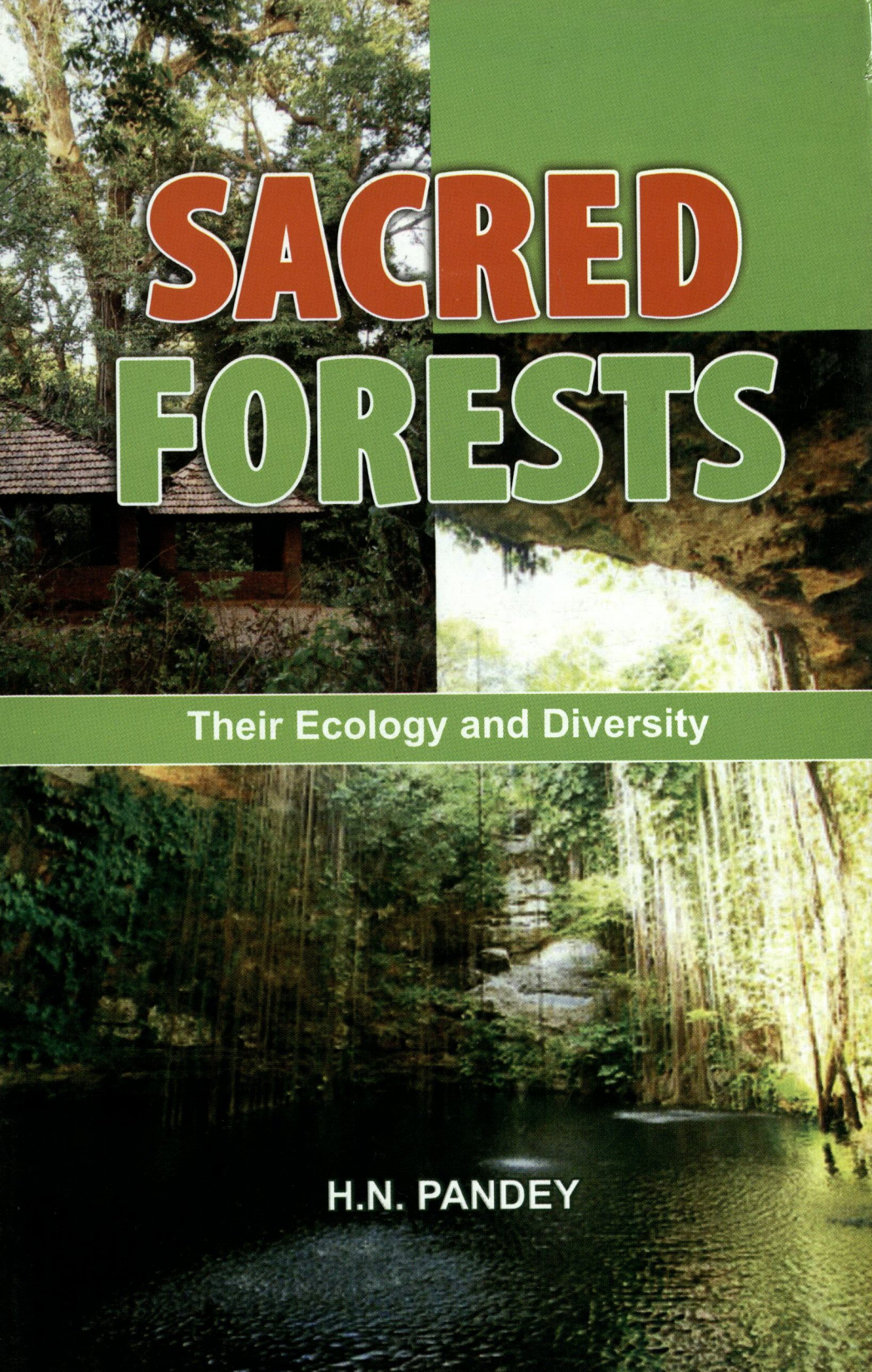
SACRED
FORESTS
Their Ecology and Diversity
H.N. PANDEY

Dr. H.N. Pandey, educated at Banaras Hindu University, Varanasi, was awarded M.Sc. (Botany) and Ph.D. degree in Plant Ecology in the year 1968. After serving as lecturer in a P.G. college at Varanasi for few years he moved to the Department of Botany, North-Eastern Hill University (NEHU), Shillong where he served as Reader and Professor of Plant Ecology till his superannuation in November 2006. During his tenure at NEHU he served as Head of the Department of Botany, NEHU and Coordinator of U.G.C.-COSIST Programme. Dr. Pandey taught various Plant Ecology courses to the undergraduate and post-graduate students for more than 35 years and conducted research on various aspects of ecology of terrestrial ecosystems of northeast India. The major areas of his research interest were forest ecosystems, tree regeneration and ecology and biodiversity of sacred groves and biosphere reserves, agro-ecosystem and agro-forestry systems and eco-restoration of degraded forest ecosystems of northeast India. He supervised 18 doctoral thesis and published about 90 research papers based on his original research work. His research has found place in the reputed national and international journals of Plant Ecology and have been cited world-wide. The author is known for his contributions in the field of Forest Ecology. He has authored six books in different branches of Botany including Plant Ecology and has edited two books 'Ecology & Resource Management in Tropics' and 'Ecology, Diversity and Conservation of Plant and Ecosystems in India'. He has written more than a dozen technical reports of the major research projects conducted by him including the one on 'The State of Environment of Meghalaya', 1994 and 2005.

Indigenous and local communities all across the globe have conserved thousands of sacred sites and sacred forests for millennia for spiritual, cultural, economic and aesthetic purposes. More recently when the species are getting extinct at faster rate all over the world, sacred forests have attracted the attention of biologists for their value in the conservation of biodiversity including rare, endemic and threatened plant and animal species and species of medicinal and economic importance. Besides biodiversity conservation, sacred forests play important role in the life of local communities by providing essential environmental services and economic benefits to them.

This book, besides giving an overview of sacred forests in India, provides comprehensive synthesis of the results of researches carried out at NEHU on the sacred forests. It is a significant addition to our knowledge on the sacred forests, in particular about species composition, community characters, tree regeneration, litter and fine root dynamics, microbial and nutrient dynamics in soil system, and evaluates the impact of anthropogenic disturbances on the above characteristics of the sacred forests. The book also identifies factors threatening the existence of sacred forests in the country and suggests measures for their conservation.

The research findings presented in the book further reinforces scientific reasons for conserving sacred forests. The book will inspire young researchers to carry out further studies on sacred forests covering socio-cultural and biological dimensions. The book will be of immense use to the forest ecologists, conservationists, foresters, NGOs, and local communities interested in the conservation of sacred forests in the country.

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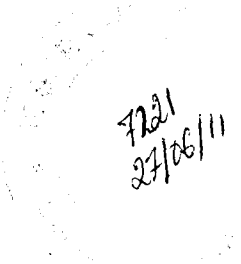

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Chapter 1
Sacred Forests

1.1 The Concept

Conservation of plants and other natural reserves has been an integral part of cultural ethos of indigenous communities in many parts of the world who considered themselves as being linked in a web of spiritual relationship with their biophysical environment (Huges and Chandran 1998). Conservation was the result of nature worship of the indigenous people all over the world. They considered specific plants or animals or even rivers and mountains as their ancestors and protected them. The evidence for this is seen even today in the rituals of many hunter gatherer groups. There are symbolic inclusion of wild animals, hunter gods and goddesses and hunting weapons in the rituals associated with the worship in the sacred groves. Though hunting was usually forbidden in the holy precincts, it was sometime permitted for an offering to a resident god or goddess. In India many societies or cultures have traditionally developed strategies for conserving and managing nature and natural resources. These strategies were highly congruent to the traditional lifestyle of the respective societies, and were determined by human attitudes towards utilization of the resources.

In India nature worship dates back to the Vedic period (5000 BC), and is based on the premise that all creations of nature have to be protected. Several plant species such as Peepal (*Ficus religiosa*),

Tulsi (*Ocimum sanctum*), Rudraksha (*Eleocarpus* sp.), Bel (*Aegle marmelos*), Ashok (*Saraca asoka*) and Kadam (*Anthrocephalus chinesis*) have been considered sacred. Besides sacred species, species required for rituals, and patches of forests and water bodies were also conserved in the name of local deities. An important tradition of nature worship is to protect patches of forest dedicated to deities or ancestral spirits. These forest patches have been designated as *'Sacred groves'*. They manifest the spiritual and ecological ethos of local indigenous communities. Recently efforts have been made by the scientists to define the sacred groves. One such effort is that of Hughes and Chandran (1998) who have defined sacred groves as "segments of landscape, containing vegetation, life forms and geographical features, delimited and protected by human societies under the belief that to keep them in a relatively undisturbed state is expression of an important relationship of humans with the divine or with nature".

It is believed that the existence of sacred forest dates back to several thousands of years when human society was in the primitive stage of development. Gadgil and Vartak (1975) have traced the historical link of the sacred groves to the pre-agricultural, hunting and gathering stage of societies, before human being had settled down to raise livestock's or till land. Hence, the concept of virgin forest is believed to be of pre-Vedic period, *i.e.*, about 3000 to 5000 years BC.

Hughes (1984) traced the origin of the concept of sacred groves in European and Greek Roman context and argued that the sacred groves or sanctuaries were the first temples of God. In Greece groves and forests were enclosed usually by stone walls. This enclosure was called *Temenos* in Greek, meaning a cut-off place or a demarcated place.

It is also believed that shifting cultivation could be one of the reasons for creation of sacred groves. In this most primitive form of agriculture in forested regions patches of forests might have been spared from slashing and burning, and have been left for the local deities in the form of sacred groves (Gadgil and Vartak 1976, Hazra 1975, 1980). Since these forest patches were often protected watersheds with a perennial source of water, people believed that the deity residing in these forests yields water. This is considered as the most popular belief of the origin of sacred groves.

Sacred groves might have also originated as a result of its utilitarian nature (Gadgil and Vartak 1976), a social institution (Kalam 1995) or as a part of the taboos that evolved historically over several generations to provide a site for culturally crucial social interactions (Gerden and Mtallo 1990). The ancestral practices of animism with the central focus on the worship of forest patches regarded them as the sacred abode of various gods/deities. Thus nature worship has been a key force in determining human attitudes towards conservation and sustainable utilization of natural resources.

Sacred groves throughout the world are associated with a range of traditional and cultural values related to forests, rituals and taboos. However, conservation practices and control over extractive activities in sacred groves vary in different communities and regions.

1.2 Distribution of Sacred Forests in the World

The sacred groves, sacred areas, sites and geographies are found almost all over the world. The sacred groves have been reported from different continents of the world such as Africa, Asia, Europe, Austro-Pacific region and Americas (Hughes and Chandran 1998, Malhotra *et al.*, 2007). In Africa it is found in Sierra Leone, Ghana, Ivory Coast, Nigeria, Old Calabar, Zimbabwe, South Africa, Egypt and Kenya. In Asia the sacred groves have been reported from India, Korea, Japan, China, Thailand and Indonesia. Countries like Germany, Britain, Italy and Finland in Europe had thousands of sacred groves in ancient times. Most of them have disappeared now. The sacred groves are widely known in the Austro-Pacific Region, New Zealand and Polynesia. In America native people believed that although the whole earth is sacred, but in certain places the spirit power manifests itself more clearly and readily. Many of these places were groves of trees. Americans of European of descent also have sometimes hallowed groves of trees. Some of them have been rededicated to early settlers, or to the war deads, or to noted leaders.

1.3 Distribution of Sacred Forests in India

In India, the sacred groves are found all over the country, especially in the regions inhabited by indigenous communities, particularly along the Western Ghats in the states of Maharashtra, Kerala, Karnataka and Tamil Nadu. In north-east India most of the sacred groves has been reported from Arunachal Pradesh,

Meghalaya and Manipur (Figure 1.1). Although, there has been no comprehensive survey of the sacred groves in the entire country, approximately 13,720 sacred groves have been documented so far (Appendix Table 2). Experts estimate the actual number could be much higher in the range of 100,000–150,000.

The earliest documented work on sacred groves in India is that of Brandis (1897a, b), the first Inspector General of Forests. Sacred groves reported from different parts of India are locally known by different names for example, sacred groves are called as *'Sarna'* or *'Dev'* in Madhya Pradesh (Bhakat 1990), *'Devrai'* or *'Devrahati'* in Maharashtra, *'Sarnas'* in Bihar, *'Orans'* in Rajasthan, *'Devarabana'* or *Devarakadu'* or *'Rulidevarakadu'* or *'Nagabana'* etc. in Karnataka, *'Kovilkadu'* in Tamil Nadu, *'Kavu'* in Kerala, *'Dev van'* in Himachal Pradesh, *'Ki Law Lyngdoh'* or *'Ki Law kyntang'* etc. in Meghalaya, *'Sarana'* or *'Jaherthan'* in Jharkhand and *'Lai Umang'* in Manipur.

Gadgil and Vartak (1975, 1976) prepared an inventory of the sacred groves or *'Devrais'* of the state of Maharashtra. Detailed information about the location, area and associated deity, folklores and traditional beliefs of 233 groves from different districts of Maharashtra were collected by Gadgil and Vartak (1981). According to Burman (1992), the number of sacred groves in Maharashtra and in the Western Ghats may be more than the number recorded by Gadgil and Vartak (1976). Balasubramanyam and Induchoodan (1996) reported 761 sacred groves in Kerala. Out of these 399 were of less than 0.02 ha in extent (Induchoodan, 1996). Perhaps highest density of sacred groves in the world is found in Karnataka (Kushalappa *et al.*, 2001). Kadamba (1998) enumerated 80 sacred groves from south-eastern coast encompassing the Marakkanam-Pondicherry-Cuddalore regions. In Andhra Pradesh 425 sacred groves were reported from Anantapur, Kurnool, Prahasam, Nellore and Cuddapah districts (Anonymous 1996). Basu (2000) reported a sacred grove from the Purulia district of West Bengal, which has an area of over 72,681m^2. Panda *et al.* (2003) reported 10 important sacred groves of Santhals from the Bankura district of West Bengal. Tiwari *et al.* (1999) inventoried 79 sacred groves of Meghalaya. Devi (2000) reported 365 sacred groves from Manipur. Dedicating a patch of forest to deities is a common practice with the Meitei community of Manipur who follow ancestral practices of animism with the central focus on the worship of forest patches which are regarded as sacred abode of *Umanglais* (sacred deities or sylvan-deities).

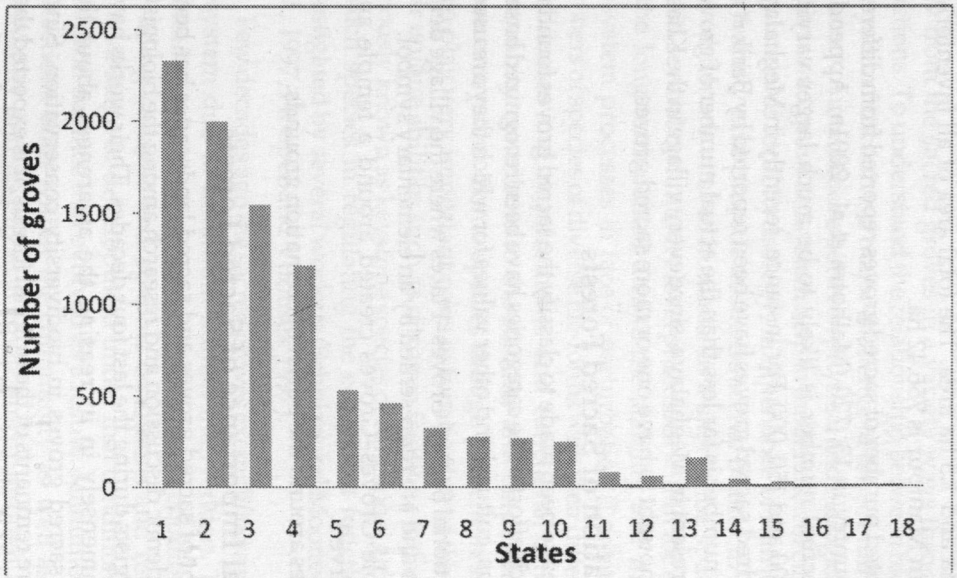

Figure 1.1: Distribution of Sacred Forests in Different States of India

(1. Maharashtra, 2. Kerala, 3. Andhra Pradesh, 4. Karnataka, 5. Manipur, 6.Tamil Nadu, 7. Orissa, 8. Madhya Pradesh, 9. West Bengal, 10. Haryana, 11. Meghalaya, 12. Sikkim, 13. Arunachal Pradesh, 14. Assam, 15. Gujarat, 16. Himachal Pradesh, 17. Rajasthan, 18. Uttar Pradesh)

The size of the individual sacred grove varies from a clump of a few trees to several hectares. Some sacred groves like those reported from Purulia district in West Bengal and Ri-Bhoi and East Khasi Hills districts in Meghalaya are spread over several hundred hectares (Basu 2000, Tiwari *et al.*, 1999). In Manipur majority of the groves are between 0.09 ha and 1.5 ha area. The total area of all inventoried sacred groves in Manipur is 756.42 ha.

The estimated number of sacred groves reported from different parts of the country is 13, 720 (Malhotra *et al.*, 2001a, Appendix Table 2), but actual number is likely to be much larger varying between 100, 000 and 150, 000. For instance, recently in Meghalaya about one hundred sacred groves have been reported by Barik *et al.* (2006). But this number is far less than the actual number of groves that might be present in Meghalaya, since every village in the Khasi-Jaintia hills is thought to have one or more sacred groves.

1.4 Classification of Sacred Forests

Attempts have been made to classify the sacred groves found in India. In one such effort three categories have been recognized based on their religious, cultural and other values for which they are used.

- ☆ Traditional Sacred Groves–Places where the village deity reside and are represented by an elementary symbol.
- ☆ Temple Groves–Groves created around a temple and conserved.
- ☆ Groves around the burial or cremation grounds.

1.5 Ecological Importance of Sacred Forests

The concept of sacred groves and sacred landscapes has been the focus of academic discussion and research among the biologists and anthropologists during the last four decades. Their works have contributed immensely in increasing the awareness about the significance of sacred groves in biodiversity conservation. Since sacred groves are remnants of the original forests, it is expected that at least a portion of the original biodiversity has survived in these forests. Some plant species growing in the sacred groves are used by traditional healers and priests who have a strong interest in the preservation of such sites and ecosystems. Small farmers, fish folk, herders and hunter gatherers, depend on the diversity of species,

genetic varieties and ecosystem services for their livelihood and cultural lives. These aspects of sacred groves have been explicitly discussed by Norse and McManus (1980).

Apart from the direct benefits of biodiversity conservation, indigenous societies have always sensed the indirect benefits which flow from the sacred groves in a variety ways through ecosystem functions. To understand the relationship between biodiversity and ecosystem function is a major challenge to the scientific community. An array of interactions between physical and biological components of the sacred grove ecosystem help in moderation of climatic regimes, regulation of local hydrology, maintenance of nutrient cycles and soil fertility and provide aesthetic scenic beauty to the landscape etc., which are vital to humans. In a short time span biodiversity affects several community level processes within the ecosystem and in the long-term contributes to the stability and maintenance of ecosystem processes in face of perturbation (Loreau 2000). Large numbers of species of diverse life-forms with their differing ecological amplitudes and requirements and functional attributes in the community contribute to the stability and perpetuation of sacred grove ecosystem. Some species though present in small numbers often play very important roles in functioning of the ecosystem by their unique abilities such as nitrogen fixation etc. Such species are variously known as keystone species or functional groups. The roles of such species in regulating the ecosystem functions are being investigated by several workers (Schulze and Mooney 1993, Tilman *et al.*, 1997, Hooper and Vitousek 1997).

Few decades ago the sacred groves exemplified a self sustainable ecosystem due to minimum human intervention. The biological communities in the groves were in dynamic equilibrium with the prevailing climatic and edaphic conditions and represented the terminal stage of development under that condition. The delicate ecological balance that evolved as a result of innumerable intricate interactions both within the community as well as between the community and its physical environment through ages has been disturbed due to biotic stress of varied kinds and magnitudes primarily caused by human activities. As a result, a large number of groves found in different parts of the country are no longer in a state of dynamic ecological equilibrium. The plant species which form the major structural component of the sacred grove ecosystem have

been changed, the soils which support the vegetation have been degraded and the forest microclimate that is crucial for regeneration of tree species have been altered. These changes have upset the ecological balance and have disrupted the structure and functioning of the majority of sacred grove ecosystems which no longer exist in self-sustainable state (Figure 1.2).

1.6 Socio-cultural Importance

In addition to the ecological importance, the sacred groves have important socio-cultural functions to the indigenous communities. The relationship between cultural and biological diversity in India has evolved as a result of close relationship between the two. The biodiversity has been conserved and survived against the forces of destruction due to strong bondage between socio-cultural values attached to the sacred groves which happen to be the store house of biodiversity. Some of the socio-cultural values of the sacred groves are summarized in Table 1.1.

Table 1.1: Socio-cultural Values of the Sacred Groves

Religious: Propitiations of deity/ancestral spirits/totems.
Cultural value: Provides cultural space to the community as a common property resource. Assertion of group identity/group solidarity/new alliances etc.
Health: Well being of community/family/individual.
Economic value: Good rainfall/good agricultural production/well being of crops and animals/source of raw materials, medicine, food, fruits etc.
Psychological: Moral support and guidance to the local people.
Educational: Ideal sites for teaching and research.

The age-old cultural ethos of tribal communities which were responsible for preservation of the integrity of the sacred grove through ages is degrading at a fast rate. The traditional belief systems that were fundamental to the concept of sacred grove conservation are being considered as mere superstitions and are gradually disappearing with the advent of modernization, urbanization and people's changing aspiration. Modernization is posing a serious threat to the local traditions which are being challenged by urban cultures and the sacred groves are losing their cultural importance for the younger generations of the people. There are instances where change in religious beliefs of people is responsible for the degradation of sacred groves.

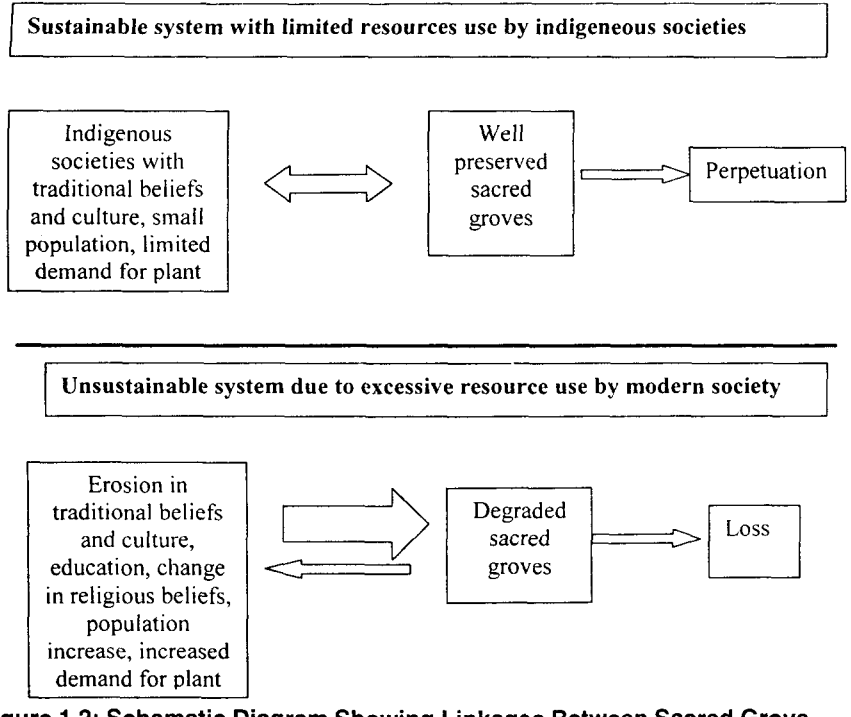

Figure 1.2: Schematic Diagram Showing Linkages Between Sacred Grove, Tribal Community and Factors Responsible for Sacred Grove Degradation

The shrinking primary forests are also forcing the local communities to encroach the sacred groves. Human activities that were previously taboo, such as dead wood collection, lopping of trees for timber and fuel wood, collection of wild edible fruits and tender branches and green leaves for fodder and cattle grazing have increased. Many sacred groves are fragmented by construction of footpaths, roads, extension of power lines etc. The disturbed and fragmented sacred groves are being invaded and colonized by exotic weeds like *Eupatorium adenophorum, Lantana camera, Artemisia nilagirica* etc., threatening the indigenous species present in the groves. The loosening of management of sacred groves by traditional institutions is also a major factor contributing to the sacred grove degradation. There are instances where decisions were taken to benefit certain sections of the village society against the traditions of the sacred groves.

1.7 Degradation of Sacred Forests

The sacred groves distributed in different parts of the country are facing various kinds of anthropogenic stresses. The intensity and frequency of these biotic stresses vary from one region to the other and even from one grove to the other in the same region. The commonly recognized factors which are responsible for destruction and degradation of the sacred groves are summarized below.

- ☆ Loss of faith in the traditional belief systems, which were fundamental to the concept of sacred groves. These systems and the rituals attached to the belief system are now considered mere superstition.
- ☆ Many groves are suffering due to transformation of the primitive forms of nature worship into formal temple worship. In many parts of the country change in the religious beliefs from traditional/Hindu way of worship to Christianity has led to destruction of the sacred groves.
- ☆ Sacred groves in many parts of the country have been destroyed due to rapid urbanization and developmental interventions such as roads, railways tracks, dams and commercial forestry. Encroachment has led to the shrinkage of some of the largest groves in the country.
- ☆ Collection of biomass in the form of green manure, medicinal herbs, tree branches and dead wood as well as

extraction of timber with religious justification is also contributing to degradation of the sacred groves.

- ☆ Invasion by exotic weeds such as *Eupatorium odoratum, Lantana camara and Prosopis julifera* etc. is a serious threat to some groves.
- ☆ Grazing pressure due to increasing livestock population and fuel wood collection is also responsible for sacred grove destruction in some areas.
- ☆ Land reforms in some states, for example in Kerala, have led to reduction in large land holdings of big land owners. Therefore they could not afford to have sacred groves in the remaining portion of their land, which in due course of time was brought under other uses.