction with the Hidrovia waterway project; wildlife poachers; and deforestation for agricultural use by Mennonites and other colonists (Arambiza 1998, Leitao 1994).

The Izozog Guarani are cooperating with the Wildlife Conservation Society (WCS) on several projects related to the management of their National Park (Arambiza 1998). Community members are creating detailed maps of various land-use zones, anthropogenic landscape features, culturally significant and sacred areas, and natural resource distributions. WCS trains select community members as para-biologists in scientific research of the area's flora and fauna. Park

guards are being trained to defend the park and its resources. The Izozog are implementing environmental education programs for both teachers and students. Finally, the Izozog created a management plan to affirm agreement of goals amongst interested parties like WCS, the Bolivian government, and international donors like the World Bank.

Thus far in the management of Kaa-Iya, there have been no conflicts between the stakeholders (Arambiza 1998). The Izozog feel they are able to continue their traditional lifestyle and protect their land from outside threats. Compared to landless Guarani neighbor groups in southwest Brazil, this certainly seems to be the case. Leitao (1994) has described the fate of the Brazilian Guarani. These groups (the Kaiowà, Nandeva and M'bya) have no means by which to continue their traditions and worse, must witness the destruction of their culturally significant territories. The presence of missionaries, critical of their cosmogony and perception of the natural world, has had negative effects on community esteem. Suicide rates are high and alcoholism is rampant.

Though not completely autonomous, the Izozog are largely in control of managing the resources they need to support their traditional livelihoods within the confines of a national park. Likely due to the influence of WCS, the Izozog have partitioned the park into land-use zones for wildlife protection, agricultural fields and livestock (Arambiza 1998). This Western concept may impact their traditional spatial conception of the landscape. Furthermore, the Kaa-Iya mapping project of other landscape features represents the danger of re-shaping indigenous models so that they fit classically Western constructions (IWGIA 1998). Similarly, the environmental education program and the training of para-biologists and park guards instill Western thought patterns and perceptions. While this may serve as a positive complement to Guarani concepts, these programs also have the potential to supplant traditional customs.

The overarching impact of the protected area in the case of the Guarani may be to promote differential cultural evolution. While the groups have long exhibited different land-use practices suited to their particular regions of the Chaco (Arambiza 1998), they have been united to some degree by their spiritual beliefs (Leitao 1994). Currently the Izozog are responding to forces of change within the protected area and the surrounding Guarani groups responding to outside forces of change (largely degradation of their territories). Though perhaps a natural function of cultural evolution and adaptation that may have occurred independent of the national park, the Izozog are likely to loose traditions that maintain the union with their fellow Guarani.

Protected Area Systems Petitioned by Indigenous Groups

The following and final cases illustrate a truly bottom-up approach to design, implementation and management of protected natural areas. In the cases of the Kayapò of Southern Brazil and the Kuna located on the Northeast coast of Panama, not only are the indigenous groups in complete control of the protected natural areas, they served as the impetus in their establishment. Up to this point, recommendations for conservation efforts in third world countries have been given in a unidirectional manner: from developed countries to developing countries (Alcorn 1991). Given the Western roots of modern protected area systems, these cases of the Kuna and Kayapò biological reserves are dependent on technical assistance from Western institutions. However, they represent an opportunity to better understand how protected areas both complement and/or conflict with traditional cultures and may contribute to the on-going evolution of conservation in protected area systems.

In the early 1980s, the Kuna became the first indigenous group to designate a protected forest within its territory (Redford and Stearman 1993). The initiative was highly popular amongst conservation organizations and received large sums of financial support from international sources. Known as PEMASKY (Spanish acronym for The Study Project for the Management of the Forested Area of the Kuna Territory), the Kuna Park, and the Kuna Wildlands Project, the Kuna set aside 60,000 hectares within their 321,159 hectare autonomous indigenous area. Given their superior ability to navigate the modern political system relative to most other indigenous groups (Chapin 1991), the Kuna conceived the idea of the forest reserve as a way to fund their major objective: protecting their sacred forest from colonization and other degrading forces (Chapin 1998).

The philosophical and ethical basis for conservation in Kuna culture stems from the idea that every living thing has a spiritual dimension (Chapin 1991). Forests are sanctuaries "where the spirits hang their clothes from the tops of the tallest trees. If they cut down the trees, the spirits will punish them. Disease-even death-could follow" (Archibold and Davey 1993). Hence, in some senses the concept of botanical parks has been pervasive throughout Kuna history in that adjacent to each community is a stand of pristine forest, even when the land may be well-suited and otherwise convenient for agriculture (Chapin 1998).

The Costa Rican institution CATIE was contracted by the Kuna to design the management plan for the reserve. The first several years of PEMASKY witnessed much enthusiasm about the possible fusion of Western and indigenous resource management practices. Increased involvement of outside conservation groups pushed the management plan toward the

design of a MAB Biosphere Reserve, though this was never truly the goal of the Kuna (Chapin 1998). Poor financial planning and dearth of forethought resulted in insufficient funding after the project's initial phases. This fact coupled with differences in the visions among planners ultimately led to the eventual obscure profile of the project and finally, its slow dissolution.

From the Kuna point of view, however, the project was successful with regard to their major objective of stopping colonization. Furthermore, the concept has been used as a model for various projects with indigenous groups in Amazonia (Redford and Stearman 1993). However, the political and scientific climate to which the Kuna adapted in planning the project is thought to have had lasting impacts on their perception of the natural world (Chapin 1998). The younger generation increasingly subscribes to Western conservation concepts without regard to the traditional ethical and spiritual basis for conservation (Chapin 1991). This specific case underscores a larger threat, of similar origin, to the Kuna culture.

The Kuna have been successful in maintaining relatively strong cultural identity in the face of outside threats and an often violent, brutal national history. This has been due in part to their ability to integrate sufficiently enough to perceive threats and defend themselves and their culture in the appropriate national and international context. Forty plus years of Western education in Spanish, has spawned a literate, modern brand of Kuna that undermines the oral tradition of teaching "the way of the great father" (Chapin 1991). Chapin (1991) poses the critical question of whether the Kuna will continue to act as stewards of the Earth as its traditional belief system is in increasing danger of disappearing.

The story of the Kayapò is possibly one of the best publicized of the indigenous Amazonians. Leaders like Payakan rose to international fame in the 1980s as they mobilized to protest illegal mining on their territory and other threats like a hydroelectric project (Conklin and Graham 1995). Much of their political power and voice was initially derived from their savvy use of Westerners' stereotypes about Amazonian forest-dwellers to their advantage in seeking self-determination (Conklin and Graham 1995). Over the course of the last fifteen years, however, the record of some Kayapò groups in the mahogany logging industry has drastically undermined this strategy (Zimmerman et al. 2001). While income generated from logging concessions helped the Kayapò finance the defense of their territory through guarding borders and performing aerial surveillance, it also contributed to the disruption of their egalitarian social structure since some availed themselves of developed-world luxuries (e.g. automobiles).

The Kayapò Center for Ecological Studies or Pinkatiì was implemented in 1992 in the 8,000 hectare forest reserve that the Kayapò themselves established for the conservation of biodiversity. The reserve is managed jointly by A'Ukre villagers and the environmental NGO Conservation International, Brazil. The research program within Pinkatiì generates employment for the A'Ukre community as research assistants (Zimmerman et al. 2001). Entry fees paid by scientists and other visitors benefit the entire community, as do the obligatory donations of medicine (primarily for malaria) required of the researchers (Zimmerman et al. 2001).

Perhaps the most significant impact of the creation of the reserve has been restoration of the egalitarian principles on which Kayapò society is based (Zimmerman et al. 2001). Within the bounds of the reserve, villagers have effectively prohibited the extraction of mahogany by outsiders and members their own community. Also, the project allows the group to participate in the market economy without disruption of their traditional lifestyle. Particularly significant is the continuation of their sophisticated agricultural techniques. The Kayapò have demonstrated no interest in migrating toward a larger-scale food production system (Zimmerman et al. 2001).

By providing needed income without disrupting important community characteristics, the Kayapò are continuing to produce food the way they always have. They employ an extensive variety of plants and through the semi-domestication of these selected varieties, the Kayapò manipulate distinct ecological units between microclimates for the net effect of increasing biological diversity (Posey 1985). Furthermore, Posey (1985) argues that these strategies, especially the Kayapò techniques for creating apètè (forest patches), may have important implications for forest conservation.

Potential negative impacts like transplanting Western concepts in the minds of the research assistants or unsustainable dependence on outside institutions may affect the success and longevity of Pinkatiì. However, thus far the project has faced no major obstacles and both Kayapò villagers and Conservation International are satisfied with its success (Zimmerman et al. 2001). Under the present circumstances, the benefits clearly outweigh the risks in the case of the Kayapò.

Conclusions

The establishment and management of protected area systems is a form of ecodevelopment that may be more or less integrated with the traditional practices of the inhabitants over which (top-down approach) or with which (bottom-up approach) they are superimposed. While in most cases, the impacts on traditional cultures is milder than those of

other development forces by which indigenous peoples will or have been inevitably influenced, these impacts merit consideration in the planning phases and management strategies of protected areas.

In re-thinking the design and implementation of protected areas in neotropical forests, evaluations of past cases should be considered. The cases of Noel Kempff Mercado National Park and Darien National Park illustrated how protected area management may inevitably create niches for increased resource exploitation of the very resources they aim to protect. The case of La Amistad Biosphere Reserve illustrated that while the participation-oriented Biosphere Reserve concept is more promising in theory, it may not be an effective model if the residents are unable, unwilling and/or otherwise excluded from the process. Geographic, historical and cultural circumstances should be evaluated before employing this model. While the bottom up approach, illustrated by the Kuna and Kayapò cases, seems to hold much merit, such models have been in practice for shorter time periods and potential dangers and pitfalls have been identified. Monitoring and evaluation of bottom-up approaches may yield invaluable insight into effective biological and cultural conservation in an increasingly dynamic global context.

"Inevitably once contact has been made with segments of national society, the relationship with the ecosystem changes" [for indigenous people] (Seeger 1982). Alcorn (1991) disturbingly predicts that by 2050 even indigenous inhabitants in the most remote areas of the world will be drawn into the global market economy. The ease of industrialized resource exploitation will increase. The losses of natural and cultivated biodiversity and cultural knowledge may proceed unchecked if more complementary protected area systems are not implemented. The complex variables that must be considered in achieving more effective protected areas, as shown in this discussion, may best be evaluated on a case-by-case basis.

More realistic and sustainable protected areas must be designed, implemented and managed taking into account the indigenous cultures involved; the specific conservation objectives; the traditional and potential resource-use of the people; and the impacts thereupon of the proposed or existing protected area. Western conservationists continue to search for a new model or paradigm to resolve the conflict between cultural and biological conservation. Rather than laboring to conceive the ideal model, the effort may be better spent exploring the unique circumstances of the myriad established and potential protected areas where interests of biological and cultural conservation intersect.

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