

Rethinking Tropical Forest Conservation: Perils in Parks

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Abstract: According to some conservationists, large, pristine, uninhabited parks are the defining criterion of success in conserving tropical forests. They argue that human residents in tropical forests inevitably deplete populations of large animals through hunting, which triggers a chain reaction of ecological events that greatly diminish the conservation value of these forests. Hence, they believe that removal of people from tropical forests is an essential step in the creation of successful parks and in the conservation of nature in the tropics. This approach can lead to undesirable consequences, however. Forest residents—and rural people generally—are potent political actors in tropical forest regions and an essential component of the environmental political constituencies that are necessary for the long-term conservation of tropical forests. In Amazonia and elsewhere, rural people are defending far bigger areas of tropical forest from unfettered deforestation and logging than are parks, thereby conserving the ecological services provided by these forests and the majority of their component plant and animal species. Moreover, the data are too sparse to judge the effects of forest peoples on populations of large forest animals. The establishment of pristine, tropical forest parks is an important conservation goal, but the exclusive pursuit of this goal undermines the broader objectives of conservation when it identifies forest residents and other rural people as the enemies of nature.

Reconsideración de la Conservación de los Bosques Tropicales: Peligros en Parques

Resumen: De acuerdo con algunos conservacionistas, los parques grandes, prístinos y deshabitados son los criterios que definen el éxito de la conservación de bosques tropicales. Ellos han argumentado que los residentes humanos en los bosques tropicales reducen inevitablemente las poblaciones de animales grandes mediante la caza, lo cual inicia una reacción en cadena de eventos ecológicos que disminuyen en gran medida el valor de conservación de estos bosques. Por lo tanto, ellos creen que la remoción de las personas de los bosques tropicales es un paso esencial para la creación de parques exitosos y para la conservación de la naturaleza en los trópicos. Sin embargo, esta estrategia puede conducir a consecuencias no deseadas. Los residentes de bosques—y los pobladores rurales en general—son actores políticos potenciales en las regiones tropicales y son un componente esencial del electorado para las políticas ambientales que son necesarias para una conservación de los bosques tropicales a largo plazo. En la Amazonia y en cualquier parte, los pobladores rurales se están defendiendo de la deforestación sin restricciones y de la tala de áreas de bosque tropical más grandes que los parques, consecuentemente, conservando los servicios ecológicos proporcionados por estos bosques y la mayoría de sus especies de plantas y animales que los componen. Además, los datos son obsoletos como para juzgar los efectos de los pobladores del bosque sobre las poblaciones de animales grandes. El establecimiento de parques forestales prístinos es una meta importante de la conservación, pero la búsqueda exclusiva de esta meta menoscaba los objetivos más amplios de la conservación cuando se identifican a los residentes del bosque y a otros pobladores rurales como enemigos de la naturaleza.

Introduction

In recent years, a group of tropical biologists has argued that human presence in tropical forests is ultimately incompatible with the conservation of biological diversity (Redford 1992; Redford & Stearman 1993; Peres 1994; Peres & Terborgh 1995; Kramer et al. 1997; Brandon et al. 1998; Terborgh 1999). Although they have drawn attention to the important effects of hunting on populations of large animals in tropical forests, their major effect has been to cast the future of tropical forests as an artificial choice between conservation, defined as the preservation of pristine, uninhabited parks, and the destruction of nature (i.e., the inevitable outcome of human presence in the forest). The real choice in large parts of the tropics, however, is between forests inhabited and defended by people and cattle pastures or industrial agriculture.

By seeing rural people as the enemy of nature instead of political actors who are the basis for an environmental constituency, the advocates of people-free parks are missing a significant conservation opportunity. Protection of uninhabited forest is a critically important goal, but forests that have been altered by people—practically all remaining tropical forests—also have tremendous conservation value. In Brazil, for example, indigenous and extractive reserves (forest reserves managed by rubber tappers and other folk communities) protect much larger areas of native forest than do uninhabited protected areas, and they are far more effective in halting deforestation in expanding frontier regions (Instituto Socioambiental 1996, 1999). Disputing the legitimacy of forest peoples and their representatives as a voice for the forest is a less effective way to achieve tropical forest conservation than is the construction of alliances with them.

Forest Destruction

Deforestation of tropical forests seriously jeopardizes the biological diversity and climate system of the planet (Wilson 1992; Houghton 1993; Bryant et al. 1997; World Conservation Monitoring Center 1997; World Commission on Forests and Sustainable Development 1999). Approximately 110,000 km² of tropical forest were cleared each year from 1990 to 1995 (Food and Agriculture Organization of the United Nations 1997). New research from the Amazon shows that deforestation monitoring programs underestimate the influence of humans on tropical forests. Fires and selective logging in standing forests are not measured in satellite-based deforestation monitoring programs, and they degrade at least as much forest as is cleared and burned each year (Nepstad et al. 1999b). The drying of forests and the greatly increased threat of fires in Amazônia, Southeast Asia, and Mexico, particularly in

El Niño years, raises the specter of even more rapid loss of biodiversity, accentuated regional and global climate change, and the loss of important environmental services performed by forests. The increasing frequency and intensity of El Niño events in recent years has increased the risk that tropical forests in Amazônia, Southeast Asia, and Mexico will desiccate and catch fire. The ancient tropical forests of the world will all but disappear in our grandchildren's lifetimes at current rates of destruction, which may be another early outcome of global warming (Trenberth & Hoar 1997; Timmermann et al. 1999).

Top Predators and Ecosystem Services

Although powerful, large-scale economic, political, and climatic forces drive the rapid clearing and impoverishment of the world's tropical forests, the people-free park advocates give disproportionate weight to the effects of local peoples' hunting. Tropical conservation is equated with the preservation of pristine, uninhabited landscapes large enough to support genetically viable populations of top predators. "In the absence of the ecological function performed by top predators, the whole ecosystem slides into imbalance and begins to spiral down in a cascade of species losses" (Terborgh 1999:16).

Hard evidence that forest people systematically and unavoidably eliminate or severely alter "the ecological function performed by top predators" is surprisingly sparse. Much of the data presented in support of this position were collected in tropical forests that were artificially isolated by elevated water levels, such as Barro Colorado Island in Panama and forest islands in Venezuela. Although these accidental experiments provide fascinating insights into the effects of animal removals on the plant and animal composition of tropical forests, they do not address a far more basic assumption that is central to the people-free park paradigm: that people inevitably deplete populations of big animals. The test of this assumption cannot be found on Barro Colorado Island or in the active colonization frontiers along rain-forest highways. This assumption must be tested by comparing the species composition of uninhabited, "pristine" tropical forests with the species composition of forests in indigenous or extractive reserves. We are unaware of rigorously documented cases of local extinction, or severe depletion, of large animals—or any other species—in indigenous or extractive reserves.

Several studies suggest that, to the contrary, hunting by forest communities even over the long term has not had these effects and that, given adequate territory, it does not threaten game species (Ayres et al. 1991; Mittermeir 1991; Silva & Strahl 1991; Vickers 1991). In a similar vein, Terborgh (1999) blames the poor regeneration of Brazil nut (*Bertholletia excelsa*) trees in Amazon forests on years of nut overharvesting by forest people,

ignoring evidence that Brazil nut stands may be relics of extinct Amerindian cultures that planted Brazil nut and other plant species (Anderson & Posey 1989; Balée 1989). Modern-day rubber tappers in the Chico Mendes Extractive Reserve (Acre, Brazil) protect young Brazil nut trees that establish in their secondary forests, increasing their density in the landscape (Nepstad et al. 1992). Brazil nut tree populations may be destined to local extinction in the *absence* of human intervention.

But what if indigenous groups and folk societies do frequently drive to local extinction populations of large animals in the forests in which they live? We are aware of no evidence that such species alterations affect higher-level criteria of tropical forest integrity, such as forest vulnerability to fire, fertility of forest soils, forest carbon content, or the role of tropical forests in regional hydrological and climate systems (Shukla et al. 1990; Nobre et al. 1991; Nepstad et al. 1992, 1994). In addition, the depletion of large-animal populations does not threaten the majority of the other species that comprise these forests. Forests that have been impoverished through hunting still have enormous conservation value.

Forest Peoples and Peoples' Forests

By identifying indigenous and traditional peoples as obstacles to effective conservation, or by concluding that indigenous and other inhabited reserves are incompatible with "real" biodiversity conservation (Redford & Stearman 1993; Peres 1994; van Schaik et al. 1997; Brandon et al. 1998; Terborgh 1999), the people-free park school impugns the critical conservation value of inhabited forest areas and ignores the role of forest peoples as constituencies for forest conservation. Redford and colleagues assert (1998:463), for example, that ". . . parks may have been created by 'top down' forces, but that is the only way they could have been created. 'Bottom up' in situ efforts have created. . . nothing of a scale sufficient to preserve large portions of ecosystems."

Indigenous people have, however, established their rights to 20% of the Brazilian Amazon (approximately 1 million km²). This is an area five times the size of all nature reserves in the Brazilian Amazon, twice the size of California, and the largest expanse of tropical forest under any form of protection anywhere. It is inhabited by fewer than 200,000 people. Nearly half of the Colombian Amazon, about 185,000 km², is indigenous reserves (*resguardos*), inhabited by approximately 70,000 people (Inter-American Development Bank 1992). Native peoples have also made substantial gains in recent years in recognition of land rights in Peru, Bolivia, and Ecuador, and indigenous organizations are increasingly active in Venezuela and Guyana.

In Brazil, in the most dynamic deforestation frontiers, indigenous areas and extractive reserves are virtually the

only protected areas that effectively halt the expansion of forest clearing. This is clearly visible in a satellite image, showing the location of new deforestation clearings outside of indigenous reserves. Although some indigenous groups may permit selective logging and mining, as in the 100,000-km² Kayapó Reserve (Fig. 1), they can and do control access to their lands. Agricultural frontier expansion stops at the boundaries of legally recognized areas because the indigenous groups control access. Forest cover that would otherwise be lost is maintained, as is the preponderance of plant and animal species. If halting or slowing deforestation are reasonable environmental goals and protect biodiversity, then preservationist absolutism at a minimum makes the perfect enemy of the good.

Politics of Protection

Because deforestation and uncontrolled frontier expansion threaten parks, indigenous peoples, and other forest peoples, conservationists need to unite in building effective alliances with constituencies in and around forests. Such alliances must be based on the recognition that conservation—like destruction—is first of all a political process. Terborgh's (1999) discussion of "extractive reserves" is a good example of a broader misunderstanding of the social and political dynamics of destruction and conservation. Echoing previous critiques (Browder 1992; Salafsky et al. 1993), Terborgh holds that extractive reserves were based on the economic viability of extracting Amazon wild rubber, which rested on the Brazilian rubber subsidy. When the subsidy was removed in Brazil's recent economic liberalization, Amazon rubber prices collapsed, and some people left the reserves. Hence, extractive reserves have failed and consequently will be overrun in the next wave of development.

Extractive reserves were not based on the economic value of rubber but on the political vision of the grassroots organization that mobilized around them. The National Council of Rubber Tappers (CNS) was the first organized Amazonian constituency to formulate its own conservation and sustainable development proposal for the forest (Schwartzman 1989). The protagonists of the extractive reserves are the grassroots groups and their allies—union federations, nongovernmental organization networks, researchers, environmental organizations, politicians, government representatives—not nontimber forest products. Over the past decade, CNS has worked for the creation of over 40,000 km² of extractive reserves, often over competing claims by cattle ranchers and loggers, and it has mobilized significant support among large and representative unions and grassroots groups for designating 10% of the Amazon as extractive reserves. Communities in at least 30 counties in the region are calling for the creation of extractive reserves to secure land ten-

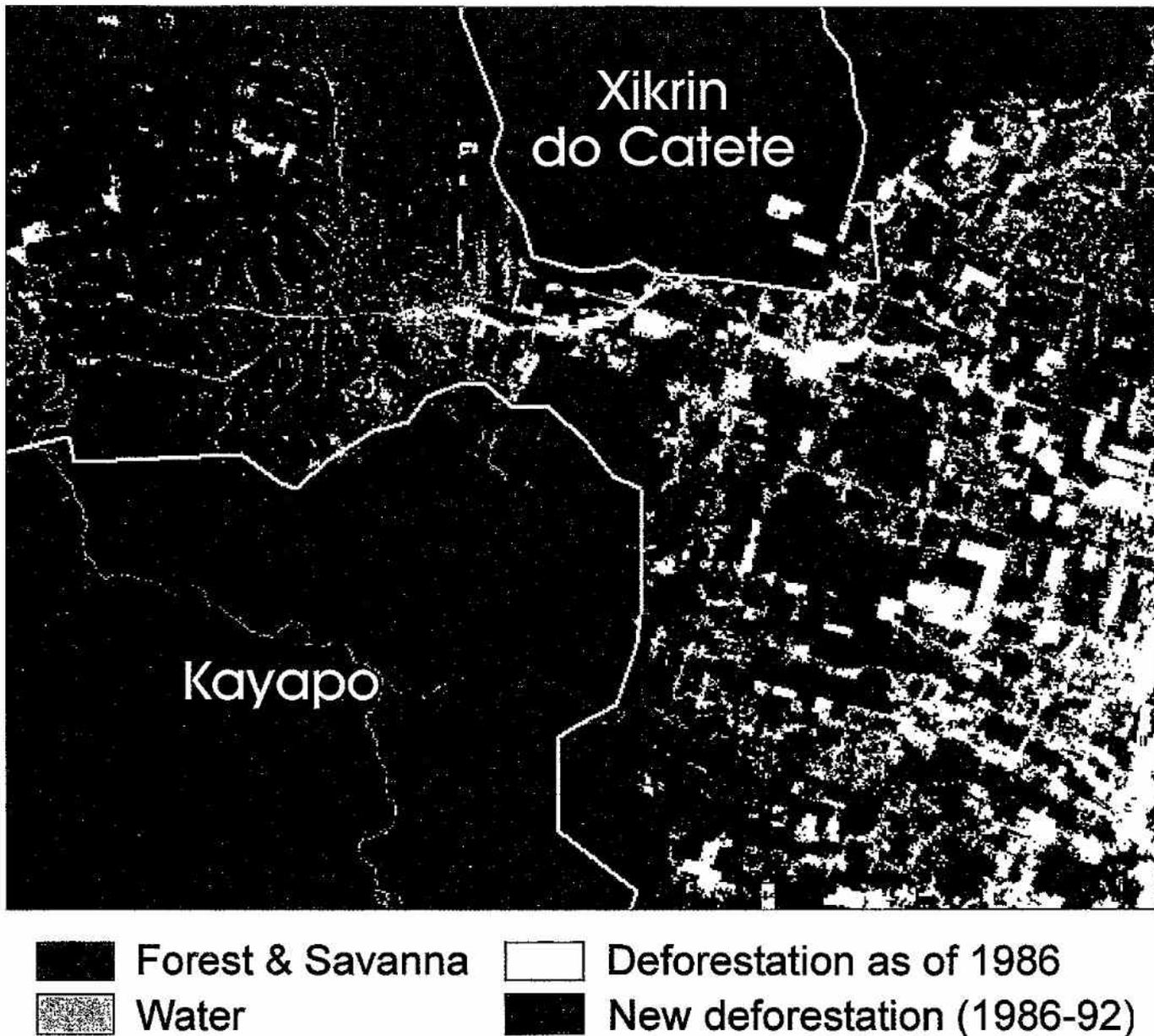


Figure 1. Landcover change from 1986 to 1992 in a southeastern Amazonian frontier landscape (lat 6°30'S, long 51°W). Areas in yellow were deforested in 1986; areas in red were deforested from 1986 to 1992. The illegal cattle ranches that were established in the southeastern corner of the Xikrin Catete reserve (red and yellow areas within marked reserve boundaries) were taken over by the Xikrin, and the ranchers were expelled from the reserve. The area without deforestation in the upper right corner of the map is part of the Carajás Industrial Mine Forest Reserve (Companhia Vale do Rio Doce). This image map is 180 km on a side and is a composite of Landsat Multi-Spectral Scanner and Landsat Thematic Mapper images. The area of new deforestation is overestimated by approximately 10% in the eastern half of the map because of registration errors.

ure and resolve disputes. In the same period, around 10,000 km² of federal parks were created in the Amazon, although many remain in the "paper" parks category. The CNS, with the support of Acre Senator Marina Silva, recently negotiated with Brazil's president to partially restore the rubber subsidy on environmental and social grounds.

Because of the mobilization of CNS and its allies, environmental protection now features prominently on the advocacy agenda of the largest representative organizations of rural workers, whose members include thousands of local unions and hundreds of thousands of families (Confederação Nacional dos Trabalhadores na Agricultura 1999). Although it is extremely important (and foresee-

able) development (Schwartzman 1992), the emergence of concerns for sustainable development and environmental protection among rural workers' organizations has drawn little attention among conservationists. Moreover, politicians allied with these ideas and initiatives (including many of Chico Mendes's associates in Acre) have made major gains in the Amazon in recent years, running on sustainable development and forest conservation platforms.

This trend runs counter to the expectation that the interests of rural people in tropical countries inexorably conflict with conservation (Shyamsundar & Kramer 1996). As one biologist put it, "... urbanites around the world write to politicians and give money to save the rain forests of Amazônia, but for the poor farmers who live there, the forests are often just an impediment to their struggle to grow crops" (Hunter 1996: 360). Similarly, it is often assumed that, because forest destruction is intrinsically in the interest of the poor, tropical politicians naturally equate destruction with progress (Terborgh 1999). The people of two states in the Amazon, however, have elected governors (Jorge Viana in Acre and João Alberto Capiberibe in Amapá) who hold that forest destruction has produced limited benefits for a small elite at great and widely distributed environmental and social cost. Both actively support forest protection, extractive reserves, and indigenous areas and are advancing models of sustainable development within their states.

The Politics of Partnership

One reason that preservationists typically do not view local people (other than park guards and managers) as potential allies is an often over-general emphasis on population growth and other biological (or zoological) parameters such as hunting as the central threats to biodiversity (Erlach 1988; Kramer et al. 1997; Terborgh 1999). There are often, however, prior, direct causes of deforestation. Brazil has more agricultural land per capita than the United States, but the deforestation rate is among the fastest in the world (Food and Agriculture Organization of the United Nations 1997). Infrastructure development, government incentives, and inequitable land tenure have far more to do with the problem of deforestation than does population (Hecht et al. 1988; Browder 1988). Even in Indonesia, with a much higher population density, much deforestation and forest burning is driven by timber concessions and plantations given out to government cronies. Long before population expansion impoverishes natural resources, political decisions move the process of destruction, often in spite of economic rationality (Gillis 1992).

It is precisely in the political arena of national development policies, incentives, and allocation of resources that environmentalists—and the protection of biological diversity—have the most to gain from engaging constitu-

encies such as indigenous, traditional, and rural people as partners. Indeed, Brandon et al. (1998:2) argue that, although parks are the best means of protecting biodiversity "requiring them to carry the entire burden for biodiversity conservation is a recipe for ecological and social failure." At the same time, advocates of people-free parks cast indigenous and traditional peoples as their adversaries in a "struggle... to define ownership of the meaning of biodiversity" (p. 2), in which "[in the 1980s] indigenous and traditional peoples saw the potential to gain power and prestige at international fora by their claims of defending biodiversity" (p. 6).

Indigenous people, in this general view, are part of the problem because they are present in parks and will inevitably degrade them (van Schaik et al. 1997; Struhsaker 1998) or, worse, prevent their creation. "In many parts of the Tropics, it is simply impossible to delineate a million-hectare tract of real estate that does not include the traditional lands... of indigenous people" (Terborgh 1999:67). These authors do not consider that if national legal regimes were to adequately recognize Indian and traditional land tenure, such superimpositions would be avoided, or that local people might have their own interests in the sustainable use of their natural resources. If, for example, "unrestricted hunting leads to extinction of fauna, no one will benefit, least of all native peoples" (Vickers 1991:78). One of the best studies of game populations in the Amazon was done at the request of the Xavante Indians of the Pimentel Barbosa Indigenous Reserve to help them design a game management plan (Leeuwenberg 1997; Leeuwenberg & Robinson 2000).

Although the advocates of people-free parks take pains to reject the notion of sustainable use as a step down the slippery slope to destruction (Sanderson & Redford 1997; Brandon et al. 1998; Terborgh 1999), they typically neglect the numerous examples of bottom-up action for natural resource conservation in tropical ecosystems inhabited by people. The 20,000-km² Jaú Park, in central Amazonia (one of the world's largest nature reserves) has a management plan that is embraced and implemented by the resident *caboclo* population because they participated in development of the plan (Fundação Vitória Amazônica 1998). In the eastern Amazon, a project designed to reduce the occurrence of accidental forest fires, conducted with a community of colonist farmers, led to the formation of a community fire commission charged with implementing a fire ordinance. Effective lobbying by nongovernmental organizations transformed the local experience into a presidential decree (Nepstad et al. 1999a).

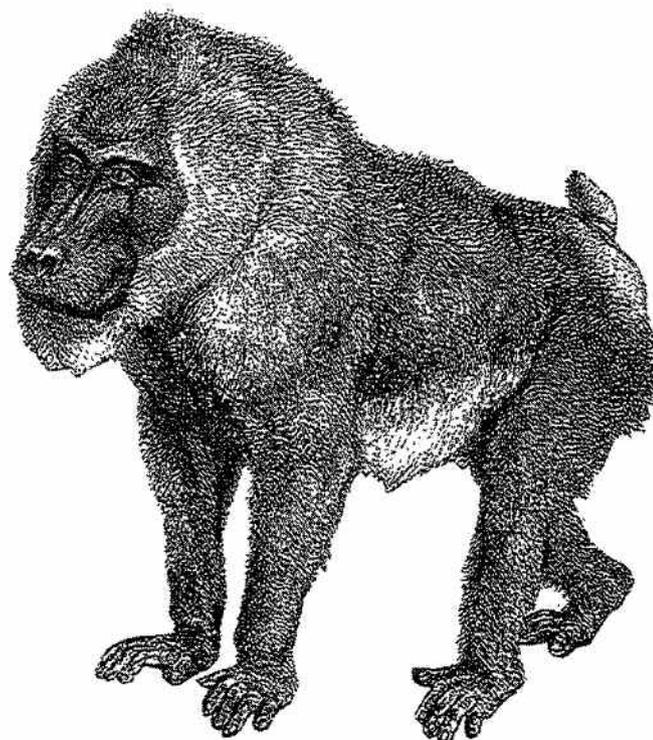
Ultimately, for the people-free park advocates, uninhabited, guarded parks are the "jewels in the crown" of conservation (Redford et al. 1998) or simply the "make-it-or-break-it issue" (Terborgh 1999:170). The model of conservation in the developing world in this view is Costa Rica. (Terborgh [1999] speaks of a "new paradigm"

for tropical conservation along these lines.) Without diminishing Costa Rica's extremely important environmental achievements, this nation had no alternative to a conservation model based largely on the U.S. strategy of people-free parks because only fragments of forest remained when protection efforts began. To adopt this model as the highest priority for the Amazon—a forest region half the size of the continental United States, of which probably >80% is intact—risks making conservation efforts a self-fulfilling prophecy of doom. The Amazon (and other large native forests) may be needed, first and foremost, to keep 75 billion tons of carbon—13 years' worth of global carbon dioxide emissions—in forest biomass and out of the atmosphere and to keep 7 trillion tons of water evaporating into the atmosphere each year, generating the rain clouds that make famed biodiversity hotspots such as the Manu region rainforests. It is a virtual certainty that if large expanses of forest cannot perform these functions, the kind of conservation that the people-free park advocates prize will not be possible. And if there are to be large, intact tropical forest landscapes of any description in our grandchildren's world, conservationists must stop debating the meaning of nature and start supporting the political constituencies for tropical forest conservation in and around the forests.

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The Fate of Tropical Forests: a Matter of Stewardship

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Before I respond to points raised by Schwartzman et al. (this issue), it is important to set the context of the debate. The major questions at issue do not concern parks; they concern the fate of wildlands outside of parks. How can biodiversity conservation be achieved under the rubric of sustainable development outside the context of strict, people-free protected areas? The debate is not over goals but over process, in particular the role to be played by rural and indigenous people as stewards of the land and its natural resources.

It should be acknowledged at the outset that the terms of debate are inextricably linked to a particular socio-economic context. What is possible or practical in one country or region may be difficult or impossible in another. Schwartzman et al. write from the vantage point of Amazonian Brazil. Consequently, their prescriptions and recommendations are highly specific to that context, as are the two land-use categories they extol: indigenous people's reserves and extractive reserves.

Brazil is a land of immigrants, newcomers emanating from Europe, Africa, and Asia who have largely ignored or brushed aside the Amazon's indigenous inhabitants in their quests for land and wealth. In the Old World, however, everyone is an "indigenous" inhabitant, so the notion of native peoples' rights takes on a different context and meaning. Similarly, the formal designation of large areas of forest as "extractive reserves" is a singularly New World phenomenon.

I agree with Schwartzman et al. that in modern times forest people living with preindustrial technology have generally not exterminated top carnivores and other large animals within the regions they occupy. But that observation should not be taken out of context as a basis for broader claims. First, it is imperative to recall that the contemporary fauna of South America represents only the remnants of a much larger fauna that existed prior to the post-Pleistocene megafaunal "overkill" perpetrated by Clovis hunters (Martin & Klein 1984). The well-documented occurrence of prehistorical overkill in the Amer-

icas, Australia, New Zealand, Madagascar, Oceania, and elsewhere should put us on notice that premodern indigenous people have not always been exemplary stewards of biotic resources. Second, much evidence points to the benign coexistence of indigenous people and wildlife in Neotropical forests as a condition deriving from technological limitations and low human population densities (Alvard 1994). Wherever indigenous people have acquired firearms and/or increased in number, depletion of game resources has been the norm (Robinson & Redford 1991; Redford 1992; Peres 1994). For an independent demonstration of this cause-and-effect sequence, one can point to the burgeoning bushmeat trade in Central Africa (McRae 1997).

Schwartzman et al. dispute the biodiversity-maintaining role of large predators and other large animals: "Nor does the depletion of large animal populations threaten the majority of the other species that comprise these forests." This statement is a rhetorical assertion that flies in the face of a great deal of scientific evidence to the contrary, much of it published in this journal (e.g., Alvarson et al. 1988; Soulé et al. 1988; Terborgh 1988; Palomares et al. 1995). It is now well established (although not entirely uncontroversial) that the absence of top predators leads predictably to "mesopredator release" and an overabundance of herbivores (Terborgh et al. 1999). Hyperabundant mesopredators generate a cascading effect in reducing the populations of songbirds and other small vertebrates (Wilcove 1985; Garrott et al. 1993), whereas excess numbers of herbivores can dramatically alter patterns of forest regeneration (Alvarson et al. 1994; McShea et al. 1997). Decimation of large vertebrates through overhunting, which has occurred in large portions of the Amazon (Redford 1992; Peres 1999), has other drastic consequences for biodiversity (Dirzo & Miranda 1991). It is thus imprudent to dismiss as inconsequential the effect that even low-density human populations can have on biodiversity via trophic cascades.

That said, I nevertheless agree with Schwartzman et al. that granting local people rights to the land is far preferable, for both ethical and conservation reasons, to allowing the land to be overrun by a disorderly invasion of loggers, miners, and ranchers. About this we have no argument.

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We differ in how we read our respective crystal balls. For the short-term, it is clear that less damage is being done to Amazonian forests by traditional forest-dwelling peoples than by well-capitalized immigrants, but what is the prognosis for the future? I doubt that the status quo of indigenous and extractive reserves is a stable one.

First, the legal status of extractive reserves in Brazil is a provisional one that can be rescinded by the government whenever social or economic conditions change (Peres & Terborgh 1995). Second, the gathering of nontimber products is an extremely marginal lifestyle (Salafsky et al. 1993). Schwartzman himself has documented that a typical *shiringeiro* (rubber-tapper) family subsists on a meager income of \$960/year (U.S.) (Schwartzman 1989). *Shiringeiros* live on the lowest rung of the economic ladder and are held there by a lack of education and marketable skills. My view of the *shiringeiro* lifestyle is that it is becoming an anachronism. Consequently, the whole idea of extractive reserves is nostalgic and backward-looking rather than representing a vision of the future.

Once upon a time there were appreciable numbers of North Americans who subsisted on revenues from game, turpentine, blueberries, pecans, pine straw, maple syrup, and other nontimber products. Now these products are banned from commercial trade (wild game), grown in plantations (blueberries, pecans), offer only seasonal employment to agricultural workers at an otherwise slack time of year (maple syrup), or have been substituted in the market by other products (turpentine). Pine mulch is still raked from the forest floor, but from pine plantations, not natural pine stands. My prediction is that some parallel to this history will unfold in the Amazon, rendering extractive reserves obsolete within a few decades. As I have said elsewhere, I favor the creation of indigenous people's reserves and extractive reserves as a temporary expedient in the campaign to save forests, but the strategy should be recognized for what it is, a temporary expedient and not as a permanent solution (Redford & Stearman 1993; Terborgh 1999).

The prospect for long-term environmental stability of indigenous reserves is not any better. Indigenous people's reserves enjoy no special conservation status. They are autonomous enclaves within a national territory, over which the community-tribe is sovereign. In frontier zones, medicine is nearly always introduced before birth control. Indigenous populations are thus likely to grow rapidly in the coming decades. More important, these populations are undergoing profound cultural transformations. The younger generation of Kayapó and other Brazilian indigenous groups is learning Portuguese and being introduced to the market economy. This younger generation will have attitudes very different from their parents' and aspirations for material wealth similar to those of Brazilians living outside reserves (Terborgh 2000). It will not be long, I predict, before the Kayapó and other indigenous groups will be in possession of

chainsaws, skidders, trucks—all the paraphernalia of the modern timber industry—and will be busily selling off their natural patrimony as the only ready means available to them of bringing prosperity to their villages. I am not saying that this is necessarily deplorable; I am saying that it is not conservation any more than it is sustainable development.

I enthusiastically concur with Schwartzman et al. that the political empowerment of rubber tappers, indigenous people, and other rural poor is indeed a salutary development but, as I see it, the banner of conservation is only a politically correct rhetorical mask for a deeper issue—the often bloody struggle between poor, long-established residents of Brazil's western frontier zone (Acre, Rondonia) and financially and socially more powerful land usurpers from Brazil's southeast. Quite understandably, the residents of Acre and Rondonia wish to defend their way of life and secure their own competing economic interests against those of the usurpers. Thus, one can legitimately ask whether the true goal of Brazil's rural poor is to conserve biodiversity in perpetuity (Redford & Stearman 1993). Personally, I doubt it. This is social competition over access to economic resources, and it is economic goals that are paramount, not biodiversity. Once the rural people of Brazil's Amazon secure their economic rights, what next? That is the question Schwartzman et al. do not address.

Although to some my skepticism may have a negative ring, I am not arguing against sustainable development. Within the next century or two, sustainable development will become a fact, or human civilization will fall. The big question that cannot be answered, and on which many opinions may have more or less validity, is how humanity gets from where it is now to a state of true sustainable development. For the time being, one thing is certain: sustainable development in the face of continued population growth is an oxymoron. So what do we do in the turbulent transition period humanity is entering now in the post-modern cyber era? Schwartzman et al. have their vision, which I claim is more backward than forward-looking and which underestimates the potential of rural people to be perpetrators of environmental destruction. I offer a different vision.

Unharvested resources are going to attract exploiters wherever they may be found. When the unharvested resources are biological, they are going to have to be protected, or they will be lost. At the risk of sounding chauvinistic, I believe that the mixed system of land tenure we have serendipitously stumbled upon through accidents of history in the United States is the best model available for conserving natural resources. Roughly 40% of U.S. national territory is public land administered by a variety of federal and state agencies. Another few percent is communal land over which sovereignty has been ceded by treaty to indigenous tribes. Now, dear readers, let me ask, how many of you have been drawn to visit

tribal reservations in the United States by the promise of seeing wildlife? The rest of U.S. territory is private land. Increasingly, privately held forest lands in the United States are being planted to monocultures of genetically "improved" pines, firs, and other harvested species (Barber et al. 1994). On these lands, biodiversity equals zero.

Biodiversity survives and will continue to survive on our public lands. Citizens are not allowed to establish residences on public land or to exploit natural resources except under permit to the responsible management agency. Public lands are for the public benefit, so the policies under which they are managed are a matter of intense political debate. Readers of this journal may not always favor these policies, but let us not lose sight of one thing: public lands in the United States are secured by law and enjoy enormous popular support. Most crucially for biodiversity, land use is legally mandated. National forests cannot be converted to agriculture or planted in monocultures of exotic species. National grasslands cannot be plowed or sown with alien forage grasses. First and foremost, it is our public-lands legislation that preserves biodiversity in the United States. The so-called Sagebrush Rebellion of the 1980s, a movement of Western ranchers and miners, never got off the ground because the U.S. populace as a whole solidly supported the concept of public land.

I agree with Schwartzman et al. that forest conservation depends first and foremost on government policies. Creating a policy environment conducive to the implementation of a mixed system of public, communal, and private lands entails challenges too numerous and complex to be addressed here. On this point, suffice it to say that the world currently benefits from a window of opportunity contained in the fact that approximately 80% of all tropical "frontier" forests are held in the public sector (Repetto & Gillis 1988). But the opportunity is unlikely to persist indefinitely. The current global trend is toward privatization. Brazil is a leader in this trend, having privatized a greater fraction of its tropical forest than any other Amazonian country (Peres & Terborgh 1995). Privatization is the worst possible fate for tropical forests because under the laws of most countries there is nothing to prevent private owners from converting the forest to plantations, cropland, or pasture (Schwartzman et al.'s Fig. 1). If natural forests are to survive the twenty-first century outside of formal protected areas, it will be because governments pass legislation establishing permanent forest estates comparable to our system of national forests.

Ultimately, if the Amazon forest is not to suffer a Blitzkrieg at the hands of humans, attitudes are going to have to change. Schwartzman et al. offer some encouraging examples suggesting that attitudes are indeed changing for the better. Action at the local level can be productive, but the effects will remain local unless the larger arena of national politics can be won over.

As for turning over stewardship of valuable troves of unexploited natural resources to local people, I profess deep reservations. Why did conservationists here in the United States so vigorously oppose the Sagebrush Rebellion, which was largely a local people's movement? And what would happen if U.S. Bureau of Land Management and U.S. Forest Service lands in the West were turned over to state or local control? The thought is so unsettling, I don't even like to contemplate it.

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Extracting Humans from Nature

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Traditional and indigenous people can claim incontrovertible rights to their land. As morally responsible humans we must support their struggle. This responsibility does not mean that as conservationists we must count as conservation everything that these people have done and wish to do. As independent peoples with rights to self-determination, their future should be in their own hands—whether that future meets our expectations or not.

It is remarkable that we find ourselves making this obvious point to a group of experienced and savvy professionals who have spent considerable time in defense of indigenous and traditional peoples. We won't claim to tell Steve Schwartzman and his co-authors about the political virtues or shortcomings of rubber tappers and Amazonian Indians, because they are experts in such matters, insofar as outsiders can be. Nevertheless, speaking on behalf of those peoples as if their interests were identical with conservation, biodiversity, and parks is disingenuous. In taking such a tack, the authors enter a twisted labyrinth of reasoning, which we find tortuous and politically dangerous for both conservation and forest-dwelling peoples.

First, we thought that in various ways we had already published conclusions similar to those in the paper by Schwartzman et al. (Redford & Stearman 1993; Redford & Mansour 1996; Sanderson & Bird 1998). But, to our major disappointment, the authors use this very literature to set up a straw man, claiming the existence of an extremist group practicing "preservationist absolutism" and advocating the perfect against the good. Then they demolish the straw man with a flourish, arriving at a conclusion that is eminently reasonable, if derived differently. Our concern is that they arrive at their major point by accusing potential allies rather than recruiting them.

The more important fault with the paper lies in an incomplete reading of the current literature, leading to unnecessary and sometimes incorrect conclusions. This is best illustrated with the repeated claim that indigenous human impact is inconsequential for biodiversity, based on a weak reading of the literature on human hunting. Schwartzman et al. state that "We are unaware of rigor-

ously documented cases of local extinction, or severe depletion, of large animals—or any other species—in indigenous or extractive reserves. Several studies suggest that, to the contrary, hunting by forest communities' even over the long term, has not had these effects and that, given adequate territory, it does not threaten game species." They cite three references for this claim, none of which can support their conclusion. Further, the mounting evidence in the literature strengthens the main vein of the literature, that in virtually all cases large game animals are strongly depleted where human population densities exceed one person per square kilometer (Robinson & Bennett 2000a). This conclusion is borne out in studies done in tropical forests of all types throughout the world, with lands of indigenous and traditional peoples offering no exception (Robinson & Bennett 2000b).

More specific evidence comes from uncited work done in extractive reserves in Brazil—the same setting in which the authors claim there has been no effect and no available studies. Two studies document local extinction of several species of game animals in extractive reserves due to hunting by rubber tappers (Martins 1993; Calouro 1995). The study Schwartzman and his colleagues call for—comparing densities of game animals in extractive reserves and un hunted forests—has, in fact, been conducted (Martins 1993; Peres 2000; Robinson & Bennett 2000a), and the results demonstrate the overwhelming negative effect of human hunting. And these results come from an extractive reserve with a human population density of one person per square kilometer, a density much lower than that of most other extractive reserves (Martins 1993). The same results have been demonstrated on Indian lands in Central America (Ventocilla et al. 1996), Indian lands in the Amazon (Chase Smith 1996; Alvard 1994; Peres 2000), and in Amazonian mestizo territories (Bodmer et al. 1994). There is simply no doubt that human hunting causes dramatic local reduction in the density of game species and in some cases leads to local extinction. Peres (2000) concludes from an exhaustive study of the effects of hunting at 24 Amazonian sites, including extractive reserves and Indian lands that "Subsistence hunting in Amazonia . . . can result in profound changes in the structure of tropical forest vertebrate communities through (a) shifts in the rela-

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tive abundance of different size classes, (b) significant reductions in the overall community biomass, and (c) changes in guild structure." In short, the assumption "that people inevitably deplete populations of big animals" is not a political assumption of a radical preservationist sect but a well-supported fact derived from numerous careful empirical studies by field-based scientists.

The weakness evident in the authors' argument about the evidence supporting the effect of human hunting on animals is not the only occurrence in this paper of seeming inattention to the best scholarship. Rather than pointing out others, we make the following argument, in the service of arriving at more reasoned conclusions that are partly consistent with the overall position made by Schwartzman et al.

First, no conservationist we know disagrees with the fact that, for many reasons, low-impact rural dwellers in forests are preferable to large-scale agents of deforestation. This is not based on an assumption that such people have *no* effect on the forest, but that they have *less* effect than other users, such as plantation owners or extensive cattle ranchers. The effect of such forest dwellers must be recognized as an inescapable product of their existence but does not necessarily identify them as enemies of conservation, as do advocates of blaming poor, rural people for deforestation. The strongest conservation advocacy must not deny the human effects of traditional or indigenous populations but must work with them as part of a realistic balance at conservation and use (Redford & Stearman 1993; Redford & Richter 1999).

Second, to place on the shoulders of relatively powerless forest dwellers the burden of stopping economically, politically, and socially powerful forces driving deforestation is at best unfair and at worst dangerous. For some time, the forces advocating large-scale rationalization of forest frontiers have claimed that poor rural people of all kinds are the major sources of environmental depredations. Following that line, national governments have allowed large-scale mining companies to chase small-scale placer miners out of large concessions, to rationalize indigenous property claims through legal representation by large corporations, and to prosecute swidden agriculturalists who dare burn small patches of forest—often along roads created by large logging companies. The conservationists' desire to work with low-impact populations in tropical frontiers is weakened considerably when extreme claims of "no impact" are shown to be false.

Third, it is essential that we, and everyone else, recognize that poor people are by nature no more likely to be conservationists than rich people. To impute conservation values to people willy-nilly risks demonizing them when they fail to achieve conservation objectives by themselves. And it allows public policy makers to make horrendous errors about pricing natural resources, under the claim that poor people are not rent-seeking and will be satisfied with extracting less if prices are held

high for their commodities. "While conservationists may hold the unrealistic expectation that native Amazonians will preserve land ceded to them in the same state in which they received it, indigenous peoples expect to be able to use these lands to assure their physical and cultural survival" (Redford & Stearman 1993).

In 1989 Schwartzman himself pointed out that the financial success of rubber-tapper households in Acre, Brazil, depended as much on their ability to successfully raise livestock as on their success in rubber collection alone. In addition, "the vast majority of rubber tappers are [or were] financially indebted to land-owners, bosses, and middlemen and are among the poorest, most marginalized segment of the Amazon's nonindigenous rural population" (Browder 1992). Extractive reserves were established as social, not ecological spaces, and "extractive reserves, when successful, protect the economic opportunities of selected forest-dwelling groups, but they do not necessarily protect the natural forest" (Browder 1992). The same is true for indigenous lands. This is not to blame these peoples for making a living, but to acknowledge that in so doing they have significant effects on the forest. If a multifaceted strategy for economic survival shows effects on the forest, we should not be surprised or disappointed but should understand it as a "natural" outcome of human habitation.

It is not uncommon for top-down political coalitions to assume the role of speaking for the poor without showing that they actually do. The world of nongovernmental organizations and umbrella organizations speaking on behalf of indigenous or voiceless peoples in the forest can make superior claims to advocacy only if they can truly represent the populations they defend. That claim cannot ride on virtues indigenous people do not claim for themselves, and it cannot be uncritical of the effects people have on fragile lands.

Finally, no one enjoys a monopoly on conservation truths, and all tropical forest settings are not alike. In this article, based as it is on a fraction of the competent literature in the field, the authors have treated "forest residents" and "rural people" as homogeneously good. Forest dwellers, like every other human population, differ not only by culture, language, and country but even within apparently homogeneous communities (Agrawal 1997). People vary not only within extractive reserves but also between extractive reserves, between countries in the Amazon, and between continents with tropical forest.

The argument presented by Schwartzman et al. reflects a larger trend in emphasizing the conservation benefits from lands under the management of traditional peoples (Redford 1999). This position, at its extreme, is illustrated by a statement of Gray et al. (1998): "if conservation organizations now recognize indigenous territories, why is it necessary to have protected areas?" If we understand politics as politically contested debates over the allocation of values, then arguments about the definition of conservation are inherently political. We suggest that this

is the best light in which to view the argument presented by Schwartzman and his colleagues.

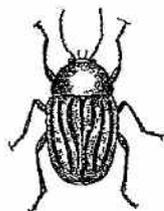
Forest conservation is a dangerous term because it means so many things to so many people. The very word *forest* has become a political term whose meaning is highly contentious. Whereas we may think of conserving a "forest" as maintaining all of the components (genetic, species, community, and ecosystem) and attributes (structure, function, and composition, Redford & Richter 1999), Schwartzman et al. clearly consider a forest a collection of trees that sequesters carbon, that does not burn, and that provides a home to people making part of their living from the forest. "Our" forest has all of its large animals in ecologically functional populations, whether or not these species are key to the forest's integrity; theirs may not.

Conservation with use should not crowd out conservation without use as a policy objective. For a decade, this has been a central danger of conservation politics as large nongovernmental organizations and small-scale advocates alike have seen that (1) protected areas are insufficient for conservation worldwide and (2) the forces advocating "sustainable use" are inexorable.

We agree with Schwartzman et al. that "protection of uninhabited forest is a critically important goal," and we also agree that "forests that have been altered by people . . . also have tremendous conservation value." We do not agree that they can claim to represent conservation, because their article is based on such a thin reading of a literature all should respect—or at least honestly dispute. Also, we do not agree that "forest peoples and their representatives . . . speak for the forest." They may speak for their version of a forest, but they do not speak for the forest we want to conserve. Recognizing and acknowledging this difference is the first step to building a strong alliance against the larger, darker forces driving forest destruction; obscuring it is to set natural allies against each other.

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Self-Determination or Environmental Determinism for Indigenous Peoples in Tropical Forest Conservation

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Rights of Indigenous Peoples

Advocates of people-free parks argue that human occupation of tropical forests inevitably results in a loss of biodiversity, notably through the elimination of top predators and the consequent disruption of ecosystems. Schwartzman et al. (this issue) do a good job countering this simplistic view, both by questioning its empirical basis and by arguing that protected areas need human occupants to defend them. In an increasingly globalized and liberalized world, conservationists cannot rely on beleaguered state bureaucracies to defend isolated, protected areas of high biodiversity (Colchester 1998b). Strictly protected areas need to be implanted within much larger managed landscapes occupied by human beings who also care about the environment and the well-being of future generations.

The actual relations between local communities and their natural environments are, of course, extremely diverse and vary not just between societies and over time but also between different localities. Indigenous peoples, as a polythetic and self-ascribed class of human societies, may be more respectful of their local environments than most societies, owing to their close ties with their ancestral lands, their common property management regimes, and their sense of holding lands in trust for future generations (Ostrom 1990; Kempf 1993; Western & Wright 1994; Kothari et al. 1996; Stevens 1997). Conservationists, whatever their misgivings about the abilities of indigenous peoples to manage their environments sustainably, have to start their interventions with the reality that exists on the ground (West & Brechin 1991). It is now recognized that as many as 85% of the world's protected areas are inhabited by indigenous peoples (Alcorn 2000), and most remaining areas of tropical forests with high biodiversity are also owned or claimed by them (Weber

et al. 2000). It makes more sense for conservationists to work with these peoples than to cast them into the role of environmental villains and expel them from their homelands. To choose the latter course is a sure route to social conflict and political instability (Colchester 1994; Ghimire & Pimbert 1997).

There are other compelling reasons that conservationists should collaborate with indigenous peoples, not least because to do otherwise would be to violate international law. Indigenous peoples' rights, *inter alia*, to the use, ownership, management, and control of their traditional lands and territories are recognized in International Labour Organisation Convention 169 (International Labour Organisation 1989). Their right to self-determination has been acknowledged by the United Nations Subcommittee on the Elimination of Discrimination and Protection of Minorities and the United Nations Human Rights Committee (Kambel & MacKay 1999). The Convention on Biological Diversity, signed into being in 1992 and now ratified by 171 countries, likewise emphasizes the need to protect customary use of biological resources. In 1994 the World Conservation Union (1994) revised its system of protected-area categories to allow others, including indigenous peoples and not just state agencies, to own and manage protected areas. The existing and emerging rights of indigenous peoples in international law have been endorsed by mainstream conservation organisations such as the WorldWide Fund for Nature (International) (1996) and the World Conservation Union (1997a, 1997b). Recently, the World Commission on Protected Areas et al. (1999) published guidelines for recognizing indigenous rights in protected areas.

From Principles to Practice

Translating such principles into practice is not easy, however, not least because government conservation policies, laws, and institutions entrenched under the old

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exclusionist model have not kept pace with improvements in international human rights law and conservation standards (Gray et al. 1998; Colchester & Erni 1999). Conservation biologists are right to remind us that the challenges are not just political, legal, and institutional but are also a matter of resource management (Redford & Mansour 1996). Indeed, it may be imprecise and unhelpful to characterize indigenous peoples as having a "conservationist cosmology"—equilibrium between indigenous societies and their environments often being maintained more by their social and political systems that limit pressure on the environment—and important to recognize that outside pressures and changing values, livelihoods, and markets may intensify indigenous resource use (Colchester 1981; Hames 1991; Adams & McShane 1992). Some conservationists are now actively working with indigenous peoples to help them design new systems of resource management to cope with their new circumstances (Weber et al. 2000).

Securing the Future: Examples from South Venezuela

Field experiences in the Guiana Highlands show that, where outsiders have helped indigenous peoples secure their rights to their lands and resources, important gains can also be made for conservation. The Orinoco headwaters in Venezuela, for example, have been continuously occupied by a number of indigenous peoples for at least several hundred years (Migliazza 1972; Colchester 1982a), yet they remain areas of high species and ecosystem diversity (Huber 1993), replete with an almost full complement of top predators and other Amazonian fauna (Cerdeña et al. 1979; Emmons 1990). The Yanomami and Ye'kuana communities that currently occupy the headwaters of the Upper Orinoco, Ventuari, Caura, and Paragua rivers live at a population density of around one person per 8 km² (Colchester 1985). Although local resource depletion is notable around fixed settlements, there is no evidence of species extinctions, even though shotguns have now largely replaced bows and arrows as the preferred hunting weapons in riverine communities (Colchester 1981). (The exception may be overhunting of caiman [*Crocodylus* spp.] on the lower rivers.)

Since the late 1960s, the Ye'kuana on the Ventuari and Caura rivers have defended their territory against outside intrusion by establishing communities at riverine access points to discourage entry by colonists and miners. In the early 1970s, the Ye'kuana of the Upper Ventuari mobilized to expel miners trying to enter their lands by air (Coppens 1972); further north, Ye'kuana closed their own placer mines so wildcat miners would not be tempted to invade their territory. The Ye'kuana also practice an explicit policy of hunting-zone rotation to relieve pressure on game

(Hames 1980), and the Sanema, the northern Yanomami, consciously space out their settlements to alleviate pressure on the environment (Colchester 1997).

In the early 1980s, in response to growing international concern about the critical situation of the Yanomami over the border in Brazil (Ramos & Taylor 1979), proposals were first made, in collaboration with the national representative of the World Conservation Union, to set aside the Orinoco headwater area as a biosphere reserve (Colchester 1980). Subsequent proposals to protect the area by one means or another, elaborated over the coming years (Colchester 1982b; Arvelo-Jimenez 1983; Colchester & Fuentes 1983), although not immediately successful, did provide the context for an effective international campaign to prevent Venezuelan mining companies from gaining access to the region (Colchester 1984). In 1991, in the run-up to the Rio Summit, the Venezuelan government enacted legislation establishing the Upper Orinoco-Casiquiare Biosphere Reserve, which, at 8.6 million ha, is the largest tropical forest protected area in the world.

Providing protection for the indigenous peoples was a key element in the rationale for establishing the reserve, and the enacting legislation recognizes indigenous rights. Although beset by management and political problems, the reserve has provided the basis for effective intergovernmental appeals to halt the opening up of the entire Venezuelan State of Amazonas to logging and mining (Colchester 1995, 1998a).

Ye'kuana and Sanema communities in the Upper Caura, just north of the reserve, have carried out a participatory land-use mapping project to assert their rights to a further 3.5 million ha (Poole 1998). The evident willingness of the indigenous peoples to defend their territory has persuaded the Venezuelan national parks agency to contract the local indigenous association to act as forest guards for two protected areas within the Upper Caura. Currently, the association is in the first stages of using the new map to elaborate a management plan, which would include zoning areas as faunal reserves to secure conservation objectives. Experience from other areas suggests that guaranteeing long-term, sustainable resource use in the area will not be easy (Weber et al. 2000) but is a more reasonable and desirable proposition than seeking to establish the entire area as a people-free park, which would be ethnocidal if not genocidal in its consequences.

Conservation biologists are right to draw attention to the real pressures on biodiversity from local communities. They are also right to be skeptical of those who promote community-based natural resource management as a panacea. They are wrong, however, to determine conservation policy purely on the basis of faunal population dynamics. Even a cursory study of the political ecology of tropical forests should persuade conservationists that they need allies where it really matters—on the ground—and few are better grounded than indigenous peoples. Re-

spect for indigenous peoples' right to self-determination implies a fundamental change in the way conservationists work with them (Colchester 1996). They should no longer aspire to be managers of other peoples' lands but rather aim to be advisers to indigenous peoples to help secure their futures (International Alliance 1996). We need science as a servant, not as a master.

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Conservation Theory Meets Practice

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We used to plan demonstrations because we expected the government to solve all our problems. Now, after waiting for so long, we know that only we can help ourselves. We can plan the use of our natural resources for our own future.

Caboclo leader (1993 forum to develop a strategy for the conservation and sustainable development of the Tambopata region in Peru)

I agree with Schwartzman et al. that rural peoples should not be identified as "enemies of nature." Rural peoples are and should be allies of biodiversity conservation not only because it is a basic human right but because they are the ones who have the most to lose if the resources they depend on are depleted. The process of establishing an alliance among conservationists, government officials, the private sector, and local peoples is long and full of difficulties, but it may empower local peoples, as foreseen by the caboclo leader in the quote above.

I have problems, however, with the broad generalizations implied in Schwartzman's essay. Strong alliances are built on the basis of each group recognizing the other group's particular interests. A transparent negotiation process results in the realization that local peoples' interests often do not include biodiversity conservation as a major goal. Local peoples' interests are driven mainly by economic and political concerns that need to be addressed to allow positive conservation and development outcomes. Just as parks cannot "carry the entire burden for biodiversity conservation" (Brandon et al. 1998:2), local peoples should not carry the sole responsibility for the political viability of protected areas.

In many cases, after suffering the local extinction of large mammals, rural peoples are the first to admit that their resource-use practices may not be sustainable in the long run. For instance, a 1993 survey to reassess the conservation status of spider monkeys (*Ateles paniscus chamek*) in the Beni Biosphere Reserve (first assessment took place in 1988), showed that this species had be-

come locally extinct in the areas occupied by the Tsimane Indians (Tarifa-Yensen 1997:63). The Tsimane hunt monkeys for food; because this resource is in low supply (or absent in some villages), they are taking steps to develop management plans to secure the long-term availability of these food sources.

People-free parks are an essential element of a comprehensive conservation strategy. It is crucial that protected areas without people exist to guarantee the natural function of pristine ecosystems. This notion does not contradict the right of local peoples to participate in the design and management of such areas. I offer an example from Madre de Dios, Peru (Moore et al. 1995).

In 1990 the Peruvian government created the Tambopata Candamo Reserved Zone of nearly 1.5 million ha of pristine rainforest ecosystems and the landholdings of many rural people. Initially, local people reacted negatively to the establishment of this protected area because they were not consulted and rightly feared that their access to natural resources would be cut or restricted. Conservation nongovernmental organizations began a dialogue with local people to repair the damage done. Local people were drawn into the planning process to zone the new protected area. This process took about 2 years of meetings, dialogue, and negotiations. The result was a concerted zoning proposal that contained a people-free core protected area (national park) in the center and two buffer areas, one in the northern part of the reserved zone (lower Tambopata river region) and the other in the southern part (upper Tambopata river region). The concept that a large portion of land should be set aside to maintain key ecological processes was debated and accepted among the local population, whose main sources of food originate in natural forests. Indigenous and colonist communities also began to apply this concept within their own landholdings.

Regrettably, this conservation planning model was wrecked by the government's decision to open the Peruvian Amazon for oil and gas exploration. In March 1996, a consortium led by Mobil Oil signed a contract to explore Block 78, which included most of the proposed

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national park in Tambopata. Víctor Zambrano, the Agrarian Federation (FADEMAD) leader that represented 5000 families in Madre de Dios, was among the first to complain:

Oil exploration should take place in a more adequate place, but not in this place that we have protected with the State for six years. It has been hard work to conserve this region. We have asked miners to leave, we have denounced illegal logging and we also have refrained from logging in order to conserve this region. What moral authority does the State have now to stop us to go into the Reserved Zone, if the State gives the area we have protected to a large company? (LaTorre 1998:110)

Mobilization in the region and pressure by conservation groups forced the government to negotiate a way out. The government established the Bahuaja Sonene National Park in July 1996. *Bahuaja* refers to the Tambopata and *Sonene* refers to the Heath rivers in the indigenous Ese'ēja language. The Ese'ēja proposed that the park be named this way in 1993. The park is not as large as it was originally proposed because Block 78 is in the way, but there is a clause in the decree that created the park stating that, as the oil companies relinquish the land they will not develop, this land may become part of the national park. In 2000, 25% of Block 78 should be relinquished and it is hoped that some of it will be integrated into the Bahuaja Sonene National Park.

Under Peruvian law, national parks enjoy the highest degree of protection. When the Peruvian Amazon was divided in blocks by the government to offer it for oil exploration, only national parks were not included as part of the pie. For instance, the 1.5 million-ha Block 78 borders Manu National Park on the west and overlaps with the Tambopata Candamo Reserved Zone and the proposed Amarakaire Communal Reserve. Manu is safe from oil exploration because it is a national park, at least for now.

If the trend to open national parks for any kind of direct use succeeds, there will be little hope of avoiding or postponing development of large enterprises. If managed well, national parks may be the cornerstones for regional planning that includes sustainable use in buffer areas outside the park and may not become islands surrounded by destruction.

The Vilcabamba region in central Peru represents another example of a participatory conservation planning process that is currently underway. It includes participation of the Ashaninka people on the western side of the Vilcabamba mountain range and of the Matsigenka people on the eastern side of the range. The Apurimac Reserved Zone includes most of the Vilcabamba region. As in Tambopata, local people were not consulted in the creation of this protected area, and for many years the

Ashaninka and the Matsigenka did not even know that part of their territory was under this land-tenure regime. In Peru, a Reserved Zone has a transitory status and may be used as a tool for further planning. The Ashaninka and the Matsigenka are currently working with one international and two national nongovernmental organizations to establish a people-free core protected area (national park) surrounded by two buffer areas. The national park would protect the areas from 1800 m above sea level to the mountain peaks where the upper tributaries of the Ene river on the west side and the upper tributaries of the Urubamba river on the eastern side originate. The two buffer areas would be communal reserves, one for the Ashaninka on the west and another for the Matsigenka on the east side. The communal reserves would border on native communities that are already titled and occupied by these indigenous groups. Meetings and negotiations are in progress. The lesson from the experience with Block 78 is that local peoples realized that national parks not only function to protect biodiversity but that they can also be used to protect their own land from large outside investments. Alliances are possible when negotiations are transparent.

It is possible to build alliances with local people and at the same time make a concerted effort to set aside large, pristine, people-free areas to maintain key ecological processes in fragile areas of the planet. Experiences in Bolivia and Peru show that each social group has to take responsibility for its own piece of reality. The question is not whether local people deplete resources or not. The question is how different stakeholders can work together to compromise for a sustainable future.

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Arguing Tropical Forest Conservation: People versus Parks

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To think that the Amazon forest can be conserved with parks, sanctuaries, forest guards and helicopters is simply to be unacquainted with our reality, or often worse: to be acquainted with it without understanding it.

Atanagildo de Deus Matos
President, National Council of
Rubber Tappers (1998)

As Terborgh (this issue) points out, the controversy that is the topic of this exchange is not parks. We all agree that nature reserves with minimal human influence are an important component of any conservation strategy in any country. Rather, the point of controversy is how best to achieve a much broader, more comprehensive conservation of nature in a region such as Amazonia, where four-fifths of the forest are still standing. In this setting, it is counterproductive to insist that the only nature worth preserving is pristine, with *no* human influence, as Terborgh (this issue) and Redford & Sanderson (this issue) seem to be saying. To pursue this narrow interpretation of nature conservation is to ignore the scale and timing of human threats to this forest. By the end of the 1997-1998 El Niño episode, for example, 1.5 million km² of Amazon forest—a third of the forest remaining in Amazonia—was desiccated to the point of flammability. Most of the forest didn't catch fire because it is far from the agricultural frontier. With the paving of >4000 km of highway into the core region of Amazonia, large-scale forest burning will follow, as will 100,000-180,000 km² of additional deforestation (Instituto de Pesquisa Ambiental na Amazônia and Instituto Socioambiental 2000; Nepstad et al. 2000). This scale of threat to Amazonia and other large tropical forest formations must frame our approach to conservation. Even if, for the sake of ar-

gument, subsistence forest dwellers at low population densities deplete populations of game species and alter the species composition of forests over the course of generations, this form of forest impoverishment is innocuous compared with the realistic alternatives.

If we give first priority to protection of areas we deem pristine—on the basis of a hypothetical “permanent protection” and at the expense of supporting the constituencies in and around forests with interests in using forest resources to secure areas large enough to perhaps change the trend—we may end up with nothing. Parks, as Atanagildo de Deus notes, are not and will not be of a scale adequate to begin addressing the sweeping threats to Amazonia and other large tropical forests. Colchester (this issue) offers an informed discussion on how indigenous and conservation interests converge in practice. Of our three critics, Chiccón (this issue) claims to see problems in our generalizations but appears to support most all of our specific points, whereas Redford and Sanderson say they have already reached all of our conclusions that are true, and Terborgh holds to a different vision.

Our central difference with Terborgh and Redford and Sanderson comes down to differing understandings of the natural and social systems at issue in conservation. Terborgh and Redford & Sanderson see the forest as a natural system that has over thousands of years attained a fragile equilibrium. It is in essence a finished product, and protection of it means maintaining stasis. Under this view, human occupation and human society are irrelevant as long as population is low and technology poor; otherwise, humans are noxious to pristine nature. Their solution, a park that keeps people out, is commensurate with their view of the forest: the ultimate end is to create it and see that it remains the same. Perhaps for this reason they tend to criticize indigenous and extractive reserves as though the creation of these areas were of itself the goal.

Archeological, ethnobotanical, and ethnohistoric stud-

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ies, however, call into question this view of the Amazon and American forests more generally. Much of the Amazon was probably more densely populated before 1500 than at any time after until this century, or in some places until today (Roosevelt 1994; Cleary 2000). Large parts of the forest still show signs of indigenous management, both intensive and extensive (Smith 1980; Balée 1994), or of resource depletion and possibly ecological crisis (Denevan 1992a). Human occupation was significant, long-term, and lasting in effect—including increasing biodiversity locally. The “pristine” forest prized by Terborgh, Chiccón, and Redford & Sanderson is in fact a recent artifact of the demographic collapse of indigenous populations after 1500 brought about by introduced diseases (Denevan 1992a, 1992b).

Similarly outdated is the view of Amazon indigenous societies as small, simple, isolated, and unchanging (e.g., Meggers 1971). Not only were these societies historically more populous than imagined, they occupied the region for far longer and were in the millennium before 1500 socially more like the central American and Andean states than recent hunters and gatherers. They had extensive exchange and trade networks and were agents of a highly dynamic social, cultural, and linguistic diversity (Carneiro da Cunha 1992; Urban 1992; Roosevelt 1993; Roosevelt 1994; Whitehead 1994; Cleary 2000).

Terborgh and Redford & Sanderson’s understanding of indigenous culture is much like a laundry list, a compendium of traits and practices. (We are indebted to anthropologist Terence Turner for this point.) These, on contact with industrial-age people, are replaced by traits and practices that reflect our technology and our appetites—guns instead of bows and arrows, clothes instead of penis sheaths. Degradation of the environment is inevitable as our traits replace theirs. But rather than a static list of traits, culture is better understood as a people’s collective ability to represent itself, to reproduce itself as a group, to forge a common and distinct identity (Urban & Scherzer 1991; Turner 1993; Albert 1997). Change need not mean assimilation or unreflective substitution of their culture by ours. The emergence of indigenous organizations, the ethnic and cultural affirmations that everywhere accompany groups’ territorial demands, and indigenous formulations of environmental concerns themselves are part of modern indigenous peoples’ self-reinvention. There are excellent reasons for indigenous groups to seek sustainability in their own self-interest, as noted by Chiccón, Colchester, and Carneiro da Cunha and Almeida (1999).

But Terborgh claims that the “banner of conservation” is for indigenous populations “only a politically correct mask for a deeper issue,” whereas Redford & Sanderson maintains that “to place on the shoulders of relatively powerless forest dwellers the burden of stopping...deforestation,” is “at best unfair and at worst dangerous.” Redford & Sanderson go further and characterize us as “speaking for

the poor without showing that [we] actually do” and failing to “truly represent the populations [we] defend.” In short, either the Indians and rural poor who claim environmental goals are prevaricating for the sake of political advantage, or we have put words in their mouths. As Redford well knows, however, indigenous organizations claim these goals for themselves (Matos 1998; Conselho Nacional dos Seringueiros—União das Nações Indígenas 1989; Coodinacion de las organizaciones indígenas de la cuenca Amazônica 1989).

If it is true that it is impossible to maintain the ecological integrity of large forests on indigenous and traditional peoples’ territories, then it will likely be impossible to do so elsewhere on the frontier. So too is it unlikely that a few fragment/parks will conserve much biodiversity for long. Terborgh and Redford & Sanderson in this sense underestimate the threat to the forest in imagining that U.S.-style parks will survive in perpetuity in the absence of the ecosystem services provided by large expanses of native forest. It is a dangerous illusion to imagine that there is a choice between “turning over stewardship of valuable troves of unexploited natural resources to local people” (Terborgh) and no-nonsense conservation, as both authors think. The forest is already inhabited, and protection of any more will depend on local people being able to achieve prosperity in and around it on a sustainable basis.

Redford & Sanderson take exception to our observation that evidence is sparse for species depletion on lands of indigenous and traditional peoples. Further examination of the literature reinforces our statement that no case of species extinction or severe depletion of large mammals has been reported from Amazonian indigenous or extractive reserves. A 2-year study of Parakanã hunting in Pará was designed to test the hypothesis that “exploitation of fauna in its current form would not be sustainable over the long term...” and concluded that “the hypothesis [should]...be rejected” (Emidio-Silva 1998:113.) In Mbaracayu Ache reserve, Paraguay, observed game harvest rates “are not likely to endanger any of the [hunted] species within the Mbaracayu reserve” (Hill et al. 1997:1351). Peres (2000a) finds that his study site in the Kayapó reserve in Pará, in the immediate environs of a village, has a higher game biomass per square kilometer than five of his six un hunted sites and all but 2 of his 25-site sample. And all the sites were within a region where the Kayapó have hunted with guns for the last 50 years (Verswijver 1985). Martins (1993), who contrary to Redford & Sanderson’s claim, did not conduct research in an extractive reserve, found some game populations reduced, unsurprising in a region continuously inhabited over the last 100 years. He failed to observe several species, although informants reported their presence. Peres (2000b) finds that vertebrate biomass declines with intensity of hunting as large-bodied mammals are removed. He also finds, however, that much of the variation in game biomass per square kilometer is ac-

counted for by forest type. Furthermore, "overall community biomass at nonhunted sites...[is]virtually the same as that of lightly hunted sites." Indeed, Peres's argument turns largely on his categorization of hunting pressure as "light," "moderate," and "heavy." He notes that "reliable data on game harvest were not available." His methods of categorization are relatively subjective and unexplained, and his argument would benefit from clarification of this issue.

Neither Peres's nor Martins's study looks at the more remote areas of indigenous or extractive reserves. Interfluves and areas beyond habitations more than about 15 km are not usually exploited in these areas because they are distant and difficult to get to (and often full of wild animals). (Peres conducted most of his nonhunted-area surveys in the Petrobras oil and gas fields, accessing clearings made by the oil company by small plane and helicopter.) The extensive interfluves in the 500,000-ha Alto Juruá extractive reserve, for example, are rarely visited (Almeida 1996) and may serve as game refuges. Many of the recent, impressive, and detailed surveys in indigenous areas tend to look (for good logistical reasons) at specific hunted areas within reserves rather than at populations inside and outside the reserve (Bodmer & Pueras 2000; Leeuwenberg & Robinson 2000; Mena et al. 2000). The area not actively hunted in the 100,000-km² Kayapo reserve, larger than Austria, with its <4000 inhabitants boggles the imagination. Comparing species composition within and outside of indigenous and extractive reserves has to take some account of the size of the area protected by the reserve, and this has not been done.

Does subsistence hunting by sparse populations of forest dwellers lead to a cascade of local extinction events? The data that would allow us to respond to this extremely important question are surprisingly scarce. Terborgh cites case studies from Wisconsin (Alverson et al. 1988), Maryland, Tennessee (Wilcove 1985), the chaparral of the western United States (Soulé et al. 1988), Spain (Palomares et al. 1995), various North American locations (Garrott et al. 1993), and his own observations in the Neotropics (Terborgh 1988, 1999) in arguing that the evidence for cascading extinctions is strong. In reviewing the same evidence, Redford (1992) cites a case study from the desert of the southwestern United States (Brown & Heske 1990) and states that "such clear-cut cases are not known from Neotropical areas." Dirzo and Miranda (1991) have demonstrated that when hunters extirpate game species in Mexico, seed and seedling predation declines and the forest floor becomes carpeted with tree seedlings, with important long-term implications for tree species composition. We agree with Terborgh that the extirpation of top predators probably affects many other species in tropical forests, particularly in fragmented landscapes such as those that were the focus of the studies he cites. But there is insufficient evidence to state that this extirpation will affect the ma-

majority of tropical forest species, which are invertebrates and plants. More important for the present debate, the evidence that subsistence hunting by sparse populations of forest dwellers will drive any species to local extinction is simply not available. Both Terborgh and Redford & Sanderson apparently agree with our statement that such species alterations, should they occur, would not affect the numerous higher-level criteria of tropical forest integrity, such as forest vulnerability to fire, fertility of forest soils, forest carbon content, or the role of tropical forests in regional hydrological and climate systems.

There are also a number of factual misconceptions in Terborgh and Redford & Sanderson's comments which have important implications. Terborgh claims that extractive reserves are impermanent and can be rescinded when conditions change. Extractive reserves are in fact created by presidential decree and can be altered by law (i.e., by the congress), just as is the case for all other federal Brazilian conservation areas, including national parks. Redford & Sanderson hold that extractive reserves are "social, not ecological spaces." They are in reality both: "The Executive Branch will create extractive reserves in territories deemed of social and ecological interest" (Decreto No. 98.897, 30 de Janeiro de 1990). Communities in a reserve contract long-term concession of use rights from the government to the reserve only when they have, through a representative organization, presented a use plan for the area that complies with principles of sustainability established in law and that can be rescinded in the event of environmental damages. As Carneiro da Cunha and Almeida have aptly put it, traditional (but not indigenous) populations are in a legal sense parties to a pact with the nation: in exchange for land and other rights, they agree to practice sustainable use of natural resources (Carneiro da Cunha & Almeida 1999). Far from giving local people "the sole responsibility of the political viability of protected areas" (Chicón; Redford & Sanderson), the reserves in the first instance remove a key obstacle to their empowerment by resolving land conflicts and guaranteeing security of tenure.

Redford has long maintained that he seeks only to make realistic collaboration between indigenous peoples and conservationists possible by dispelling illusions and clarifying where goals diverge (Redford & Stearman 1993). He resurrects the venerable stalking horse of the "ecologically noble savage," charging that we treat forest residents as "homogeneously good." But we have only observed that forest peoples' organizations and representatives are important political actors, in what is after all a political process, and that effective alliance requires the allies to recognize one another's legitimacy.

Terborgh in particular appears unaware that both extractive reserves and indigenous lands belong to the nation: these are federal lands (in the case of indigenous lands, inalienably) to which local groups have determinate use rights. The notion of "turning valuable natural resources

over" to local communities, conceived as similar to the U.S. Sagebrush Rebellion, is thus a wildly inaccurate analogy.

Terborgh asks rhetorically how many readers have "been drawn to visit tribal reservations in the United States by the promise of seeing wildlife spectacles?" Those who fail to study history may indeed be doomed to repeat it. The great wildlife spectacles of the United States were driven to destruction by white settlers, not the Indians—most notably the American bison (*Bison bison*), brought to the brink of extinction as a matter of public policy precisely in order to reduce the plains Indians to destitution and occupy their lands.

This highly selective vision of the history of U.S. conservation is more accurately described as nostalgic than backward-looking. Only through exceptional optimism—or deep pessimism—can a system that has 5% of the nation's native forests not protected be projected as a model for a forest half the size of the United States that is still at least 80% intact. Our vision is indeed different from Terborgh and Redford & Sanderson's. It starts with the effective protection of native and traditional peoples' lands and builds on the dozens of local education, health, and economic projects that local leaders, professionals, and scientists have developed over the last 20 years that point the way to a better life for people in and around the forest. We emphasize continual dialogue, experimentation, support for unions, associations, and other grass-roots groups that seek sustainable family agriculture, and support for environmental political leaders such as those in the Amazon. We propose to continue and expand dialogue with all actors on issues of common concern, such as fire prevention. We see the creation of global and national means to compensate forest communities and governments for the ecosystem services of the forest as a critical priority. The creation and protection of indigenous areas and extractive reserves, and indeed ensuring tenure security for small farmers, are not, like the creation of a park, the end of a process, but the beginning.

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