Article

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Conserving Biodiversity as if People Matter: A Case Study from India

India has rich traditions of nature conservation as well as a vigorous official program of protection of nature reserves developed over the last 40 years. However, the official program suffers from total reliance on authoritarian management arrangements in which decisions are made centrally and coercion is used to implement them. At the same time, the state apparatus organises subsidized resource flows to the urban-industrial-intensive agricultural complex which promote inefficient, non-sustainable resource-use patterns that are inimical to conservation of biodiversity. These processes are illustrated within the concrete setting of the district of Uttara Kannada in southern India. It is suggested that the interests of conservation would be served far better by an approach that withdraws the subsidies to the elite so that a much more efficient, sustainable and equitable pattern of resource use, compatible with conservation of biodiversity, can be instituted. In conjunction with this, the larger society should involve local people in working out detailed plans for conservation of biodiversity and offer them adequate authority as well as appropriate financial incentives to implement these plans. The paper goes on to illustrate how such an approach may be implemented in the case of Uttara Kannada.

INTRODUCTION

With extensive tracts of humid tropical forests and great heterogeneity of environmental regimes, India is one of the top twelve megadiversity countries of the world. Given the large biomass needs of its tribal and rural populations and the exploding resource demands of its growing urban-industrial-intensive agriculture complex, conserving this heritage of biodiversity is a formidable challenge. India has rich traditions of nature conservation; following independence it has also developed an extensive network of nature reserves.

The Project Tiger with 17 reserves spanning the country has saved this magnificent animal from the brink of extinction. There are however signs that all is not well with the country's programs of conservation. India's cultural traditions have preserved an enormous network of trees of the genus *Ficus,* an important keystone resource-throughout the countryside. These trees are now being increasingly felled to bake bricks and to make crates. At the same time, key reserves in the network of Project Tiger such as Kanha and Manas are threatened by discontented local tribal people. The important questions that must now be tackled, relate not only to identifying the deficiencies in the coverage of the national network of nature reserves, but to how decisions are made on what elements of biodiversity are to be conserved and how this is to be accomplished (1, 2).

It is important to look critically at the processes affecting overall patterns of natural-resource utilization and not just at those impinging on nature reserves. Very broadly the ongoing processes may be summarized as follows:

a. Intensification of resource fluxes in favor of industry-organized services-intensive agricultural complex involving large-scale state subsidies.

b. Increasing biomass demands of a growing rural population forced to meet its requirements from open-access public lands.

Together these two kinds of pressures promote nonsustainable, inefficient use of natural-resources, resulting in decimation of biodiversity. This is coupled to

c. Attempts at conservation of biodiversity in a network of officially constituted nature reserves, relying on policing by the state apparatus, while the traditional practices of conservation are given short shrift.

How do these processes affect biodiversity? What specific elements are responsible for negative impacts? How might these problems be overcome and what would come in the way of overcoming these problems?

UTTARA KANNADA

The two richest humid tropical forest tracts of India fall in the biogeographic provinces of Eastern Himalayas and Malabar, the latter comprising the west coast and the hill range of Western Ghats (3, 4). The district of Uttara Kannada (13° 52' to 15° 30' N and 74° 05' to 75° 5'E) with an area of 10 200 km^2 lies at the center of Malabar (Fig. 1). It is a region of gentle undulating hills, rising rather steeply from a narrow coastal strip bordering the Arabian Sea to a plateau at an altitude of 500 m with occasional hills rising above 600 to 860 m. The annual precipitation largely confined to the monsoon months of June to September ranges between 3500 mm on the coast, rising to 5000 mm on the crestline and declining to 1000 mm on the eastern plateau. An interpretation of the Landsat imagery suggests that around 6900 km^2 of the district is under forest cover, around 2000 km^2 is under paddy and millet cultivation, 130 km^2 under coconut and betelnut orchards, 200 km^2 under rocky outcrops and the balance under habitation and reservoirs (5). This tract of 6900 km^2 of forest land is the largest single contiguous tract of humid tropical forest in Peninsular India. Today, it harbors 1741 species of flowering plants and 403 species of birds. Notable wildlife includes the tiger, elephant, gaur or Indian bison, liontailed macaque, Wynaad laughing thrush, Travancore tortoise, several species of legless amphibians and dipterocarp trees (6).

Colonial Period

Uttara Kannada has been well known historically for its forests and wildlife. In the 17th century both the British and Dutch had established trade stations on its coast. These dealt extensively in wild pepper and cardamom, sandal and teak wood and poon (*Calophyllum elatum*) for ship masts. Accounts of Europeans who worked at these stations mention the rich wildlife with an abundance of tiger, panther, elephant, bison and several species of deer. The district came into British hands in 1799. Buchanan, a naturalist in the employ of the East India Company travelled extensively through the district in 1800–1802. His very detailed accounts confirm that apart from the southern parts of the coastal tract, the district was thickly forested and abounded in wildlife. He also mentions, the cultural traditions of local people that focused on nature conservation such as sacred groves. Howevér, he interprets the almost-total protection offered to these groves as a "contrivance" to prevent British rulers from laying a claim to what was now its rightful property (7).

The history of the British period can be summarized as a series of attempts by the colonial power to appropriate the rich forest resources of the district as cheaply as possible. To this end, the community-based systems of restrained use and conservation had to be scuttled. This was accomplished

through refusal to recognize the legitimacy of all customary and community ownership rights. The British recognized only two forms of ownership, state ownership of all non-cultivated lands and private ownership of all cultivated lands. The bulk of state-owned lands were converted into reserve-forest lands. A fraction, about 25% was set aside as minor or leaf-manure forest lands for meeting the subsistence biomass needs of local people. These are substantial since agriculture in this hilly district with its laterized nutrient deficient soils depends heavily on organic manure inputs. But the minor/leaf-manure forest lands came to be treated as open-access resources and have consequently been subject to escalating degradation as envisaged in the tragedy of the commons scenario. The reserve forests were dedicated to supply cheap raw material, primarily, teak to serve colonial interests of shipbuilding, railways and other constructions. As a result, they were almost totally depleted of natural teak between the years 1800–1850; followed by depletion of other hardwoods, especially *Terminalia* and *Lagerstroemia* species, and conversion to single species plantations of teak. The evergreen tree species were of little commercial value until the 1940s, and up to that time forest working focussed on their replacement by the more valued timber species. Although a succession of management plans initiated in early 1900s professed sustainable harvests as their aim, in fact there was only further depletion. All management plans were set aside during the two world wars, permitting totally unregulated harvesting from reserve forests (8–10).

Since Independence

The British forest-management regime in Uttara Kannada was dedicated to export of teak and other timber as cheaply as possible. World War II brought about an important change, however, when the British decided to encourage plywood manufacture in India. With its rich evergreen forests providing abundant raw material, one of India's first plywood factories was set up in the Uttara Kannada district. This was followed by a paper factory and a polyfiber industry, both of which were established soon after independence.

The policy of dedicating state-owned forest lands to furnish a cheap supply of industrial raw materials was carried to further extremes after independence. Thus, in 1958, bamboo, earlier prescribed to be eradicated as it constituted a weed in teak plantations, in spite of its manifold rural uses, was sold to the paper industry. The price was as low as Rs. 1.50 (USD 0.30 at the then prevalent exchange rates) per tonne, i.e. over a thousand times less than the market value. Giant wild mango trees that regularly yielded much valued fruit worth more than Rs. 100 per year, were also made over to plywood industry for as little as Rs. 150 for a whole tree. The result has been rapid decimation of a whole range of species in the more humid tracts, especially on the steeper western hill slopes. Other natural-resources have also been made available at highly subsidized rates to the urban, industrial, intensive agriculture complex. For example, there have been a series of state sponsored hydroelectric projects within the district. The electricity so generated has been supplied to industrial consumers and urban households as well as used in water lifting for irrigated agriculture at greatly subsidized rates. At the same time the cultivators whose lands were submerged under the reservoirs have been poorly compensated and often forced to encroach on forest land to eke out a living. This whole system of subsidized resource use has ensured that neither resource managers nor resource users are concerned with resource-use efficiency.

While the commercial pressures have mounted, so have the subsistence demands of the rural population that has grown rapidly as a result of the eradication of malaria after World War II. These subsistence demands continue to be met from open-access public lands, with further erosion of traditional practices of disciplined harvests from common lands. Consequently, highly inefficient and wasteful patterns of natural-resource use have prevailed (11).

Traditions of Conservation

In common with the rest of the Indian society, people of Uttara Kannada have inherited a rich variety of traditions of nature conservation (12, 13). These include:

- Protection of individual plants and animals considered to be sacred, e.g., trees of the genus *Ficus* or monkeys such as the hanuman langur and bonnet macaque.
- Protection of specific life history stages, such as birds breeding at heronaries.
- Protection of entire biological communities in the sacred groves and sacred ponds.
- Protection of animals from overhunting through devices, such as a ban on hunting of fruit bats at the roosting sites but not outside the sites.

The British colonialists and, following independence, Indian resource managers have both consistently attacked these traditions in many ways. For example, the plywood industry has harvested *Ficus nervosa* as a preferred species and many sacred groves have been clearcut to supply timber. Fisheries managers have poisoned sacred ponds removing indigenous fish and restocked them with exotic carps for sale to outside agencies.

State Initiated Conservation Efforts

The main focus of regulation of hunting during the British period was on the traditional subsistence/ritual hunting by local people, which aimed to ensure supply of game to the European hunters. These hunters began to hunt many species, such as elephant, that had previously been immune from hunting by local people. They also vigorously pursued extermination of species perceived as vermin such as the Indian wild dog. Indeed, there

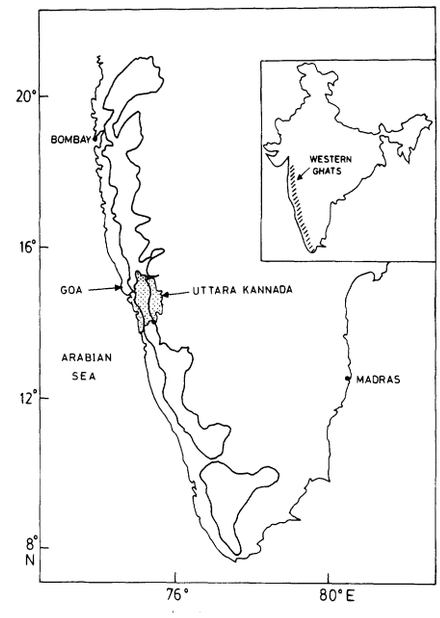
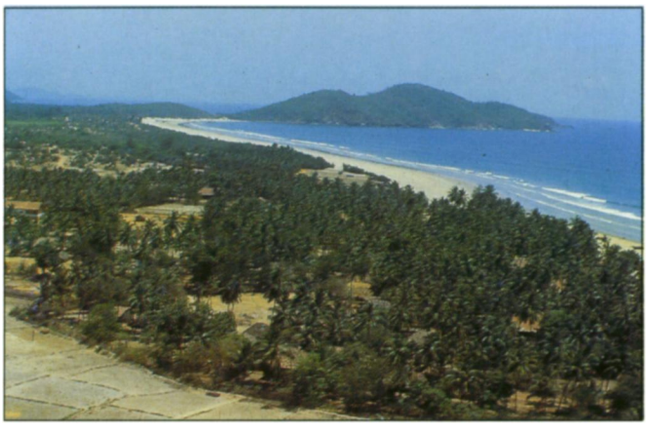


Figure 1. A map of peninsular India indicating the location of the hill range of Western Ghats. The district of Uttara Kannada stretches from the coast, across the hills to the peninsular Indian plateau.

was a rapid decline in wild-animal populations during the British regime. The pace of this decline increased further after independence with the introduction of the jeep and widespread availability of firearms (14).

This ever accelerating depletion of wildlife led to the beginning of conservation measures in the 1950s with the establishment of an Indian Board for Wildlife and of Wildlife Wings in Forest Departments. The main tool of conservation that was adopted was a ban on hunting of endangered species everywhere together with the establishment of Wildlife Sanctuaries and National Parks.

A major Wildlife Sanctuary, Dandeli W. L. S., of over 5730 km^2, was established in 1953 in the northern parts of Uttara Kannada. However, little protection to natural vegetation and wildlife was provided since a large paper mill was established in the very heart of this sanctuary in 1958 and a series of dams of the giant Kali hydel project covered the rest of the sanctuary in the 1970s (15). The ban on hunting has not been very effectively implemented since it is operated in a centralized, rigid fashion without allowance for local conditions. For example, farmers claim that there are now too many wild pigs in the district with the newly arriving weeds, *Lantana* and *Eupatorium* providing excellent shelter, and depletion of panther and tiger populations, cutting down predation. These pigs cause severe crop damage and farmers hunt them relentlessly. Nevertheless, hunting wild pig remains an offence in law. So does the annual ritual hunting by local communities such as the *Halakki Vakkals* who engage in such a hunt as a religious observance. At the same time official managers continue to



The coastal landscape of Uttara Kannada. There is little left of natural vegetation. However the coastal stretch is covered by coconut plantations mixed with a tremendous diversity of cultivars of mango (*Mangifera indica*) and jackfruit (*Artocarpus integrifolia*) along with a number of fruit yielding tree species belonging to genera *Myristica, Spondias* and *Garcinia*. All of these also occur in the wild. Photo: M.D. Subash Chandran.

The mosaic of disturbed natural forest and anthropogenic grasslands near the crestline of Western Ghats in Uttara Kannada district. Such vegetation supports the greatest diversity of bird species within this district. Photo: R.J. Ranjit Daniels.

An irrigation pond in the eastern part of Uttara Kannada district. These ponds support a wide diversity of resident and migratory waterfowl. Photo: R.J. Ranjit Daniels.

violate traditions of conservation of the local people.

Social Conflicts

This whole system of resource management initiated under the British rule and further elaborated after independence is based on alienating local people from control of and access to resources. Its primary objective has been to make natural resources available as cheaply as possible to the elite, be it the British ruling classes or the industry-organized services-intensive agriculture complex of the Indian society. The elite that benefits from resource mobilization is shielded from the ill-effects of the degradation of the resource base, since it can shift to the use of other resources or resources from other regions as the occasion demands.

The pattern of natural-resource use promoted by centralized authority has been non-sustainable when viewed from local areas such as the Uttara Kannada district. It has also led to severe conflicts with the local populations attempting to maintain their customary rights over and access to resources (5, 11). In the process, the local traditions of resource conservation have been increasingly disrupted or have broken down altogether.

Nevertheless, the effectiveness of traditional conservation can be clearly seen in the landscape of Uttara Kannada, where a large number of monkeys still survive and thousands of *Ficus* trees dot the countryside due to their religious significance. The only remaining natural stand of the genus *Dipterocarpus* persists in a sacred grove, as does the last large patch of a *Myristica* swamp.

RE-ORIENTING CONSERVATION

Evidently, there is a case for working out a new approach to conservation of biodiversity in Uttara Kannada. It is clear that conservation cannot be considered in isolation from local people, and broader patterns of natural-resource use and development, but must be complemented by policies promoting sustainable and equitable development of the natural-resource base as a whole. To be effective, any approach must give a larger role to the local people. This would entail restoring to them much of the authority they have lost over the past two centuries along with appropriate financial incentives. Local people must be involved because their well being is still intimately linked to the health of the natural-resource base of their own localities, hence they have a real stake in its sustainable use. Thus, in Uttara Kannada people depend on natural vegetation to meet almost all the needs of domestic cooking and water heating, 90% of fodder needs for livestock, and 80–90% of nutrient-supply needs for cultivated lands. Local people are also dependent on natural vegetation for making ropes, baskets, agricultural and fishing implements and for thatching their huts and cattle sheds (5). They still collect many wild fruits, hunt birds and wild pigs and fish the rivers to provide a significant fraction of their nutrition (16). For them, degradation of natural-resources is a genuine hardship, and of all the people and groups who compose the Indian society they are the most likely to be motivated to take good care of the landscape and ecosystems on which they depend. The many traditions of nature conservation that are still practiced could form a basis for a viable strategy of biodiversity conservation (2).

Involving local people in conservation, however, does not imply as some Gandhian environmentalists have stated that India must abandon all efforts at industrialization and return all authority to village communities in an effort to recreate an agricultural society in balance with nature (17). Such a scenario is simply not feasible for a variety of reasons, including the pressures of the international economic and political system. The practical option is to continue the processes of industrialization and intensification of agriculture, but with an emphasis on efficient, sustainable and equitable resource use.

The central argument so far has been that inefficient, non-sustainable and inequitable resource use is promoted by the large-scale state intervention through subsidies to the industrial-organized services-intensive agriculture complex that is shielded from the costs of environmental degradation. These costs are passed on, for instance to the peasants and artisans of Uttara Kannada district who have been deprived of all authority over the local natural-resource base. The proper response would then be to withdraw the subsidies that presently flow to the elite. Instead, the elite should be made to

BOX

Existing Apparatus for Planning and Implementing Biodiversity Conservation in India.

CENTRAL GOVERNMENT

Ministry of Environment and Forests

Primarily advisory, and as disburser of funds for special projects such as Project Tiger *since Land Use, Forestry and Law and Order are responsibilities of State Governments. Advisory Boards provide minimal inputs to the Central Ministry.*

STATE GOVERNMENTS

Forest Departments: Territorial and Wildlife Wings

These two wings have joint jurisdiction throughout a state. Wildlife Wings *are manned by Forestry Personnel on temporary secondment. All the decision-making power of these as well as all other State Government agencies is concentrated in the hands of Ministers, Secretaries and and Departmental Heads operating from the state capitals. At the state level a Wildlife Advisory Board provides minimal inputs, there are no inputs from a more local level.*

Assessing conservation priorities for Uttara Kannada (6).

Sl No.*	Attribute	Criterion	Prescriptions for UK	The only or best representative localities of conservation interest
1.	Species richness of constituent biological communities	Greater value attached to communities with larger number of species	Evergreen forests harbor largest number of species of flowering plants and amphibians, and moist deciduous forest zone that of birds	Bharatnalli Madurahalli, Gunjavati Range, Bargadda-Patoli, Hulidevargodlu-Unchalli, Aganashini estuary, Kulgi-Virnoli
2.	Geographical range of constituent biological communities	Greater value attached to communities with more restricted range	*Myristica* swamps harbor communities with a restricted range	Kathlekan
3.	Spatial occurrence of constituent biological communities within their range	Greater value attached to communities with more restricted spatial occurrence	Communities of spray zones of waterfalls are of very restricted occurrence; Limestone outcrops	Unchalli waterfalls, Yan
4.	Identity of species making up consitutent biological communities	The more distinctive the component of species, the greater the value	Mangrove vegetation and beaches harbor a highly distinct set of sepcies	Sunkeri, Thenginagundi Aganashini estuaries Karwar-Kamat Bay
5.	Endangerment due to human pressures	The more endangered communities are of greater value	Riverine forests are greatly endangered by human pressures	Hulidevaragodlu-Unchalli waterfalls
6.	Attributes of component species			
(a)	Restricted geographical range	Greater value attached to species with more restricted range	Evergreen forests harbor birds with more restricted range	Suremane, Hulidevaragodlu
(b)	Narrow habitat preference	Greater value attached to species with narrow habitat preferences	Freshwater ponds and estuaries harbor birds with narrow habitat preferences	Madurahalli, Nyasergi, Salgaum, Sanikatta, Masur
(c)	Taxonomic uniqueness	Greater value attached to species with fewer related species	Gnetum, a gymnospermous climber of evergreen forests is the only member of its order in UK	Hulidevaragodlu
(d)	Endangerment due to human pressures	Greater value attached to species subject to greater pressures	Wintering waterfowl in marshes are hunted extensively	Aganashini estuary and Nyasergi
(e)	Ecological role	Species serving as keystone resources would be attached greater value	Ficus species are keystone resources of tropical forests throughout the district	Ficus trees protected on religious grounds are scattered
7.	Interaction with adjacent communities	Greater value attached to communities serving as links in maintaining higher diversity	Betelnut plantations serve as links between patches of evergreen forests	

* Sl = Specific locality

compensate the rural poor for the decline in their quality of life, consequent on degradation of the natural-resource base. At the same time the local people should be increasingly involved in controlling and managing the natural-resource base of their localities. This ought to promote a far more efficient, sustainable and equitable process of intensification of natural-resource use, a process that would be compatible with conservation of biodiversity.

Outside Control

The natural-resource development approach advocated here, would of course have to be complemented by an effort more specifically focused on biodiversity. The current approach treats conservation as a matter of keeping local people out of a few large nature reserves and preventing them from killing most larger species of wild reptiles, birds and mammals anywhere within the district. All the decisions pertaining to such regulations are made centrally, partly in the national capital of Delhi and largely in the state capital of Bangalore by the Forestry Service personnel (Box). Substantial amounts of funds are then placed at the disposal of the Forest Departments to discharge their regulatory function. The state apparatus has at its disposal little detailed locality-specific knowledge of either the distribution of biodiversity or the various pressures impinging on it. Its functionaries have no real personal stake in conservation of biodiversity, nor are they in a position to effectively discharge their regulatory function. It is then no wonder that these efforts have not been very fruitful.

Involving the Local People

A far more effective conservation effort would focus on the whole landscape instead of a few reserves, on the whole diversity of species and ecosystems instead of only on larger vertebrates and emphasize positive rewards for promoting conservation in place of regulation by the state apparatus. Above all, it would place the major responsibility for the task squarely in the hands of the local people, rather than with an impersonal centralized bureaucracy or technocracy.

The local people would not however be

in a position to operate entirely on their own and the conservation effort would have to be one of co-planning and co-management. Local people do possess very detailed information on local biodiversity, its history and the forces impinging on it. But they lack a broader, global perspective. Outside experts collaborating with local scientists, when these are available, could provide such a perspective (6).

The starting point of this exercise was to note that we might wish to conserve biodiversity, defined as the entire spectrum of variety and variability among living organisms and the ecological complexes in which they occur, for a variety of reasons. These reasons may include subsistence use value, e.g. herbal medicines used locally; commodity use value, e.g. cane or wild honey; non-consumptive use value, e.g. watershed services; option value, e.g. wild relatives of cultivated plants that may provide useful genetic material for future breeding programs; transformative value, provision of experience of unspoilt nature; and existence value, for its own sake. This rationale suggests certain conservation priorities. These priorities must be related to attributes of any locality to assess the locality's significance for conservation. In general, a locality will be valued more if it contains elements that are distinctive, threatened, rare or of restricted occurrence; and if it harbors many such elements (see Table).

The local people must be intimately involved to take this broad prioratization further and to decide on specific action points. For example, the evergreen forests of Uttara Kannada district are rich in wild relatives of cultivated fruit trees, as well as many cultivars of fruit trees. Quite a few farmers have developed large collections of such species, especially of genera *Mangifera*, *Artocarpus*, *Myristica*, *Garcinia* and *Spondias* on their own lands, out of personal interest. Many local people also know of individual wild mango trees that bear fruit of special flavor or have exceptionally high yields. Their inputs would obviously be of value in deciding on the focus of a program to conserve wild relatives of cultivated plants. Similarly some habitat types are now conserved only in sacred groves, e.g. *Myristica* swamps in Kathlekan. Local people know of such patches in forest interior; they also appreciate their religious significance.

Conservation priorities must also take account of the whole set of human demands on a given locality. For example, artificial freshwater irrigation ponds constructed in preBritish times in the eastern parts of the district are important habitats of migratory waterfowl. These ponds are now being encroached by paddy cultivators. The local people are fully aware of who is encroaching and what their economic motivations are. Today, the state apparatus tries to regulate such encroachment through coercion. This often fails. Instead, the resources devoted to enforcement could be offered to local communities so as to motivate them to continue to conserve the freshwater ponds in their own villages. The different villages concerned could submit bids based on the annual level of financial incentive they would need to accept the conservation option. If the state that speaks for the broader public interest finds these bids acceptable, it could decide to implement conservation programs in partnership with some or all of the villages involved. Conversely, it could decide to write off some of the freshwater ponds of the Uttara Kannada district to extend paddy cultivation. Local communities should of course receive payment only if they succeed in conserving the freshwater ponds involved.

Undoubtedly, more research and practical experience is required to design and implement an alternative to the centralized and authoritarian approach to conservation. An important obstacle is likely to be the resistance of the central authority because a large bureaucratic apparatus to implement programs locally would simply be unnecessary. Rather a much smaller, technically more sophisticated apparatus would be required, one which would have a capability to assess broader priorities, to help local authorities work out detailed plans and monitor to determine whether the local authorities are in fact implementing the conservation measures as agreed. The local authorities would have to be strengthened and better organized and capable of taking further programs of decentralization of political and administrative responsibilities. This would entail rendering local governments much more accountable to people than is presently the case. The central authority would also have to transfer a great deal of its jurisdicial and policing powers to the more locally-oriented institutions.

Such a local involvement management strategy is very much in the spirit of the proposal to involve local communities that is an important element of the *Global Biodiversity Strategy* being developed by WRI, IUCN and UNEP (18). It is also consistent with the microlevel planning initiative of the National Wastelands Development Board of the Government of India (19). Such international and national support is critical to the success of an alternative approach, for it is apt to run into serious opposition on the part of the political-economic-bureaucratic vested interests that benefit from the present-day pattern of non-sustainable resource use and of a rigid policing approach to conservation. Fortunately, the global trends are today exceptionally favorable for a decentralized, peopleoriented approach. As a result, more and more attempts like that exemplified by the Marine Conservation and Development Program on the Visayas islands, Philippines, are likely to be initiated in the coming years (18). Their success would be greatly enhanced if they are backed by a locality specific analysis of the situation in its concrete historical setting. Involvement of local people is absolutely essential for implementing the conservation measures on the ground.

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