

In this issue

Conserving a hotspot heritage: Research and management in the Kalakad–Mundanthurai Tiger Reserve

Living organisms seldom occur randomly in nature. Individuals aggregate together in suitable spaces to form local populations. Populations are sprinkled patchily over larger areas, forming the distribution range of a species. While some species have large or pan-tropical, even global, distributions, many others appear severely restricted when viewed at large spatial scales, constituting localized endemic species. At a higher level, groups of species may have overlapping ranges, thus forming patches with high species diversity in large geographical regions. Such patches have been called hotspots and biologists give a lot of importance to such regions.

Why are hotspots exciting? First, because they contain a significant proportion of the global diversity of living organisms in a small fraction of the area. So conserving them would be cost-efficient. Second, hotspots tend to contain a large number of endemic species that occur nowhere else. For these, local extinction spells global extinction. To survive, these species must be protected where they are. Finally, hotspots, where Nature attains her highest profusion, are too often foci of human exploitation. An irony of the most precious being, perhaps, the most threatened.

Globally, biologists have identified 25 hotspots of the diversity of life. In a related exercise, focusing on unique ecosystems, a Global 200 'roll of honour' has been prepared of critically important ecological regions. Many of these carefully identified areas are in India. Not all over India, but localized, clustered, and patchily distributed in different regions. One of the most significant regions is the 1600-km-long Western Ghats mountain chain running along our western coast.

The chain of patchy distribution does not end there. Even within the Western Ghats, the diversity of living

organisms is greater in the southern extremity, especially south of the Palghat gap. Down at the southern end of this remarkable mountain chain, in the Agasthyamalai Hills, is an area with a stupendous array of natural ecosystems and diversity of living organisms. This region of potentially endless fascination for biologists is the Kalakad–Mundanthurai Tiger Reserve (KMTR).

In this issue, we present to the reader a glimpse into KMTR, undoubtedly one of the world's greatest nature reserves. It has one of the last remaining large tracts of tropical rainforest in the Western Ghats spreading over more than 300 square kilometres. There is an impressive diversity of habitats ranging from dry thorn to rainforest, tree-savanna to montane grassland, rivers, hill streams, and marshes. Species diversity and endemism of most taxa are higher than in other places in the Western Ghats. The articles in the special section represent overviews and insights into the natural wealth, ecology, dynamics, research potential, conservation problems, and potential management solutions applicable in KMTR. The articles, selected after careful review from a large number of submissions (unfortunately, to avoid exceeding section limits and focus, not all papers could be published), and accompanying photographs throw open a window for a glimpse into KMTR.

The opening paper by A. J. T. Johnsingh (page 378) gives an overview of the KMTR. He traces the history of protection and research in KMTR, highlighting its immense value for conservation of the biological wealth of the Western Ghats. In addition, he emphasizes its importance for the more traditional, and often more effective, conservation directed towards endangered species such as the tiger (*Panthera tigris*) and Nilgiri tahr (*Hemitragus hylocrius*). In an Appendix to this paper, Johnsingh presents a near-complete checklist of the vertebrates of the Reserve collated by himself along with several colleagues. Besides serv-

ing as a useful reference, this is perhaps one of the first such lists produced for an Indian wildlife reserve, and is testimony to the value of the considerable research carried out in KMTR.

Succeeding papers in the volume deal with taxa ranging from plants to arboreal mammals, spanning the fields of ecology, behaviour, sociology, and conservation biology. These papers highlight threats to KMTR and pointers to conservation solutions and management strategies. Since a large portion of the plant diversity in KMTR is found in the tropical wet evergreen rainforests, the paper by N. Parthasarathy (page 389) tracing changes in forest composition in relation to past land-use is especially relevant. Plants cannot survive in isolation and many of them rely on dispersal agents to propagate their populations. Drawing on many years of research, T. Ganesh and Priya Davidar (page 394) discuss aspects of dispersal of tree species in the evergreen forests.

How do animal populations and communities respond to structure and alteration of the vegetation in their habitats? Three articles deal with this question. On page 400, M. Soubadra Devy and Priya Davidar trace the impacts of selective logging of rainforest on butterfly communities. They found that, although logged areas had higher diversity of species, this was due to the entry of ubiquitous species of drier habitats, at the expense of species specialized to wet forest. This finding has important implications for biodiversity studies. Emphasis on enhancing or maintaining high diversity is not always beneficial.

At a more detailed species-specific level, Divya Mudappa *et al.* (page 424) describe the distribution pattern, in relation to habitat, altitude, and season, of a little and little-known endemic mammal of the Western Ghats, the Malabar spiny dormouse (*Platacanthomys lasiurus*). The study illustrates that to conserve arboreal mammals in complex forest habitats, there is a need to maintain habitat structure, especially lianas that are

often cut away in the mistaken belief that they are detrimental to the forest. In an intensive demographic study, S. F. Wesley Sunderraj and A. J. T. Johnsingh (page 428) examine the impacts of biotic disturbances on the endangered Nilgiri langur (*Trachypithecus johnii*), a leaf monkey unique to the Western Ghats. Their study shows how moderate-intensity but chronic human disturbances such as wood cutting and extreme disturbances to habitats by large pilgrim crowds and dynamiting can cause langur populations to decline through decreasing birth and increasing death rates. With hard-earned data, this is one of the few studies worldwide clearly linking demographic changes of primate populations with habitat changes.

Looking at the 'lesser mortals' of the animal world, two articles discuss distribution patterns and community structure of amphibians and reptiles in the tropical rainforest floor. Karthikeyan Vasudevan and colleagues (page 406) and N. M. Ishwar and colleagues (page 413) report on their pioneering field studies, (punctuated by the exciting rediscoveries of several species) on the community ecology of these taxa. Besides highlighting the use of a new method called adaptive cluster sampling to study these rare and patchily distributed organisms, their studies reveal the need to protect different drainages and altitude zones for the conservation of the unique herpetofauna.

Clearly, animals need their own spaces. Often, they have to defend them by establishing territories. Such defence may be through vocal displays and fights, where knowing and assessing your neighbour could be critical. Madhusudan Katti on page 419 explores vocal communication and territoriality in a small warbler that migrates to India during winter.

Management issues of the Tiger Reserve are the theme for the three final articles in the Special Section. V. K. Melkani (page 437) describes experiences gained over the last four years in involving local people in conservation of KMTR through eco-development. Taking up the thread of this article, Sugato Dutt (page 442) elaborates on the eco-development experience and highlights other related management issues, such as fuel wood demand management and habitat manipulation for wildlife. The eco-development experiment, which has failed in other countries for a variety of reasons, appears to be showing promise in KMTR, although it is perhaps too early to tell.

Managing past and present human impacts and land use is central to conservation of KMTR. In this regard, conservation planners should find Rauf Ali and Anupama Pai's article on page 448 extremely useful. They describe the non-tribal settlement enclaves within KMTR, problems created by them, and suggestions for management. They also develop a

simple prioritization of the enclaves, which are scattered all over the Reserve, for acquisition and incorporation in KMTR.

As past studies and the articles here demonstrate, poaching, wood cutting, habitat alterations, extraction of forest produce, disturbances by people, including tourists, pilgrims, tribals, and government agencies, continue to have their impact on KMTR. Many taxa and issues still require exploration before we understand what needs to be done to ensure their conservation. The potential for research and monitoring is self-evident.

What the articles in this issue convey by example, is the utility of field research for augmenting understanding of ecological dynamics and conservation problems, which is a prerequisite for proper management. Field biologists, park management, and local people can work hand-in-hand for conservation; this is what the KMTR experience illustrates.

The Kalakad–Mundanthurai Tiger Reserve is a remarkable natural heritage, one to cherish and safeguard. It is a measure of our maturity as a nation, of our tradition of respect for nature, and our pragmatism in appreciating our natural wealth, that we are attempting to protect and conserve such regions.

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