



## BIODIVERSITY AND THREATS TO SACRED GROVES - A CASE STUDY OF PALLIYANA SACRED GROVE LOCATED IN THE COASTAL BELT OF THRISSUR DISTRICT, KERALA

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### ABSTRACT

Sacred Groves are patches of forest vegetation conserved by the villagers and local people by dedicating them to the local deity. These groves are rich in biodiversity. Now a days these natural patches of forest face severe threats due to various human interference. Analysis on the plant diversity, floristic richness and ethnomedicinal status of plants present in Palliyana sacred grove in Vatanappally, belonging to the coastal belt of Thrissur district, Kerala; to highlight the threats faced by the grove and the necessity for its preservation. Identification and distribution of different plant groups, evaluation of ethnomedicinal plants, Species Richness Index (Menhinick 1964) and Diversity Index (Shannon, 1963), IUCN status. Sacred grove is rich in vegetation and biodiversity. It also consists of many ethnomedicinal, endemic and vulnerable species of plants. Different anthropogenic factors are depleting the biodiversity of the sacred grove. So, it is very necessary to protect and maintain these remnants of natural forest for the future.

**KEYWORDS :** Floristic richness and diversity, Palliyana sacred grove, ethnomedicinal wealth, human interference and depletion of vegetation.

### INTRODUCTION

Nature worship is an integral part of human beings mainly in India. Sacred groves, one form of nature worship, are patches of forest vegetation conserved by the villagers and local people by dedicating them to the local deity and cultural and religious beliefs (Rajesh, 2016). These groves are rich in biodiversity with rare, endemic and medicinally important plant species (Sambandan & Dhathanamoorthy, 2012). However, the most serious problem now a day we face is the large-scale destruction of vegetation including the patches of forest vegetation the so called sacred groves, due to various anthropogenic activities. The weakening of traditional values and socio-cultural practices among the people is one major reason for the depletion of these groves. The present study was carried out to collect information on floristic richness, diversity, ethnomedicinal wealth and relevance in the conservation of sacred groves, based on the analysis of a selected sacred grove. The study also aims to analyze various reasons which lead to the degradation of groves and to create awareness among the people on the relevance of conserving these treasure houses for the future.

### OBJECTIVES

- To assess the floristic richness and diversity of Palliyana sacred grove
- To analyze the ethnomedicinal plant wealth in the grove
- To analyze the IUCN listed plants present in the grove
- To analyze the threats which leads to the degradation of the sacred grove

### MATERIALS AND METHODS

#### Study area

The study area is Palliyana sacred grove of about 90 cents (3642.17 Sq.m) in size located at Vatanapally Panchayath which belongs to the Coastal Belt of Thrissur District, Kerala. The study was conducted during the period January 2016 - March 2017. This sacred grove is worshipped mainly for the serpent God "Naga".

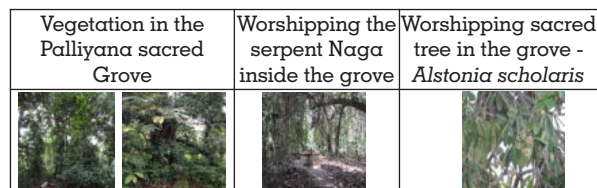


Figure 1: Certain views from the Palliyana sacred grove

### Identification and distribution of plants

The plant species were identified based on the plant key characters and Flora of the Presidency of Madras (Gamble & Fischer, 1915-1936), field keys devised by Balasubramanyan et al. (1985) and other relevant Floras, Manuals, Revisions etc. The floristic richness and diversity index of plants in the sacred groves have been recorded.

- Species richness index (Menhinick, 1964)  
Species richness index =  $S/\sqrt{N}$ , where S - total number of a species and N - total number of individuals in a sample
- Diversity Index of plants- based on Shannon Weiner Index (Shannon & Wiener, (1963)  
Shannon Weiner Index ( $H'$ ) =  $-\sum \{(n/N) \ln (n/N)\}$

### Analysis on the ethnomedicinal plant wealth

The details of ethnomedicinal plants and related information were collected through survey, discussions and interviews with local people and traditional healers in the area. The identification and other required information on ethnomedicinal plants were done with the help of referred books and reports (Akhtar, 1992; The Ayurvedic Pharmacopoeia of India, 2004; Khare, 2007; Bhakat & Pandit, 2003).

### Analysis and identification of IUCN listed plants

The details of IUCN status of plant species were collected with the help of referred book- Flowering Plants in Kerala (Sasidharan, 2012) and other relevant books and reports (Daniels et al., 1915).

### The destruction factors visually observed and recorded

Various man-made activities were observed to have contributed to the depletion and destruction of the grove.

### RESULTS AND DISCUSSIONS

The floristic study conducted in Palliyana sacred grove identified 35 species of trees which comprises of 33 genera belonging to 21 families, 24 species of shrubs which comprises of 22 genera belonging to 10 families, 16 species of herbs which comprises of 16 genera belonging to 16 families, 19 species of climbers which comprises of 18 genera belonging to 15 families and 8 species of liana or woody climbers which comprise of 8 genera belonging to 7 families (table 1). *Alstonia scholaris* is the worshipping sacred tree in the grove but most dominant tree is *Artocarpus hirsutus* of

Moraceae then immediately followed by *Aphanamixis polystachya* of Meliaceae. Most dominant shrub is *Ixora coccinea* of Rubiaceae which is followed by *Bridelia stipularis* of Euphorbiaceae whereas the most dominant herb is *Eragrostis unioides* of Poaceae which is immediately followed by *Panicum notatum* of Poaceae. *Ichnocarpus frutescens* of Apocynaceae *Pothos scandens* of Araceae and are the most dominant species of climbers while most dominant woody climber is *Salacia fruticosa* of Hippocrateaceae which is immediately followed by *Uvaria narum* of Annonaceae. *Acampe praemorsa*, *Bulbophyllum sterile* of Orchidaceae, and the Pteridophyte *Drynaria quercifolia* of Polypodiaceae are the two epiphytes present in the sacred grove. Eight species of plants are found endemic to Western Ghats and four species are endemic to Peninsular India (table 3). According to IUCN plant list *Ixora malabarica* of Rubiaceae, *Nothapodytes nimmoniana* of Icacinaceae and *Saraca asoca* of Leguminosae are reported as vulnerable, *Syzygium caryophyllatum* of Myrtaceae reported as endangered. Total of 101 species of plants are identified in the Palliyana sacred grove and out of which 22 species of plants are identified as ethnomedicinal (table 3). The ethnomedicinal plant species in the grove are found constituted 21.78% of the total plant species present in the grove. The sum of the diversity index of all the plant groups in the grove is 4.29 and species richness is 2.45 (table 1).

Better distribution of vegetation and higher diversity of plant species particularly ethnomedicinal species, from diverse groups of plants such as trees, climbers, lianas, shrubs and herbs in the studied sacred grove compared to the distribution of vegetation in the nearby areas of the grove may be

attributed to comparative low human interference and conducive environmental factors in the grove area such as physical and chemical properties of soil and microclimate. However, the study observed that certain construction works, farming activities, over exploitation, dumping of domestic wastes and plastics, invasion of exotic species like *Lantana camera* and *Mikania micrantha* are the main threatening factors of Palliyana sacred grove. All these factors are found contributing to the gradual but progressive destruction of vegetation and diversity of plants in the grove. If this trend continues, it may lead to complete disappearance of such treasure houses in the near future. So necessary action should be taken to prevent the destructing factors effectively.



Figure 2: Some of the threatening factors of sacred grove

Table 1: Distribution of plant groups in Palliyana sacred grove

Plant Groups	No. of species	No. of Genera	No. of family	Total no. of plants	Diversity index	Species richness
Trees	35	33	21	341	4.29	2.45
Shrubs	24	22	16	366		
Herbs	15	15	11	281		
Climbers	19	18	15	618		
Lianas	8	8	7	110		
Total	101	96	70	2627		

Table 2: Details of Ethnobotanical plants in Palliyana Sacred Grove

Botanical Name	Local Name	Family	Habit	Parts Used	Medicinal Uses
<i>Abrus precatorius</i>	Kunni	Leguminosae	Climber	Whole Plant	Leaf juice is a blood purifier. Root paste is used for swellings and skin diseases. Plant extract is boiled with coconut oil.
<i>Alstonia scholaris</i>	Ezhilampala	Apocynaceae	Tree	Bark	Decoction of bark is used in the treatment of diarrhoea, dysentery, liver complaints, skin diseases and rheumatic pains. Milky juice is applied to ulcers.
<i>Aporosa cardiosperma</i>	Vetti	Euphorbiaceae	Tree	Roots	Oral administration of root extract is used for jaundice.
<i>Aristolochia indica</i>	Karalakkam	Aristolochiaceae	Climber	Whole plant	Seeds are used to treat dry cough and pain in the joints. Decoction of roots are recommended in cases of cholera, diarrhoea and leucoderma. Plant is anti-poisonous.
<i>Asparagus racemosus</i>	Sathavari	Liliaceae	Climber	Tubers	Root is used in the treatment of throat problems, tuberculosis, leprosy, epilepsy, diseases of blood, kidney and liver and gonorrhoea. A decoction of tubers in milk is very effective in bladder problems. The root extract with a honey is given against colic.
<i>Bridelia stipularis</i>	Cherupanachi	Euphorbiaceae	Tree	Roots, leaves and bark	Aqueous extraction of bark is used to prepare a mouth wash, paste of leaves and stem cure eczema. Oral administration of decoction of root and stem for asthma, cough and internal sores.
<i>Cyperus rotundus</i>	Muthanga	Cyperaceae	Herb	Rhizome	Powdered rhizome is mixed with milk is used for digestive disorders and renal problems.
<i>Diospyros malabarica</i>	Panachi	Ebenaceae	Tree	Bark and seeds	Infusion of fruits is used to sore throat. Fruit juice is used as an application for wounds and ulcers. Oral administration of seed oil is given in diarrhoea and dysentery.
<i>Garcinia gummi-gutta</i>	Kudampuli	Clusiaceae	Tree	Roots, leaves and fruits.	A decoction of the fruit rind is used for the treatment of rheumatism, bowel complaints, piles and disorders in the womb.
<i>Gnetum ula</i>	Odavalli	Gnetaceae	Liana	Seeds	Seed oil is externally applied on area affected by rheumatism.

<i>Gymnema sylvestre</i>	Chakkarakolli	Asclepiadaceae	Climber	Roots, leaves	Roots and leaves are boiled with water and this extract used for balancing the blood sugar levels, cough and sore eye.
<i>Holigarna arnottiana</i>	Cheru	Anacardiaceae	Tree	Bark	Highly diluted bark decoction mixed with milk and turmeric used in mild skin problems.
<i>Hydnocarpus pentandrus</i>	Marotti	Flacourtiaceae	Tree	Seeds	Seed oil applied to area affected by rheumatism.
<i>Ichnocarpus frutescens</i>	Parvalli	Apocynaceae	Climber	Root, leaves	Root and leaf extract is applied externally to treat back pain and skin diseases.
<i>Ixora coccinea</i>	Thechi	Rubiaceae	Shrub	Flowers	Water boiled with the leaves is an effective wash in skin diseases, Oil prepared with the flowers is used for external application in itch and skin eruptions. Flower buds are used in the treatment of conjunctivitis and redness of the eyes. The decoction of root is effective in dysentery, gonorrhoea, leucorrhoea and nausea.
<i>Memecylon depressum</i>	Kaikkathetti	Melastomataceae	shrub	Bark and fruits	Leaf paste used in snake bite. A lotion prepared from the leaves is used in ophthalmia. Fruits are used to treat skin diseases.
<i>Mimusops elengi</i>	Elanji	Sapotaceae	Tree	Bark and fruit	A decoction of the bark forms a good gargle in odontalgia, oral administration of ripe fruit pulp is used against dysentery.
<i>Mussaenda frondosa</i>	Vellilam	Rubiaceae	Shrub	Leaves	Decoction of stem is used as a remedy for cough and decoction of root is given against white leprosy. Aqueous extract of leaves in hot water used as shampoo.
<i>Saraca asoca</i>	Asokam	Leguminosae	Tree	Bark and Flowers	The bark is a uterine tonic and it is used extensively leucorrhoea and various forms of menstrual disorders. It cures inflammation of the cervical glands, thirst and burning sensation.
<i>Tabernaemontana alternifolia</i>	Kuruttupala	Apocynaceae	Tree	Leaves	Latex from leaves directly applying on warts, wounds and other skin diseases.
<i>Terminalia bellirica</i>	Thanni	Combretaceae	Tree	Fruits, seeds	Powdered seeds and fruits with honey are used for cough and fever.
<i>Tinospora sinensis</i>	Chitamruthu	Menispermaceae	Climber	Whole plant	Plant juice is recommended for gonorrhoea. Decoction of stem is used in the treatment of giddiness, piles, anaemia, diabetes, vaginal and urethral discharges and enlarged spleen.

Table 3: IUCN listed plant species in the Palliyana Sacred grove

Sl. No	Plant Name	IUCN Status				
		Endemic	Endangered	Vulnerable	Threatened	Rare
1	<i>Bridelia stipularis</i>	Peninsular India				
2	<i>Canthium rheedei</i>	Peninsular India				
3	<i>Holigarna arnottiana</i>	Southern Western Ghats				
4	<i>Hydnocarpus pentandrus</i>	Western Ghats				
5	<i>Ixora malabarica</i>	Southern Western Ghats		Vulnerable		
6	<i>Litsea coriacea</i>	Peninsular India				
7	<i>Mussaenda frondosa</i>	Peninsular India				
8	<i>Nothapodytes nimmoniana</i>			Vulnerable		
9	<i>Salacia fruticosa</i>	Western Ghats				
10	<i>Saraca asoca</i>			Vulnerable		
11	<i>Syzygium caryophyllatum</i>	Western Ghats	Endangered			
12	<i>Tabernaemontana alternifolia</i>	Southern Western Ghats			Near Threatened	
13	<i>Vateria indica</i>	Western Ghats				
14	<i>Xanthophyllum arnottianum</i>	Western Ghats				

## CONCLUSION

The present study found richness in vegetation and plant diversity in the sacred grove area compared to nearby areas of the grove. This grove is maintained basically for religious practices and worship of the deity by the farmers and the local people. Certain plant species of the grove are threatened, endemic and vulnerable which are economically and medicinally very important and not commonly found in the nearby premises. The conservation of such plant species is very essential for the future

generation, but found threatened by various human interventions. Therefore, it is necessary to create awareness among the local people regarding the conservation of these kind of natural forest patches. Further, Government should declare such areas as 'protected land' and stringent laws should be enforced for their protection. Scientific documentation and creating awareness in the present and future generations on the need and importance of conservation and management of the sacred groves as a treasure house of biodiversity is to be initiated.

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