POLICY: ECOLOGY

Conservation Targets: Do They Help?

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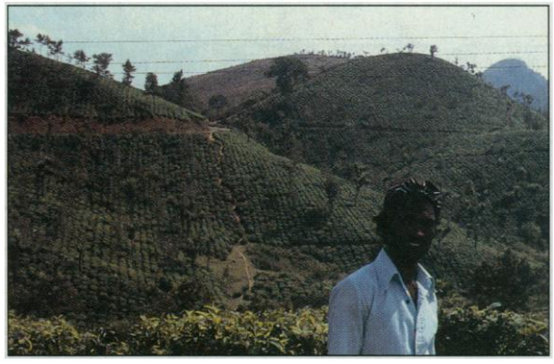
The most irreversible environmental problem of this era is the projected rapid loss of biodiversity, including the disappearance of up to half of the world's species (*1*, *2*). In response, many international commissions and nature conservation organizations have called for the near-term protection of at least 10 or 12% of the total land area in each nation or in each ecosystem (*3*, *4*). If successful, this campaign would double or triple the land area now designated as national parks or similar strict reserves (*5*). We are concerned, however, that these target percentages could become de facto ceilings of protection and imply that protecting 10% or so of the land is sufficient to prevent the predicted major extinction event. (See related commentary on page 2068.)

We interviewed 25 conservation leaders, biologists, and agency personnel about the origins of the 10 or 12% goal and its implications (*6*). Several stated that the justification for this target was political expediency and that targets based on ecological knowledge would be much higher but would be politically unacceptable in many nations.

The biologists in our sample agreed with the statement that, politics aside, protection of only 10% of Earth's ecosystems could make at least half of all terrestrial species vulnerable to artificial (anthropogenic) extinction, if not immediately, then in the near future. The most frequently given basis for this opinion is the species-area relation [the log number of species that exist in a place increases linearly with the log of area (*7*)]. A 50% loss of species after a 90% loss of habitat area assumes certain parameter values for the species-area relation describing similar isolated habitat remnants (*2*, *8*).

The situation is most serious in the tropics, which are estimated to contain two-thirds of the world's terrestrial plant and animal species (*9*). The area covered by relatively undisturbed tropical forests has been reduced by about half since the middle of this century, and these forests are currently shrinking at a rate of about 0.8% per year (*10*–*12*). Barely 5% of the tropical rainforest biome is protected (*13*).

Exacerbating the rapid loss of forests is the inability of governments to monitor habitat changes and enforce conservation laws, leading commentators to assert that many tropical reserves are merely "paper parks" (*14*). The steady increase in global demand for tropical goods (natural and agricultural) is also accelerating rates of habitat conversion in developing nations (*15*).



Tea plantation in southern India. This land was once tropical rainforest, but now only a few shade trees remain.

Do Unprotected Lands Contribute to Conservation?

Advocates of economic development often claim that tropical fauna and flora can persist in unreserved lands. It is true that within the borders of some nations, particularly those of the north, there remain vast expanses of cold and arid lands with little economic value. Although their productivity is low, these lands have the potential to sustain natural ecosystems and protect wildlife. Nevertheless, most nations, temperate and tropical, are rapidly converting forests to capital or to subsistence uses (*11*, *16*). Even in surviving forest reserves and forest-like plantations and woodlots, habitat value for most species is frequently destroyed by the nonsustainable collection of rare species for the pet trade, hunting for meat, fuelwood collecting, overly short logging rotations, excessive burning, grazing of livestock, and the lack of enforcement of regulations governing logging, recreation, mining, and oil and gas exploration and extraction (*14*). Coastal and marine ecosystems in the tropics suffer analogous fates (*17*). Moreover, the expansion of free trade and the global market are providing greater and more diverse economic options for tropical landowners wishing to satisfy northern cravings for perishables year-round.

The World Resources Institute has classified lands as low, medium, or high disturbance (*12*). Analysis of these data indicates that for tropical nations in forested regions of Asia, Africa, and Latin America, 29 out of the 63 nations have already surpassed an 80% level of disturbance, hastily following the destructive path blazed by the developed, industrialized nations.

Thus it appears inevitable that nearly all unreserved forest lands in the tropics will soon be degraded or subject to intensive human activity (*18*). We conclude that lands outside strictly protected reserves in the tropics, not to mention those in many temperate-zone nations, will be greatly diminished in their capacity to sustain native species and ecosystems by 2050, by which time human populations may have more than doubled.

How Much Is Enough?

If 10% of wildlands is far too little to prevent a mass extinction, how much territory is enough? In the few detailed studies available, the typical estimate of the land area needed to represent and protect most elements of biodiversity, including wide-ranging animal species (*19*), is about 50% (see the table). These results, inadequate though they may be, support the conclusion that conservation targets in the range of 10% are far from adequate, all the more so in the tropics because of the greater rarity and small geographic ranges of tropical species.

Conclusions

Achieving the 10% target in much of the world today would be a heroic accomplishment. At the same time, it is arguable that campaigns with targets in this range can create the unintended and false impression that such a paltry tithe to nature is enough to prevent a mass extinction of species. Even though these targets are usually accompanied by deadlines (such as by the year 2000), they are rarely realistic. In part this is because influential commercial extractors resist increasing the targets during subsequent conservation campaigns.

Recent events support our skepticism about the value of interim conservation targets. During their successful election campaign of 1992, the National Democratic Party in the Canadian province of British

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Columbia promised to achieve 12% preservation of all ecosystems by the year 2000. Even though 12% of the total area of the province soon may be protected, many ecosystems—such as interior Douglas fir, coastal western hemlock, and bunchgrass ecosystems—will have far less than 12% representation, whereas other economically less valuable and less diverse vegetation types will have more than 12%. Also, political pressures have led to the substitution of recreational and economic criteria for an earlier, biologically based, process of reserve selection. Many of the recently selected reserves are small or are located in regions with relatively low economic and biodiversity value. There is no reason to believe that these patterns and problems are unique to British Colombia.

Area required (%)	Region	Goal
45	Australian river valleys (*25*)	To contain all plant species
49	Oregon Coast Range (*26*)	To capture regions of high biodiversity, represent all ecosystems, maintain target species, and provide for connectivity
75	Norway (*27*)	To protect all plant species in deciduous forests
33.3	Florida (*28*)	To preserve habitats essential for rare and declining species

Estimates of minimum areas for the protection of biodiversity. The objectives and criteria of these studies varied.

Therefore, two questions remain. First, do the popular 10 or 12% guidelines actually encourage nations to double or triple the area of land set aside in a relatively natural state? We hope so. Twenty nations have stated their intention to achieve the 10% goal by the year 2000 (*20*), but only five are tropical, and only two (Bolivia and Colombia) have substantial amounts of tropical forest. On the other hand, the rate of tropical deforestation is increasing dramatically (*11*, *21*), and the rate of nature reserve creation has slowed in the past decade and can be expected to decline even further (*22*). It is even possible that the 10 to 12% targets (*3*), by failing to warn of the true scale and gravity of the extinction episode, are contributing to an atmosphere of public complacency and political denial, at least in the rich nations that fund many of the economic development and conservation projects in the tropics. Instead of investing most of their biodiversity funds in questionable sustainable development experiments—the current policy of most foreign aid programs and mainstream conservation organizations—it would be more prudent if agencies were to redouble their efforts to expand and strengthen the global system of protected areas (*23*).

Finally, even if the current conservation targets were animating an international resurgence in nature protection, we must ask whether significantly higher target numbers would be even more effective, at least in those nations (tropical and temperate) that still retain large areas of wildlands. Given that there are but a few years left to act in the tropics (*21*, *22*), there is little to lose by being candid and acknowledging that the 10% goal is effectively a prescription for reducing global species richness by half or more. If numerical targets are politically necessary, then they should be based on scientifically sound reserve design goals and protocols (*24*). One size, particularly if it is small, does not fit all.

References and Notes

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7. The species-area relation is expressed as $S = CA^Z$, where S is the number of species, A is area, C is a constant, and Z is the power law constant; Z values range from about 0.2 to 0.5, with the higher values associated with oceanic islands and other isolates. See R. H. MacArthur and E. O. Wilson, *The Theory of Island Biogeography* (Princeton Univ. Press, Princeton, NJ, 1967).
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