



# Sacred Grove—A Nature’s Gift—as a Remedy for Human Ailments, a Biodiversity Reservoir for Restoring Indigenous Traits for Endangered Listed Plants—A Review

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## Abstract

This review article is an attempt on hypothetical analysis of biodiversity which includes by exploring and implementing the so called protected area by the small communities “Sacred Groves” made declared by a group of people of those community over a century, some were half way made and few, were more than a decayed old. Sacred groves are considered rich in biodiversity, and also the resourceful source of flora and fauna of rare species. Traditional knowledge based sacred groves conservation has a significant contribution in the process of biodiversity conservation and also most of the plants or trees are of medicinal importance and hence the maintenance of the sanctity of that area reflects in the rectification of human ailments. Sacred groves are indicative of positive consequential combination of religion and ecology. The present article is written to draw attention to the readers to have an idea of other country’s traditional systems of offering prayers to the God, and also their belief system for natural sacred sites. This conservation of many plants species has been reported, so in view of the biodiversity conservation with respect to plants, their sacredness and the involved community of different countries, the present review article has incorporated the published work as well as the unpublished views also, for opening an avenue to study the interrelation of community based sacred groves, the ingredients of that area and the functional efficacy towards nature for treating human ailments under natural environment. This review article gives way to many innovative ideas which definitely lead to newer technologies by technocrats.

## Keywords

**Biodiversity, Sacred Groves, Indigenous, Nature, Conservation, Traits**

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## Subject Areas: Biodiversity, Conservation Biology, Ecology, Environmental Sciences

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### 1. Introduction

The ideology behind the writing of this review is to harbor and extract out the concentrated knowledge on sacred groves from various communities of the world where, such places and practices are enduring like in India. Out of them, some are residing in the remote areas of forest. Few still have a superstitious beliefs and many from the community wave off in search of better livelihood. Initially, the authors are of the opinion that India and other Asian countries have such beliefs because they have number of communities who are residing in different parts of the Indian States and based on their communities they refine their ideas in the form of rules which should be followed by all the people of that area for its successful implementation. Gradually, their action on such a protected area basis has started coming into limelight as the time grows with technologies, while on the contrary, recession in employment has triggered the need of money and the people in search of money turn to the natural resources and start disturbing the terrestrial ecosystem by extracting the plants and trees from the forest for their livelihood, either to have fuel wood or MAPs *i.e.*, medicinal aromatic plants from the forest without landed upon with the standards or rules of extracting the wild MAPs from these forest without the knowledge of the forest officials and gradually it becomes a practice and leads to serious disaster of extinction of number of plants from the forest.

#### 1.1. What Are Sacred Groves and How Their Existence Noticed? Why Are Sacred Groves Important for the Conservation of Nature and Culture?

In many countries of the world, sacred natural sites are important areas for environmental conservation as also mentioned by Vershuuren (2010) [1]. The concept of “sacred” in most cultures implies something sanctified, holy or revered and also associated with the secret or prohibited for trespassers or common people. According to Saikia (2006) [2] “Sacred groves are small groves that vary in size from a few hectares to a few kilometers protected by local communities as being the sacred residences of local deities and sites for religions-cultural rituals, have served as valuable storehouses of biodiversity”. In India it is mainly community based and so called “Puneet Vana” or Sacred Groves. The international scenario tells us as described by Carmichael, (1994) [3], these are called Sacred natural sites.

#### 1.2. Rectifying Nature towards the Balancing of Ecosystems-Aquatic, Terrestrial and Air

As technology becomes more and more prevalent and popular among everyday lives of children, the nature becomes more foreign. Children need to embrace nature in their lives, should know how nature works?, the role of nature in developing the pure potentiality in humans, also the use provide experiences that are not available through any form of technology. The IT world has created lot of gadgets based on the newly available technologies, which even replaces the human work becoming similar to the robotic technology. Yes, indeed the robotic activities are heartless and like a battery till filled it works. Somehow with nature also the same methodology is in progress as the human concerned is least about nature-the only natural resource that gives us a healthy life free from all types of ailments without side effects. It is emphasized by Groot *et al.* (2010) [4] on well being of human and describe in Deepak Chopra’s book on spiritual law (1994) [5] that whatever we give to nature and the nature give us the same or even many times more. Any type of disorder observed in nature is a nature-deficit disorder as described by Allen (2001) [6]. The humanity is responsible for such type of disorders mainly.

#### 1.3. Nurture Nature—A Need for Future Generation

Nature provides people with fresh air and free open space. The expectation with young generation is to understand nature as they are the future generation of this universe who could follow the laws of nature for their growth, country’s growth and should prioritise the intuitive thoughts and specified with the responsibility to restore nature in the form of natural resources. Practice of nurturing nature from the childhood would give a boon to the thoughts and a wide spectrum to work upon it. The belief would be intensifying through self experiences.

These experiences considered as rewards from nature and are expected to transmit either verbally or through their writings to the people who are residents of that area. A workout in this regard would be appreciated to motivate for realisation of the existence of nature around. The younger generation can use this space to play, run, imagine, think, and explore most importantly. The creativity is limitless and nature provides endless opportunities for them, if utilises altruistically as published by Burner *et al.* (2001) [7]. They are exposed to decision making and are given almost complete freedom to express themselves. The young generation could spend hours lost in their imagination; in a separate world as also described by Nair (1997) [8].

## 2. The Contribution of Sacred Groves and Sacred Sites Society and Nature

The objective of the traditional management of sacred sites is to maintain their separateness or sanctity by controlling access of trespassers/anybody without the permission to that area considered as sacred. The Convention on Biological Diversity calls for benefit sharing with indigenous people holding such traditional knowledge Gokhale (2009). In addition to this, many ecosystems such as wetlands, mangroves and sacred groves have also been brought under conservation schemes as mentioned by Boojh and Ramakrishnan (1983) [9] Ramakrishnan (1996) [10]. These sacred mountains have kept their untouched nature and natural biodiversity for hundreds of years.

### 2.1. Types of Sacred Groves

The sacred groves found in India can basically be classified under three categories based on analysis of studies on sacred groves Roy (1998) [11], Ray and Ramachandra (2010) [12],

- Traditional Sacred Groves—it is the place where the deity resides.
- Temple Grove is created around a temple and conserved.
- Grove around the burial or cremation grounds.

## 3. Ecological Significance of Sacred Groves

• **Conservation of Biodiversity**—The sacred groves are important reserves of floral and faunal diversity along with the additional group of microorganisms that have been conserved by local communities.

• **Rain water harvesting and Recharge of Aquifers**—The groves are often associated with ponds, streams or springs, which help meet the water requirements of the local people. The vegetative cover also helps in the recharging the aquifers.

• **Soil Conservation**—The vegetation cover of the sacred groves improves the soil stability, soil fertility, ultimately improving the soil properties of that area and also prevents soil erosion. Most importantly the soil conservation could be the source of restoring the original strain characteristics of living system of soil. From these groves one can frame the original characterization of microbes involved in biogeochemical cycling process of simplifying the need of phosphorous, nitrogen etc in the soil (unpublished data).

## 4. Biodiversity and Sacred Groves

Sacred groves are sometimes small forests that local communities conserve primarily because of their religious importance (Saikia, 2006) as described earlier in this article. These groves are consider as a rich and dynamic source of ecological, holistic treatments for human ailments, social in terms of pool or server for extinct species of plants restoring some of the rare plants, and act as a cultural functions of some plant species in sacred groves may provide emergency foods during periods of drought, crop failure, and food crisis as explored by TGBRI, Scientists while going with the group of Kani tribes in Kerala. Also such sacred places can help in protecting watershed resources like springs, soil fertility and moisture, and ecosystem processes such as nutrient cycling. A variety of factors promote the conservation of biodiversity in sacred groves like general or selective limits or prohibitions on the use of biotic species. Also information may be kept secret from outsiders such as about species of ritual, medicinal, or commercial value.

Each sacred grove is a dynamic system, may exist through centuries or more as a leftover of a natural and anthropogenic ecosystem. It may be revived with the renewal of some cultural and religious traditions for the purpose of conservation. For example, sometimes as a resource management strategy a community may designate or sanctify a patch of forest to be a sacred grove, and then after a period of time sanctified patch would be use

for other purposes. Also sacred groves are dynamic systems because the species composition of any plant community naturally changes with time and also the ecological succession, even without natural perturbations or human disturbances. Accordingly, a landscape can be a mosaic of patches of various types of plant communities, and that may help to sustain some of the biodiversity in a region as researched by Ray and Ramachandra (2010) [12]. Sacred groves can also serve as a seed source for the ecological restoration of degraded landscapes. Indeed, often sacred groves, like other sacred places in nature, stand out as vegetation-rich ecosystems as compared to their surroundings.

## 5. International Scenario

Sacred groves are the combination of traditional systems and religious places or sites that have a conservation role, may need to be strengthened and augmented by incentives for local communities to boost their efforts; legal, government, or international environmental protection schemes for their awareness and monetary contribution; and some rewards should be allotted for the establishment and maintenance of buffer zones as described and mentioned by Leslie E. Sponsel, (2008) [13]. Recognition and protection of sacred places by scientific, environmental, governmental, and/or non-governmental organizations can simultaneously promote their innovative conservation ways of associated biodiversity and cultures. There are various organizations working on these natural sites on community based people perceptions. These organizations have their own aphorism based on the sites chosen for study. Many organizations are relevantly working for biodiversity conservation, such as Conservation International with its Faith-Based Initiatives Program; Leslie (2008); Groombridge and Lenkins (2002) [14]; Lockwood *et al.* (2006) [15]; Mallarach (2007) [16]. These organisations have been reported to work on certification of forests and their produces. Such secular NGO helps religious groups around the world to develop their own environmental programs focussing on their core beliefs, values, and practices. This organization implemented many projects dealing with the protection of sacred localities and critically examines the possibilities of linking religious faiths with protected areas for the conservation of biodiversity. The project arose from a conference held in 2000 in Bangkok by the WWF and the WCPA.

The statistical analysis of the existence of sacred grove through SWOT matrix is beyond belief and they summarize the strengths and weaknesses of sacred places for biodiversity conservation. The strengths are that they may be of high conservation value; more strongly protected and better managed than those that are exclusively government sanctioned and regulated; important for preserving traditional knowledge; significant manifestations of culture and cultural diversity; of intrinsic value because of their sacredness; and destinations for ecotourism. They may also attract increasing recognition, funding, and other support in contrast to secular places. The weaknesses are that the sacred place has not been adequately recognized and appreciated by the government and public; it may be semi-natural instead of untouched nature or wilderness; it may be too small or fragmented to possess much if any value for biodiversity conservation; it may be vulnerable to changes in the associated culture and religion; its economic values may be allowed to supersede religious ones; traditional custodians may wish to keep it secret; and knowledge and control of it may be reduced from its traditional users. However, the authors point out that none of the above benefits and costs are inevitable, and that management is the most important factor influencing them as described by Leslie (2008); Schaaf and Lee (2006) [17], while protected area status for a sacred place is not always applicable, as it depends on much of the interest of the people to be a part of the community as reported by Roy and Burman (1992) [18].

## 6. Sacred Protection

The sacred grove are taken care by the communities of that area and the government also takes care after the introduction of CBD for protected areas, such as national parks and wildlife sanctuaries. These are viewed as an important historical change in land and resource values, people attitudes and a major achievement for environmental and biodiversity conservation. Large areas are needed by big herbivores and carnivores that range widely in order to satisfy their needs as described by Blicharska *et al.* (2013) [19]. However, government protected areas number over 100,000, they cover only about 10-15% of the world's land surface and approximately 1% of the ocean Rao *et al.* (2011) [20]. While new protected areas continue to be implemented by governments and international organizations, more adequate coverage in terms of number, size, and sample of biodiversity which can only be achieved by embracing community based conservation, according to many experts Alison Ormsby, (2013) [21]; Chandran and Hughes (1997) [22]; Kumbhojar and Kulkarni (1998) [23]. Local traditional envi-

ronmental knowledge (TEK) together with sustainable resource use and management regime can be of great practical importance in conservation and contribute to nature.

## 7. Sacred Grove-Society and Social Issues

The societal effect usually rejuvenates the sacred grove and sacred places. The plant kingdoms found in the grove are usually the wild medicinal plants and conserving the extinct group of plants. The importance and effectiveness of wild MAPs available in sacred groves depends on the sacredness and powers of the deity of that grove. The people believe in the traditional knowledge transmitted from generation to generation to serve the humanity. The combination of nature, community, the transfer of the traditional knowledge and sacredness of the grove, altogether are responsible and represents the purity of the sites. Nature and social sciences, and sometimes even the humanities, ecological and environmental anthropologists are especially well positioned to help, explore, document, and manage the connections among sacred places, communities, cultures, religions, biodiversity, and conservation. Society's view of nature and interaction with it are culturally nurtured and mediated. This principle applies to communities with ideas about the sacredness of particular localities in nature, as described by Ramachandra Guha (2000) [24], Sahotra Sarkar (2005) [25], and Mishra *et al.* (2004) [26]. Anthropologists and others have demonstrated that Western science, technology, and government have no monopoly on environmental conservation. The cultural connections as a methodological principle, anthropologists are in process of adapting others cultures and religions and simultaneously document their comparative analysis. Some also collaborate with members in promoting their practical concerns through applied or advocacy work, such as Christopher McLeod's [27] Sacred Land Film Project (2002) at the Earth Island Institute. In addition, anthropologists are especially well situated to serve as intermediaries among individuals from different interest groups like conservation, government, community and religious organizations Mallarach (2007) [16].

Sacred grove has different origin with varying indigenous characteristics. Based on the uniqueness, numerous sacred places in the world are associated with societies. Because anthropology has traditionally focused on indigenous societies, and certainly they remain a core commitment of the profession, it has a unique role to play in this arena through basic and applied research as well as through advocacy and in promoting co-management schemes and empowerment, as Thomas Schaaf and others (2006) [28] have demonstrated [19] in their work with UNESCO-MAB. Protecting sacred places simultaneously can help to protect cultures, religions, and rights as well as the associated biotic species and ecosystem as reported by Malhotra (1998) [29].

## 8. Biodiversity-Original Gene Pool In Relation to Plants, Animals and Microbes

The most important issues of 21st century on the national and global agenda is the need to preserve biodiversity for future generations and hence trying to understand and document the indigenous knowledge about the resource management practices. Religion, being a powerful instrument for convincing people through various activities on several festive and religious occasions has always been used for meeting the desired objectives of the society. The various religious philosophies have contributed significantly in the conservation of forests; biodiversity and landscapes by disseminate customary norms, practices and beliefs. Some prominent live examples of traditional and cultural forms of biodiversity conservation still exist and are in practice, which include sacred groves, sacred species and sacred landscapes. Sacred groves are the religious practice of conserving biodiversity with strong beliefs, customs and are treasure of rare and endemic species. The removal of any material, even dead wood or twig means violating the rules Gadgil and Vartak (1974) [30]. Such groves still exist in many parts of the world and represent surviving vegetation of the locality, preserved in its original form with least disturbance. Preservation of these groves, though on the pretext of religious beliefs, is of importance for conserving germ plasm that is otherwise under threat from human interference Khiewtam and Ramkrishnan (1989) [31].

The human being could not able to estimate the power of nature and that is why the concept of sacred groves is still relevant and exists today, especially in many parts of Mexico, Ghana, Nigeria, Syria, Turkey and Japan as reported by Gadgil and Vartak (1974) [32]. In India, they occur in Western Ghats, Madhya Pradesh, Maharashtra, Meghalaya, Karnataka, etc., and found in variety of habitats from scrub forests of Thar Desert (maintained by Bishnois), to rain forests of Kerala in Western Ghats, Himachal Pradesh in the North and Kerala in the south are specifically known for their large number of sacred groves. India has the highest concentration of sacred groves in the world. Estimates suggest that there might be between 1,00,000 and 1,50,000 sacred groves around

the country as reported by **Srivastava et al.** (2007) [33] and named differently in different parts of India such as *Law lyngdhoh* in Meghalaya, *Kovil kadu* in Kanyakumari, *Dev bhumi* in Uttarakhand, *Kavu* in Kerala, *Sarna* and *Deorai* in Madhya Pradesh, *Oran* in Rajasthan, *Jaherthan* and *Garamthan* in West Bengal, *Deovan* in Himachal, *Ummanglai* in Manipur, (all are in India) etc. The existence of such undisturbed diminutive is mostly due to certain outlaws, strong beliefs, supplemented by mystic folklores Durning (1992) [34].

**Biodiversity source-sacred groves:** The sacred grove is kept in a comparatively undisturbed condition, due to deep faith and regard of local people and the belief that the deities would be offended, if trees are cut, flowers and fruits are plucked. The vegetation composing the sacred groves is very different from that of the surrounding areas of the region. Many of the sacred groves are studied in different parts of India, with a general focus on diversity of plant species. About 372 species are counted in Tarkeshwar sacred landscape and over 100 species are noticed in Hariyali sacred landscape. Kabi sacred grove in North Sikkim has 241 species of plants in a 3 km<sup>2</sup> area. Jamir and Pandey (2003) [35] studied plant species diversity of three sacred groves in Meghalaya and found 395 species. 83 species are reported in Nakuleshwar sacred grove from Kumaon Himalaya as reported by Negi (2010) [36]. Tiwari et al., 1998 [37] studied 79 sacred groves in Meghalaya, spread in the area of 0.01 to 900 hectares in size and also the species diversity found much higher than in disturbed forests. In addition, the species *Myristica magnifica* and *Pinanga dicksoni* are now mainly confined to a *Myristica* swamp in a sacred grove of Uttara Kannada in northern Karnataka as described by Manikandan (2011) [38].

**Rare and endemics plant species from sacred groves:** Sacred groves are the depository of rare species. In a report at least 50 endangered and rare species in sacred groves of Meghalaya. *Kunsteria keralensis*, a climbing legume, reported from a sacred grove in southern Kerala, is confined to that sacred grove Nair and Mohanan (1981) [39]. *Belpharistermma membranifolia*, *Buchanania lanceolata* and *Syzygium travuncorium* are rare species found only in some sacred groves of Kerala. Mohanan also discovered a rare species of cinnamon, *Cinnamomum quilonensis*, in some of the *Kavus* of Alapuzha district in Kerala described by Chandrashekara and Sankar (1998) [40]. The Kallabbekkan sacred grove in Kumta taluk, Karnataka, in extent, despite being in the midst of arecanut-spice gardens of a populated village, is rich in endemics like wild nutmegs (*Myristica malabarica*), *Cinnamomum malabathrum*, *Garcinia gummi-gutta* and wild pepper. *Petiveria alliacea*, an endangered medicinal plant have been reported from sacred grove of Kanyakumari as reported by Sukumaran and Raj (2007) [41]. In Kodagu district of Western Ghats, sacred groves have found to protect some threatened tree species such as *Actinodaphne lawsonii*, *Hopea ponga*, *Madhuca neriifolia* and *Syzygium zeylanicum*, which are not found elsewhere.

## 9. Soil and Climatic Habitats—Sacred Grove—A Soil Property Retainer

Soil condition of such sites are very rich as several text exhibit remarkable microhabitat-specific natures which can be attributed to the local environmental conditions and sacred groves provide excellent micro-climatic conditions for the luxuriant growth of those plant species which are not present in the surrounding areas at the same altitude. Also such area have good microbial loading and hence consider good for biogeochemical cycles. Changes in the microhabitat often induce noticeable damping effect on the dominance of one tax on in that area which sometimes account for its disappearance on one hand and simultaneous emergence of another species, since many species are highly sensitive even to the smallest changes in the environmental conditions. For example in Haat Kali sacred grove, *Hedera nepalensis* and *Smilax aspera* are found frequently on trees of *Cedrus deodara* and provide shelter to other life-forms. *Microstylis acuminata*, an orchid grows gregariously in moist and humus rich soil of the grove.

**Conservation of water resources:** The concept of water harvesting begun from sacred grove of Rajasthan, India, and the pioneers Dr. Rajendra Singh has been rewarded with a Magsaysay award on his successful achievement of forests water harvesting. Sacred groves also have their own micro-climate which increases nutrient recycling, recharge of aquifers and also a primary source of perennial streams. For example, in Nakuleshwar sacred grove of Pithoragarh district, Uttarakhand, the dense forest forms plenty of the area of land around perennial water stream and provide essential requirement of water to the villagers and other people of the area living in the vicinity of the sacred sites.

**Source of Livelihood:** There is a need of national—international rules which should be implemented and sincerely to be follow in all sacred grove of the country wherever these diminutives exist. Most of the sacred groves besides maintaining biodiversity provide a livelihood to the community they belong to. The system of

benefit sharing also begun from sacred grove forest produces by local communities and the care takers of the groves. They have developed a rotation system of getting forest products by which all the families receive benefits during different time. The family, who is utilizing their traditional knowledge of medicine for human ailments rectification, would be allowed to practices their expertise but most of the time free of cost except they charged for the herbs sometimes. Tree cutting is prohibited and only felled trees are taken away by the natives. In India, few of the examples of communities sustained around the sacred grove are Chamunda Devi and Haat Kali sacred groves in Kumaon Himalaya as reported by Singh (1997) [42].

### 9.1. Sacred Plant Species as a Source of Relieving from Ailments

The plant species are used as good fodder, fuel wood and timber, apart from the fact that they play a key role in nutrient cycling and conservation, as well as in ensuring water balance within the soil and enriching soil with nutrients to enhance the soil fertility. From ancient times, lower—higher plants, animals and microorganisms are the part of our life. Some plant species are grown in sacred places because people thought that souls of ancestors and deities reside in these plant species and protect their life from different ailments and also give judgments through medium, where ever the innocent people being sufferers. Plants are oldest creation of God on earth and the conscious about them is as the human civilization. Worshiping of plants is one of the earliest religious trends since the time ancient. Plants are treated as to the abode of the gods, and hence called Sacred Plants. In the scriptures, these plants are mention of the *Kalpa vrisksha* and *Chaitya vrisksha*, indicating that worshiping of the trees is an Indian tradition. These plants are often grown along and within the temples. Various religious ceremonies and festivals are based on these trees, flora or plants. In India, there are many festivals, which are based on. Holy Basil (*Ocimum species*), Asoka (*Saraca asoca*), Banyan tree (*Ficus bengalensis*), Peepal (*Ficus religiosa*), Kela (*Musa paradisiaca*), Neem (*Azadiaracta indica*), Aam (*Mangifera indica*) and Beal (*Aegle marmelos*) etc., are sacred plant species in India. Many of them like the sacred basil and neem are multi-purpose medicinal plants. Several studies were carried out in Almora district (Uttarakhand) on the religious or sacred plants Ray and Ramachandra (2010) [12]. For example, *Cedrus deodara* is frequently seen in Jageshwar and Dhaula Devi sacred groves and is protected through religious beliefs, *Quercus leucotricophora* in Jhakarsham sacred grove, *Pinus roxburghii* in Gairar sacred grove, similarly, in Pithoragarh district, *Rhododendron arboreum* in Malay Nath and Narayan Swami Ashram sacred grove, *Osmanthus fragrance* in Thal Kedhar sacred grove, *Cedrus deodara* in Haat Kali and Chamunda (Hanera) Gangolihat, etc. Many ethnic, religious and cultural traditions are associated with plant species (folk music, dance, literature and poetry). In spite of this, these plant species play a significant role in our daily life. These species are used as a good fodder, fuel wood and timber, apart from the fact that they play a key role in nutrient cycling and conservation, as well as in ensuring water balance within the soil and enriching soil with nutrients to enhance the soil fertility. Due to these enhanced properties the sacred grove green belt is categorize as a special and protected area of sacredness for human ailment treatment too.

### 9.2. Importance of Sacred Groves

#### 9.2.1. Merging of Nature—Sacred Groves-Community (People Ailments etc.)

Sacred grove are the main source of providing herbal medicines to continue the local health tradition particularly the tribal medicine, which are purely oral in tradition and are in danger of being lost. In this context, community based medicinal practices and knowledge; it becomes evident that dissemination of knowledge is mainly oriented. From time immemorial, healers acquire the knowledge from their forefathers or village seniors through oral practices and practical experiences. Most of the healer families have rich tradition of medicine practices from generation after generation. Sometimes, village healer have pupils who learn the medicine details from their teacher and treat their community with that knowledge, also it is said that medicines. This indigenous knowledge is very much location and community specific which reflects their knowledge on nature and natural resource management. However, it is interesting to note that, in spite of having a wide knowledge of nature and its importance in human life, rarely there are scriptures available, the reason may be confinement of the communities in small areas and application of their medicinal knowledge to local people which do not need documentation at all. Moreover, the secret nature of the religious practices and myths may have a role in maintaining the oral tradition of this knowledge. Diversity in medicinal plant resources, their availability in social and religious practices are often very much specific to the respective community which hinders in establishing connection among different group sometimes. Above all, sanctity and serenity of such areas are based on the purity of

place, people's heart and type of plants used. Why the author has given stress upon the purity and people, because the ideology of such healers belong to such community have a strong belief in maintaining the sacredness the giver, seeker, and the mediator *i.e.* the herbal medicines of sacred grove area.

Government activity is also criticizing in relation to the existing forest rules and regulations which often restrict the access of important medicinal plants for the communities which insist them to follow illegal ways to gather required plants (as expressed by all the tribal practitioners from all the states). However in some areas controlled collection is permitted under supervision. Another important point is registration of the tribal healers. It is a matter of serious concern that, although a good percentage of people is dependent on tribal medicine system for their healthcare, tribal healers do not have valid registration certificate for practicing medicine (as expressed by tribal practitioners from Tripura, Andhra Pradesh and Nagaland, India). Most of them are practicing independently and locally. They are always in trouble due to lack of the safeguard of registration whenever there is any serious problem in patients health and life. In comparison to the allopathic and traditional Indian medicine they are always far behind in terms of validity, health insurance and financial assurance. There are numerous examples of medicinal plant cultivation by local people in India besides availability through sacred grove and wild medicinal and aromatic plants. Socio-culturally valued species find place in home gardens and courtyards.

Similarly, Juang and Munda tribes of the Keonjhar district of eastern India use 215 plants, belonging to 150 genera and 82 families as reported by Mahapatra (1992) [43]. This suggests a wealth of traditional knowledge on biodiversity and herbal health care in tribes of eastern India. Tribes in the region are dependent on forests for other species as species of mushrooms, wild berries, tubers, and flowers that are included in their diet including cooking oil. Understanding of traditional knowledge on biodiversity of the region will be most helpful in planning for sustainable forest management.

### 9.2.2. Sacred and Community Based Traditional Ethos

Some of the ethos may not have known conservation effect, yet may symbolically reflect a collective appreciation of the inherent value of life forms, and the love and respect for nature. Traditional conservation ethics are still capable of protecting much of the country's decimating biodiversity as long as the local communities have even a stake in the management of natural resources. Traditional ethos is reflected in a variety of practices including sacred groves and sacred landscapes. They are fairly well described by Deb *et al.* (1998) [44].

One example from northeast India is particularly made notable by Tiwari *et al.* (1998) [21]. The tribal communities of Meghalaya—Khasis, Garos, and Jaintias—have a tradition of environmental conservation based on various religious beliefs. As elsewhere in India, particular patches of forests are designated as sacred groves under customary law and are protected from any product extraction by the community. Such forests are very rich in biological diversity and harbor many endangered plant species including rare herbs and medicinal plants. Alison, (2013), identified 79 sacred groves and their floristic survey revealed that these sacred groves are home to at least 514 species representing 340 genera and 131 families. About 1.3% of total sacred grove area was undisturbed, 42.1% had relatively dense forest, 26.3% had sparse canopy cover, and 30.3% had open forest. Notably, the species diversity indices were higher for the sacred grove than for the disturbed forest.

### 9.2.3. Importance of Sacred Grove as a Source of Indigenous Pool of Living System

From the resultant learning coming out of these efforts, it is now clear that biodiversity conservation cannot be addressed by keeping it in the state domain alone; rather it gains substantially by the participation of local communities and civil society. It is also clear that people not only use the biodiversity, but they also manage the landscape in such a way, which promotes biodiversity conservation over the landscape. Management practices include purposive protection of forests and groves, transformation of natural forests into resource-enriched forests, establishment of mixed forest plantations and agro forestry systems, integrated management of water and trees etc Alison, (2013); Gadgil and Chandran (1992).

### 9.2.4. Ecological Importance of Sacred Groves

The value of sacred groves is immense. It is also the repositories of rich medicinal plants, wild relatives of crops and many important species, which act as the valuable gene pool. They give much ecological and genetically significance and play an important role in wildlife conservation also. Umanglai with unmolested vegetation harbours *in-situ* conservation of wild plant species with potential, economic, along with rare and threatened plant species. Perhaps sacred groves could be called as a last refuge for these vulnerable species. They are acting

as mini-botanical gardens as published in the book by Anderson *et al.* (2003) [45]. The cultural trees like Choi (*Cassia fistula*), Kurao (*Erythrina* sp.), Tairel (*Cedrella toona*), Nongleisang (*Xylosma longifolia*), Heikreng (*Cettiscinua menum*), Khongnang (*Ficus* sp.) etc. are grown naturally and conserved in most of the sacred groves. Medicinal plants like Langtheri (*Eupatorium birmaticum*), Nongmangkha (*Adhatoda vastica*), Mayokpha (*Terminalia arjuna*), Leihou (*Michilia* sp.) etc are also grown in these natural centers. Sacred groves are the good source of the variety of medicinal plants, fruits, fodder, fuel wood, spices, etc. Few of the medicinal plants which are rare in forest, they are conserved in some of the sacred groves e.g., Lam thabi (*Melothria purpusilla*) in Mahabali sacred grove. Trees from the sacred grove may be cut down especially only for the purpose of the celebration of the sacred groves or for the requirement of the others rituals practices as mentioned in the paper of Singh and Singh (1997) [46]. The conservation of plants in the Koubru sacred grove has immense contribution in the protection of several leopards or tigers that are threatened now-a-days. Mayokpha sacred grove at Elangbam leikai Keisamthong, is associated with the diety “Pungjao lakpa” on incarnation of “Pakhangba” (snake). In this grove Mayokpha (*Terminalia arjuna*) is conserved along with the conservation of all snakes inhabiting in and around the area of the grove. In Konthoujam sacred grove native trees and other medicinal herb species have ever since been treasured and play a significant role in ecological balance of that region.

Faunal species like bees, lizards, snake, monkeys etc. are also seen in sacred groves of Manipur. Monkeys (*Rhesus* sp.) Flying fox found in Mongba Hanba sacred grove (popularly known as Mahabali) are largely conserved within the grove and give a good picture of the Mahabali sacred grove. Many of the birds are found nesting in the sacred groves. Practice of bee keeping by the care-taker within the Heingang Marjing sacred grove is found to be successful. This practiced is sustainable and can be made as a source of income, which may contribute, though little account, for the management of the sacred grove. Besides these, sacred groves play a great role in maintaining the microclimate of the region. Conservation of these groves can conserve water and, prevent soil and nutrient loss. Sacred groves also help in preserving the religious and cultural heritage of Meitei culture of north east, India.

### 9.3. Sacred Groves and Its Inhabitants of Soil

Healthy soil sustains an enormous diversity of microbes, exceeding that of eukaryotic organisms. Microorganisms exist in every conceivable place on earth and one gram of soil may harbor up to 10 billion microorganisms of possibly thousands of different species as reported by Roello-Mora and Amann, (2001) [47]. One of the reasons of writing this review on sacred groves in spite of being its earlier published reviews on sacred groves is to disseminate about the utility of sacred groves for researchers and technocrats to positively explore the nature through the Godly world.

The capacity of a soil to function in a productive and sustained manner is dependent on activity and diversity of microorganisms. Since Microbial diversity describes complexity and variability at different levels of biological organization as explained by Kummerer (2004) [48]. Microorganisms play an important role on nutritional chains. Without bacteria, soil would not be fertile and organic matter would accumulate within a short time. Soil organisms are assumed to be directly responsible for soil ecosystem processes, especially the decomposition of soil organic matter and the cycling of nutrients. These processes are regarded as major components in the global cycling of materials, energy and nutrients as reported by Wardle and Giller (1996) [49].

### 9.4. How These Sacred Grove Helps in Increasing the Properties of Soil?

Sacred groves are considered the relics of evergreen forest vegetation which once existed in the locality and later lost due to anthropogenic interventions like shifting cultivation, overexploitation of forest produce, cattle grazing and changes in land use by converting forests to monoculture plantations like tea, coffee, cardamom, rubber, teak, eucalyptus, etc., agricultural lands and dwelling sites. These activities have been continuing ever since man started cultivation and exploitation of natural resources for livelihood. But, these isolated undisturbed forest patches have been protected by the society in the name of worship of deities which has resulted in the conservation and management of these micro ecosystems designated as sacred groves. Having left undisturbed and unexploited for years, these sacred groves even now remains a treasure of biodiversity and gene pool conserving many endemic and endangered plants and animals of economic and scientific importance which does not exist elsewhere. Due to anthropogenic activities and consequent disturbances and changes in the microclimate, Kerala, once endowed with numerous sacred groves have been dwindled considerably at present with only about 568

sacred groves of appreciable extent and biodiversity. In this context, it was felt that detailed systematic information regarding the floristic diversity, hydrology and soil physicochemical properties is to be studied in detail, which is expected to serve as a scientific data base highlighting the need for their conservation.

### 9.5. Possibility of Getting the Original Wild Strain/Variety of Microbes

Wild relative of a cultivated crop is part of the gene-pool of that crop and the relationship between various members of gene-pool of any cultivated crop is essentially based on genetic perspective and genetic focus.

## 10. Conclusions

Most of the reported work highlighted about the sacred grove formations, the sacred sites and its sanctity, their communities, the area, the plants naturally found, grown and protected, their medicinal importance for human ailments rectification, biodiversity check, anthropological links, etc. Some of the authors have reported about the involvement of community people to carry over the hierarchical work. Their earlier generation has taken up as traditional knowledge for onward transfer of the knowledge to human ailments rectification with the use of wild medicinal plants grown in such protected area. A lot of studies on sacred grove of India have been taken into consideration as case studies with especial reference to: type of grove, the origin of the same, place, the community people and traditional knowledge hierarchy. Most of the authors review articles reveal and discuss about the role of sacred grove in biodiversity conservation and few of them report the possibility of retaining the soil enriched properties, mainly for restoring the originality of microorganisms which are responsible for enhancing the soil fertility through biogeochemical cycling. Although much of the fundamental researches have to be taken care of, since, the terrestrial ecosystem is one of the important systems among all. Authors have indicated the possibility of fundamental research which could add up to the depth of the importance and existence of sacred grove, where the soil of such sites is barely touched by the intruders, and hence, considering the sanctity of such sites would may contribute in further study. Societal, case studies, conservation research have been reported enough but sacred grove involve the soil, air and water ecosystem too, so relatively the less research on biological aspect and so very less published work is available. Few publications related to isolation, purification and identification of fungi from soil of sacred grove have been published by University of NEHU, Shillong, India. The agriculturally important microorganisms with their original identity could be isolated from such places with so much of serenity and sacredness of sites intact, and most importantly the originality of the properties of the isolates. Authors have emphasized the research work to be taken in future since the sacred grove or International importance of sacred natural sites is the urge for the protection of sacred natural sites which have also been recognized by the Convention on Biological Diversity (CBD) and the UN Permanent Forum on Indigenous Issues. Proposed development at sacred sites by the governance would be sometimes problematic as these lands are maintained traditionally by local communities and would not normally allow the trespassers even.

- 1) As original germ pool for wild species
- 2) Natural habitats recovery pools of many flora and fauna

Sacred places now can be considered as a new edge for interdisciplinary research on their own virtues and also for their potential relevance for biodiversity conservation. This reflects the emerging recognition to sacred groves in many places of the world. Its important role is that religion and spirituality can be together in harmony as science and intellectual experiences. For innovations and discoveries the spiritual growth in a person or group of personalities is a must as quoted by revered Babuji Maharaj of India in one of his whispers during the last week of December, 2014, which could be interpreted as: the work is done in a group or solely and being recognised. This may create lots of desires and in some people egos clashing has started take birth thus a person is spiritually grown and balanced. A lot of other things will be innovated. In some ways, attention to this phenomenon is a natural development. Even secular approaches to environmental protection often become a kind of secularisation of a space, such as pursuing wilderness as an ideal. This is exemplified by John Muir (1838-1914), who experiences the forested mountains of the Western United States as a sacred place, and who is especially influential in the creation of the national park system.

Many students are of the opinion that sacred places are to be included in the curriculum and are convinced that there is an urgent and dire need for a fundamental rethinking and reworking of contemporary spirituality, human ecology, environmentalism, and conservation as these are interconnected. They believe that the recognition and protection of sacred places in nature may be needed more than ever before for the survival of biodiver-

sity and accordingly that of humankind in the 21st century according to Aldo Leopold (1887-1948), a prominent pioneer in wildlife biology and conservation, and also on “Land Ethic it is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.” This ethic applies as well to sacred places and their role in biodiversity conservation.

## 11. Further Research/Approach

Hypothetical based research is to be formulated on the variety of sacred grove and places with respect to their characteristics like biological matters such as their size, age, species composition, biodiversity level, and degree of naturalness as well as any historical, social, cultural, religious, economic, political, tenure, and legal matters. Hypothesis about the conservation efficacy of sacred localities have to be tested empirically and quantitatively, rather than relying only on assumptions and assertions. However, in practice this may be difficult, impractical, or even impossible sometimes. Nevertheless, the relevance of many sacred places for biodiversity conservation is already strongly indicated by the accumulating work of numerous independent researchers and international organizations. As far as microbial diversity plus the isolations of microbes having original traits are of utmost importance since very little work has been reported in India and abroad.

Applying interdisciplinary approaches to key areas of work the cultural, spiritual and socio-economic domains are increasingly understood as interrelated and mutually dependent aspects of human wellbeing, interdisciplinary approaches need to be developed across all governance levels and geographical scales. Interdisciplinary approaches should therefore also be inclusive and give equal weight to different ways of knowing, wisdom and sciences across different cultural worldviews. Because of the complexity of this, it is indicated that these integrated approaches should be applied to key areas for working with sacred natural sites:

policy and law: policies and legal frameworks are essential for the protection of sacred grove and natural sites, knowledge and awareness: increased knowledge of all kinds is necessary for the proper management of sacred natural sites and in addition there needs to be broad public awareness to garner support for their conservation, site action: effective conservation of sacred sites essentially happens in the field where sacred sites need to be safeguarded and their existence secured. To improve the present scenario, several attempts have been started at government and non-government levels to recover the gradually eroding local knowledge source *i.e.* sacred grove related to nature and natural resources and evaluate them in light of scientific understanding. Ministry of Environment and Forest (MoEF), conducted All India Coordinated Research project on Ethnobotany (AICRPE) a) to develop a better understanding of the life, culture, customs and traditional knowledge system of tribes b) to develop sustainable development alternatives which are in sync with the values and ethos of tribes, and c) to strengthen the linkages between tribal welfare and the management of the forests. Traditional Knowledge digital Library (TKDL) has been developed by Government of India to document the ethnomedicinal knowledge of different communities which could be helped to protect the intellectual property rights. The retrieval will be based on the Traditional Knowledge Resource Classification (TKRC) and International Patent Classification (IPC). Also the idea of giving benefits to the communities taking care of the sacred sites would be given to elevate the humanity in each one of the community people. The recognition of the community is as important as the appreciation to each individual for their efforts towards maintaining these sacred sites through some development programmes, which would incorporate the lessons to conserve the biodiversity, maintain the biodiversity registers, also it would include the use of traditional knowledge for plants for rectifying human ailments.

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