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Study on sacred groves of Udupi district from Karnataka, India

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Abstract
Sacred groves are one of the most valuable of such legacies from the primitive practices of nature conservation. Scattered, presumably throughout India are tracts of sacred forest, which have been completely or nearly completely immune from human interference on grounds of religious beliefs. The nature of religious cults associated with such sacred groves suggests that the practices are very ancient, deriving from the hunting gathering stages of the society. The religious belief associated with the groves seems to primitive cults, probably dating from the hunting gathering stage. The deity is generally a mother goddess, though it may also take the form of phallic worship. The deities are fiery spirits apt to cause serious harm to whoever offends them. Since any disturbance to the grove was considered an offense to the deity, the groves were traditionally free of all human interferences. Karnataka harbors nearly 1,500 documented sacred groves, which are most commonly called *devarakadus* or *devarkans.* In smaller groves, tree cutting or other resource extraction is strictly prohibited, while larger groves often function as "resource forests," in which people are allowed to gather products for sustenance. Hundreds are dedicated to snakes, which protect agricultural crops by controlling insect and rodent populations. During the present study many sacred groves from Udupi district from Karnataka State were visited and the ecosystem, conservation status of plants and vegetation was studied.

Keywords: Sacred grove, devarakadus, devarkan, nagbana, biodiversity, Udipi, Karnataka

Introduction

The practice of dedicating groves to deities is common in India. The groves provide a haven for birds and animals and they also preserve many species of plant, which would otherwise have become extinct. India is a county of sacred cows, sacred monkeys and sacred banyan trees. The deities are generally of timely primitive nature. The deities are generally lie open to the sky, and are known in many cases to be offended of a shelter be erected over them. They are always situated at a distance from any human settlement, all of which point to their origin in the nomadic stage of society. The composition of vegetation, corresponding to the climax formation for that region, corroborates the supposition that the sacred groves have been immune from human interference for a very long period of time.

Apart from such value to local inhabitants, these sacred groves are now playing the role of reservoirs of biological diversity. It is well known that the climax forests tend to be far richer in number of plant species than other stages of succession. Well preserved sacred groves support the climax type of vegetation rich in species of trees, herbs, shrubs, lofty trees and climbers. Thus the traditional and cultural practices of dedicating forest groves to some deities have resulted in conservation of natural resources. In many groves, villagers perform annual rituals and ceremonies to appease the presiding deity and ensure the well-being of the community. It is also common for people to make individual offerings, often in the form of terracotta figures, in exchange for wishes such as good health or harvest or the birth of a child. Sacred groves help to define the cultural identity of the communities that revere and protect them.

The Western Ghats, a mountain range that runs along India's west coast, through the states of Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala is one of the world's biodiversity "hotspots." Its ecosystems include tropical wet forest, mountain evergreens, moist deciduous forest and scrub grassland. An estimated 2,000 plant species and 300 vertebrate animal species live in this region and nowhere else.

As a result of the high conservation and biodiversity values held in sacred groves, increasing attention is being paid to their potential as a tool and model for biodiversity conservation. These groves are important today as they banks of genetic diversity that have to be preserved and sustained. These areas often contain species that have disappeared from the regions outside the grove. This practice best demonstrates the nature caring and biodiversity conservation attitude of our ancestors.

Along Uttara Kannada, Udupi and Dakshin Kannada there are many sacred grove assigned to 'Naga' or the serpent god, commonly known as Nagbana. Along with serpent stone sculpture are present trees, shrubs and climbers. Nag worship is common in sacred groves of Karnataka. The Nagbana is a unique ecosystem wherein through religious background, cultural heritage is used as a tool to conserve natural heritage. Cobra, the presiding deity is worshipped as a helper and not as a form of evil. Due to advent of modern civilization these beliefs and taboos are becoming weaker day by day and are likely to be forgotten in the near future. Comparative studies between the rituals and cultural traditions of the same god at different localities would be worth studying to enlighten about the cultural heritage of sacred groves.

Materials and Methods

In the present study field surveys of various sacred groves of Udupi district of Karnataka state was done during 2021 - 2023. Field trips were organized in such a way as to encounter different sacred groves and forest pockets at regular intervals. The information on plants was collected

through arranging night meetings, dialogues and knowledgeable people of forest department and local inhabitants of Udupi district. During the study the local inhabitants were interviewed with a view to find out ethno medicinal properties of plants. During the survey, firsthand information on the medicinal uses of the plants was gathered from the local tribes like Mundas and Kudubis.

The methodology involves field trips during which observations are made on rituals and various customs observed by the people and how these are related to the conservation of Devarakadus (Sacred groves). Temple priests and several other people who regularly visit these places for worship were also interviewed. Observations regarding villages lying on the roadside, deity, area of devarakadus and its distance from the village or nearby road were recorded. Area under consideration in the present work includes rural areas of Udupi district of Karnataka. The physical and climatic conditions are mainly influenced by Sahyadris and their spurs. The topography determines the moisture condition, temperature, humidity, wind etc. The climate of the tract is generally agreeable in rural zone.

While compiling the work of the sacred groves special attention was paid to the rare, vulnerable, endangered, threatened and medicinal plants. Based on our studies, a list of plants, which require urgent attention for conservation, has been prepared. Thus, the information relating to early warning of species loss or genetic erosion was obtained. Such studies, if extended for all the agro - climatic zones of Karnataka, one would be able to initiate effective conservation strategies such as identifying and establishing natural sites for conserving plants even if they are not threatened at present. Also, priority areas for conservation could be identified.

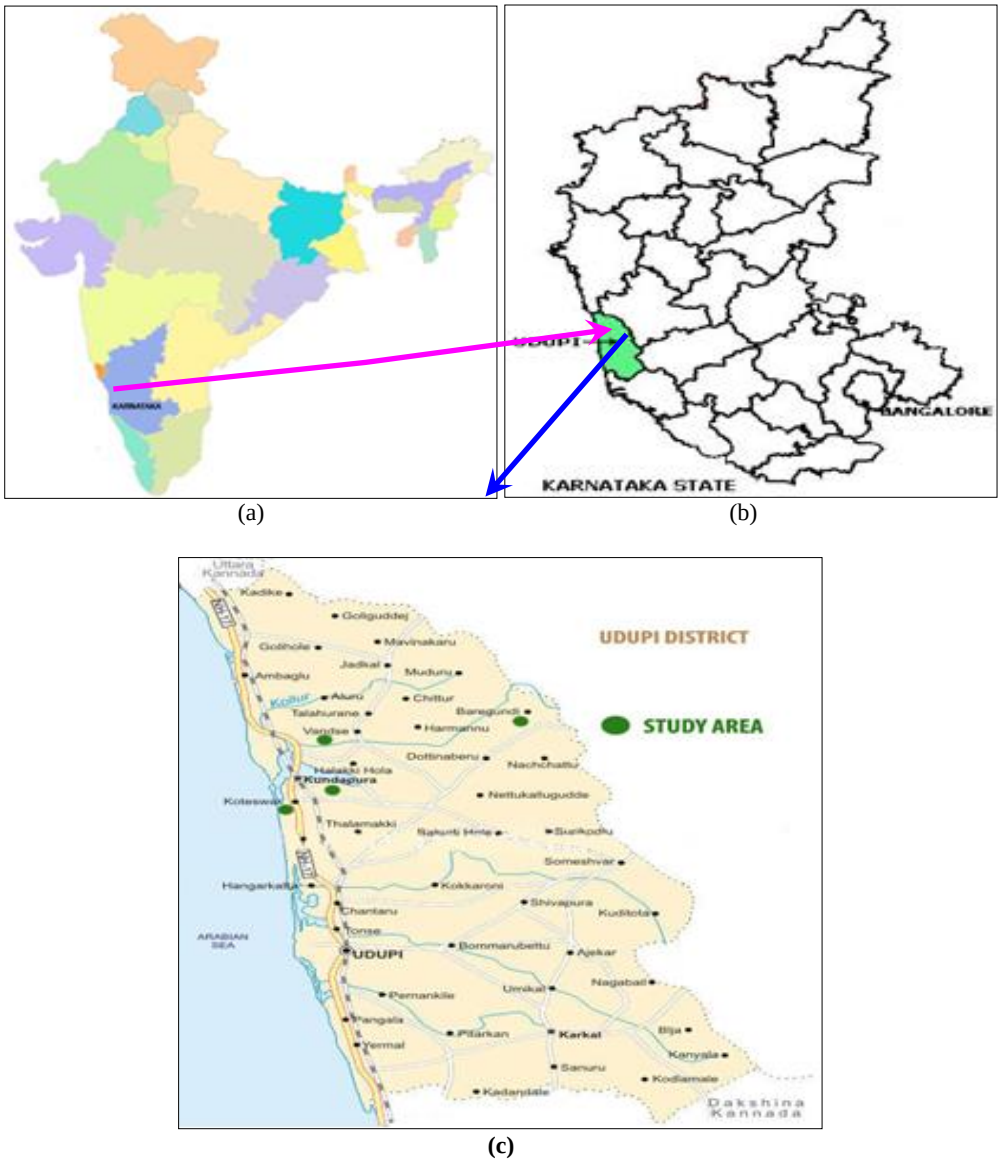

Fig 1 (a, b & c): Study area – Sacred groves in Udupi district of Karnataka

Observations

There is vast diversity among India's sacred groves. Some contain only a few trees, while others are hundreds of acres in size. Sometimes groves overlap with larger forested areas, while others exist as islands in open plains or desert. Even their names vary from region to region. Most sacred groves in India are associated with the almost 40,000 endogamous groups within the Hindu caste system and other major religions such as Buddhism and Islam, along with other religious communities and traditional tribal groups.

From Karnataka, sacred groves have been reported from the districts of Uttar Kannada, Shimoga, and Kodagu. The natural populations of *Vateria indicia* L., a dipterocrap endemic to the western Ghats occur in a couple of sacred groves of Uttar Kannada and Shimoga. Kodagu district has 1214 sacred groves covering an area of 2550.45 ha. The sacred groves have not been properly documented from Daskshina Kannada and Udupi districts of Karnataka, where a network of numerous sacred groves occurs even today, dotting the otherwise deforested landscape of the coastal and plateau regions. Floristically, the Nagbanas are the last shelters of natural forests in the coastal and plateau parts of these districts. They are also the indicators of the rich vegetation that had existed here in the past, which has now been replaced by paddy fields and plantations. The species of plants occurring in the Nagbanas are diverse, and they are strikingly different from those few that occur in their surrounding areas.

A preliminary survey has revealed that the frequently found and easily recognized species of plants of the Nagbanas which are reported to be endemic to peninsular India and the Western ghats. Lianas like *Calycopteris floribunda* Lam., *Hippocratea indica* Wild., *Strychnos* species., *Alangium salvifolium* (L.f.) Wangerin, *Gneutum ula* Brongn., etc. of stunning girth abound only in the *banas* because, when found growing in open areas, they are harvested by the locals for weaving baskets. Besides the Nagbanas are also the repository of germplasm of Wild yams (*Dioscorea* species.), *Piper* species, *Mangifera indica* L., and a variety of medicinal and fruit-yielding plants.

During the present study, nine sacred groves located at Vandse, Baregundi, Kundapur and Koteshwar from Udupi district of Karnataka were selected for floristic survey. Out of nine groves, two sacred groves are located in Vandse, two sacred groves in Baregundi, three sacred groves in Kundapur and two sacred groves in Koteshwar were studied. The floristic survey of the nine sacred groves located at four different places was done and majority of the groves were assigned to 'Naga' or the serpent god.

Table 1: Sacred groves studied in Udupi district of Karnataka

Sr. no.	Name of Sacred grove	Deity	Place
1	Shetty grove	Nagdevta	Vandse
2	Kothari grove	Nagdevta	Vandse
3	Gayadi grove	Nagdevta	Baregundi
4	Nandi grove	Nagdevta	Baregundi
5	Kaveri grove	Nandikeshwara	Kundapur
6	Kalwadi grove	Panjurli	Kundapur
7	Kalbettu grove	Nagdevta	Kundapur
8	Pujari grove	Nagdevta	Koteshwar
9	Chuttiber grove	Chuttiber	Koteshwar

Table 2: Endemic plant species found in sacred groves of Udupi district of Karnataka

Sr. no	Botanical Name	Local Name	Habit	Family
1.	*Artocarpus hirsutus* Lam.	Hebbalasu	Tree	Moraceae
2.	*Dalbergia horrida* (Dennst.)Mabb.	Parantolu	Climber	Papilionaceae
3.	*Garcinia indica* (Thouars) Choisy.	Murgalu	Tree	Guttiferae
4.	*Gymnostachyum fabrifugum* Benth.	Nelamuchiru	Herb	Acanthaceae
5.	*Holigama ferruginea* Marchand	Holegeru	Tree	Anacardiaceae
6.	*Hopea parviflora* Beddom	Karimara	Tree	Dipterocarpaceae
7.	*Hopea ponga* (Dennst.) Mabb.	Karimara	Tree	Dipterocarpaceae
8.	*Hydnocarpus pentandara* (Buch-Ham.) Oken.	Soorante	Tree	Flacourtiaceae
9.	*Ixora brachiata* Roxb.	Keskuru	Tree	Rubiaceae
10.	*Jasminum malabaricum* Wight	Kadumallige	Climber	Oleaceae
11.	*Memecylon malabaricum* (Clarke.) Cogn.	Ollekodi	Shrub	Melastomataceae
12.	*Mussaenda belilla* Buch.-Ham.	Bolle tappu	Climber	Rubiaceae
13.	*Psychotria dalzelli* Hook.f.	Bilikepula	Shrub	Rubiaceae
14.	*Tabernaemontana heyneana* Wallich	Kokkekai	Tree	Apocynaceae
15.	*Vateria indica* Linn.	Dhoopa	Tree	Dipterocarpaceae

Table 3: List of plant observed in different sacred groves of Udupi district of Karnataka

Sr. no.	Botanical Name	Habit	Family
1	*Abelmoshus esculentus* (L.) Moench.	Shrub	Malvaceae
2	*Abelmoshus ficulneus* (L.) Wall. & Arn.	Shrub	Malvaceae
3	*Abelmoshus manihot* (L.) Medic.	Shrub	Malvaceae
4	*Abuliton persicum* (Burm.f.) Merrill.	Shrub	Malvaceae
5	*Acacia arabica* Willd.	Tree	Mimosaceae
6	*Acacia catechu* Willd.	Tree	Mimosaceae
7	*Acacia pennata* (L.) Willd.	Tree	Mimosaceae
8	*Acalypha hispida* Burm.f.	Herb	Euphorbiaceae
9	*Achyranthes aspera* Linn.	Herb	Amaranthaceae
10	*Achyranthes coynei* Santapau	Herb	Amaranthaceae
11	*Adhatoda zeylanica* Medik.	Shrub	Acanthaceae
12	*Aeschynomene indica* Linn.	Herb	Fabaceae
13	*Ageratum conyzoides* Linn.	Herb	Asteraceae
14	*Albizzia chinensis* (Osb.) Merrill.	Tree	Mimosaceae
15	*Albizzia lebbeck* Benth.	Tree	Mimosaceae
16	*Albizzia procera* (Roxb.) Benth.	Tree	Mimosaceae
17	*Alstonia scholaris* (L.) R.Br.	Tree	Apocynaceae
18	*Anacardium occidentale* Linn.	Tree	Anacardiaceae

19	*Annona reticulata* Linn.	Tree	Annonaceae
20	*Annona squamosa* Linn.	Tree	Annonaceae
21	*Anogeissus latifolia* Wall.	Tree	Combretaceae
22	*Antidesma diandra* Roth.	Tree	Euphorbiaceae
23	*Areca catechu* Linn.	Tree	Arecaceae
24	*Bassia latifolia* Roxb.	Tree	Sapotaceae
25	*Bauhinia racemosa* Wall.	Tree	Caesalpiniaceae
26	*Bombax ceiba* Linn.	Tree	Bombacaceae
27	*Boswellia serrata* Roxb.	Tree	Burseraceae
28	*Butea monosperma* (Lamk.) Jaub.	Tree	Fabaceae
29	*Calophyllum inophyllum* Linn.	Tree	Clusiaceae
30	*Calycopteris floribunda* Linn.	Liana	Combretaceae
31	*Casuarina equisetifolia* Linn.	Tree	Casuarinaceae
32	*Cocus nucifera* Linn.	Tree	Palmae
33	*Coffea arabica* Linn.	Shrub	Rubiaceae
34	*Dalbergia sissoo* Roxb.	Tree	Papilionaceae
35	*Dillenia pentagyna* Roxb.	Tree	Dilleniaceae
36	*Diospyros embryopteris* Pers.	Tree	Ebenaceae
37	*Diospyros microphylla* Bedd.	Tree	Ebenaceae
38	*Dipterocarpus indicus* Bedd	Tree	Dipterocarpaceae
39	*Gmelina arborea* Roxb.	Tree	Verbenaceae
40	*Gnetum ula* Brongn.	Liana	Gnetaceae
41	*Madhuca indica* Linn.	Tree	Sapotaceae
42	*Mimusops elengi* Linn.	Tree	Sapotaceae
43	*Phoenix sylvestris* Roxb.	Tree	Palmae
44	*Santalum album* Linn.	Tree	Santalaceae
45	*Sapindus laurifolius* Vahl.	Tree	Sapindaceae
46	*Swietenia mahagoni* (L.) Jacq.	Tree	Meliaceae
47	*Tectona grandis* Linn.	Tree	Verbenaceae
48	*Terminalia arjuna* Wight & Arn.	Tree	Combretaceae
49	*Terminalia bellerica* (Gaertn.) Roxb.	Tree	Combretaceae
50	*Terminalia chebula* Retz.	Tree	Combretaceae
51	*Terminalia tomentosa* Wight & Arn.	Tree	Combretaceae
52	*Vitex negundo* Linn.	Shrub	Verbenaceae
53	*Wrightia tinctoria* (Roxb.) R. Br.	Shrub	Apocynaceae
54	*Zizyphus jujube* Mill.	Shrub	Rhamnaceae

Table 4: List of threatened plant in sacred groves of Udupi district of Karnataka

Botanical Name	Family	Status	Place
Orophea uniflora Hook. f. & Thomson	ANNONACEAE	Rare	Kundapur
Polyzygus tuberosus Walp.	APIACEAE	Rare	Kundapur
Cryptocoryne cognatoides Blatt. & McCann	ARACEAE	Vulnerable	Baregundi
Calamus nagbettai R.R.Fernald & Dey	ARECACEAE	Vulnerable	Baregundi
Ceropegia fimbriifera Bedd.	ASCLEPIADACEAE	Vulnerable	Vandse
Marsdenia raziana Yogan. & Subr.		Rare	Koteshwar
Cyathocline lutea J.S. Law ex Wight	ASTERACEAE	Rare	Baregundi
Nanothamnus sericeus Thomson		Rare	Baregundi
Senecio mayurii C.E.C. Fisch.		Rare	Baregundi
Impatiens talbotii Hook.f.	BALSAMINACEAE	Rare	Kundapur
Salacia malabarica Gamble	CELASTRACEAE	Endangered	Baregundi
Hopea Jacobi C.E.C. Fisch.	DIPTEROCARPACEAE	Rare	Baregundi
Dalechampia stenoloba Raghavan & B.G.P. Kulk.	EUPHORBIACEAE	Rare	Koteshwar
Cynometra bourdillonii Gamble	FABACEAE	Vulnerable	Kundapur
Flemingia gracilis (Mukerjee) Ali.		Rare	Vandse
Kingiodendron pinnatum (DC.) Harms		Rare	Kundapur
Crotalaria digitata Hook.		Rare	Kundapur
Leucas angustissima Sedgw.	LAMIACEAE	Rare	Baregundi
Decaschistia trilobata Wight	MALVACEAE	Rare	Vandse
Aglaia talbotii Sundara Raghavan	MELIACEAE	Vulnerable	Baregundi
Eugenia discifera Gamble	MYRTACEAE	Endangered	Kundapur
Bulbophyllum elegantulum (Rolfe) J.J. Sm.	ORCHIDACEAE	Vulnerable	Kundapur
Isachne mysorensis Sundararagh	POACEAE	Rare	Koteshwar
Dichanthium paranjpyeanum (Bhide) Clayton		Rare	Koteshwar
Glyphochloa divergens (Hack.) Clayton		Rare	Baregundi
Hubbardia heptaneuron Bor		Rare	Baregundi
Pterospermum reticulatum Wight & Arn.	STERCULIACEAE	Rare	Baregundi
Curcuma bhatii (R.M.Sm.) Skornick. & M.Sabu	ZINGIBERACEAE	Vulnerable	Vandse

Result & Discussion

During the last few decades socio-economic, ecological and conservation importance of sacred groves has been recognized and it has been emphasized that immediate conservation of them is must. Several approaches and options could be adopted to conserve these scared spaces. However, most essential, but most neglected is the management of information on sacred groves, which would lead into planning of appropriate policies and action plan to save these groves from the clutches of both modernization and urbanization. Vast amount of information is available on various aspects of sacred groves. However, this information is scattered at various levels. This includes researchers, academicians, nature-lovers, villagers and settlers in the vicinity of these groves. Not much of this information is in electronic form.

On the contrary most of the information is in folklores and passed from a generation to generation, hence issue of its authentication and validity arises. The local inhabitants have religious beliefs and respect for sacred groves, which has resulted in their preservation. Folklore plays an important role in supporting these sentiments. The traditional customs, rituals and other religious ceremonies of these communities are closely linked to their way of life.

The sacred groves of Udupi district harbors some endemic plant species like *Artocarpus hirsutus* Lam., *Dalbergia horrida* (Dennst.) Mabb., *Garcinia indica (*Thouars) Choisy., *Gymnostachyum fabrifugum* Benth., *Holigama ferruginea* Marchand, *Hopea parviflora* Beddom, *Hopea ponga* (Dennst.) Mabb., *Hydnocarpus pentandara* (Buch-Ham.) Oken., *Ixora brachiata* Roxb., *Jasminum malabaricum* Wight, *Memecylon malabaricum* (Clarke.) Cogn., *Mussaenda belilla* Buch.-Ham., *Psychotria dalzelli* Hook.f., *Tabernaemontana heyneana* Wallich and *Vateria indica* L.

While studying the sacred groves, we observed that traditionally, sacred groves were established with a view to preserve, share and save water resources from the region where they existed. The concept of sacred groves grew over time when some of the important ecological and economic species of plants or animals were conserved (or protected) in a grove. Sacred groves was one way of expressing the gratitude of man towards the vegetation which sustained and supported life under respective agro-ecological condition. Only recently did the scientists start looking at these biological treasures systematically, highlighting the in - situ conservation methods by studying them.

The sacred groves have become the last refuge of many plant species. Many of the plant species, which depend for their very survival in the region on the sacred groves are of considerable practical value. Apart from the preservation of rare species, the sacred groves may be serving the function of preservation of biological diversity even in the case of commoner species of trees. Such climax vegetation is very rich in species of trees, climbers and epiphytes. As such, these sacred groves serve the vital function of preservation of plant species, which have become very rare or extinct elsewhere. Preservation of these species could be of great economic significance. Some of the species so preserved are already of medicinal significance and others could acquire such significance in future.

Conclusion

Sacred groves harbor many woody plant species as well as fauna. These groves function as genetic reservoirs of wild species. As religious beliefs and taboos weaken, the pressure on these forests increases. The temples within the groves are still used as places of worship, but the forest surrounding them has become relatively unimportant. In many places strong taboos against biomass extraction no longer exist, while in other places natural resources are removed from the forest under cover of darkness. The rationale behind the reverence for nature and the protective taboo seems to have been forgotten, sometimes even where religious rituals continue to be observed. It is important that people recognize the values of these remaining patches of forest and that levels of resource extraction be kept low and regulated; this would facilitate sustainable resource use. Identifying the socio-economically important species of the sacred grove and raising them in buffer zones might be a viable strategy for their conservation and sustainable use. This would not, however address the social changes that have contributed to the sacred groves decline. Where spiritual and ethical traditions no longer ensure the conservation of these forests, the public may need to be educated and informed about other reasons like environmental, social and economic for conserving the forest and using it sustainably.

As deforestation has been taking place at a rapid rate in many areas, such sacred groves has come to be the only remnants of the original forest in a number of cases. Because of the absence of human interference the sacred groves supports the climax vegetation. Such climax vegetation is very rich in species of trees, climbers and epiphytes. As such, these sacred groves serve the vital function of preservation of plant species, which have become very rare or extinct elsewhere. Preservation of these species could be of great economic significance. Some of the preserved species are already of medicinal significance and other could acquire such significance in future. Even in the case of species not in any danger of extinction, the sacred groves may serve to preserve genotypes, which may be useful in a future forest tree breeding programme. The sacred groves are also of great Silvicultural interest as indicators of the natural productivity of the region.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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