

There is an urgent need to create our own depository for microorganisms. Presently, India does not have such institutions as the American Type Culture Collection (ATCC), and our valuable microbial germplasm continues to be deposited in foreign countries. In addition, we have to develop our own skills for characterization, otherwise our samples will continue to be sent outside for identification and characterization.

Experts suggested that India can reject patents on microorganisms without in any way jeopardizing its position in the WTO. There is sufficient scope within the WTO framework for nations to exercise flexibility in defining patentable subject matter. They can for example, exclude from

patentability those categories which would offend public order or morality. The 'Odre Public' and morality clauses have been successfully used in Europe to oppose patents already granted by the Europe Patent Office. The possibility of invoking this clause to protect our indigenous plants and knowledge must be fully explored. Even today, there is no patent harmonization in western countries, mainly on account of objections from society on various issues, particularly morality.

It was widely felt that India should not accept patents on microorganisms at this stage. Patents favour only the patent-holder, not the common man, not the scientific community, not the larger community. Patents also block the flow of

information and materials. Scientists do not have free access to microorganisms for research purposes. Studies have shown that strong patent regimes slow down the discovery of new drugs. It is wrong to say that patents are the only way of rewarding the scientific community or of providing them with a much-needed infusion of funds for research. In fact, over 80% of patents are held by corporations, not by scientists. Moreover, patents on microbes will lead to patents on plants and animals and all life forms, which is unacceptable.

Suman Sahai is at Gene Campaign, F-31 Green Park (Main), New Delhi 110 016, India.

Sacred groves of India – Vanishing greenery

G. Harikrishnan Nair, K. Gopikumar, Pramod G. Krishnan and K. K. Sunil Kumar

Love and respect towards nature has been an ancient Indian tradition. Affection towards nature was as zoolatry (worshipping of animals), thottam (considering plants and animals sacred), etc., which in turn led to a sort of prudent conservation. Religious beliefs, traditions and customs of Indians bear an allegiance in restricting the exhaustive use of natural resources. An understanding of the conditions under which human societies evolved, effective methods of prudent use of resources and of the circumstances under which these practices broke down is considered very important in our endeavour to steer ourselves in to a course of sustainable utilization of earth's resources¹. There are several examples of such social restraints on resource utilization. In Bhandura district of Maharashtra, the traditional fishing had never disturbed the spawning aggregations of freshwater fishes in the hill streams. Another example for the traditional system of refugia for natural resources is the network of sacred groves seen throughout India².

Sacred groves are patches of vegetation preserved on religious grounds. The area of a sacred grove varies from a few trees to some acres. Each grove has a patron deity and folklore associated with it. Any sort of damage to these vegetational sanctities was considered a sin by villagers or the people of that locality.

Distribution

There are only four regions important for groves in India³. These include the Khasia and Jaintia hills, the Western Ghats of South India, Aravalli hills and Sarguja, Chanda and Bastar areas of central India. In India the maximum number of sacred groves are seen in the states of Kerala, Maharashtra, Madhya Pradesh, etc.

Importance

Sacred groves are ecologically and genetically very important. They are the abodes of rare, endemic and endangered species of flora and fauna. Besides, they serve the function of preserving the genetic diversity of even the common species of trees. Ancient teak (*Tectona grandis*) forests are reported from two sacred groves of Maharashtra, though teak has disappeared from their vicinity. These teak specimens exhibit genetic variation and therefore proved to be of great value in the future tree breeding programmes⁴. Wild cultivars having better pest resistance and productivity are also reported from sacred groves. They may also become useful in future in the genetic improvement programmes⁵.

In Allepey district of Kerala, natural forests are encountered only in sacred groves that remind us of a great past. Certain new plant species have been identified from some sacred groves. Pres-

ence of a new woody climber (*Kunstleria keralensis*) had been reported from a sacred grove in Kerala⁶.

The value of sacred groves is immense. They are good sources of a variety of non-wood products like fruits, fodder, fuel wood, fatty oils, spices like pepper, cinnamon and nutmeg, medicinal plants, etc. A detailed account of the medicinal plants, wild cultivars and endemic species found in a sacred grove (Iringole kavu) of Kerala state has been reported⁷.

The faunal wealth of the sacred groves is also worth mentioning. An ornithological survey in a sacred grove of Kerala (Mukkuthala kavu, Malappuram) could identify seventy species of birds⁸. However, detailed faunal studies are still lacking from sacred groves. Besides these, the amenity value, roles of sacred groves in water conservation and their effect on microclimate of the region, etc. are also important and deserve special attention in future studies.

Present scenario

Our ancestors were fully aware that the natural resources which sustained them must be conserved for the sustenance of future generations. But the inconsiderate and self-centered modern man is exploiting the natural resources without giving heed to the well-being of younger generations. Sacred groves are the victims of this

grim tragedy. During the early period, collecting even a fallen branch from a grove was taboo. However, the scenario has changed now. The increasing human population, along with the deteriorating religious faith, had led to the relentless exploitation of these vegetational sanctities.

Out of the four sacred groves in the Panshet reservoir catchment of Maharashtra, Central India, one at Shirkoli and another at Gondelkhal, both of fifteen hectares each, were felled in 1956. The other two sacred groves, one at Tav and the other at Mangaon were also reported to be in danger⁴. In Maharashtra, inam groves (groves in which no deity resides) are said to be destroyed to a large extent.

In Kerala also, human interference has caused severe damage to sacred groves. The study on the ecological aspects of Mukkuthala kavu (Malappuram Dist.) revealed that this grove has rich floral wealth (about eighty-nine plant species were identified of which forty-three are arborescent). They include rare, endemic and endangered species⁹. Among the species identified, there were fifty medicinal plants and six wild relatives of cultivars. Unfortunately this biological richness is being eroded away by various biotic interferences. Based on the extent of disturbance, two zones, viz. disturbed and undisturbed, were clearly identified in this area. Phyto-sociological studies

and soil analysis carried out separately in these two zones throw light on the plight of this grove. In the disturbed zone, the soil nutrient status and vegetational cover is being depleted day by day due to biotic interferences in the form of grazing, fuelwood collection, etc. Recently the one and only specimen of *Syzygium travancoricum* of this grove, which is a rare species was felled by the temple authorities. This indicates the irreverent attitude and lack of awareness among the people regarding the importance of sacred groves.

Ecophysiological studies conducted in Mannampurath kavu (Kasargod Dist.) also emphasize the importance of complete protection and the need of public awareness for the existence of such relict communities¹⁰. This grove is also bountiful in its floral aspects with 61 species of angiosperms. The study revealed that the species composition and density shows marked difference with the degree of disturbance. The lion's share of this grove is in the disturbed zone. The soil nutrient status and vegetational cover is dwindling rapidly and in no time this area will become barren. These studies point to the fact that sacred groves are no longer going to have the privilege they had in the past.

1. Gadgil, M., *Social Restraints and Resource Utilization, Culture and Conservation – The Human Dimension in Environmental Planning* (eds Jeffrey, McNully, A. and David), Goom Helm, USA, 1985, pp. 135–153.
2. Chitampalli, M., A statement in the paper entitled 'Social Restraints and Resource Utilization, Culture and Conservation – The Human Dimension in Environmental Planning' by Gadgil, 1985.
3. Gadgil, M. and Vartak, V. D., *Econ. Bot.*, 1976, 30, 152–160.
4. Gadgil, M. and Vartak, V. D., *J. Bombay Nat. Hist. Soc.*, 1975, 72, 314–320.
5. Ramachandran, K. K. and Mohanan, C. N., Final report submitted to the Ministry of Environment and Forests, Government of India, 1991, p. 21.
6. Mohanan, C. N. and Nair, N. C., *Proc. Indian Acad. Sci.*, 1981, B90, 207–210.
7. Induchoodan, N. C., M Sc thesis submitted to Kerala Agricultural University.
8. Pramodkrishnan, G. and Harikrishnan Nair, G., Mimeograph, 1994.
9. Harikrishnan Nair, G., B Sc project report submitted to the Kerala Agricultural University, 1992.
10. Sunil Kumar, K. K., B Sc project report submitted to the Kerala Agricultural University, 1992.

The authors are in the College of Forestry, Kerala Agricultural University, Vellanikkara, Trissur 680 654, India.