

Wilderness preservation and biodiversity conservation—keeping divergent goals distinct

Conservation biology, as developed and practiced in the United States, has the explicit aim of maintaining and encouraging biodiversity. The term “biodiversity” was introduced in 1986 by Walter Rosen as a shorthand for “biological diversity.” Although Rosen’s original intention was quite precise, biodiversity, according to a survey of US conservation biologists, has become a fashionable scientific—but no more precise—substitute for the undeniably vague term “nature” (Takacs 1996). These conceptions of biodiversity are actually quite different, and the differences matter when strategies for biodiversity conservation have to be devised.

“Biological diversity” may be hard to define, but its intended meaning is not hard to fathom: It refers to diversity at all levels of biological organization, from alleles, to populations, to species, to communities, to ecosystems. “Nature,” by contrast, is a much more vague term: In the United States, at least, it seems mostly to refer to “wilderness” (Cronon 1996b). Meanwhile, “wilderness,” according to the 1964 US Wilderness Act, is a place “where man himself is a visitor and does not remain.” Humans are sometimes admitted as being part of a wilderness, especially if they are members of indigenous groups already resident in that “wilderness.” But from this Eurocentric point of view, these humans are not much different from other animals: Bereft of “civilized” culture, they do not destroy the sanctity of a pristine wilderness. Another aspect of “wilderness” is that the wilder a place, the more natural it is. An Antarctic landscape is more of a wilderness than the interior of an Amazonian rainforest—the latter has a higher den-

sity of human inhabitants.

Biodiversity conservation, therefore, cannot be identical with wilderness preservation (see also Haila 1997). In this article, I explore the differences—that is, examine exactly how the two goals differ and what that difference entails, particularly for biologists. The goals differ not only with respect to their explicit and implicit long-term objectives, but also with respect to their justifications, their immediate targets and obstacles, and the strategies that are likely to achieve these targets (Table 1). In some instances, the tasks of biodiversity conservation and wilderness preservation converge, but at least as often they do not. When they do not, the conservation of biodiversity is often more feasible when that goal is not conflated with that of wilderness preservation. This point is important because there is a third factor that is often critical to conservation efforts: social interests, whether those of social justice movements (whose immediate goals often coincide with the interests of conservationists) or aspirations for economic improvement (which may or may not conflict with biodiversity conservation). If wilderness preservation is cast aside as a predetermined goal, it can become easier for biodiversity conservationists to negotiate and, often, to achieve consensus with these social interests.

Wilderness and its preservation

“Wilderness” as a category of positive concern—as opposed to “waste” lands to be tamed and used efficiently by humans—is of recent and highly localized vintage. As Nash (1973) put it: “Friends of wilderness should remember that in terms of the entire history of man’s relationships to nature, they are riding the crest of a very, very recent wave.” Although

the origins of this concept of wilderness are usually traced back to eighteenth-century European romanticism, its relevant use in today’s context emerges only in the late nineteenth and early twentieth centuries, primarily in the United States (Oelschlaeger 1991, Denevan 1992, Cronon 1996a, 1996b). Wildernesses as uninhabited areas in the United States were generally created through the exclusion of the human residents (i.e., the First Nations) and an erasure of their history. Erasure refers to the systematic, if unconscious, reconstruction of memory to recast as uninhabited “wildernesses” the lands from which the original inhabitants were forcibly expelled. The final stage of exclusion was achieved at the end of the last “Indian” wars, when the remnants of the First Nations were herded into reservations and their traditional lands were declared to have been unoccupied by humans from the beginning of time (Cronon 1996b).

John Muir, the founding figure of the wilderness myth in the United States, accepted the presence of the First Nations in such putative wildernesses as Yosemite (which was set aside as a park in 1864) and claimed that “Indians walked softly and hurt the landscape hardly more than the birds and squirrels” (Nabhan 1995). He also recognized the importance of the use of fire by the First Nations in creating the landscapes that he hoped to preserve as wildernesses. Subsequent wilderness advocates generally forgot this caveat. But they all agreed that wilderness was what the First Nations—for instance, the Miwok of Yosemite—had called home. What was universally ignored by these later advocates was that Yosemite and other wildernesses had been intensively but relatively stably modulated by their First Nation residents for centuries.

by Sahotra Sarkar

Table 1. Wilderness preservation and biodiversity conservation—summary of issues.

Issue	Wilderness preservation	Biodiversity conservation
Objective	Landscapes without humans	Biological diversity at all levels of organization
Justifications	Aesthetic	Intellectual interest; present and future utility
Targets	National Parks; wilderness preserves	High-biodiversity regions; representative sample of biodiversity
Obstacles ^a	Economic interests; over-consumption; human encroachment; invasive technologies	Economic interests; over-consumption; human encroachment; invasive technologies; habitat fragmentation; human exclusion, in some cases; diversion of scarce resources from conservation to wilderness
Strategies	Legislation; habitat purchase	Diverse methods

^aObstacles are of particular importance because the results of wilderness preservation, such as the creation of small national parks and complete exclusion of human use, may generate problems for biodiversity conservation. In such a situation, the two goals are in conflict. See text for further discussion.

During the first decade of this century, Muir and his followers fought the first modern environmentalist battle, over whether the city of San Francisco had a right to dam the Tuolumne River (in the Hetch Hetchy Valley inside Yosemite National Park) to augment its water supply (Cronon 1996b). They lost that battle but ultimately won the war to designate and preserve wildernesses throughout the United States.

Wilderness preservationism spread. The immediate target was the creation of national parks for recreational use, primarily by short-term visitors. The strategy of choice—and, in retrospect, a very effective one—was federal intervention eventually imposed with the force of law (Nash 1973, Graber 1995). Concern for biological diversity played no role in the selection of US national parks in the early decades of this century: The first swamp was so designated (the Everglades National Park) only in the 1940s, and there is still no national park dedicated to preserving grasslands (Cronon 1996b). Rather, the national parks were “sublime” landscapes: mountains, waterfalls, and other landforms of exquisite and deep aesthetic appeal to transient visitors, who usually came from an urban elite rather than from the surrounding rural population. Nevertheless, throughout the world, espe-

cially since 1950, the creation of national parks has emerged as the predominant strategy of biodiversity conservation.

Arguably, the concept of national parks is a US export to the rest of the world. At the very least, the United States had priority in the formulation of official policies to create and maintain national parks. For example, it was not until 1930 that Canada passed a National Parks Act (earlier parks had been aimed at the preservation of historic sites rather than landscapes; Doern and Conway 1994); a system of wildlife reserves, including parks, was established in Kenya after 1945 (Olindo 1991); and although the British created some kinds of forest reserves (mainly multiple use) in India in the nineteenth century and in what is now Malaysia at around 1900, it was not until around 1930 that identifiable parks were created in those countries (Gadgil and Guha 1992, Aiken and Leigh 1995). Wilderness preservationism reached most of Latin America even later, with Mexico being an unusual early adopter of parks.

Because the concentration of economic power in the so-called First World has made it the source of calls for nature preservation during the last 25 years, the creation of national parks in the US mold to preserve wilderness has emerged as a part of almost

every conservationist and preservationist strategy (Cronon 1996b). The Convention on Biological Diversity, formulated at the 1992 Rio de Janeiro United Nations Conference on Environment and Development (UNCED), even included wilderness as a type of ecosystem and habitat to be targeted for conservation.

Conservation of biological diversity

During the 1980s, biodiversity became the focus of concern of biologists alarmed by the increasing pace of anthropogenic extinction, particularly in the neotropics (e.g., Wilson 1988). Concern for biodiversity came to include the traditional focus on the potential extinction of charismatic (and culturally symbolic) species as well as those recognized as endangered by the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). “Biodiversity” includes allelic diversity within populations, structural differences between populations, diversity of species, and diversity at higher levels of phylogenetic and ecological organization (e.g., ecosystems). In recent years, the targets of biodiversity conservation have expanded from the traditional concern with species and even ecosystems. For instance, they now include “endangered biological phenomena” such as the migration of the monarch butterfly (*Danaus plexippus*) in the United States and Mexico, each cycle of which takes several generations (Brower and Malcolm 1991).

A serious problem with the concept of biodiversity is that there is no fully satisfactory quantitative measure for it. Three commonly used indexes, α -, β -, and γ -richness, refer, respectively, to the number of species within a homogeneous habitat, the rate of change of species composition between habitats, and the rate of change across larger units. These indexes do not, however, capture the value of rarity, for instance, of endangered biological phenomena or of unique species in otherwise unexceptional or biologically impoverished habitats. Identifying conservation targets often remains dependent on educated intuition. Given the diversity of the appropriate foci for con-

ervation, these targets can vary widely, ranging from deserts and forests to farms and horticultural gardens (e.g., if these two “unnatural” systems contain unique species). The important point is that, except perhaps for a few species, such as large, wide-ranging predators, there is no a priori reason to suppose that conservation of biodiversity requires wilderness, such as national parks that exclude humans. Whether it turns out that this is so will depend on empirical data, as will be discussed below.

The intellectual rationale for biodiversity conservation was forcefully enunciated by Janzen (1986) in the context of a plea for the conservation of tropical forest systems: He asserted that the unknown biological systems of the tropics present research problems of unparalleled biological interest. Moreover, both the species and the ecosystems are unique and threatened with impending permanent extinction. Janzen added that past experience has also shown that tropical forests are a potential source of many practically valuable commodities. The last assertion is not a biological reason, but in a late twentieth century context, when the sciences often have to justify expenditure and investment in them in terms of economic value, it was an important point to make.

Ehrenfeld (1976) and some other conservation biologists have presented other, generally less utilitarian rationales for biodiversity conservation (for discussions of the various positions see Norton 1986, 1987, Rolston 1994). If the importance of intellectual interest is acknowledged, along with the potential for new resources, then these other reasons (which have generally been controversial) are not strictly necessary for an adequate defense of biodiversity conservation. Nevertheless, in the political arena, these other reasons—including, for instance, consonance with certain cultural and religious traditions—may well have more persuasive power than the recognition of the undeniable intellectual interest of biodiversity.

Confluences

In spite of the radical differences in the long-term objectives and usual

targets of biodiversity conservation and wilderness preservation, and in the justifications offered for these two goals, there are points of confluence. The existence of such overlaps explains why the two goals have so often been pursued in tandem and why some biologists who recognize the differences between them still downplay the significance of these differences (e.g., see Graber 1995). There are both positive and negative reasons for the confluence between biodiversity conservation and wilderness preservation. The positive reason is that they share one type of target habitat: fragile ecosystems or those with rare or endangered species that show little or no human influence. Such habitats exist but are probably rare. None of the 18 global hotspots of biodiversity identified by Myers (1988, 1990) satisfies the criterion of either minimal human presence or influence.

More important are the negative reasons for the confluence: Many issues of concern for wilderness advocates are equally important to biodiversity conservationists. These issues include at least four anthropogenic factors that contribute to the extinction of populations, species, and ecosystems:

- **Economic cornucopianism.** Whether it be attempts to drill for oil within the Arctic National Wildlife Refuge in Alaska, cattle ranching in Amazonia, or logging in Borneo, unbridled market forces have been inimical to the interests of both wilderness preservationists and biodiversity conservationists. For both camps, a potential solution is to assign economic value to environmental goods or services. There have been significant attempts in this direction (e.g., Pearce 1993), but in practice there is little reason for optimism that such a strategy will be effective in preventing destruction of nonrenewable natural resources for short-term profits.

- **Overconsumption.** Wilderness and biodiversity advocates generally agree that current patterns of natural resource use, if accompanied by current rates of population increase, cannot be sustained in the long run. Overconsumption arises from exces-

sive per capita consumption in most industrialized countries and high population densities in many developing countries. It endangers wilderness preservation by inevitably requiring the development of wild lands, and biodiversity conservation either by direct use of relevant resources or by reduction of habitat. How much population a region or the entire world can sustain depends on choices about patterns of living; contrary to the often emotional debates about this issue, there are no known relevant absolute limits (Cohen 1995).

- **Human encroachment.** By definition, human encroachment would destroy a wilderness. Human encroachment can—although it need not—also deplete biodiversity, for instance, by destroying biotically fragile habitats. Encroachment may be, but is not necessarily, a result of overconsumption. Even necessary human activities far from a region can lead to encroachment, for instance, through the emission of atmospheric pollutants that affect the appearance of landscapes or the viability of populations.

- **Invasive technologies.** Even if wildernesses admit only temporary visitors, it matters for preservation whether these visitors come on foot or in motorized vehicles. Even people who argue for the compatibility of biological conservation and human use admit that modern technologies, such as mechanized forestry, pose special problems. Gómez-Pompa and Kaus (1992) make a useful distinction between technologies that are internal to a local environment and those that are external. The former emerge and evolve by trial and error within communities, usually those with a stake in the long-term renewable management of resources. The latter often introduce irreversible changes that are generally detrimental to the entire habitat, including the biological diversity that it contains.

Conflicts

Given how common it is that wilderness preservation and biodiversity conservation are conflated, it may be surprising that the area of confluence

is so minute. The reason for the small overlap is that, contrary to a pervasive implicit belief, the presence of humans per se is not necessarily detrimental to biodiversity. Human groups, particularly those that do not use invasive technologies and have lived in a region for many generations, are often integral parts of ecosystems and may have little or no negative impact on biodiversity. Moreover, even intrusive human use may not always be detrimental to biodiversity.

Two examples appear to be typical of such benign, although intrusive, use. First, Latin American tropical rainforests, particularly those along the Amazon, are ecosystems of extraordinarily high biodiversity. Hecht and Cockburn (1990) have systematically documented not only high densities of past human populations in many parts of the Amazon, but also evidence of intensive but stable modulation of forests (see also Posey and Balée 1989). Second, in Costa Rica, the La Selva Biological Station straddles a transition between tropical premontane and wet forest life zones (Hammel 1990). It borders the Braulio Carrillo National Park and is a major repository of biodiversity (Barry 1990, Clark 1990). Until recently, it was universally believed to be devoid of human influence. But, in recent years, pottery shards and crop residues have been discovered in La Selva (Yoon 1993).

There are many more examples of humans forming integral parts of ecosystems that have shown no recorded biodiversity decline. However, the fact that there is no recorded decline from their use of natural resources does not mean that there was no general biodiversity decline or that it increased. No study to date adequately distinguishes the effects of indigenous groups on general biodiversity from their effects on the abundance of key resources (Nabhan 1995).

Three examples show how traditional resource management systems have been used to maintain or increase an abundance of desired species, which are the key resources in this context (for other examples, see Anderson 1996). First, the Nass River watershed in northern British Columbia (Canada) was the traditional

home of the Nishga First Nation. Each Nishga community controlled its own part of the watershed, and a hierarchical system of controls allocated specific fishing sites to individuals (who acted on behalf of groups). This allocation system prevented overharvesting (Gadgil and Berkes 1991). Second, the *dina* system in Mali manages biotic resources by ensuring that different groups specialize in different resources. For instance, the Bozo people specialize in shallow-water fishing, whereas the Somono specialize in net fishing. Four different groups specialize in farming, and one, the Fulani, specializes in herding. Once again, the system, which was formalized in the nineteenth century, seems to act to prevent the disappearance of any single resource (Gadgil and Berkes 1991). A third example comes from Mexico, where traditional shifting (i.e., slash-and-burn) agriculture involved processes of clearing, planting, and fallowing, which resulted in a mosaic of forest patches at different growth stages, including a significant amount of mature forest. This mosaic prevented forest fires from spreading (Gómez-Pompa and Kaus 1992). For the farmers, it also ensured adequate amounts of sufficiently renewed soil for agriculture. The prevention of fires almost certainly helped to preserve biodiversity in the surrounding forest.

Unless the targeted resources act as keystone species in their ecosystems, it is impossible to conclude from these examples that general biodiversity was maintained. Nevertheless, it seems likely. Indeed, circumstantial evidence suggests that, in many cases, human intervention has been critical to the maintenance of biodiversity. Although most such reports are anecdotal, two cases have been extensively documented.

First, in Keoladeo National Park in Rajasthan, India, a 450 ha artificial wetland with shallow bodies of water was created in the eighteenth century. This wetland attracts tens of thousands of wintering waterfowl and also supports large numbers of bird species that breed during monsoons (Gadgil and Guha 1995). Before Indian independence (1947), the area was a hunting reserve that also served as a grazing ground for cattle from the surrounding villages and as

a water source for irrigation during the dry postmonsoon period. After 1947, it was set aside as a national park. On the advice of Indian and US ecologists, who had not, however, carried out detailed field studies, grazing was banned in the early 1980s in an effort to promote bird diversity. When villagers protested the loss of fodder, the Indian state responded with violence; the police killed several protesters. The ban on grazing has, despite its intent, devastated Keoladeo as a bird habitat, especially for wintering geese, ducks, and teals. Paspalum grass, which had been kept in check by grazing, has now established a stranglehold on the wetland, choking the shallow bodies of water (Vijayan 1987).

A second example comes from the Sonoran Desert, where two oases, one on either side of the United States–Mexico border, were subject to different management regimes. On the US side, the protection of an oasis by its inclusion in the Organ Pipe Cactus National Monument led to a significant decline of species diversity over a 25-year period. On the Mexican side, continued traditional land use by Papago farmers at the Quitovac oasis 54 km to the southeast led to no such decline (Nabhan et al. 1982).

These examples can be easily discounted by skeptics on the grounds that the available comparisons are not proper controls. Unfortunately, it is virtually impossible to find adequate controls for actual conservation targets. Experimental work similar to studies of the effect of habitat fragmentation on biodiversity should also be conducted to study human impacts. The examples given here suggest that many forms of human use need not have an adverse effect, and may indeed have a positive effect, on biodiversity.

Politics

Biological conservation does not proceed in a sociopolitical vacuum. The wilderness preservation strategy of setting up national parks largely to exclude human resource use while encouraging transient visitors, often to finance park maintenance, leads in at least two ways to a contentious political terrain that is inimical to

biodiversity conservation. These problems typically occur together. First, setting up a national park that excludes humans from traditional habitats and prevents them from using resources denies them perceived cultural, economic, or social enhancement. The result is a political conflict that can significantly hurt biodiversity conservation efforts. Second, the strategy of concentrating on the creation of national parks in which all human resource use is excluded may result in compromises in which regions outside the reserves are entirely unprotected. The reserves then become isolated habitats, in many ways similar to islands, with all the attendant negative consequences for biodiversity.

Two cases illustrate the first problem. One is that of Tortuguero, on Costa Rica's Caribbean coast, where turtle conservation efforts began in the 1950s. In the 1960s, decrees were promulgated to regulate hunting, and legislation passed in 1970 and 1975 converted the protected area into the Tortuguero National Park and banned hunting completely (Boza and Mendoza 1981, Lefever 1992). Between 1970 and 1995, the park became a major ecotourism destination. The facilities created to house the visitors range from expensive rustic lodges to cheap rooms in Tortuguero village. Access to the village is by a 6-hour motorized boat ride. Regular boat service existed for a while, but it petered out in the late 1980s. The villagers now have to rely on the goodwill of tour operators for all transportation. Although boating was the traditional mode of transportation before the creation of the park, the villagers feel that they are being denied the material advancement common elsewhere in Costa Rica. This situation, along with the absence of adequate educational and medical facilities in the village, had generated significant local resentment by 1995 (Sahotra Sarkar, unpublished local interviews, August 1995). The residents perceived a state policy of preference for foreign tourism over local needs. Their solution was to propose a road to Tortuguero that would pass through parts of fragile forests near the Tortuguero reserve. The road would also probably lead to illegal logging and destruction of bio-

logically important habitat. Although the road has yet to be built, it has significant political support in all surrounding communities.

The social problems at Tortuguero pale in comparison to the scale of those created by the establishment of national parks and reserves in India. This process gained momentum around 1960, promoted by a coalition of Indian hunters-turned-preservationists (from a declining colonial elite) and international organizations such as the World Wildlife Fund and the International Union for the Conservation of Nature and Natural Resources (Guha 1989). By 1989, India had 65 national parks and 380 wildlife sanctuaries (Kothari et al. 1989, Agarwal 1992). The parks were usually based on the habitats of large charismatic mammals, such as the Asian elephant (*Elephas maximus*), the greater one-horned rhinoceros (*Rhinoceros unicornis*), and the Bengal tiger (*Panthera tigris tigris*). The establishment of the parks led to massive displacement of villages, often without any adequate provisions for the displaced (Guha 1989, Agarwal 1992). No official figures for the numbers of displaced people are available, but the following example from a region with almost no large parks is probably representative: In the Jharkhand region of east-central India, thousands of people were displaced to create parks and reserves. Because there is no official policy of culling excess animals, villages surrounding the parks suffer from depredations (Sukumar 1989, 1994, Agarwal 1992). Tension between state officials and villagers is unusually high (Agarwal and Narain 1993, Gadgil and Guha 1995). Poachers sometimes hire villagers and successfully evade anti-poaching efforts using local knowledge; there have even been acts of arson against parks and reserves by villagers adversely affected by their establishment (Gadgil and Guha 1995).

Two examples are characteristic of the second political problem—that is, that protected reserves can become “islands” in a sea of unprotected regions. One example comes from Costa Rica, which is usually touted as a success story of biodiversity conservation through what, in this article, is called wilderness

preservation. Approximately 29% of the land area of Costa Rica is set aside on paper as national parks and reserves (Meffe and Carroll 1994). Yet Faber (1993) estimates that, whereas 55% of Costa Rica was forested in 1961, only 22% remained forested in 1991. Only approximately half of this forested area was in parks and reserves. This fact makes the 29% land area in reserves irrelevant because much of this area is neither forested nor otherwise important for biodiversity. In addition, Repetto (1992) estimates that approximately 28% of Costa Rica was deforested between 1966 and 1989. Even if Faber's lower, 33% estimate of total deforestation is used, the average annual deforestation rate was 6.9%, by far the highest in Latin America. This high deforestation rate apparently resulted because the establishment of official conservation areas led to almost total deforestation outside these areas, usually to satisfy economic interests. There was no premium on establishing simultaneous human use and biodiversity preservation through the 1980s, although this attitude is slowly changing. Meanwhile, the national parks have become isolated wildernesses of varying size. Many of them are also ravaged by excessive ecotourism (Wallace 1992). Thus, the strategy of wilderness preservation has not been particularly successful in conserving biodiversity.

A second example of the second problem is provided by Sabah, in Malaysian Borneo. Sabah has 386,375 ha in national parks and reserves (Aiken and Leigh 1995), which form more than 5% of the land area. What this figure hides is that some parks, such as the Tawau Hills Park, were extensively logged (approximately 40% of Tawau Hills) before their designation as national parks or reserves (Aiken and Leigh 1995). Over two-thirds of the reserve area is occupied by commercial forests (Cleary and Eaton 1995). Outside of a few major national parks, such as Mt. Kinabalu, Sabah is almost entirely logged. The major purpose the designation of parks seems to have served is to deflect environmental criticism. More important, the parks are isolated and separated by extensively logged regions, thus

restricting many species to small and isolated habitats.

The two types of problems with national parks—political conflict and the promotion of destruction outside the parks—are often compounded in the same situation. An example is the situation created by the Gunung Mulu National Park, a 52,890 ha park in Sarawak in Malaysian Borneo that was created in 1974. The indigenous nomadic Penans who had lived in the area that became the park retained their right to use it. Although the park has developed into a major tourist attraction, the area outside it is being extensively logged, despite much-publicized protests by Penans and other indigenous groups living in these areas. Logging has entirely isolated the forest in the park (Cleary and Eaton 1995). Newly displaced Penans from the other areas are not permitted to use the park (Sahotra Sarkar, unpublished local interviews, July 1996). Indigenous Berawans, who also traditionally lived within the area of the park, now live outside, with no right to use resources inside (unlike the local Penans). For a while, they catered to visitors by providing tourist facilities. However, their houses are now slated for demolition and their land is being expropriated to create a golf course outside the park intended primarily to attract Japanese tourists. Local resentment is severe.

It is important to note that in every one of these cases, there is no essential contradiction between social interests and biodiversity conservation. In Tortuguero, for example, conservationists could have helped to establish regular transportation by boat, using the leverage that they have with the Costa Rican government, and attempted to ensure local medical services and educational facilities. These strategies would have simultaneously helped conservation and improved conditions for local people. In India, the prevention of village dislocation, and the incorporation of local inhabitants into conservation, would have helped to avert poaching. Moreover, in this case, whatever biodiversity that existed had done so in association with human presence for millennia, albeit with significantly lower populations—so there was

probably no need for the parks in the first place.) All except a tiny minority of ranchers would have benefited from the partial maintenance of forests throughout Costa Rica. The beneficiaries would have included agriculturists, who probably form approximately 80% of Costa Rican farmers (Caufield 1991). Finally, in Sabah and Sarawak, logging benefited a tiny fraction of the population while destroying several indigenous cultures. Isolated national parks, while being at best questionable safeguards for biodiversity, served mainly to deflect environmentalist criticism. Biodiversity conservation would have been better served had traditional land usage been allowed to continue.

Because of the political problems caused by the creation of national parks and reserves, social ecologists (i.e., those who see ecological health as a social justice issue) have routinely criticized the creation of national parks and reserves, especially when these are created by decree of distant national governments acting in concert with international agencies and ignoring local needs. The arguments and evidence presented in this article show that this strategy is actually a result of biodiversity conservationists using a strategy borrowed inappropriately from wilderness preservationists. The real dispute should be between social ecologists and wilderness preservationists, not between social ecologists and biodiversity conservationists. Some of these issues have been implicitly acknowledged in the last decade, for instance, through UNESCO's "biosphere reserve" projects and integrated conservation and development projects (ICDPs), which were initially floated in the early 1970s but popularized only during the last decade (see Alpert 1996). In contrast to national parks, biosphere reserves and ICDPs allow human habitation and use of the designated areas, as long as that use does not cause irreversible degradation of the habitats.

Conclusions

Wilderness preservation cannot be used as a surrogate for biodiversity conservation. Indeed, wilderness preservation and biodiversity con-

servation may be in conflict. Biodiversity conservation can avoid contentious political issues while simultaneously promoting long-term conservation by maintaining independence and distance from wilderness preservation. In the conflict between wilderness preservation and biodiversity conservation, the biologist's professional concerns are (with the exception of situations such as that of ecologists desiring specifically to study ecosystems bereft of humans) restricted to biodiversity conservation. Janzen's (1986) plea for activist conservation serves as a manifesto for the latter. The biologist must ensure biodiversity conservation to prevent systems of outstanding intellectual interest from disappearing forever through extinction. And to the extent that biologists must justify their demand on societal funds by pointing toward utility, then, extrapolating from past experience, it is likely that unexplored biological systems will provide resources of significant value.

This is not to say that wilderness preservation (i.e., the maintenance of currently uninhabited or sparsely inhabited landscapes) may not have value in its own right. Preservation should, however, involve negotiation with other interests, such as those of developers. There is also the important question of how much preservation is affordable. Affordable preservation would probably include the national parks and many other areas in the United States and other wealthy nation-states. Appropriate negotiation and settlement would also probably lead to the wilderness designation of areas such as forests in the Pacific Northwest (which are contested between loggers and preservationists) without having to rely on the politically vulnerable fate of single species, such as the Northern spotted owl (*Strix occidentalis caurina*). By following a strategy of negotiation and settlement, the preservationist acts on deeply held aesthetic values and, in contested situations, should expect to pay to uphold them.

Social concerns are not concerns of the biologist as biologist. As a member of a civil society, a biologist may have a social conscience. There may be cases in which biological

conservation necessarily conflicts with social justice, and there may be no tangible process through which such conflicts can be avoided. For instance, hunting an endangered turtle may be an eastern Indian community's only method of avoiding starvation. Because of socio-political constraints, the economic changes necessary to defuse such a situation may not be possible in the time frame during which the turtle becomes extinct. In such contexts, social justice must take precedence over the biologist's desire for conservation. Fortunately, situations of this kind are vanishingly rare—no clear example is available.

Similarly, a biologist may also value wilderness. But when wilderness preservation conflicts with biodiversity conservation, the biologist's professional judgment must favor biodiversity. Once again, such a choice is rare at present (although not unimaginable, as the examples of Keoladeo and the Organ Pipe Cactus National Monument show). Moreover, choices of this sort are likely to become more frequent because biodiversity protected in wildernesses is often a biased, nonrepresentative sample of biodiversity (e.g., see Pressey 1994). Therefore, wilderness preservation may conflict with biodiversity conservation when the former restricts options for the latter by diverting resources from biodiversity to wilderness.

A more usual choice occurs when wilderness preservation conflicts with social justice. Ordinary ethics dictates the precedence of the latter, but it is important to note that in these conflicts, biodiversity conservation usually gives no reason for preferring wilderness preservation over social justice. In such a circumstance, the issues must be kept separate, and biodiversity concerns—and professional judgments—must not be allowed to be used to hide the real choice: wilderness or justice. The stark choice must be faced by the individual as aesthete and citizen. That reality, perhaps, is the major—and most troubling—point of this article.

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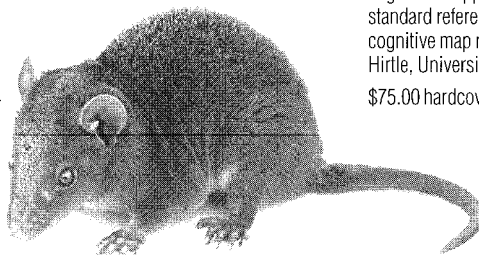
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