INNOVATIVE ENERGY TECHNOLOGY SYSTEMS AND ENVIRONMENTAL CONCERNS: A SUSTAINABLE APPROACH
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Sacred Groves and their Significance in Conserving Biodiversity an Overview of the Kavus–Sacred Landscapes of Kerala

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Abstract

Since time immemorial humans have been worshipping the nature and conserving biodiversity, and as its part certain areas of nature's landscape incorporating biodiversity have been left undisturbed and protected as sacred living temples. The conservation of environment and protection of life supporting systems are deeply embedded in Indian culture and tradition. Sacred groves are tracts of virgin forest with rich diversity which have been protected by local people for centuries for their cultural and religious beliefs and taboos that deities reside in them and protect the villagers from different calamities. Each sacred grove carries its own legends, lore and myths which form the integral part of the sacred grove. An inextricable link between present society and past in terms of biodiversity, culture, religious and ethnic heritage exists in sacred groves. However with the passage of time and the change in the socio-economic aspect, considerable changes have taken place in the extent of sacred groves, in their vegetation structure, peoples perception towards them and the religious beliefs and taboos. Therefore a holistic understanding of the current status, structure and function of sacred grove is essential for assessing their ecological role and formulating strategies for their conservation. This paper briefly reviews the studies on sacred groves in India and kerala in particular highlighting that the tradition of sacred groves could provide a powerful tool for ensuring biodiversity conservation through community awareness and participation.

Keywords: Traditional practices, sacred groves, Indigenous beliefs, and taboos, Biodiversity conservation.

1. Introduction

Nature worship is an integral part of human society and going back to historic time period the tradition was quite evident in every continent as represented in the culture, religion and social norms of traditional societies. Since time immemorial conservation of natural resource has been an integral part of diverse cultures in different ways. The traditional worship practices show the symbiotic relation of human beings and nature. Indigenous communities all over the world lived in harmony with the nature and conserved its valuable biodiversity. Sacred groves are tracts of virgin forest with rich diversity, which have been protected by the local people for centuries for their cultural and religious beliefs and taboos that the deities reside in them and protect the villagers from different calamities.

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Comparatively undisturbed due to the faith and regard of local people and the belief that the sylvan deities would be offended , if trees are cut and flowers and fruits are plucked.

Hughes and Subhash Chandran (1997) define sacred groves as 'segments of landscape containing trees and other forms of life and geographical features, that are delimited and protected by human societies believing that preserving such a patch of vegetation in a relatively undisturbed state is necessary for expressing one's relation to the divine or to nature'. Hence, these remain as isolated patches of climax vegetation in the midst of agricultural landscapes. Gadgil and Vartak (1975) observed that in many parts of India, sacred groves represent surviving examples of climax vegetation and are disappearing under the influence of modernization.

Sacred groves are present in many parts of the world, mostly from the regions where tribals practice shifting cultivation. These include regions in Mexico, Ghana, Nigeria, China, Syria, and Turkey etc. In India these are distributed in the Himalayas, North-East India, highlands of Bihar, Orissa, Madhya Pradesh, Andhra Pradesh, Karnataka, TamilNadu and Kerala. Locally, these are known as *Sarana* (in central India), *Devrai* and *Deviahate* in Maharashtra, *Devarkadu* in Coorg, *Orance* in Rajasthan, *Kavu* or *Nagavanam* in Kerala, *Nandavana* in Tamil Nadu, *Sidharavanam* in Karnataka, and *Kavu* in Andhra Pradesh. Although, there has been no comprehensive study on the Sacred Groves / Forests of the entire country, experts estimate the total number of Sacred Groves / Forests in India could be in the range of 100,000 – 150,000.

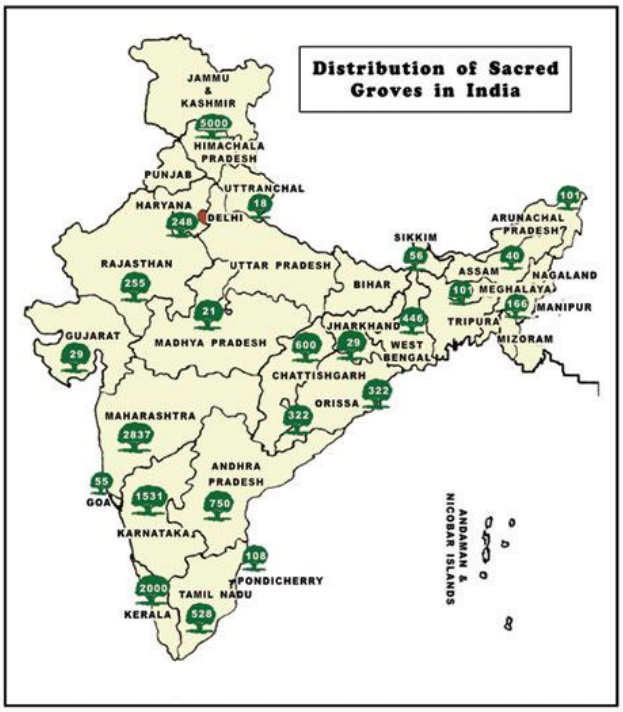

Fig. 1: Distribution of sacred groves in India.

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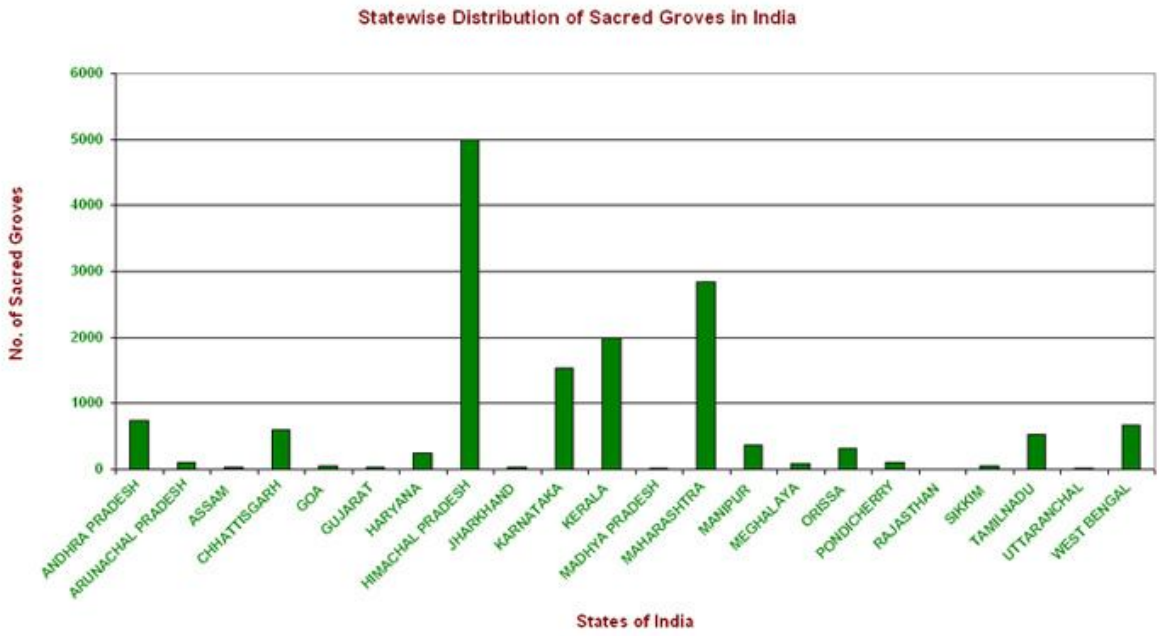

Fig. 2: Statewise Distribution of the Sacred Groves in India.

In recent times, sacred groves are being increasingly exposed to various kinds of threats leading to either qualitative degradation or total disappearance. In India, this community based tradition has received considerable attention from a sociological as well as a biological perspective.

This paper aims at understanding the tradition of sacred groves of kerala in particular-the islands of biodiversity, the concept of the sacred, the deities and the worship patterns, the cultural, ecological and economic significance and the threats posed due to the development projects, shifts in belief systems, pilgrimage and tourism, rapid urbanisation and suggests conservation strategies and awareness for upkeeping the tradition which in turn would benefit in terms of biodiversity conservation as has been an integral part of diverse cultures from time immemorial.

2. History of Sacred Groves in Kerala

Sacred groves are seen throughout kerala having varied forms, cultural practices and belief systems. Snakes are worshipped by the tribals and traditional people. Adivasis and Dravidians are known to worship inanimate objects like trees and stones and live in villages covered by forest patches called *"kaval kadus"* (Unnikrishnan1997). Such green patches played an important role in balancing the village ecosystem and give a religious dimension for protection. Although limited in area, the sacred groves or *"kavus"* (in Malayalam) of Kerala are distinct and unique in their biological diversity. These protected landscapes are found mostly in coastal and midland regions and rarely in highlands. Combinations of ponds/water bodies and sacred groves constitute a unique network of ecological landscape systems that intervene with life and culture of the people.

The age-old system of having a temple, a tank and associated sacred grove explains the ancient method of water harvesting and sharing in villages of Kerala. As an ecosystem, they help in soil and water conservation, besides preserving the biological wealth. They are the treasure house of rare and endangered species of animals and abode of many medicinal,

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endemic, endangered and economically important plants. The ponds and streams adjoining the groves are perennial sources of water. Many animals and birds resort to them for their water requirements during summer. The nutrients generated in the groves find their way into the adjoining agro ecosystems like paddy fields, coconut, tapioca and rubber plantations (Ramachandran *et al.,* 1991). They provide a country-wide network of protected areas, wherein the inherent diversity of flora and fauna are preserved for present and future human use. While the adjacent areas were all cleared for agriculture, the sacred groves are maintained intact for generations to support relic vegetations and are often among the best places to study endemism (Induchoodan & Balasubramanyan, 1991). Ward & Conner (1927) reported existence of about 15,000 sacred groves in Travancore. Ramachandran and Mohanan (1991) identified 239 sacred groves in Kerala. Induchoodan and Balasubramanian (1991) made a study on the endemic plants of three sacred groves. Induchoodan (1998) identified 364 important sacred groves in Kerala with floristic wealth of over 722 species.

Sacred Groves are important, not only because they are sacred, but values of far reaching importance are implicit in them. The scientific economical social and spiritual values implicit in them will have to made explicit. The new land reforms in Kerala and the religious beliefs and taboos of younger generations are major threats in protecting and conserving these sacred groves. Under these circumstances, preservation, conservation and management of the sacred groves are an important necessity and warrants top priority.

3. Concept of the Sacred

The concept of sacredness implies the perception of the existence of something, or much, not yet fully understood. Man knows that he is part of the whole of nature, but the whole is awe inspiring, imperfectly understood and must therefore be treated with care and respect. As a logical consequence, all living bodies and things or associations of living beings are to be respected as sacred manifestations, not just symbols but also as embodiments of the Eternal mysterious. The word sacred should be interpreted not in the narrow sense of religious belief alone but to cover all places, which people have chosen to care for, whatever may be the reasons. The right interpretation of sacred would be that which is held in great esteem and awe and hence sacred to the people.

4. Deities and Rituals

Each *kavu* has a presiding deity in the form of a *Naga* (Nagaraja, Nagayakshi, Nagakannya etc.), Lord Sastha (Ayyappa), Bhagavathi, or some ancestral spirits. In Southern Kerala, most of the sacred groves are dedicated to *Naga* (*Sarpa* God) and many are associated with Siva and Bhagavathi temples. In Northern Kerala, the groves are named on the presiding deities and locally known as *kotta* in Malayalam. These deities may be of the different forms of the Mother Goddess (Kali), Vaishnava or Shivaite forms. There are temples exclusively dedicated to *Naga*

Many myths, legends and faiths are associated with these sacred groves and the local people follow strict code of conduct in promoting the sanctity of these. The rituals and rights performed to the sacred groves vary from region to region, among different castes and patron deity of the sacred groves. *Nurum paalum* (rice flour and turmeric powder are mixed in milk and made in to a thick mixture by a traditional method) is an important offering to the snake gods with ritualistic devotional dance called *sarpam thullal* to propitiate the serpent god. There are more than 100 types of *theyyams*, dances representing various gods, goddesses, and

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spirits. No human interference is allowed inside the groves except to perform rituals, prayers and offerings to propitiate the deities.

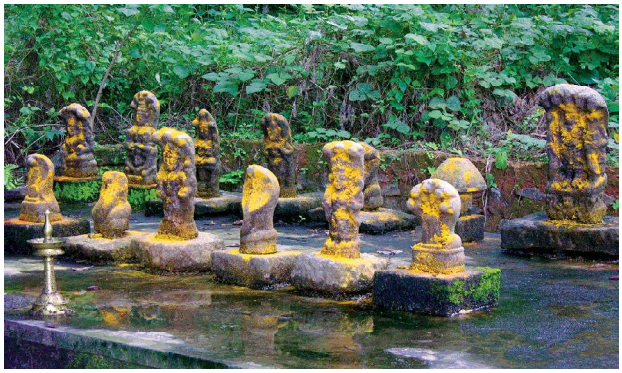

Fig. 3: Naga Idols Inside a Sacred Grove.

5. Flora and Vegetation

Fig. 4: The vegetation in sacred groves exhibit a variety of flora and fauna.

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It is believed that the sacred groves are remnants of evergreen forests that were widespread in the region. Thiruvananthapuram, Kollam, Pathanamthitta, Alappuzha, Thrissur, Kozhikode, Kannur and Kasaragod districts of Kerala harbour the maximum number of sacred groves. The vegetation in these groves exhibits a large variety of flora and fauna that depend on one another for their existence. The general floristic composition and physiognomy of vegetation of the sacred groves are typically like the low level evergreen forest. The vegetation in undisturbed groves is luxuriant and comprises several stories of trees mixed with shrubs, lianas and herbs. The soil is rich in humus and covered with thick litter. Macro fungi are abundant, so also the ferns. Whenever there is a water body, algae and water plants grow gregariously. Floristic Variations have occurred in many sacred groves exposed to human and animal interferences as well as climatic and edaphic changes. Top canopy is represented by species like *Artocarpus hirsutus*, *Vateria indica*, *Hopea* sp., etc.

Fig. 5: Huge buttress tree–Hopea parviflora inside kolani sacred grove.

Typically, the vegetational canopy consists of the layers. In the top canopy, the dominant tree species are usually about an average of 30 to 50 metres height and consist

mainly of *Artocarpus hirsutus, Alstonia scholaris, Anacolosa densiflora, Hopea parviflora, Hopea ponga, Calophyllum calaba, Diospyros ebenum, Holigharrna*

arnottiana, Ficus sp., Vateria indica etc. The second canopy, typically of 20-30 metres height, is composed of all the members of the first storey as well as species like *Garcinia gummi-gutta, Carallia bracteata, Mimosops elengii, Polyalthia fragrans, Hydnocarpus alpina, Hydnocarpus pentandra, Mangifera indica, Myristicamalabarica, Knema attenuata* etc.

The third canopy layer between 10-20 metres consists mainly of *Aglaia elaegnoidea, Ixora sp. Meiogyne ramarowii, Acronichia pedunculata, Litsea coreacea, Nothopegia racemosa, Morinda pubescens, Polyalthia korinti* etc. Monocots widely represented in the sacred groves of Kerala are *Calamus* sp., *Borassus flabellifer, Caryota urens, Pandanus foetidus* and several species of bamboos.

The ground flora is always represented with the seedlings of the emergent and dominant species . In addition, according to the light requirements many perennials and annuals are seen in the ground flora. They are represented by *Myxopyrum smilacefolium, Pipe*r spp., *Dioscorea* spp., *Amorphophallus* spp., *Costus speciosus, Sesamum* spp., *Gloriosa superba, Boerhaavia* spp., *Achyranthus aspera, Leucas* spp., *Phyllanthus* spp., *Plumbago* spp. etc.

The occurrence of woody lianas is the peculiarity of sacred groves of Kerala. These compete with the tree for light and reach up to the upper canopy. Some of the commonly

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found lianas are Gnetum *ula, Anamirta cocculus, Cissus pallid ,Strichnos minor* etc. Other climbing and straggling species like *Tetracera akara, Hugonia mystax, Mussanda bellila, Morinda umbellata, Jasminum* spp., *Connarus,* etc. occur widely. Several orchid species such as *Vanda, Bulbophyllum* and *Cymbidium* are commonly found together with parasites like *Loranthus.*

6. Ecological Significance of sacred groves

Being a unique unit in the rural landscape, the sacred grove performs several ecological functions, which can directly or indirectly help in the maintenance of ecosystem health of all interacting landscape units. According to Rajendraprasad (1995), sacred groves with their complex array of interaction, influence the flora and fauna of the region as well as the microclimate of that locality. The soils of sacred groves show high porosity and low bulk density compared to the soils of the vicinity. The thick litter cover and channels created by soil macro fauna together enhances water retention, root system development, gaseous exchange, and heat conductance. The role of sacred groves as micro watersheds has been recognized by several workers. According to Rajendraprasad (1995), most of the sacred groves in Kerala are associated with freshwater ecosystem, and to certain extent, these water bodies meet the water needs of the local communities. The vegetative cover of the sacred groves improves the soil stability of the area and also prevent soil erosion.

6.1 Environmental Importance of Sacred Groves

The luxuriant vegetation of the groves spreads at different levels capturing maximum sunlight and leading to the optimum level of biomass accumulations, thereby keeping the carbon dioxide and oxygen balance stable. The dense canopy release large quantities of water vapors through transpiration resulting in a cool climate in the surrounding areas. The thick vegetation with its different layers also reduce the raindrop impact, and thereby, the rainwater reaches the soil system very slowly. Because of the high humus over the soil system, the water gradually penetrates to the ground and stored as ground water in underground aqua ducts, ponds or wells associated with the groves, thus facilitating the harvesting and distribution of water to the adjoining area. The organic matter consisting of dry leaves, stems etc. accumulated on the ground are degraded by soil organisms which permeates into the nearby agricultural land and enhance the soil fertility. In addition, as the *kavus* are the nesting place of the many birds, their droppings, which are rich in phosphorus enrich the nearby phosphorus deficient soil.

Kavus also act as centres of biological control in agriculture due to the existence of complicated food web, regulated by balanced predator-prey organisms such as snake-rat, owl-rat, insects, etc. This, in turn, helps to increase the production in agriculture. *Kavus* are also abode of many pollinating agents like insects, bees, birds etc. of many economically important plants of the region. As sanctum sanctorum of many rare endemic and endangered plants, these hold gene pool of many wild relatives of cultivars offering genetic materials for crop improvement programmes. These are also a source of many medicinal plants used by local health practitioners. Sacred groves located in urban areas help in mitigating air pollution by controlling free movement of dust and other air pollutants.

7. Threats to the Sacred Groves

In many parts of the country, during the past three decades, sacred groves have started deterioration both in terms of cultural and biological integrity, though the nature and extent of

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threats and pressures are often regional and even grove-specific. The change in the socio-economic aspect is one of the major threats to the existence of sacred groves in Kerala. The magnitude of these threats varies from region to region as well as from one type of grove to another. The major threats to sacred groves can be grouped under the following heads.

7.1 Commercial Forestry

Over the past two centuries, the local people have lost their customary rights of forest management in many parts of the country, due to government regulations. Hence, many sacred groves have been destroyed due to commercial forestry operations.

7.2 Development Projects

Some of the sacred groves that fell under government vested lands were destroyed when townships grew. Railroads and highways have also taken their toll of many sacred groves, and some of them have been inundated by big dam projects. Thus increase in the demand for land has also resulted in encroachments in the groves. Such activities have resulted in shrinkage of some of the largest *kavus* in Alappuzha, Ernakulam and Kannur districts.

7.3 Disappearing of joint family systems

Disappearing of joint family systems and division of family and ancestral properties, has resulted in the Kavus and other areas being handed over to a generation who has little or no faith in keeping the integrity of the kavus. In such cases, either the *kavu* has been totally removed, or at times, only the deity has been retained. Trees and associated habitat has been completely converted for other purposes. In some cases, symbolic representation of the sacred grove has been allowed to remain by preserving the oldest and the largest tree in the grove.

7.4 Sanskritization

In many places, local folk deities have been replaced with Hindu Gods and Goddesses. This has resulted in the erection of temples in the sacred groves leading to their fragmentation and destruction.

7.5 Pilgrimage and Tourism

The integrity of many groves with regional or pan-Indian character has suffered deterioration due to the influx of large number of pilgrims and tourists.

7.6 Removal of Biomass

In many sacred groves, anthropogenic activities like removal of biomass, firewood and cattle grazing was permitted and continuation of these practices over generations has resulted in the dwindling of the groves and adversely affecting the functioning of these ecosystems.

7.7 Encroachment

Since the location of these virgin ecosystems are in the midst of highly populated areas many instances have been reported, where the groves have been encroached by local communities as well as by people migrating from outside for settlements and agriculture.

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7.8 Fragmentation

Many of the sacred groves have been fragmented by roadways, extension of power lines, reclamation of land for agriculture, and illegal encroachment may lead to fragmentation of the grove and consequently loss of biodiversity and disruption of ecological functions.

7.9 Socio-cultural causes

Religion had an overwhelming influence on the preservation of forest patches as sacred groves, in addition to the ecological and economic values attributed to them, a notable feature of Indian culture is the continuation of many prehistoric religious practices, despite the growth of dogmatic religions along with them. A cultural transformation and changing worldview of nature among the people of the Western Ghats are among the causes for the decline of the sacred groves (Chandran *et al.*, 1998).

7.10 Cutting of trees and Ecotourism Promotion

Cutting of trees for temple renovation and construction inside the grove is another major threat to the groves. Recently, ecotourism without proper management in the large sacred groves of Kerala has adversely affected the existence of flora and fauna.

7.11 Natural calamities

Natural causes that are a constant threat to the groves include destruction of vegetation due to calamities such as lightning, floods, and windblasts etc. These accelerate the encroachment of exotic weeds and suppress the growth of original flora of the groves. The lianas such as *Acacia insigna* and *Mikania* sp. grow above the upper canopy of the trees and prevent light from reaching canopy, and thereby arresting the growth of the trees.

8. Conclusion

It is very important to uphold traditions and beliefs in order to protect and conserve these unique forest patches which represent the relict vegetation of the concerned area. These forest patches are no longer free from anthropogenic pressure. The disappearance and/or degradation of sacred groves not only symbolize the loss of the rich relict flora and fauna but also its rich tapestry of culture associated with the grove. Management of sacred groves and sacred sites through the traditional local system is now being challenged by a number of economic and social issues, and thus the traditional methods are rendered less effective. This calls for external intervention taking the local people into confidence. Important sacred groves should be brought under the 'Protected area Network' to ensure their proper conservation. Ecological services rendered by sacred groves needs to be highlighted and people should be made to realize that the conservation of groves is crucial for their sustenance.

A people-declared-managed sacred groves policy would be more effective in conserving bio-diversity of these. This may be due to the reason that these groves are intimately connected to the social life of the communities and form an integral part of its cultural identity. By unraveling the scientific and environmental significance of the sacred groves, its cultural integrity and biological diversity, it is high time for the conservationists and communities, along with government and non governmental organizations to take up strategies for conserving these fragile landscapes for the betterment of humankind.

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