

CONSERVATION OF INDIA'S LIVING RESOURCES THROUGH BIOSPHERE RESERVES

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ABSTRACT

While many of our traditional conservation practices such as sacred groves and trees protected the plant resources, the modern approach to nature conservation has failed to do so. This approach based on wild life sanctuaries and national parks has emphasized the manipulation of the habitat in the interest of a few spectacular species such as the tiger or rhinoceros and consequently neglected the conservation of overall plant and animal diversity. These reserves have also tended to emphasize only certain vegetation types such as deciduous forests ignoring the exceedingly rich ecosystems of evergreen forests. The biosphere reserves correct this distortion by focussing on the preservation of overall plant and animal diversity including the wild relatives of domesticated plants and animals. These must therefore be ideally chosen so as to represent at least two examples of each of the vegetation types of the Indian sub-continent, preferably as a large habitat mosaic of substantial area since the long term potential for preservation of species critically depends on the total area available. The proposed Nilgiri biosphere reserve, with vegetation types ranging from dry scrub to wet evergreen forest meets these criteria. The biosphere reserves should also attempt to preserve the diversity of land races of cultivated crops and domesticated animals *in situ* by maintaining pockets of traditional agriculture through special incentives. Where the entire vegetation types have completely disappeared as with the moist deciduous forest of the Gangetic plains the biospheres should try to recreate the original vegetation in selected sites.

THE TRADITION

MAN has been the most potent agent of ecological change on the surface of the earth for a long time, perhaps ever since his ancestors acquired control over fire some lakhs of years ago. While extinction has been the fate of all biological species, and nineteen out of twenty species that ever existed on the earth have gone extinct, the pace of such extinctions has picked up tremendously since man became the dominant force on the earth in the last fifty thousand years or so. However, responsible as man has been for the decimation and ultimate extinction of the populations of many plant and animal species, he has also been alive to the need for the conservation of this biological wealth since the dawn of human history. The most primitive hunting-gathering tribes have a number of cultu-

ral practices sanctified by religion that put restraints on the utilization of plant and animal species and promote their conservation. Such practices include taboos on the killing of certain species sacred to all human communities or totemic species sacred to specific clans, closed seasons for hunting, sacred groves and lakes and so on^{1,2}. These traditions of conservation protected a whole range of living creatures from herbs like tulsi (*Ocimum sanctum*) to the giant banyan trees (*Ficus benghalensis*) and from animals like rats to tigers and elephants. These traditions also conferred protection on whole biological communities protected as sacred groves or lakes or stretches of rivers³⁻⁶.

Such practices continue to be very much alive in India till this date, and to them we owe the continued existence of many species ranging from rhesus macaques to the newly discovered

leguminous climber, *Kunstleria keralensis* from the coastal plains of Kerala which have lost almost all their natural plant cover except in the few sacred groves scattered here and there⁷.

THE GAME PRESERVES

Thus, while our traditions of nature conservation respected plants, and even embodied the concept of preservation of the overall biological diversity in an entire community, the more modern approaches to nature conservation completely neglected it. This approach had its roots in the hunting preserves of the feudal lords, and consequently emphasized the maintenance of large populations of game species at the cost of overall biological diversity. Thus Hudson⁸ describes how the larger hawks were all extirpated from the British downs in the nineteenth century by the gamekeepers who regarded them as the enemies of gamebirds for whose exclusive benefit the land was to be maintained.

In India too most of the national parks and wild life sanctuaries of today such as Ranthambor, Keoladeo Ghana, Gir and Bandipur are former hunting preserves of Maharajas and the present-day wild life managers feel that their aim is accomplished so long as the populations of spectacular erstwhile game species such as sambar or tiger are maintained at a high level. They therefore consider as justifiable practices such as removal of all older trees. In fact, it is such older trees with their holes that provide nesting sites for a variety of birds such as woodpeckers and hornbills and their removal drastically depletes the overall biological diversity. Similarly, the foresters have also felt no qualms about exploiting and destroying sacred groves which constituted the only remaining patches of natural vegetation over a vast area⁴. It is for the same reason, that there have been no nature reserves for protecting threatened plant species till a few years ago⁹

A NEW CONSERVATION ETHIC

It is only recently that the Western cultures have begun to appreciate the shortcomings of

their approach of aggression against and ponder over man's responsibility for nature^{10,11}. Out of this has emerged the realization of the value of preservation of the biological diversity as a whole, for all species of living organisms are marvellous chemical factories, each unique and each of great potential value. Many lowly organisms, written off by man as of no significance, have proved of tremendous value to him, as for instance happened with moulds that have revolutionized modern medicine through the discovery of antibiotics. It is therefore imperative that we do not destroy options for future by wiping out entire biological species and communities from the face of the earth¹².

With this realization of the necessity, nay urgency, of the preservation of overall biological diversity is emerging a new approach to conservation¹³. The biosphere reserve programme that has come out of UNESCO's programme of Man and Biosphere is one of the results of this new approach to conservation^{14,15}. A major difference between the biosphere reserves and the wild life sanctuary-national park approach to nature conservation is therefore the stress on the conservation of the overall biological diversity as opposed to the focus on just a few species like the tiger or rhinoceros. In particular, this new approach would naturally give due emphasis to the conservation of the diversity of plant species which form the base of the pyramid of life.

CHOICE OF RESERVES

How do we then go about preserving overall biological diversity? We would like to choose a network of our nature reserves such that the network as a whole harbours at least one population of as many different species as possible. This could be approached if the network has at least one example of each biome in each of the biogeographic subregions. It was with this view that Dasmann¹⁶ and Udvardy¹⁷ proposed a classification of the biogeographical provinces of the world to serve as a base for the selection of a global network of biosphere reserves. The same logic evidently applies to the Indian subcontinent, and our attempt should be to devise a

network of biosphere reserves to include at least one example of each biome in each biogeographic region.

The current network of nature reserves is evidently very deficient on this criterion. These reserves over-represent the deciduous forest types which harbour the so-called game species and neglect other biomes. Thus in Karnataka all the major sanctuaries fall in this category, and the sanctuaries representing other vegetation types such as evergreen forest or scrub savanna are much smaller and recent¹⁸. Furthermore, the only sanctuary in the scrub belt of Karnataka, Ranibennur focusses on the game species, black-buck, its arboreal vegetation being entirely the exotic *Eucalyptus*¹⁹.

We shall therefore have to re-examine and re-design our system of nature reserves to conserve the entire diversity of plant and animal species. Its basis will have to be distribution of vegetation types of India, each representing a particular combination of plant species. The natural vegetation of India can be divided into 42 such vegetation types, ranging from the *Cullenia—Mesua—Palaquium* association of the rain forests of Southern Western Ghats to the *Prosopis—Capparis* scrub of the Indian desert. Recently, Gadgil and Meher-Homji²⁰ have attempted to identify all the remaining tracts of each vegetation type on the basis of which a network of nature reserves could be set up.

Modern ecological studies have a great deal of relevance to offer in terms of the choice of nature reserves. We now know that the long-term potential for conservation of any locality depends on the area of the habitat available. As a result, while small habitat islands may initially hold a large number of species, they can in the long run only sustain a smaller number proportional to their area. It is therefore important that the nature reserves be as large as possible. Furthermore, their potential for conservation is greater, greater the variety of habitat types they incorporate, the greater their compactness and proximity to other natural habitats²¹⁻²³.

NILGIRI BIOSPHERE RESERVE

The Government of India propose to constitute an area on and around the Nilgiris as one of the country's first biosphere reserves²⁴. This choice was arrived at after examining all the tracts of natural habitats in the biologically very rich province of Western Ghats. The proposed biosphere reserve region has the fullest representation of the whole series of vegetation types of Southern India from *Acacia* scrub, dry deciduous forest with *Anogeissus* and *Tectona*, moist deciduous forest dominated by *Terminalia*, evergreen forest with *Cullenia* and evergreen sholas and grassy downs of the higher reaches of Western Ghats. Moreover, it has the largest contiguous tract of natural vegetation on the Western Ghats. It therefore holds the highest potential for the long-term preservation of the biological diversity on the Western Ghats, although with a total core area of around 2000 sq. km. it is too small to permit continuing speciation²³.

GENETIC RESOURCES

Of particular value to us are the genetic resources of wild relatives, and land races of domesticated plants and animals^{22,25}. The biosphere reserve programme should pay particular attention to this aspect, and another one of the country's first biosphere reserves will be the Tura Citrus gene sanctuary in Meghalaya, an area particularly notable for the wild Citrus species²⁶.

The Nilgiri biosphere reserve proposes yet another approach to conservation of these genetic resources on the assumption that the land races of cultivated plants are best preserved *in situ* under traditional agricultural practices. This biosphere reserve therefore proposes a special zone termed as manipulation zone (agriculture). In this zone the farmers would be involved in a programme of maintenance of traditional varieties of domesticated plants and animals and traditional cultural practices that go along with them. They would be paid to do so as a compensation for not taking to the higher yielding plant and animal varieties. The cost of such a programme should still be cheaper than mainte-

nance of these varieties at research stations. More importantly, the varieties could continue to evolve in their natural setting and acquire further valuable genetic potential.

ECOSYSTEM RESTORATION

While substantial tracts of some of the vegetation types of India still persist, others have almost totally vanished. Thus there is almost no trace left of the so-called dry evergreen forest dominated by *Manilkara—Chloroxylon* on the Coromandel coast. An attempt should be made as a part of the biosphere reserve programme to reconstitute these ecosystems by systematically bringing together at least the indicator species of these communities in specially protected habitats²⁷.

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