

Biodiversity in India*

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Biodiversity is under threat worldwide.¹ For example, the global mammalian extinction rate of 0.35% of species lost per century since 1600 is calculated to be between 17 and 377 times the mammalian background extinction rate during the past 65 million years, that is, since the mass extinction that removed the dinosaurs. India has considerable biodiversity that is under threat as the table below (which deals only with animals) indicates.

Table 1: Summary of animal biodiversity threats.

	Number of Indian species (Percent of world total)	Percent of Indian species evaluated	Species threatened in India as percent of those evaluated	Number extinct (percent of those evaluated)
Mammals	386 (7%)	59%	41%	4 (1.8%)
Birds	1219 (12%)		7%	unknown
Reptiles	495	73%	46%	unknown
Amphibians	207 (4%)	79%	57%	unknown
Freshwater fish	700	46%	70%	unknown

Note: Based on (Kumar et al. 2000). Global species totals, and threat data for birds are based on . For birds, unlike for the other animals, the threat refers to worldwide extinction rather than extinction in India. Threatened species are those defined as critically endangered, endangered, or vulnerable according to (IUCN 2004) definitions.

Biodiversity, as measured by the numbers of plant and vertebrate species is greatest in the Western Ghats and the northeast. This is because of the presence of tropical rainforests that are typically the richest habitats for species diversity. Both these areas are included in the world's list of hotspots of biodiversity: small geographic areas with high species diversity. Of the two, the Western Ghats have more endemic species, those that are found nowhere else.

Threats to species are principally due to a decline in the areas of their habitats, fragmentation of habitats and declines in habitat quality, and, in the case of some mammals, hunting (Kumar et al. 2000). Fragmentation raises the extinction risk because

¹ This essay confines itself to discussing wild species diversity. Genetic and consequent morphological diversity within species is also of interest, particularly for domesticated plants and animals.

isolated subpopulations can go extinct one by one without being repopulated. Stochastic declines in small subpopulations makes it more likely that they will go extinct, and this is further exacerbated by the reduction of genetic variability in subpopulations resulting from isolation. Species with already restricted ranges are particularly vulnerable to these threats.

For the terrestrial species, the declines in habitat quality and quantity arise from conversion of forests and grasslands to agriculture, of natural forests to monoculture plantations, and from grazing and woodcutting pressures. In some areas, invasion by exotic species of plants also results in habitat degradation. Prominent examples are the spread of the Peruvian thorny tree *Prosopis juliflora* in the dry parts of northern India where it replaces native species such as *Acacia nilotica* (*babool*), and the spread of the South American flowering bush *Lantana camara* in the sub-Himalayan belt.

For aquatic and semi-aquatic species, the declines in habitat quality are due to diversion of ground and surface water, resulting in the drying up of streams and other water bodies, from siltation, and pollution from pesticides and other chemicals. Freshwater fish are also threatened by the introduction of exotic species which may be predators or competitors.

Why is biodiversity loss an economic concern? There are several reasons why biodiversity has economic value. Pharmaceutical value is one. Recent work suggests that earlier work claiming that the pharmaceutical value of biodiversity is negligible was mistaken. It remains unclear, however, how generally poor populations living in biodiverse environments and having the means to affect extinction prospects could capture these values.

A second source of value is ecosystem value. Loss of biodiversity may trigger large unpredictable changes in an ecosystem and some of these may adversely impact agriculture or human health, perhaps through induced changes in hydrology or pest populations. Again, there is no directly useable information on the magnitudes of such risks.

A third source of value is tourism. The principal attraction for tourists in areas such as the Silent Valley National Park in Kerala is biodiversity. While biodiversity *per se* may not be the attraction for most tourists visiting areas with high biodiversity, their

willingness to pay for the preservation of such areas in their “natural” state or for the survival of some charismatic species of birds and animals means that habitat protection for these species has a market demand and biodiversity conservation thus finds a source of finance.

Finally, there is the existence value of biodiversity. This may be negligible for the bulk of the Indian population but may be quite significant for a minority among the relatively wealthy as well for a minority in developed countries. It may be very large if future generations’ likely preferences are taken into account.

It is the last source of value, the preference of an elite minority, that has been the principal driver of policies to conserve biodiversity in India. These have taken the form of legislation such as the Wildlife Protection Act of 1972 and its various amendments and the Forest Conservation Act of 1980 that extended the colonial Forest Acts of 1878 and 1927 to evict inhabitants of forests and other wild areas by declaring large areas of forest or other wild areas “Reserved”, “Protected”, “Wildlife Sanctuaries” or “National Parks”, and stripping them of their rights to exploit these natural resources (Saberwal et al. 2001) (Vasan 2005). This was possible when political power was centralized in the Congress party, with a prime minister (Indira Gandhi) who was sympathetic to the cause of conservation.

The capacity of the Forest and other departments of state governments to enforce legislation protecting wild habitats deteriorated with the general decline in administrative capacity occasioned by the spread of a system of electoral fundraising that depended on corrupting the civil services to raise money for the party in power. By the 1990’s it had become clear to almost all observers that the system could not be relied upon to resist encroachment on forest habitats by politically powerful industrial and agricultural interests. Meanwhile the system of restrictions on the rights of user of poor, largely tribal, forest dwellers, has become, in the absence of political commitment to protect wild habitat, an extortion mechanism (Vasan 2005). As an illustration of the by now almost surreal nature of the system, consider the following line from an advertisement by the Government of Chhatisgarh touting its achievements in development in *The Hindu* of 29 October 2005: “Amnesty for more than 2,50,000 ST/SC and below poverty line people

for petty forest crimes”. Having sown the wind of dispossession, elite conservationists are now seeing the first signs of the resulting populist whirlwind.

In response to the realization that conservation by fiat was failing, Joint Forest Management and Eco-Development schemes were initiated in the 1980s and 1990s. While the former assigns a share of cash flow (including in-kind) rights to local communities, tenure is insecure. The latter are based on the premise that investments in non-forest related activities financed by governments will lower the relative returns to natural resource exploitation. It may well be the case, however, that this may induce a subset of the relevant population to desist from natural resource exploitation and also cause them to lose any interest in protecting the natural asset which may then be degraded by another subset of the population.

Local communities exercise influence over the exploitation of the natural assets in question. They can degrade them and prevent others from degrading them if they were motivated to do so. The best chance of preserving the assets, therefore, seems to be to assign the full rights to revenue flows from *non-extractive uses* such as tourism to these communities together with a democratic and transparent institution that allows them to resolve internal common pool problems. In addition rights to extractive uses, at least within limits that would not degrade the resource², together with tenure security should be granted (or restored). This would give local communities the incentive to both maintain the resource and to exclude outside appropriators. Local democracy restricted to such a limited set of issues is likely to be more successful at resolving common pool problems of overextraction than the political system has been at the state and national levels.

In many cases this may be enough to induce communities to preserve biodiversity while continuing to use the areas for grazing, firewood collection, timber and collection of other forest produce.³ In and around existing ‘Protected Areas’ (Wildlife Sanctuaries

² If such limits violate prior patterns of use, then compensation would have to be provided. In many cases, rights to profits from tourism would be sufficient to cover these losses. Enforcement of such limits would, however, remain problematic so long as local communities did not feel the limits would be in their own interest. Incentive payments, rather than coercive regulation, would probably be the best option in such cases.

³ Saberwal et. al. (2001) show that it is a misconception that extractive human use is incompatible with biodiversity conservation. In some cases, as in the famous bird refuge at Keola Deo Ghana, biodiversity

and National Parks), tourism values may be high enough for this to be the profit-maximising option. Fees are presently much lower than profit-maximising levels (Chopra 2000) and policing costs inefficiently high (Somanathan et al. 2005). When a community has full ownership of tourism revenues, the right to set fees, and manage policing, we may expect much higher revenue streams together with much reduced costs of protection from most Indian Protected Areas. This could bring unprecedented prosperity to some of the poorest areas of the country.

In cases where there are no easily seen charismatic species or scenery, direct payment for biodiversity conservation may be necessary in addition to tourism and revenues from extractive use in order to give local managers sufficient incentives to prevent biodiversity reduction or habitat conversion. If reputed NGO's were to create trust funds to be used for the preservation of specific areas, they may well be able to raise enough contributions domestically and abroad to give local communities that extra incentive to protect many threatened areas. It helps that biodiversity has a highly uneven distribution so that protecting small areas can have very high payoffs in terms of biodiversity conservation.

Current debates over the Tribal Rights Bill suggest that neither conservationists nor tribal rights activists have seriously considered a solution involving the transfer of tourist revenues to local communities although some (Saberwal et al., 2001) have called for much more meaningful local involvement in conservation management. Conservation NGOs, despite their belated realization that alienating local people increases the risk of a populist open season on natural assets, have not recognized the importance of granting them security of tenure and rights to and control over tourist and other revenues. Nor have they taken actions to promote locally run tourist parks on the peripheries of the officially Protected Areas. Trust funds for direct payments to private landowners and communities have not yet begun even though this may be the only way to protect certain habitats housing less conspicuous endangered animals such as amphibians which are often not in Protected Areas (Bawa et al. 2004).

depends on certain human uses such as grazing. The ban on grazing there resulted in water bird habitat being choked by vegetation.

Tribal rights activists have campaigned for a restoration of tribals' expropriated land and rights of user. They have not demanded full rights to all revenue flows, whether in cash or in kind, tenure security over commonly held forest areas, and control rights for setting access fees and regulating use. By couching their arguments in terms of justice and equity alone, they have failed to make the case for a larger transfer of assets that would promote efficiency by preventing resource dissipation and reducing monitoring costs, *and* make for a more genuinely equitable distribution of resources.

The principal obstacle to such a development is the interest of politicians in maintaining a degree of state control over natural resources so as to continue to generate illegal revenues for campaigning and private consumption. It is significant that both the Joint Forest Management and the Eco-Development schemes fall far short of true community ownership despite the provision made for 'Village Forests' in the Forest Act of 1927 and despite the success of Van Panchayats in eastern Uttaranchal, an organizational form established by the colonial government in 1930. Somanathan et. al. (2005) show that the Van Panchayats have been just as good, if not better, at forest conservation than the state forest department and at less than a tenth of the cost per hectare.

An alliance of conservationists and tribal rights activists may however, succeed in initiating genuine reform in a political climate in which tribals are becoming ever more active. In this case, considerable government resources could be freed up when forest departments are gradually downsized and redirected to a mainly scientific and advisory rather than policing role.

An important exception to the pattern of dispossession and alienation of forest communities and failed state regulation is seen in the northeastern states other than Assam and Tripura. They are demographically different from the rest of India in that Scheduled Tribes constitute a majority of the population and this meant that the Forest Acts were never applied in a way that resulted in the loss of tribal control over forest land. To the best of my knowledge there are no systematic comparisons of the performance of these states in forest conservation with the rest of India. However, there does not seem to be any evidence that they have performed more poorly. It is probably true that with the spread of firearms, hunting has greatly reduced wild animal

populations. It is notable that there has been no serious attempt to apply the provisions of the Wildlife Protection Act restricting hunting in these areas. It would be politically impossible to do so. These areas constitute a promising region for experiments by conservation NGOs in starting locally run tourist parks.

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