

---

# Arguing Tropical Forest Conservation: People versus Parks

STEPHAN SCHWARTZMAN,\* DANIEL NEPSTAD,† AND ADRIANA MOREIRA‡

\*Environmental Defense Fund, 1875 Connecticut Avenue, NW, Suite 1016, Washington, D.C. 20009, U.S.A.,  
email [sschwartzman@environmentaldefense.org](mailto:sschwartzman@environmentaldefense.org)

†The Woods Hole Research Center, P.O. Box 296, 13 Church Street, Woods Hole, MA 02543-0296, U.S.A., and  
Instituto de Pesquisa Ambiental da Amazônia (IPAM), Travessa Dr. Eneas Pinheiro, 66087-430 Belém, Pará, Brazil

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 km<sup>2</sup> 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 km<sup>2</sup> 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-

---

*Paper submitted May 28, 2000; revised manuscript accepted May 31, 2000.*

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 millenium 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-km<sup>2</sup> 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-

ajority 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" (Chiccón; 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.

## Literature Cited

- Albert, B. 1997. Territorialité, enthopolitique et développement: à propos du mouvement indien en Amazonie Brésilienne. *Cahiers des Amériques Latines* 23:177–209.
- Almeida, M. 1996. The management of conservation areas by traditional populations: the case of the Upper Juruá extractive reserve. Pages 137–157 in K. H. Redford and J. A. Mansour, editors. *Traditional peoples and biodiversity conservation in large tropical landscapes*. The Nature Conservancy, Arlington, Virginia.
- Alverson, W. S., D. M. Waller, and S. L. Solheim. 1988. Forests too deer: edge effects in northern Wisconsin. *Conservation Biology* 2:348–358.
- Balée, W. 1994. Footprints of the forest: Kaapor ethnobotany: the historical ecology of plant utilization by an Amazonian people. Columbia University Press, New York.
- Bodmer, R., and P. E. Puertas. 2000. Community-based comanagement of wildlife in Peruvian Amazon. Pages 395–409 in J. G. Robinson and E. L. Bennett, editors. *Hunting for sustainability in tropical forests*. Columbia University Press, New York.
- Brown, J. H., and E. J. Heske. 1990. Control of a desert-grassland transition by a keystone rodent guild. *Science* 250:1705–1707.
- Carneiro da Cunha, M. 1992. Introdução a uma história indígena. Pages 9–24 in M. Carneiro da Cunha, editor. *História dos Índios do Brasil*. Companhia das Letras, São Paulo.
- Carneiro da Cunha, M., and M. Almeida. 1999. Populações tradicionais e conservação. *Biodiversidade Amazônia: consulta* 99. Instituto Socioambiental, São Paulo. Available from <http://www.socioambiental.org.br/> (accessed May 27, 2000).
- Cleary, D. 2000. Towards an environmental history of the Amazon: prehistory to the nineteenth century. *Latin America Research Review* 36:2.
- Conselho Nacional dos Seringueiros—União das Nações Indígenas. 1989. II Encontro Nacional dos Seringueiros/I Encontro dos Povos da Floresta. Rio Branco, Acre.
- Coodinacion de las organizaciones indígenas de la cuenca Amazônica. 1989. For the future of the Amazon region. Quito, Ecuador.
- Denevan, W. 1992a. The pristine myth: the landscape of the Americas in 1492. *Annals of the Association of American Geographers* 82:369–385.
- Denevan, W. 1992b. The aboriginal population of Amazonia. Pages 205–234 in W. Denevan, editor. *The Native Population of the Americas in 1492*. University of Wisconsin Press, Madison.
- Dirzo, R., and A. Miranda. 1991. Altered patterns of herbivory and diversity in the forest understory: a case study of the possible consequences of contemporary defaunation. Pages 273–287 in P. W. Price, T. M. Lewinsohn, G. W. Fernandes, and W. W. Benson, editors. *Plant-animal interactions: evolutionary ecology in tropical and temperate regions*. Wiley, New York.
- Emidio-Silva, C. 1998. A caça de subsistência praticada pelos índios Parakanã (sudeste do Pará): características e sustentabilidade. M.S. thesis. Universidade Federal do Pará, Belém, Pará.
- Garrott, R. A., P. J. White, and C. A. Vanderbilt White. 1993. Overabundance: an issue for conservation biologists? *Conservation Biology* 7:946–949.
- Hill, K., J. Padwe, C. Bejyvgi, A. Bepurangi, F. Jakugi, R. Tykuarangi, and T. Tykuarangi. 1997. Impact of hunting on large vertebrates in the Mbaracayu reserve, Paraguay. *Conservation Biology* 11:1339–1353.
- Instituto de Pesquisa Ambiental na Amazônia and Instituto Socioambiental. 2000. *Avança Brasil: os custos ambientais para Amazônia*. Available from <http://www.ipam.br/> (accessed May 27, 2000).
- Leeuwenberg, F. J., and J. G. Robinson. 2000. Traditional management of hunting in a Xavante community in central Brazil: the search for sustainability. Pages 375–394 in J. G. Robinson and E. L. Bennett, editors. *Hunting for sustainability in tropical forests*. Columbia University Press, New York.
- Martins, E. 1993. A caça de subsistência de extrativistas na Amazônia: sustentabilidade, biodiversidade, e extinção de espécies. M.S. thesis. Universidade de Brasília, Brasília.
- Matos, A. de D. M. 1998. The ideas of Chico Mendes and the national council of rubber tappers. Pages 10–11 in S. Schwartzman, editor. *From the ashes: reflections on Chico Mendes and the future of the rainforest*. Environmental Defense Fund, Washington, D.C.
- Meggers, B. J. 1971. *Amazonia: man and culture in a counterfeit paradise*. Aldine, Chicago.
- Mena, V. P., J. R. Stallings, J. Regaldo B., and R. Cueva L. 2000. The sustainability of current hunting practices by the Huaorani. Pages 57–78 in J. G. Robinson and E. L. Bennett, editors. *Hunting for sustainability in tropical forests*. Columbia University Press, New York.
- Nepstad, D., G. Carvalho, A. C. Barros, A. Moreira, U. Lopes, P. Lefebvre, J. Cappobianco, and A. Alencar. 2000. Breaking the positive feedbacks between land use, forests and climate in the Amazon fire regime. *Forest Ecology and Management*: in press.
- Palomares, F., P. Gaona, P. Ferreras, and M. Debiles. 1995. Positive effects on game species of top predators by controlling smaller predator populations: an example with lynx, mongooses, and rabbits. *Conservation Biology* 9:295–305.
- Peres, C. A. 2000a. Effects of subsistence hunting on vertebrate community structure in Amazonian forests. *Conservation Biology* 14:240–253.

- Peres, C. A. 2000b. Evaluating the sustainability of subsistence hunting at multiple Amazonian forest sites. Pages 31–56 in J. G. Robinson and E. L. Bennet, editors. *Hunting for sustainability in tropical forests*. Columbia University Press, New York.
- Redford, K. H. 1992. The empty forest. *BioScience* 42:412–422.
- Redford, K. H., and A. M. Stearman. 1993. Forest-dwelling native Amazonians and the conservation of biodiversity: interests in common or in collision? *Conservation Biology* 7:248–255.
- Roosevelt, A. C. 1993. The rise and fall of the Amazon chiefdoms. *L'Homme* 33:255–283.
- Roosevelt, A. C. 1994. Amazonian anthropology: strategy for a new synthesis. Pages 1–29 in A. C. Roosevelt, editor. *Amazonian Indians: from prehistory to the present*. The University of Arizona Press, Tucson.
- Smith, N. 1980. Anthrosols and human carrying capacity in Amazonia. *Annals of the Association of American Geographers* 70:553–566.
- Soulé, M. E., E. T. Bolger, A. C. Alberts, J. Wright, M. Soricce, and S. Hill. 1988. Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. *Conservation Biology* 2:75–92.
- Terborgh, J. 1988. The big things that run the world: a sequel to E. O. Wilson. *Conservation Biology* 2:402–403.
- Terborgh, J. 1999. *Requiem for nature*. Island Press, Washington, D.C.
- Turner, T. 1993. De cosmologia á historia: resistência, adaptação e consciência social entre os Kayapo. Pages 43–66 in E. Viveiros de Castro and M. Carneiro da Cunha, editors. *Amazônia: etnologia e história indígena*. Núcleo de História Indígena e do Indigenismo, São Paulo.
- Urban, G. 1992. A história da cultura brasileira segundo as línguas nativas. Pages 87–102 in M. Carneiro da Cunha, editor. *História dos Índios do Brasil*. Companhia das Letras, São Paulo.
- Urban, G., and J. Scherzer. 1991. Introduction: Indians, nation-states and culture. Pages 1–18 in G. Urban and J. Scherzer, editors. *Nation-states and Indians in Latin America*. University of Texas Press, Austin.
- Verswijver, G. 1985. Considerations on Mekrãgnotí warfare. Ph.D. thesis. University of Ghent, Belgium.
- Whitehead, N. L. 1994. The ancient Amerindian polities of the Amazon, the Orinoco and the Atlantic coast: a preliminary analysis of their passage from antiquity to extinction. Pages 33–53 in A. C. Roosevelt, editor. *Amazonian Indians: from prehistory to the present*. The University of Arizona Press, Tucson.
- Wilcove, D. 1985. Nest predation in forest tracts and the decline of migratory songbirds. *Ecology* 66:1211–1214.

