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Role of Sacred Groves as *In-Situ* Conservation Model for Conserving the Natural Vegetation: A Case Study

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Abstract

The present study documents the dicotyledonous flora of a sacred grove known as *Kalakkal Mana*, located at Vaikom, Kuravilangad in Kottayam District, Kerala. Sacred groves are traditionally protected forest patches that play a crucial role in the conservation of biodiversity and maintenance of ecological balance. The floristic survey resulted in the taxonomic documentation of 48 species of dicotyledons belonging to 46 genera and 26 families, indicating considerable species richness within a relatively small area. Analysis of family-wise distribution revealed that Asteraceae and Apocynaceae were the dominant families, each represented by four species. This was followed by Lamiaceae, Moraceae, and Rubiaceae, with three species each. Families such as Caesalpiniaceae, Mimosaceae, Verbenaceae, Asclepiadaceae, and Papilionaceae were represented by two species each, while the remaining families were represented by a single species, reflecting a broad range of taxonomic diversity. At the generic level, *Piper* (family Piperaceae) and *Ficus* (family Moraceae) were notable, each represented by two species, emphasizing their ecological importance and adaptability within the sacred grove ecosystem. The present findings also highlights the role of sacred groves as important reservoirs of plant biodiversity, conserving native and ecologically significant species. However, the present status of sacred groves in Kerala is increasingly precarious due to anthropogenic pressures, land-use changes, and erosion of traditional conservation practices. The degradation of these groves threatens local biodiversity and ecological stability. Given their significant role in regulating ecological equilibrium, the conservation of sacred groves is of immense importance in the current environmental context. This study provides baseline data on dicotyledonous plant diversity, which can serve as a foundation for future floristic, ecological, and conservation-oriented studies aimed at safeguarding the biodiversity of sacred groves in Kerala.

1. Introduction

Sacred groves are one of the finest examples of traditional *in situ* conservation practices, which dates much prior to the modern concept of wide life reserves. These are patches of nature near-climax pristine vegetation of trees and associate groups of organisms, managed as a part of local cultural tradition. In such groves all forms of vegetation are conserved including tree, shrubs, herb, lianas and climbers (Gadgil & Vartak, 1976). Such scared groves are found in a wide range of ecological situations, from coast to the Ghats. The area of a sacred grove varies from a few trees to about 20 hectares of multitier primary forest. Each grove has a patron deity and folklore associated with it (Nair *et al*., 1997). It has been estimated that total number of scared groves in the country lie between 10,000 and 15,000 (Saini *et al*.,2011).

Sacred groves are repositories of biological wealth of the nation and this act as last shelters of nature and the indicator of the rich vegetation that had exited in the past. More over these are the store house of germplasm of wild as well as folk medicinal plants (Malhotra *et*

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al., 2001). It also import because about 60% of the regenerating space in them are medicinally important and 40% medicinal plants are unique to them (Chandrashekara & Sankar, 1998). Scared groves were perhaps the first temples of worship in the world. The concept of sacred groves is as old as the civilization where a patch of forest or water body is dedicated to local deities and nobody is permitted to cut plants or to kill animals or any form of life, such a traditional socio-cultural mechanism aiming at nature conservation that integrated socio-cultural aspects for conservation (Agnihothi *et al*., 2012).

The indigenous communities of the state have an age–old tradition of preserving small patches of old growth forests as a part of their culture and religious believes, these popularly known as sacred forests or sacred forests or sacred groves. The area possesses biodiversity rich communities, which provide refuge for a large number of flora, in which many of them are endemic and rare (Bhandari & Chandrashekhar, 2003). Ancient man worshipped varied wonders and mysteries in nature due to many reason necessary for his survival. Living in close interaction with nature, ancient man knew that nature resources are necessary for his survival and its misuse would be disastrous (Murugan *et al*., 2007).

Sacred groves, biodiversity parks and biosphere reserve are the sites for in-situ conservation of various flora of the country. The protection of environment and life supporting system is intricately interwoven with the conservation of biological diversity. The conservation activities are extended in ex-situ mode by introducing plants from such in-situ center in to the botanic garden and some parks (Upadhaya *et al*., 2003) sacred groves have close linking with the ecology of the place . These are representatives of relic climax vegetation of Indian sub-continent and part of socio cultural traditions (Sukumaran, 2002). Sacred groves and other ethno forestry elements are example of traditional biophilia of ancient human cultures, which express a tendency to love and respect of nature (Deb *et al*., 2007).

Sacred groves are not only the sacred ecosystem functioning as a rich repository of nature's unique biodiversity, but also a product of the socio ecological philosophy our fore fathers have been cherishing since olden days. Sacred groves do not just help conserve valuable biodiversity, soil and water, but are also critical in regulating weather and climate cycles so vital for life to blossom and flourish on the planet. Our fore fathers held reverential attitude towards nature and its all life form. Sacred groves are the potent symbol of the same. People cherish sanctity of life through conservation of biodiversity. This ecological philosophy is a potent tool to avert any crises in the society (Jayarajan, 2004).

Sacred groves are tracts of virgin forests, the vestiges of an ancient practice in which people protected forest patches to avoid the perceived wrath of its resident Gods. This sanctum of rare, endangered and endemic plants combined with other biotic and abiotic components represent a unique example of the all embracing concept and practice of Indian way of in-sit conservation and protection of environment. Such sacred groves are in unique in their biological diversity and ecosystem functioning. Most of such groves are dens with tree, shrubs, herbs, lianas, epiphytes, climbers and twiners and thereby it can support a wide range of local biodiversity (Rajendraprasad *et al*., 1998).

Sacred groves play a crucial role in soil and water conservation. Many sacred groves hold water resources in the form of spring, ponds, lakes, streams or rivers. The vegetation of the grove itself return water, soaking it up like sponge during wet periods and releasing it slowly in time of drought. It is evident that one of the important ecological role of these groves is to provide more dependable source of

water for the organisms living in and often perennial and in some case, act as the last resort to many animals and birds for their water requirement , especially during dry season (Gadgil & Vartak, 1975).

Sacred groves may also to reduce the incidence and intensity of forest fire, at last in some climates. In addition, transpiration from the sacred grove vegetation would increase atmospheric humidity and reduce temperature in the immediate vicinity and produce a more favorable microclimate for many organisms. In most such groves, the rate of litter decomposition and nutrient release in to the soil is very high (Chandren *et al*., 1998). The soil itself has little nutrients to support the large biomass of the sacred grove. The fine root mat developed on the surface of the soil is important for supporting the large above-ground biomass and for effective recycle of nutrients. Many microorganisms, invertebrates, fungi, etc. flourish and a vast array of species which are not indigenous to the groves may also colonize and thrive. The root mats also prevent the nutrient from leaching (Boraiah *et al*., 2003).

There are many myths, legends a faith associated with the sacred groves of. All sacred groves of Kerala are dedicated to Gods or Goddess or to certain animal spirits. The deities in the sacred groves are at time represented by some tree like *Alstonia caudania, A. schoaris, Adenanthera pavonina, Hydnocarpous pentandra, Commiphora caudatum, Caryota urens, Holarrhena antidysenterica, Strychnos nux-vomica, Ficus tinctorius, Mimusops elengi* etc. A stone slab installed at the base of the tree is the altar on which the offering including the animal sacrifices are made. These trees are also considered to be the abode of conduct in protecting the sanctity of sacred groves. Human interventions are not normally allowed inside sacred groves except to perform rituals and offering to appropriate the deities. No material, either plant or animal origin, are not permitted to be taken out of the sacred groves (Sivathambi, 1991).

The people believed that the spirits inhabiting the *kavu* would manifest their displeasure in different ways. Therefore, annual rituals are performed on the belief that as long as the sacred groves exist, none can destroy them for money or other material gains. No one is allowed to cut or remove any plants or kill animals associated with the sacred groves; even the fallen twinges, branches or leaves are not to be removed. Violation of the rules that disturb or dispel or the sanctity of the grove and its immediate surroundings were considered to be unpardonable sins that will invite the wrath of the patron deity or spirits by bringing epidemic disease, frame, natural calamities or suffering to the people (Kalam,1996).

Sacred groves with their complex array of interaction influence the flora and fauna of the region as well as the microclimate of the locality. The soils of sacred groves show high porosity and low bulk density compared to the soil of the vicinity. The thick litter cover and channel created by soil micro fauna together enhances water retention, root system development, gaseous exchange, and heat conductance. More over rich groves are well known for the climax form of vegetation in which richer in species than the earlier stages of its succession. If any type destruction may occur nearby forest of such groves, in this occasion these groves act as last refuge of many plant animal species. So it is also known as islands of biodiversity (Rajendraprasad *et al*., 2000). The present study on the selected sacred grove of Kottayam District of Kerala is aimed To document the dicotyledonous angiosperm vegetation in the sacred grove and also evaluate economic and ecologic importance of the sacred grove on the basis of the economic and ecological significance of the plants.

2. Materials and Methods

The present study was based on the dicotyledonous specimens collected

from the selected sacred grove "*Kalakkal Mana*" of Vaikom, Kottayam District, Kerala. The study was conducted during the period from October, 2023 to February, 2024. Descriptions of different taxa were made from two sources such as: Floristic study and Literature review

2.1. Floristic study

Floristic study was conducted by extensive field visits in the study area. The plants were collected in duplicates of 3-4 specimens from each locality for morphological analysis and herbarium preparation. Photographs of live specimens, if possible, were taken using Canon Power Shot SX 200 IS camera. Field notes and labels were prepared from the collection spot itself. Habitat of the plants was observed in the field and marked in the field note. The plants are arranged based on the classification proposed by Bentham and Hooker (1862-1883) was followed with necessary modifications in accordance with the current status.

2.2. Literature review

Floristic study conducted in the past by different workers in Kerala comes under this purview. The major floras representing the study area like *Flora of the Presidencyof Madras* (Gamble & Fischer, 1915-1936), *Flora of British India* (Hooker, 1885), and all the regional floras were analyzed to complement the study.

The specimens were processed for the preparation of Herbarium by standard methods (Santapau, 1955). The voucher specimens were deposited in the Department of Botany, Deva Matha College, Kuravilangad.

3. Results and Discussion

3.1 Floristic Analysis

The present day study was under taken to enumerate the dicotyledonous plant diversity of the sacred grove "*Kalakkal Mana*" of Vaikom, Kottayam District, Kerala. A total of 48 species belonging to 46 genera, coming under 26 families were collected (Table No.1& Plates 1-6) The polypetalae was represented by 10 families, gamopetalae by 12 families and monochlamydae by 4 families respectively.

Table No. 1 List of plant species with respect to its Subclass and families.

SUBCLASS	FAMILY	SPECIES
Polypetalae	Achariaceae	*Hydnocarpus wightianus* Blume.
	Malvaceae	*Hibiscus rostellatus* Guill. & Perr.
		Sida rhombifolia L.
		Urena lobata L.
	Rutaceae	*Glycosmis pentaphylla* (Retz.) DC.
	Oxalidaceae	*Biophytum sensitivum* (L.) DC.
	Vitaceae	*Leea indica* (Burm. f.) Merr.
	Caesalpiniaceae	*Bauhinia acuminata* L.
		Caesalpinia pulcherrima (L.) Sw.
	Mimosaceae	*Acacia caesia* (L.)Willd.
		Mimosa pudica L.
	Papilioniaceae	*Abrus precatorius* L.
		Desmodiumtriflorum (L.) DC.
	Melastomaceae	*Memycylon malabaricum* Allg.
	Cornaceae	*Alangium salviifolium* (L.f.) Wangerin

Gamopetalae	Rubiaceae	*Canthium coromandelicum* (Burm.f.) Alston
		Chassalia curviflora (Wall.) Thwait.
		Mussaenda frondosa L.
	Asteraceae	*Acmella ciliata* (Kunth) Cass.
		Chromolaena odorata (L.) R.M.King
		Cyanthillium cinereum (L.) H.Rob.
		Synedrella nodiflora (L.) Gaertn.
	Oleaceae	*Nyctanthes arbor-tristis* L.
		Olea dioica Roxb.
	Myrsinaceae	*Embeliatsjeriam-cottam* (Roem. & Schult.) DC.
	Apocyanaceae	*Alstonia scholaris* (L.) R. Br.
	Asclepiadaceae	*Ichnocarpus frutescens* (L) W.T Ation.
		Tabernaemontana divaricata (L.) R.Br. *ex* Schult.
		Tylophora asthmatica (L. f.) Wight & Arn.
		Calotropis gigantean (L.) Dryand.
		Dregea volubilis (L.f.) Benth. *ex* Hook.f.
	Convolvulaceae	*Merremia tridentata* (L.) Hallier f.
	Loganiaceae	*Strychnos nux-blanda* A.W. Hill
	Solanaceae	*Capsicum annuum* L.
	Acanthaceae	*Justicia nilgherrensis* (Nees) Wall.
	Verbenaceae	*Clerodendrum cordatum* D.Don. Prodr.
	Lamiaceae	*Lantana camara* L.
		Anisomeles indica (L.) Kuntze.
		Hyptis capitata Jacq.
		Leucas aspera (Willd.) Link
Monochlamydae (Apetalae)	Amaranthaceae	*Aerva lanata* (L.) Juss. Ann.
	Piperaceae	*Piper longum* L.
		Piper nigrum L.
	Euphorbiaceae	*Glochidion ellipticum* Wight.
		Phyllanthus amarus Schumach. & Thonn.
	Moraceae	*Artocarpus hirsutus* Lam
		Ficus exasperata Vahl.
		Ficus religiosa L.

The dominant families in the sacred grove, on the basis of highest number of species were Asteraceae and Apocynaceae, both are represented by 4 species each followed by Lamiaceae, Moraceae, Rubiaceae with 3 species each. The families like Caesalpineaceae, Mimosaceae, Verbenaceae, Asclepiadaceae, Papilionaceae were with 2 species each. The remaining families are represented by 1 species each. The genera *Piper* of Piperaceae and *Ficus* of Moraceae were represents two species each (Fig. No.1-4).

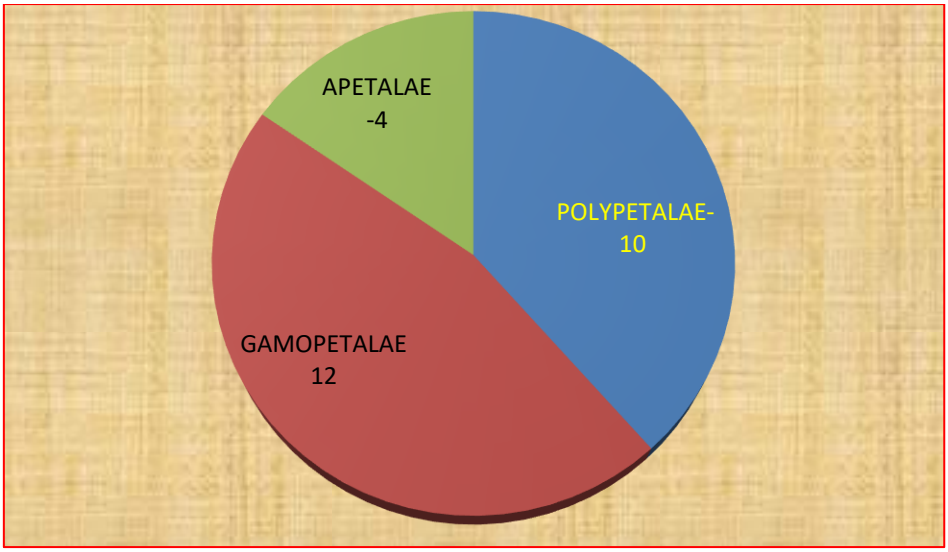

Fig.1. Number of families coming under different subclasses represented in the Sacred grove

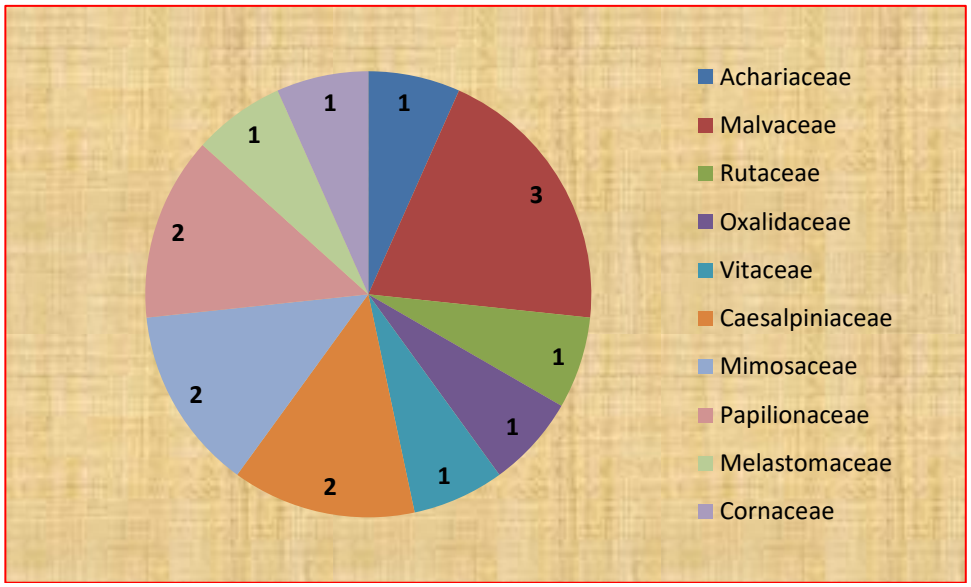

Fig.2. Number of plants under Polypetalae families represented in the Sacred grove

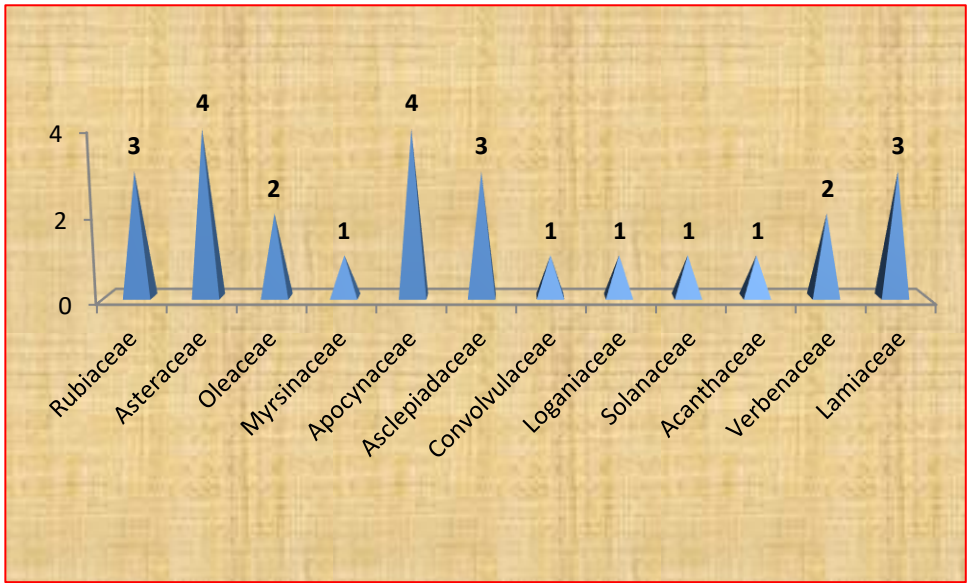

Fig. 3. Number of plants under Gamopetalae families represented in the Sacred grove

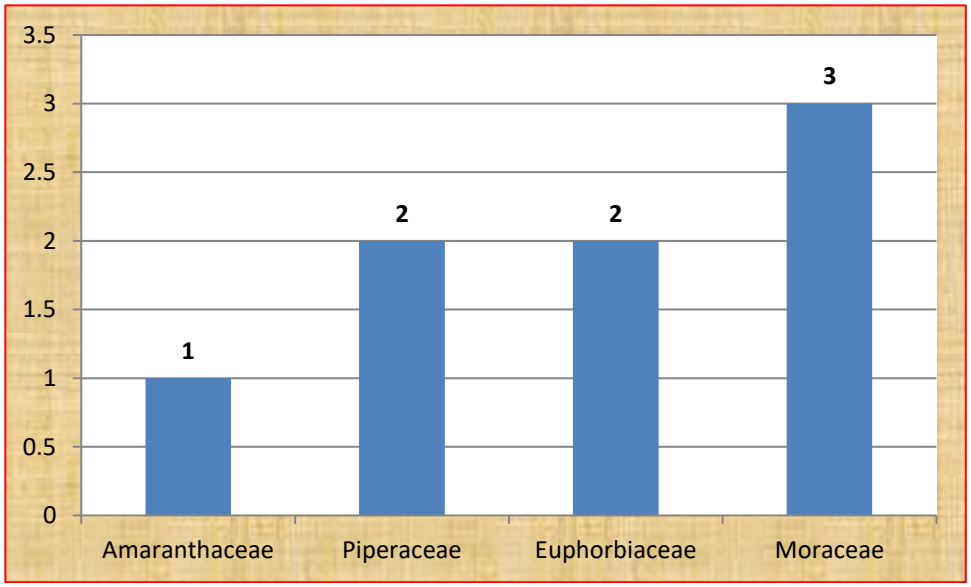

Fig. 4. Number of plants under Apetalae families represented in the Sacred grove

Studies on sacred groves in Meghalaya (Tiwari *et al.,* 1998), Kerala (Chandrashekara & Sankar, 1988) Maharashtra (Gadgil & Vathak, 1976) and Himachal Pradesh (Sing *et al.,* 1998) showed that they are the harbour of rich floral and faunal diversity. The case study on sacred grove at Moonamkadavu, Kasargod District, Kerala by Anish Babu *et al*., (2014a&b), highlights the occurrence of 8 species of *Ficus* such as *Ficus benghalensis* L., *Ficus caulocarpa* Miq., *Ficus exasperate* Vahl., *Ficus heterophylla* L.f., *Ficus hispida* L., *Ficus microcarpa* L.f., *Ficus racemosa* L. and *Ficus religiosa* L. are the major key stone species in this grove. Moreover they also reported 6 Rare, Endangered and Threatened (RET) plants from the same grove such as *Boesenbergia pulcherrima* (Wall.) O.Ktze. (Zingiberaceae), *Hopea ponga* (Dennst.) Mabb. (Dipterocarpaceae), *Syzygium travancoricum* Gamble (Myrtaceae), *Vepris bilocularis* (Wight & Arn.) Engl. (Rutaceae), *Cycas circinalis* L. (Cycadaceae) and *Gnetum ula* Brongn. (Gnetaceae).

Moreover, the role of beliefs, folklores and taboos associated with sacred groves has been emphasized by several authors (Gadgil & Vartak, 1975,

1976; Sethi, 1993; Visalakshi, 1995; Oliver King *et al*., 1996; Swamy *et al*., 1998; Tiwari *et al.,* 1999; Huges & Chandran, 2000; Basu, 2000; Kushalappa *et al*., 2001 & Ramanujam & Kadamba, 2001).

3.2 Ecological Significance

Sacred groves are now important reservoirs of biodiversity, which help in soil and water conservation besides preserving the rich biological wealth. The trees improve soil stability and prevent top-soil erosion. The trees and shrubs are the main home for some animals like squirrel and many birds. The nutrients generated in the grove find their way into the adjoining agro ecosystems like paddy fields, tapioca and other plantations.

Sacred groves also perform several ecological functions. The role in the ecosystem management has been studied by many workers. Wingate (1888) reported that the sacred groves of Uttara Kannada, plays a great role in the existence of springs and perennial streams in the region. Similarly most of the sacred groves in Kerala are also extent meet the water needs of local communities as well as both flora and fauna of such ecosystem (Rajendraprasad, 1995, Chandrashedara, 1998). Swamy *et al*., (1998) reported the ecosystem services of sacred groves through watershed functions in Tamil Nadu. Pushpangadan *et al.,* (1998) also reported one of the important ecological roles of sacred groves is to provide a more dependable source of water for the organism living in and around of sacred groves.

3.3 Major threats to the sacred grove

The major threat to the existence of sacred groves in Kerala state is the disappearance of the old joint-family systems and partitioning of the family properties along with the economic scenario. In most cases the sacred grove will be handed over to a generation who has no or little faith in keeping its integrity. As a result it will be totally denied or sometimes only the deity will be retained. Another major threat is the cattle grazing. The third one is the transformation of primitive forms of nature worship in to formal temple worship, as observed the present sacred grove, also resulted in the degradation of groves. The invasion by exotic weeds such as *Eupatorium odoratum* and *Lantana camera* are another major reason for the depletion of the flora of sacred grove.

3.4 Suggestions for conservation of sacred groves

The present study also suggest some measures to protect this valuable ecosystem by following points like to create awareness in the public people about the importance of the sacred groves, Enforce total ban on cutting of trees from the sacred groves, Preserve the rare species found in the sacred groves in seed banks by biotechnological methods like tissue culture, An inventory of all the sacred groves of the state should done with the help of Government.

4. Conclusion

The present study is dicotyledonous flora of a sacred grove,"*Kalakkal Mana*" of Vaikom, Kuravilangad, Kottayam District, Kerala. The study resulted in the taxonomic treatment of 48 species of dicotyledons belonging to 26 families. The total numbers of genera are 46. The dominant families in the sacred grove, on the basis of highest number of species were Asteraceae and Apocynaceae, both represented by 4 species each followed by Lamiaceae, Moraceae, Rubiaceae with 3 species each. The families like Caesalpineaceae, Mimosaceae, Verbenaceae, Asclepiadaceae, Papilionaceae were with 2 species each. The remaining families are represented by 1 species each. The genera *Piper* of Piperaceae and *Ficus* of Moraceae were represents two species each. The study revealed the importance of conserving the sacred groves of Kerala state. The present status of the sacred groves in

Kerala state is rather precarious. The sacred groves and their role in regulating the ecological equilibrium is of immense importance today. The present stud is a base line data for the further studies about the biodiversity and their conservation in sacred groves.

PLATE No. 1

Fig.1.*Hydnocarpus wightiana* Blume.

Fig.2. *Hibiscus rostellatus* Guill. & Perr.

Fig,3. *Sida rhombifolia* L.

Fig.4. *Urena lobata* L.

Fig.5. *Glycosmis pentaphylla* (Retz.) DC.

Fig.6. *Biophytum sensitivum* L.

Fig.7. *Leea indica* (Burm. f.) Merr.

Fig.8.*Acacia caesia*(L.)Willd.

PLATE No. 2

Fig.1. ***Abrus precatorius*** L.

Fig.2.*Mimosa pudica* L.

Fig. 3. ***Caesalpinia pulcherrima*** (L.)Sw.

Fig.4. ***Bauhinia acuminata*** L.

Fig.5. ***Desmodium triflorum*** (L.) DC.

Fig.6. ***Memycylon malabaricum*** Allg.

Fig.7. ***Alangium salviifolium*** (L.f.) Wang.

Fig.8.*Mussaenda frondosa* L.

PLATE No. 3

Fig.1.*Chassalia curviflora* (Wall.) Thw.

Fig.2.*Canthium coromandelicum* Burm.f.

Fig. 3. *Cyanthillium cinereum* (L.) H.Rob.

Fig.4. *Chromolaena odorata* (L.) R.M.King.

Fig.5. *Acmella ciliate* (Kunth.) Cass.

Fig.6. *Synedrella nodiflora* (L.) Gaertn.

Fig.7. *Olea dioica* Roxb.

Fig.8.*Nyctanthesarbor-tristis* L.

PLATE No. 4

Fig.1.*Ichnocarpus frutescens* (L.) Ation.

Fig.2.*Alstonia scholaris* (L.) R.Br.

Fig. 3. *Embeliatsjeriam-cottam* (Roem.) DC.

Fig.4. *Tabernaemontana divaricata* (L.) R.Br.

Fig.5. *Tylophora asthmatica* Wight & Arn.

Fig.6. *Calotropis gigantean* (L.) Dryand.

Fig.7. *Dregea volubilis* (L.f.) Benth. *ex* Hook.f.

Fig.8.*Strychnos nux-blanda* A.W. Hill.

PLATE No .5

Fig.1.*Merremia tridentata* (L.)Hall.

Fig.2. *Capsicum annuum* L.

Fig. 3. *Justicia nilgherrensis* **(**Nees) Wall.

Fig.4. *Lantana camara* L.

Fig.5. *Clerodendrum cordatum* D. Don.

Fig.6. *Hyptis capitata* Jacq.

Fig.7. *Leucas zeylanica* (L.) Aiton

Fig.8.*Anisomeles indica* (L.) Kuntz

PLATE No. 6

Fig.1. ***Aerva lanata*** (L.) Juss.

Fig.2. ***Piper longum*** L.

Fig. 3. ***Piper nigrum*** L.

Fig.4. ***Phyllanthus amarus*** Schum.

Fig.5. ***Glochidion ellipticum*** Wight.

Fig.6. ***Artocarpus hirsutus*** Lam.

Fig.7. ***Ficus exasperata*** Vahl

Fig.8.*Ficus religiosa* L.

6. References

Agnihotri, P.,Singh,H.,Hussain, T. and Patalbhuveneswar,T. (2012).A new sacred grove from kumaon Himalaya. *Curr. Sci*.,**102(6):**830-831.

Anish Babu,V.B., Antony,V.T., Binu Thomas and Prabhu Kumar,K.M.(2014a). *Ficus spp*. A valuable tree species in sacred groves. *J. Sci.Bot.,* **4(2):***74-76.*

Anish babu,V.B., Antony,V.T., Binu Thomas and Prabhu Kumar, K.M.(2014b). Scared groves: Potential microhabitats for conserving rare endemic and threatened plants. *J.Sci. Bot*., **4(4):**223-226.

Basu,R.(2000). Studies on sacred groves and taboos in Purulia district of west Bengal. *Ind. For.,***126(12):** 1309-1318.

Bhandari,M.J. and Chandrashekhar, K.R. (2003). Sacred groves of Dakshina kannada and Udupi districts of karnataka. *Curr.Sci*., **85(12):**1655-1656.

Boraiah, K.T., Vasudeva, R., Bhagwat,S.A., Kushalappa, C.G.(2003). Do informally managed sacred groves have higher richness and regeneration of medical plants than state-managed reserve forests?.*Curr.Sci*., **84(6):**804-808.

Chandran,M,S., Gadgil, M. and Hunghes, J.D. (1998). Sacred groves of the Western Ghats. In: Rmakrishnan, P.S., Saxena, K.G., Chandrashekara, U.M. (eds.) *Conserving the sacred for biodiversity management.* Oxford and IBH publishing co., New Delhi 1998;211-232.

Chandrashekara, U.M. and Sankar,S. (1998). Ecology and management of sacred groves in Kerala, India. *Forest Ecol.Manag*., 112:165-177.

Chandrashekara, U.M. (1998). Impact of repeated natural distributance on the regeneration of trees in a sacred grove at Iringole, Kerala. Paper presented in the international conference on Conservation of tropical species, communite and ecosystems held in december,1998. Thiruvanthupuram, Kerala.

Deb,D., Deuti,K. and Malhotra, K.C.(1997). Sacred grove relics as bird refugia. *Curr. Sci*., 73: 815-817.

Gadgil,M. and Vartak, V.D.(1975). Sacred groves of India-a plea for continued conservation. *J. Bom. Nat. Hist. Soc*. 72(2):314-320.

Gadgil, M. and Vartak,V.D.(1976). Sacred groves of Western Ghats of India. *Ecol. Bot*., 30:152-160.

Gamble J.S. and Fischer, C.E.C.(1915-1936). *The Flora of Presidency of Madras.* part 1-119 part1-7 by Gamble and 8-11 by Fischer; Adlard and Sons Ltd., London. (repr.ed.vols.1-3.1957).

Huges, D.J and Chandran, S.M.(2000). Sacred groves and conservation: the comparitive history of traditional reserves in the mediterranean area and in south India. *Environ. History,***6:**169-186.

Jayarajan M. (2004). Sacred groves of north Malabar, discussion paper no.92, KRPLLD, Thiruvanthupuram.

Kalam, M.A. (1996). Sacred groves in Kodagu district of Karnataka (south India):a socio-historical study. Pondy papers in social sciences, No.21, French Institute, Pondicherry.

Kushalappa, C.G., Bhagwat, S.A and Kusshalappa, K.A. (2001). Conservation and management of sacred groves of Kodagu, Karnataka, south India, a unique approach. In: Ganeshaiah,K.N.,Umashaanker,R.and Bawa, K.S9 (Eds.), tropical ecosystems: structure, diversity and human welfare. Oxford and IBH publishing, New Delhi,pp.565-569.

Malhotra, K.C., Gokhale, Y., Chatterjee, S. and Srivastava, S. (2001). Cultural and ecological dimensions of sacred groves in India.Indian national science academy, New Delhi and Indrira Gandhi Rashtriya Manav Sangrahalaya, Bhopal, pp.30-43.

Murugan,K., Ramachandran, V.S., Swarupanandan, K. and Remesh, M. (2007). Socio-cultural perspectives to the sacred groves and serpentine worship in Palakkad District,Kerala. Ind. *J. Trad. Know*., **7(3):**455-462.

Nair,G.H., Gopikumar, K., Pramod, G., Krishnan, K. and Sunil Kumar, K.K.(1997). Sacred groves of India-vanishing greenery. *Curr. Sci*., **72(10):**697-698.

Oliver King I.D., Viji, C. and Naramsimhan, D. (1996). Sacred groves: traditioal ecological heritage. *Int. J. Ecol. Environ. Sci.,* **23:**463-470.

Pushpangadan, P., Rajendraprasad, M., Krishnan, P.N. (1998). Sacred groves of Kerala.a synthesis on the state of-art-of knowledge. In: Ramakrishnan, P.S, Saxena, K.G. and Chandrashekar U.M. (Eds.), Conserving the sacred for Biodiversity Management. Oxford-IBH Publishing, New Delhi,pp.193-209.

Rajendraprasad, M., Krishnan, P.N and Pushpangadan, P. (1998). The life from spectrum of sacred groves. A functioanl tool to analyse the vegetation. *Trop.Ecol*., **39 (2):**211-217.

Rajendraprasad, M., Krishnan, P.N and Pushpangadan, P. (2000). Vegetational Characterization and litter dynamics of the Sacred groves of Kerala-south India. *J. Trop. For. Sci*., **12(2):**320-335.

Rajendraprasad, M. (1995). The Floristic, structural and functional analysis of Sacred Groves of Kerala. Ph.D.Thesis, University of Kerala, Thiruvanthupuram, India.

Ramanujam, M.P. and Kadamba, D.(2001). Forests in Pondicherry 2001. plant biodiversity of two tropical dry evergreen Forests in Pondicherry region of south India and the role of belief systems in their conservation **10:**1203-1217.

Saini,D.C., Kuleshreshtha, K., Kumar, S., Gond, D.K. and Mishra, G.K. (2011). Conserving Biodiversity Based Cultural and Religious Values. National Conference on Forest Biodiversity; Earth's living Treasure,pp.145-152.

Santapau, H. (1995). Botonical collector's manual-A Hand book. Govt.press, New Delhi.

Sasidharan, N. (2004). Biodiversity documentation for Kerala, part-6:Flowering plants. Kerala Forest Research Institute (KFRI). Peechi.

Sethi, P. (1993). Phytosociology of a tropical dry evergreen forest patch in the puthupet sacred grove, coromandal coast, Tamil nadu. M.Sc. Thesis, Pondicherry, University, Pondicherry, India. pp.112.

Singh, G.S, Rao, K. S. and Saxens, K.G.(1998). Eco-cultural analysis of sacred species and ecosystems in Chakkinal Watershed, Himachal Pradesh. In: Ramakrishnan, P.S., Saxena, K.G. and Chandrashekara, U.M.(Eds.),Conserving the Acred for Biodiversity Management. UNESCO and Oxford-IBH Publishing, New Delhi,pp.289-299.

Sivathambi, K. (1991). Divine presence or socio prominence-An inquiry in to the social role of the places of worship in Yalappanam Tamil Society. *J. Inst. Asian Stud*., 9:1-22.

Sukumaran, S. (2002). Studies on the sacred groves of Kanyakumari District and their values in rural life Ph.D. Thesis, Manonmaniam Sundaranar University, Thirunelveli. pp.201-202.

Swamy, P.S., Sundarapandian, M. and Chandrasekaran S. (1998). Structure and function of sacred groves: Case studies in tamilnadu, In: Rmakrishnan, P.S., Saxena, K.G. and Chandrashekara, U.M. (Eds.), *Conserving the Sacred for Biodiversity Management*, Oxford and IBH publishing co., New Delhi,pp.364-475.

Tiwari. B.K, Barik, S.K. and Tripathi, R.S. (1998). Sacred groves of Megalaya. In: Ramakrishnan, P.S., Saxena, K.G, and Chandrashekara, U.M. (Eds.), Conserving the Sacred for Biodiversity Management.

UNESCO and Oxford and IBH publishing,New Delhi,pp.253-262.

Tiwari.B.K, Barik, S.K. and Tripathi, R.S.(1999). Sacred forests of Megalaya: Biological and Cultural diversity: Regional center, national afforestation and Eco-Development board, North-Eastern hill University, Shillong,pp.120-132.

Upadhaya, K., Pandey, H.N., Law, P.S. and Tripathi, K.S. (2003). Tree diversity in sacred roves of the Jaintia hills in Meghalaya of Northeast India. *Biodiv. Conserv*., 12:583-597.

Visalakshi, N. (1995). Vegetation analysis of two tropical dry evergreen forests in Southern *India. Trop. Ecol*., **36(1):**117-127.

Wingate, R.T. (1888). Settlement proposals for 16 villages of Kumtataluk, No. 210 of Dec.1888, Forest settlement office, Karwar.