



Floral diversity of sacred groves located in great Himalayan National Park (GHNP), Kullu, Himachal Pradesh (India)

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ABSTRACT

The traditional conservation models, such as, the sacred groves, sacred species and sacred landscapes demonstrate how nature is of vital importance to the indigenous people. With the passage of time, as over-exploitation dominated this “*symbiotic relationship*”, it got modified to “*parasitism*”. Conservation remained an important concept of ancient Indian Civilizations. One finds the mention of nature and its sacred elements in other Hindu texts, such as, Upanishads, Sutras and Purans. In order to curb the harmful attitude of humans towards nature, the modern day concept of ‘*Conservation*’ was evolved. In the present times the Sacred Groves can be considered as “*Repository of Biodiversity*”. Considering the forests as sacred and associating them with the local deity and folklores is one of the traditional ways of conservation. These are classic models of community based conservation built on the indigenous belief system and management practices. In Himachal Pradesh the sacred groves are known as “*Dev ban*”. They are mostly found in district Kullu, Mandi, Shimla, and Lahaul-Spiti. The present paper is based on studies carried out in Manhara Dev ban and Manu Rishi *Dev ban* located in Shansher Panchayat area of Great Himalayan National Park, Kullu, to document the floral diversity of these sacred groves.

Keywords: Sacred Groves, Floral Diversity, Great Himalayan National Park, Community Based Conservation, Himachal Pradesh.

INTRODUCTION

Since times immemorial, man and nature exhibit a symbiotic relationship. The traditional communities have evolved with the environment by magnificently harmonizing the modification of nature with its conservation. Hence, human interaction with nature is complimentary in the process of evolution. Traditional wisdom, socio-cultural practices and religious beliefs celebrate and value the biodiversity and its significance. Sacred groves are defined as small patches of native vegetation that are protected by the traditional communities based on cultural or religious beliefs (Gadgil and Vartak, 1976; Chandrakanth *et al.* 1990; Ramakrishnan, 1996).

Erman, 1894 highlighted that many sacred groves are analogous to villages in Zimbabwe, Egypt and South Africa. In Ghana, attempts have been made at policy level to recognise socio-cultural and religious importance of sacred groves (Spindel, 1989).

In 1992, Burmann described the sacred groves of Dieri tribe in Central Australia. They regard some trees as sacred and protect them from any harm. Sacred groves are found in nineteen Indian states (Verschuuren *et al.*, 2010). It has been estimated that total number of sacred groves in the country is between 100,000 and 150,000 (Saini *et al.*, 2011). The concept of sacred groves is an ancient one wherein a patch of forest or water body is dedicated to local deities and nobody is allowed to harm the plants or hunt animals or disturb any other form of life (Agnihotri *et al.* 2012). Management of most groves is under the control of local communities and the ownership of a group of families, or a clan. The synchronisation of the rituals of sacred grove and the blossoming of flowers of forest trees and various agricultural operations, divulge the close sense of synchronization that exists between nature and indigenous communities (Patnaik and Pandey, 1998).

India has a large protected area network representative of its biological diversity (Rodgers & Panwar 1988). But some essential steps in protected area establishment have met strong resistance, notably the completion of legal formalities and regulations covering the resource utilization by the local communities (Panwar 1992). The biodiversity is concentrated in the areas located away from main habitations (Pandey and Wells 1997). This is more evident in the remote and inaccessible areas of the Himalay where the secluded indigenous communities have developed distinctive traditions and customs, as well as farming practices, and systems of forest resource utilization. Singh and Rawat (1999) surveyed the flora of GHNP and stated that it is home to nearly 26 per cent of the flora of Himachal Pradesh. The traditional conservation system has maintained the flora of the region. The sacred groves of the region are rich in medicinal and aromatic plants of great value. Vasan and Kumar (2006) carried out an ethnographic study of two *dev bans* in district Kullu. They found that while the instant decisions related to a *dev ban* were made at local level, the key influencers originate beyond the local community. Sushma *et al.* (2017) studied two sacred groves in Western Himalay. They

conducted a preliminary survey and gathered information on the flora and fauna of the sacred groves, associated deity and adjacent communities. They studied the ethno-botanical uses of plants and taboos that are helping in conservation of natural resources. In Himachal Pradesh the sacred groves are called "*Dev ban*". These sacred forests have a size varying from clump of a few trees to large areas covered with dense forests. They are mostly found in district Kullu, Mandi, Shimla, and Lahaul-Spiti. The present paper is based on the study carried out in Manhara *Dev ban* and Manu Rishi *Dev ban* located in Shansher Panchayat area of Great Himalayan National Park, Kullu to document the floral diversity of these sacred groves.

MATERIAL AND METHODS

Study Area:

The study area was selected in the Eco-development zone of the Great Himalayan National Park, district Kullu, Himachal Pradesh. The eco-zone of GHNP consists of around 160 villages out of which the study has been conducted in sacred groves of Shansher panchayat. Shansher panchayat consists of 15 villages. Khain village is the most populated one with 262 residents. The villages with least population are Bharogi and Sanogi with 20 and 17 residents respectively. 65.90 per cent of the population belong to General Category, 30.41 per cent belong to Scheduled Castes and 3.67 per cent belongs to Other Backward Classes. The average household size in Shenshar panchayat is 3.821. Females comprise the majority of the population with 51.26 per cent and males with 48.73 per cent. The sex ratio of the area is 1052. The families in this region are mostly joint families and all families follow Hindu norms. The villages in panchayat are located in the remote areas making the access to health facilities, such as, government hospitals a great task. Lack of livelihood opportunities due to the inaccessibility of the area is a pressing issue. Most of the people hence resort to agricultural practices and to labour works. Most of the agricultural land in the panchayat is rain fed as there is lack of irrigation facilities in the villages. Hence, people are mostly dependent on rainfall and other natural sources of water for irrigation.

Methodology:

The key resource persons that were contacted for collecting primary and secondary data included the

women folk and other residents of panchayat, elderly villagers, panchayat representatives, *devta* Committees and other members of local institutions. Field survey of the sacred groves located in Shansher panchayat was undertaken systematically. Various floral species were recorded by using various techniques. The flora was inventoried after close sighting and identification. After the survey, flora has been classified into various categories according to their habits.

RESULTS AND DISCUSSION

The floristic study of the sacred was done to get acquainted with the floristic diversity of the sacred groves; to study the distribution of plants on the basis of their habit and family; to know about the

distribution of plant types in the area and to enumerate the flora according to their uses with special reference to their ethno-botanical importance.

Enumerated Plants in the sacred groves:

The various plants enumerated in the study area have been enlisted in the tables along with other details including the part of the plant used, ethno-botanical importance of the plant, general utilisation, potential medicinal use and IUCN status of the species. A total of 115 plant species representing 106 genera and belonging to 64 families were recorded. The flora has been enumerated systematically according to Bentham and Hooker’s system of classification. Out of the total enumerated species, 83 were Dicotyledons which are represented by 49 families, 76 genera.

Table 1: Distribution of Plants on the basis of their habit

Type of Plant	Number	Percentage
Trees	26	22.60%
Herbs and shrubs	58	50.43%
Grasses	15	13.04%
Climbers	4	3.5%
Fungi and pteridophytes	12	10.43%
TOTAL	115	100

Table 2: Distribution of Plant Types in the Sacred Groves

Type	Families	Genera	Species
Dicotyledons	49	76	83
Monocotyledons	3	13	15
Gymnosperms	3	5	5
Pteridophytes	4	7	7
Fungi	5	5	5
Total	64	106	115

PERCENTAGE DISTRIBUTION OF PLANTS

■ TREES ■ HERBS AND SHRUBS ■ GRASSES ■ CLIMBERS ■ FUNGI AND PTERIDOPHYTES

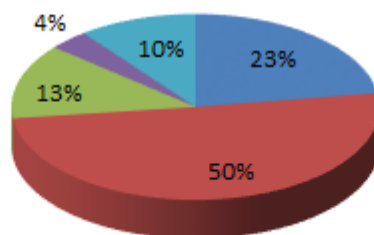


Figure 1: Distribution of Plants in the Sacred Groves

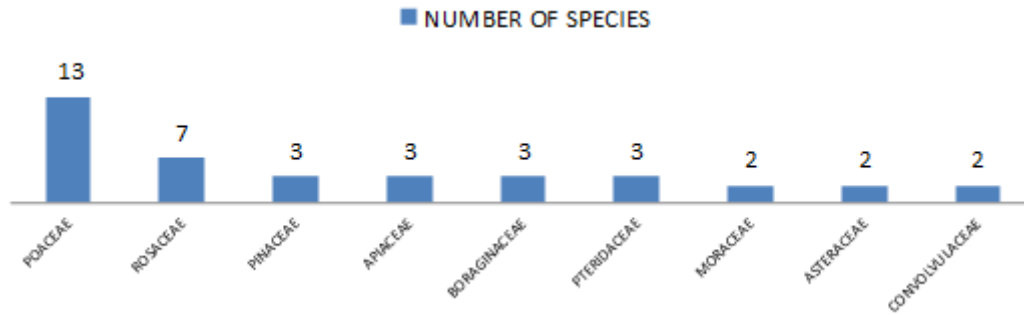


Figure 2: Number of Species Recorded in the most Common Families

Monocotyledons are represented by 3 families, 13 genera and 15 species. Gymnosperms recorded belong to 3 families, 5 genera and 5 species. The number of Pteridophytes recorded were 7, belonging to 4 families, 7 genera. 5 species of fungi were recorded belonging to 5 families and 5 genera. Among the families Poaceae family was most dominant consisting of 12 species and 10 genera. The second common family recorded was Rosaceae. The enumerated number of trees out of the total species formed 22.60 per cent, 50.43 per cent were represented by herbs and shrubs, 13.04 per cent by grasses, 3.5 per cent of the total recorded species were climbers and 10.43 per cent of fungi and pteridophytes were recorded.

DISCUSSION

The floral diversity has survived in the study area due to the traditional concept of sacred groves and regulations linked with it. Traditional wisdom about the use of the plants is essential for providing scientific validation. Various studies have been conducted in the protected areas for enumeration of floral diversity. Singh and Rawat (1999) surveyed the flora of GHNP and stated that it is home to nearly 26 per cent of the flora of Himachal Pradesh. Bodh *et al.* (2018) conducted a study in various villages of the GHNP for assessment of diversity and utilisation pattern of economically important biodiversity in the GHNP. They stated that the protected areas of Kullu have received very less consideration on ethno-botanical studies. Hence, ethno-botanical studies were carried out in seven villages of GHNP. However, they stated that detailed ecological studies about the biodiversity of GHNP are required. The traditional conservation system has maintained the floral diversity of the region. The sacred groves of the region are rich in medicinal and aromatic plants having great curative value. Due to restrictive conservation policies in the

GHNP, people have perceived a negative attitude. Pisharoti (2008) stated that the people of GHNP have perceived a negative attitude towards conservation due to the sense of alienation and legal restrictions on access to the Park. She suggested that detailed ethnographic studies of people living near the park are required to understand the relationship between people and the forests. The sacred groves form one such relationship and its understanding forms the basis of acquiring knowledge about local flora and fauna. The ethno-botanical study of the biodiversity of the sacred groves and associated forests is essential to make people aware of the concept of sustainable use of natural resources. The people and forests of GHNP have survived ages juxtaposed and complimenting one another. The people have protected the forests by imposing various rules through religious beliefs, taboos and totems that exist in the area. The sacred grove is one such entity that is protected by the religious regulations and myths. However, with the reduced accessibility to resources, the forest area adjacent to the inaccessible sacred grove is succumbing to the increased pressure of human needs. Hence, keeping in mind the present state of depleting natural resources, detailed study on ethno-botanical importance of floral diversity was undertaken in Shansher panchayat. The trees found in the study area have varying ethnobotanical importance to the people of the area. These are used as timber, fodder, dye, wild edible in local delicacies, for therapeutic purposes, have ethno-medical importance, religious significance, and many more. The medicinal plants enumerated in the study area have diverse ethno-botanical utilisation such as anti-periodic uses, Laxative uses, used as condiments, blood purification, aphrodisiac, anti-pyretic, and used for curing various body ailments. Based on the findings of the study, it is suggested that the scientific enumeration of floral diversity of other panchayats and villages of GHNP be undertaken to document the traditional wisdom.

Table 3: Tree Species documented in the sacred groves

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-Botanical Importance	General Utilisation	Medicinal Use	IUCN Status
1.	Deodar, keoli, kelo	<i>Cedrus deodara</i>	Pinaceae	Wood, needles	Wood oil used for curing ulcers and wounds. Used for healing wounds in cattle.	Timber for beams, doors, window frames	Rheumatic, used for curing ulcers and wounds	Least concern
2.	Rai, Kalrai	<i>Abies pindrow</i>	Pinaceae	Wood	Social importance	Yields strong timber used for packing cases and crates	Used for curing foot cracks	Least concern
3.	Kail	<i>Pinus wallichiana</i>	Pinaceae	Wood, bark, needles, roots	During winters, the needles yield sweet <i>mana</i> .	Timber used for planking, doors, window frames, shutters and furniture. Bark used for dying silk and wood.	Root oil is used as insect repellent to ward off maggots from cattle.	Least concern
4.	Khanor	<i>Aesculus indica</i>	Sapindaceae	Wood, fruits	Nuts fed to sheep and fruits are edible.	Timber used for furniture, toys and carvings, pencil making.	-----	Vulnerable
5.	Burass, Cheo	<i>Rhododendron arboreum</i>	Ericaceae	Flowers, leaves	Has religious significance, flower juice is used for maintaining a healthy heart.	Flowers edible and yield juice which is sold commercially; Flowers are also gifted to the palanquin of local deity	Flower juice used as cardio tonic; Paste of leaves is used for healing cuts and wounds.	Least concern
6.	Chimul, Cherailu	<i>Rhododendron campanulatum</i>	Ericaceae	Leaves, twigs	Leaves used to cure headache.	Wood used as fuel wood. Dried twigs used for curing chronic fever.	Leaf juice is used for rheumatism.	Not evaluated
7.	Shegal, kainth	<i>Pyrus pashia</i>	Rosaceae	Fruits, bark, leaves	Fruit extract used for curing mouth ulcers.	Leaves used for fodder and wood for making agricultural tools.	Fruits used to cure diarrhoea, and relieve rheumatism	Least concern
8.	Shaadi	<i>Prunus cerasoides</i>	Rosaceae	Fruits, kernels, wood	Used as substitute for almond, used in preparation of local beverage.	Oil used as cooking oil, hair oil, timber used to make farming tools.	Kernel oil used to cure rheumatism.	Not Extinct

Table 3: continued...

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-Botanical Importance	General Utilisation	Medicinal Use	IUCN Status
9.	Jamu	<i>Prunus cornuta</i>	Rosaceae	Wood, leaves	Wood used for construction. Leaves and fruits yield a green dye.	Wood used for making agricultural tools, used in construction of houses.	Used as digestive.	Not Extinct
10.	Koish	<i>Alnus nitida</i>	Betulaceae	Wood, leaves	Used as fodder for cattle. Used to dye wool.	Wood used for making wooden frames, leaves used for fodder.	---	Endangered
11.	Junglee Popular, Pahari Pipal	<i>Populus ciliata</i>	Salicaceae	Wood, tender leaves	Tender leaves used as fodder	Used for making plywood, paper and pulp making.	----	Data deficient
12.	Khidik	<i>Celtis australis</i>	Ulmaceae	Wood, Leaves, wood	Lopping of stems for fodder.	Wood used for tool handles, sports equipment etc. Stems and leaves fed to cattle.	----	Least Concern
13.	Moharu	<i>Quercus dilatata</i>	Fagaceae	Wood, stems, leaves, kernel	Kernels are dried and used for treatment of cough and cold.	Wood is used for making agricultural implements, axe- handles. The stems are lopped for fodder. Kernels are fed to cattle.	Kernels are dried and known as "Morash" and are used for treatment of cough and cold.	Vulnerable
14	Ban	<i>Quercus leucotrichophora</i>	Fagaceae	Wood, fodder	Used as fuel wood for charcoal making.	Wood is used for making plough, farming tools. Lopped extensively for fodder.	---	Vulnerable
15	Kharsu , Khareau	<i>Quercus semecarpifolia</i>	Fagaceae	Wood, leaves	Used as fuel wood and for charcoal making	Wood used for making agricultural implements; lopped for fodder	---	Vulnerable
16	Chimu, Toot, Shahtoot	<i>Morus alba</i>	Moraceae	Leaves, fruits, Stems	Leaves fed to silkworm larvae (<i>Bombyx mori</i>) in its rearing. Fruits are used for making jams.	Lopped for fodder. Wood used in manufacturing of sports goods; fruits are edible.	Leaves are anti-inflammatory, anti-bacterial	Not Extinct

Table 3: continued...

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-Botanical Importance	General Utilisation	Medicinal Use	IUCN Status
17	Darek	<i>Melia azedarach</i>	Meliaceae	Wood, leaves, seeds	Leaves are used as bio-insecticide.	Wood used for making ploughs and furniture. Used as pulpwood and insect repellent.	Seed oil is greenish yellow in colour which is used for joint pains	Not Extinct
18	Akhrot, Walnut	<i>Juglans regia</i>	Juglandaceae	Kernels, wood, roots, bark, leaves	Twigs used for cleaning teeth, used for colouring lips. Kernels are dried and used in various ethnic delicacies such as <i>siddu</i> ; nuts are offered to village gods on various religious occasions.	Kernels edible; Wood used for making furniture, musical instruments, wood carving in temples.	Kernels are stimulant, diuretic. Paste of kernels and husk is applied to various skin infections. Leaves have anti-inflammatory and astringent properties.	Near Threatened
19	Daral, Toon	<i>Toona ciliata</i>	Meliaceae	Wood, flowers	Flowers yield a red natural dye used for colouring cotton and woollen fabric.	Wood used for making furniture, plywood making, and door panels. Dye from flowers is used for colouring fabric. Leaves are lopped for fodder.	Bark is bitter, astringent and anti-periodic. It is used to cure dysentery.	Least concern
20	Sharoli, Thangi, The Himalayan Hazel	<i>Corylus jacquemontii</i>	Betulaceae	Nuts, kernels	Oil extracted from kernels is used for various purposes.	Nuts edible. Used in some traditional delicacies.	The kernels serve as cardio tonic.	Endangered
21	Kaphal	<i>Myrica esculenta</i>	Myricaceae	Fruit, bark, leaves	Fruits are edible and are sold in the market.	Fruits edible and are used for preparation of various drinks.	Bark and leaves are used for curing asthma, sinusitis. Bark is used for curing onorrhoea, typhoid, epilepsy.	Least concern

Table 3: continued...

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-Botanical Importance	General Utilisation	Medicinal Use	IUCN Status
22	Shirsh, Siris	<i>Albizia lebbbeck</i>	Mimosaceae	Wood, stems and leaves	Tree is lopped for fodder. Timber used for construction work.	Timber used for making tool handles, panelling, and flooring. Yields a reddish brown gum which is used as an adulterant with Gum Arabic.	-----	Not Extinct
23	Angu, Angaah, Himalayan Ash	<i>Fraxinus micrantha</i>	Oleaceae	Wood	Wood is used for making ploughs, tool handles.	Wood used for making furniture, building houses, sports goods.	-----	Data deficient
24	Fegda	<i>Ficus palmata</i>	Moraceae	Fruits, leaves, stems, branches	Fruits are edible; Latex is used for removal of thorn from skin.	Used as fodder to animals, Fruits are edible	Fruits are laxative. Plant has anti-diabetic, anti-fungal properties.	Least Concern
25	Kakdei, Kakarsinghi	<i>Pistacia integerrima</i>	Anacardiaceae	Leaves and galls	Galls are used with honey to treat coughs	Used as fodder, used for treatment of asthma	Galls used for curing Asthma, coughs.	Near threatened
26.	Willow, Brittle willow	<i>Salix fragilis</i>	Salicaceae	Leaves, stem	Leaves are used for fodder	A multipurpose tree used mostly for fuel wood and fodder.	Bark used for treating rheumatism and is anti-inflammatory.	Not Evaluated

Table 4: Medicinal Plants documented in the Sacred Grove

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-botanical Importance	General Utilisation	Medicinal Use	IUCN STATUS
1.	Patish	<i>Aconitum heterophyllum</i>	Ranunculaceae	Roots	Roots anti-periodic. The grounded root is mixed with sugar to relieve stomach related problems.	Used to cure stomach ache.	Aphrodisiac, Astringent tonic. Also used to cures diarrhoea and cough.	Endangered
2.	Bach	<i>Acorus calamus</i>	Acoraceae	Rhizomes	Rhizomes effective in curing dysentery and snake bites.	Used to cure stomach ache.	Used as nerve tonic. Roots are antipyretic, also used for curing rheumatism.	Endangered
3.	Sathjalari	<i>Ainsliaea aptera</i>	Asteraceae	Roots	Roots are grounded and used for curing injuries.	Used to cure wounds.	Can increase the urine flow. Used to relieve diarrhoea, dyspepsia.	Threatened
4.	Chora	<i>Angelica glauca</i>	Apiaceae	Roots	Used as condiment in cooking and taken as powder for digestion.	Used in cooking as a spice.	Used to cure flatulence and dyspepsia.	Endangered
5.	Ratanjot	<i>Arnebia benthamii</i>	Boraginaceae	Root	Roots are dried and mixed in mustard oil to enhance hair growth.	Roots yield a red dye which is used in dyeing wool.	Antiseptic and anti-bacterial	Endangered
6.	Pashan bhed	<i>Bergenia ciliata</i>	Saxifragaceae	Roots, leaves	Used to treat kidney problems.	Used for treatment of stones in kidney and urinary bladder.	Roots used in diarrhoea, rheumatism.	Endangered
7.	Pathar tor	<i>Berginia legulata</i>	Saxifragaceae	Rhizome	Used in expulsion of urinary bladder stone.	Used to treat urinary problems.	Rhizomes are diuretic, anti-inflammatory.	Threatened
8.	Kashmal, Daru haldi	<i>Berberis aristata</i>	Berberidaceae	Roots, berries	Root extract is obtained by boiling the roots and is used as blood purifier.	Roots grounded and applied on skin.	Root powder is emollient. Berries are laxative and stomachic.	Endangered

Table 4: continued...

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-botanical Importance	General Utilisation	Medicinal Use	IUCN STATUS
9.	Kala zeera	<i>Bunium persicum</i>	Apiaceae	Seeds	Used to cure indigestion.	Used to relieve flatulence.	It is carminative, diuretic and stomachic.	Vulnerable
10.	Bhang	<i>Cannabis sativa</i>	Cannabinaceae	Whole plant especially leaves and seeds	Plants yield a fibre that is used to make local shoes known as "Pule".	The plant fibre used to make ropes and cordages.	The extract from seeds and leaves is stomachic, anodyne, febrifuge.	Not extinct
11.	Ban haldi	<i>Curcuma aromatica</i>	Zingiberaceae	Whole plant especially rhizomes	Used to cure burns and bruises.	Used as dyes and in cosmetics.	Used as emollient, used to cure injuries.	Not extinct
12.	Hathpanja	<i>Dactylorhiza hatagirea</i>	Orchidaceae	Root tubers	Used for curing fractures in bone and is eaten as vegetable.	Used to cure cough and cold and consumed as nerve tonic.	The root extract is aphrodisiac, expectorant and used to cure fractures.	Endangered
13.	Singli mingli	<i>Dioscorea deltoidea</i>	Dioscoraceae	Root tubers	Used in angling to poison fish, Used as insect repellent and used for washing woollen clothes.	"Diosgenin" extract is used in birth control pills.	It is used against rheumatism and as contraceptive.	Endangered
14.	Somlata	<i>Ephedra gerardiana</i>	Ephedraceae	Stems	Used to cure fever.	Used to cure haemorrhage and liver related problems	Used as febrifuge, anti-pyretic and for problems related to liver and gall bladder.	Endangered
15.	Fennel, Saunf	<i>Foeniculum vulgare</i>	Apiaceae	Seeds	Used as condiment.	Used as condiment.	Used as condiment.	Not Extinct
16.	Basanti	<i>Hypericum perforatum</i>	Hypericaceae	Whole plant	Juice from leaves is used to cure earache.	Used to cure malaria and boost immunity.	It is anti-periodic, anti-depressant and	Not extinct

Table 4: continued...

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-botanical Importance	General Utilisation	Medicinal Use	IUCN STATUS
17.	Dhoop	<i>Jurinea macrocephala</i>	Asteraceae	Roots and twigs	Used as incense for deotas and in their temples.	Used as incense and as an ingredient in <i>agarbatti</i> and <i>dhoop</i>	is used for curing cancer. Used as emollient and laxative.	Endangered
18.	Wild mint	<i>Mentha arvensis</i>	Lamiaceae	Leaves and roots	Leaves dried and used for curing stomach ache.	Used as stomachic in various mixtures.	It is stomachic, carminative and is used to cure rheumatism	Least concern
19.	Kadi patta	<i>Murraya koenigii</i>	Rutaceae	Leaves	Used in flavouring food	Used as spice in food	Used to cure dysentery and diarrhoea. Leaves are diuretic and stomachic	Least concern
20.	Jatamansi	<i>Nardostachys grandiflora</i>	Valerianaceae	Roots	Powder of the root is smoked by older people for irregular heartbeat. Used with oil to promote hair growth	Used as depressants and as cardio tonic	Used to calm heart palpitations and to cure hypertension	Endangered
21.	Salam Misri	<i>Polygonatum verticillatum</i>	Liliaceae	Rhizomes	Rhizomes edible and consumed as local delicacy	Rhizomes edible	The rhizome extract is aphrodisiac and nerve tonic	Endangered
22.	Karroo	<i>Picrorhiza kurroa</i>	Plantaginaceae	Roots	Consumed for curing bile, liver problems	Root powder used to cure jaundice. Used as bitter tonic and as liver tonic	Used as tonic, blood purifier, expectorant, laxative	Endangered
23.	Bankakri	<i>Podophyllum hexandrum</i>	Berberidaceae	Fruits, roots and rhizomes	Used to relieve constipation	Used as health tonic	Used tonic for liver	Endangered

Table 4: continued...

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-botanical Importance	General Utilisation	Medicinal Use	IUCN STATUS
24.	Bhekhali, Bekhal	<i>Prinsepia utilis</i>	Rosaceae	Seeds, root	The stems are used to ward off evil powers from the house	Hollow branches used for making toys and flutes for children. Oil extracted from roots is massaged on rheumatic joints	Oil extracted from seeds consumed as tonic for curing arthritis. Root extract is used to cure dysentery.	Not extinct
25.	Gulab	<i>Rosa moschata</i>	Rosaceae	Flowers, Fruit	Flowers are used in flavouring.	Flowers used in confectionary for flavouring	Fruits edible and are used to kill worms.	Not extinct
26.	Majith	<i>Rubia cordifolia</i>	Rubiaceae	Stems and roots	Used to cure fevers.	Used as blood tonic.	The plant has antipyretic properties; used as tonic for curing kidney problems.	Not evaluated
27.	Bhootkesi	<i>Selinum vaginatum</i>	Apiaceae	Stems, roots	Local liquor is prepared by grounding roots with wheat flour and adding seeds to it.	Used to treat cough and as nerve tonic.	Roots and seeds are expectorant, sedative and analgesic	Threatened
28.	Janglee ajwain, Ban ajwain	<i>Thymus serpyllum</i>	Lamiaceae	Whole plant especially seeds	Used to relieve stomach ache by consuming it with "gudd".	Used to cure stomach ache and digestive problems.	Used as stomachic, laxative, anti-bacterial, anti-fungal for relieving toothache	Not evaluated
29.	Rakhal, Yew	<i>Taxus wallichiana</i>	Taxaceae	Bark, needles	Consumed as tea.	Fruits edible and extract from young shoots is used for relieving headache.	Taxol obtained from the needles is used for curing cancer. It is a laxative and cures headaches	Endangered
30.	Nag chhatri	<i>Trillidium govanianum</i>	Liliaceae	Roots	Used in curing inflammation in joints.	Corticosteroid hormone extract is used in	It is aphrodisiac	Endangered

Table 4: continued...

Sr. No.	Vernacular Name	Scientific Name	Family	Part Used	Ethno-botanical Importance	General Utilisation	Medicinal Use	IUCN STATUS
						preparation of sex hormones.		
31.	Musakbala	<i>Valeriana jatamansi</i>	Valerianaceae	Rhizomes and leaves	Decoction used as tonic to cure stomach ache.	Used as tonic for stomach ache. Used as incense in perfumery industry.	The plant has aphrodisiac, laxative, and antiseptic properties.	Endangered
32.	Banafasha	<i>Viola serpens</i>	Violaceae	Whole plant	Taken as tea as an expectorant in lung congestion.	Used as expectorant to relieve congestion. Useful in asthma, cough and fever.	The plant has expectorant, febrifuge antipyretic and diuretic properties.	Not evaluated
33.	Bannah	<i>Vitex negundo</i>	Verbenaceae	Whole plant	Used as insect repellent especially mosquitoes.	Used as expectorant and to cure asthma.	The plant is anodyne and febrifuge. Used as nerve tonic. The plant is used widely for its expectorant properties.	Not extinct

Table 5: Shrubs and herbs documented in the sacred groves

Sr. No.	Vernacular Name	Scientific Name	Family	General Utilisation
1.	Himalayan Butterfly bush	<i>Buddleja crispa</i>	Scrophulariaceae	Used as an ornamental flower
2.	Masuri berry	<i>Coriaria nepalensis</i>	Coriariaceae	Seeds edible and often cooked
3.	Himalyan hounds tongue	<i>Cynoglossum nervosum</i>	Boraginaceae	It is an invasive weed
4.	Bursha	<i>Daphne papyracea</i>	Thymelaceae	Used as stomachic
5.	Mooti	<i>Desmodium elegans</i>	Fabaceae	Its roots are used to relieve flatulence, and used as diuretic
6.	Wild Strawberry	<i>Fragaria vesca</i>	Rosaceae	Wild edible fruit
7.	Himalayan Crane's Bill	<i>Geranium himalayense</i>	Geraniaceae	Used as an ornamental flower
8.	Kathi	<i>Indigofera pulchella</i>	Fabaceae	Used as febrifuge and has anti-inflammatory properties
9.	Peeli Chameli	<i>Jasminum humile</i>	Oleaceae	Used to cure liver related issues, as an aphrodisiac
10.	Pirlu, Honeysuckle	<i>Lonicera angustifolia</i>	Caprifoliaceae	Used to relieve gastrointestinal problems
11.	Jhunjhru	<i>Myrsine africana</i>	Primulaceae	Decoction of roots is used for purifying blood
12.	Mehandi	<i>Lawsonia inermis</i>	Lythraceae	Used as dye for hair, skin and wool
13.	White dead-nettle	<i>Lamium album</i>	Lamiaceae	Leaves are edible and the flowers are a source of attraction for bees
14.	Lithospermum	<i>Lithospermum purpurocaeruleum</i>	Boraginaceae	Used to boost immunity in Chinese medicine, yields a purple dye
15.	Common self-heal	<i>Prunelaa vulgaris</i>	Lamiaceae	Used to treat sore throat
16.	Common purslane	<i>Portula oleracea</i>	Portulacaceae	Leaf juice is used for curing stomach ache
17.	Wild Isabgol	<i>Plantago major</i>	Plantaginaceae	Used as digestive and laxative
18.	Jangli Palak	<i>Rumex nepalensis</i>	Polygonaceae	The leaves are used to treat swelling in gums
19.	Thornless blackberry	<i>Rubus ulmifolius</i>	Rosaceae	Used as carminative and digestive, for treatment of ulcers
20.	Himalayan yellow buttercup	<i>Ranunculus trivedii</i>	Ranunculaceae	Used to cure skin infections
21.	Nair	<i>Skimmia laureola</i>	Rutaceae	Bark powder used for treatment of wounds
22.	Sweet Box	<i>Sarcococca saligna</i>	Buxaceae	Used as blood tonic and as laxative
23.	Dalhousie blue bell	<i>Strobilanthes pentstemonoides</i>	Acanthaceae	To control loose bowel movement
24.	Marigold	<i>Tagus minuta</i>	Asteraceae	The plant is used for treating skin infection and for gastritis
25.	Cranberry bush	<i>Viburnum grandiflorum</i>	Adoxaceae	Fruits are edible and have anti-oxidant properties

Table 6: Various Grasses documented in the sacred groves

Sr. No.	Vernacular Name	Scientific Name	Family	General Utilisation
1.	Bans, Hill bamboo	<i>Arundinaria saphthiflora</i>	Poaceae	Used for making hookah pipes, baskets and mats
2.	Musliya grass	<i>Andropogon ischaemum</i>	Poaceae	Used as fodder grass
3.	Carpet bent grass	<i>Agrostis stolonifera</i>	Poaceae	Used as fodder grass
4.	Slender false broom	<i>Brachypodium sylvaticum</i>	Poaceae	Used as fodder grass
5.	Scented grass	<i>Chrysopogon gryllis</i>	Poaceae	Grazed by cattle
6.	Dhruv grass , Jub	<i>Cynodon datylon</i>	Poaceae	Considered as sacred plant and used in almost every Hindu ritual
7.	Orchard grass	<i>Dactylis glomerata</i>	Poaceae	Used for hay
8.	Himalayan fairy grass	<i>Micanthus nepalensis</i>	Poaceae	Used as an ornamental plant
9.	Kush grass	<i>Saccharum rufipilus</i>	Poaceae	Used in some rituals at weddings in some places
10.	Himalayan Rush	<i>Juncus himalensis</i>	Juncaceae	Used as forage plant
11.	Nightshade	<i>Solanum ferox</i>	Solanaceae	Roots are stimulant, astringent, digestive and expectorant
12.	Munj grass	<i>Saccharum munja</i>	Poaceae	Used for making cordages and ropes.
13.	Sabai grass	<i>Eulaliopsis binata</i>	Poaceae	Sacred plant used in religious rituals and sacrifices.
14.	Poa grass	<i>Poa pertensis</i>	Poaceae	Used as forage plant.
15.	Thatch grass	<i>Saccharum spontaneum</i>	Poaceae	Used as forage plant, ornamental plant, also used in paper making and making handicrafts.

Table 7: Climbers documented in the sacred groves

Sr. No.	Vernacular Name	Scientific Name	Family	General Utilisation
1.	Lemon clematis	<i>Clematis buchaniana</i>	Ranunculaceae	Anti-inflammatory, used to treat peptic ulcers
2.	Amar bel , Akash bel	<i>Cuscuta reflexa</i>	Convolvulaceae	Has diuretic properties, acts as emollient and febrifuge
3.	Morning glory	<i>Ipomea purpurea</i>	Convolvulaceae	Seeds are laxative and used to relieve constipation
4.	Himalayan Ivy	<i>Hendra nepalensis</i>	Araliaceae	It has anti-fungal, anti-bacterial properties, used in treatment of diabetes

Table 8: Pteridophytes documented in the sacred groves

Sr. No.	Vernacular Name	Scientific Name	Family	General Utilisation
1.	Maiden hair	<i>Adiantum venustum</i>	Pteridaceae	Anti-inflammatory, antibacterial and used to cure cold
2.	Spleenwort fern	<i>Asplenium dalhousiae</i>	Aspleniaceae	Used to treat problems related to spleen
3.	Lip fern	<i>Cheilanthes dalhousiae</i>	Pteridaceae	Magico-religious value, used to keep away evil eyes
4.	Lingar	<i>Diplazium esculentum</i>	Dennstaedtiaceae	Edible fern, consumed as pickle and vegetable
5.	Wood fern	<i>Dryopteris nigropaleacea</i>	Dryopteridaceae	Used as an ornamental plant and for treatment of wounds
6.	Cretan brake fern	<i>Pteris cretica</i>	Pteridaceae	Used as an ornamental plant
7.	Eagle Fern	<i>Pteridium aquilinum</i>	Dennstaedtiaceae	Edible fern

Table 9: Fungi Species Recorded in the Sacred Groves

Sr. No.	Vernacular Name	Scientific Name	Family	General Utilisation
1.	Guchhi, Chunchru	<i>Morchella esculenta</i>	Morchellaceae	Edible mushrooms enjoyed in various delicacies. It is stomachic, laxative and purgative.
2.	Button mushroom	<i>Agaricus campestris</i>	Agaracaceae	Wild edible mushroom
3.	Caesar's mushroom	<i>Amanita caesarea</i>	Amanitaceae	Wild edible
4.	Chichi	<i>Sparassis crispa</i>	Sparassidaceae	Wild edible
5.	Green shield Lichen	<i>Flavoparmelia caperata</i>	Parmeliaceae	Lichens are present in areas that have clean air and are sensitive to air pollution

DIVERSITY OF TREES IN THE SACRED GROVES



Aesculus indica sapling



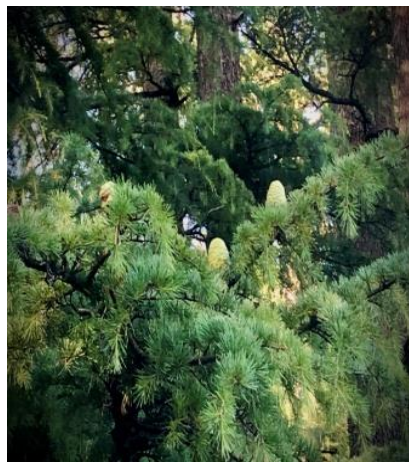
Aesculus indica tree



Cones of Kail



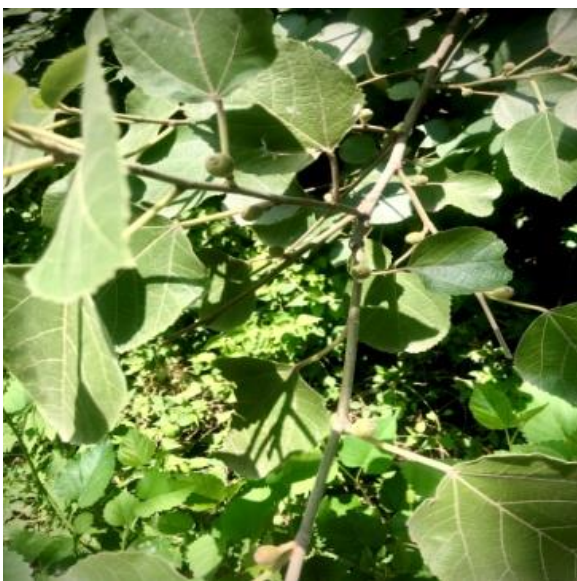
Pinus wallichiana



Female cones of Deodar situated at sub axial part of branch



Cedrus deodara



Ficus palmata



Corylus jacquemontii

DIVERSITY OF MEDICINAL HERBS AND SHURUBS IN THE SACRED GROVES



Podophyllum hexandrum



Angelica glauca



Berberis aristata



Murraya koenigii



Mentha arvensis



Picrorhiza kurroa



Digitalis lanata



Cannabis sativa



Bergenia ciliata

DIVERSITY OF PTERIDOPHYTES IN THE SACRED GROVES



Diplazium esculentum



Edible part of Lingar



Pteridium aquilinum



Pteris cretica



Athyrium filix



Hymenophyllum spp.



Dryopteris nigropaleacea



Adiantum venustum

Conflict of Interest

The author declares that there is no conflict of interest.

REFERENCES

- Agnihotri, P, Singh, H, Hussain, T and Patal T. (2012) Bhuvneshwar: A new sacred grove from Kumaon Himalaya. *Current Science*, 102(6):830-831.
- Bodh, M, Samant, SS, Tewari, LM and Kumar, OP (2018) Diversity and utilisation pattern of Economically important biodiversity of Great Himalayan National park of Himachal Pradesh, India. *Journal of Ethnobiology and Traditional Medicine*, 129:1459-1486.
- Burman, RJJ (1992) The Institution of sacred grove. *Journal of Indian Anthropological Society*, 27:219-238.
- Chandrakanth, MG and Romm, J (1991) Sacred forests, secular forest policies and peoples actions. *Natural Resources Journal*, 31: 16-16.
- Erman, A (1894). *Life in Ancient Egypt*. New York: Macmillan.
- Gadgil, M and Vartak, VD (1976) Sacred Groves in Western Ghats in India. *Economic Botany*, 30:152-60.
- Pandey, S and Wells, M (1997) Eco-development planning at India's Great Himalayan National Park for Biodiversity Conservation and Participatory Rural Development. *Biodiversity and Conservation*, 6 (9):1277-1292.
- Panwar, HS (1992) *Eco-development: An Integrated Approach to Sustainable Development for People and Protected Areas in India*, paper presented in the IVth World Congress on National Parks and Protected Areas. Caracas, Venezuela, 10-21 February 1992.
- Patnaik, S and Pandey, A (1998) A study of indigenous community based forest management system: Sarna (Sacred Grove) In *Conserving the Sacred for Biodiversity Management* (Eds. Ramakrishnan, P. S., Saxena, K. G. and Chandrashekara, U.M.) New Delhi: Oxford and IBH Publishing Co.
- Pisharoti, PM (2008) Livelihood Changes in Response to Restrictions on Resource Extraction from the Great Himalayan National Park. Centre for Wildlife Studies and National Centre for Biological Sciences, Manipal University (Unpublished).
- Ramakrishnan, P, Saxena, KG and Chandrashekara, UM (1998) Conserving the sacred for biodiversity management. Kerala: Forest Research Institute.
- Rodgers, WA and Panwar, HS (1988) *Planning a Wildlife Protected Area Network in India*. Vol. I & II. Field Document No. 7. Dehradun: Wildlife Institute of India.
- Saini, DC, Kulshreshtha, K, Kumar, S, Gond, DK, Mishra, GK (2011) Conserving Biodiversity Based on Cultural and Religious Values. National Conference on Forest Biodiversity: Earth's Living Treasure.
- Singh, SK and Rawat, GS (1999) Floral Diversity and Vegetation Structure in Great Himalayan National Park, Western Himalaya. Forest Research Education and Extension Project- Great Himalayan National park (FREEP-GHNP), Research Project. Dehradun: Wildlife Institute of India.
- Singh, S, Youssouf, M, Malik, Z and Bussmann, RW (2017) Sacred Groves: Myths, Beliefs, and Biodiversity Conservation: A Case Study from Western Himalaya, India. *Hindawi International Journal of Ecology*, 1-12.
- Spindel, C (1989) *In the Shadow of sacred grove*. New York: Vintage Books.
- Vasan, S and Kumar, S (2006) Situating Conserving Communities in their Place: Political Economy of Kullu Devban. *Conservation and Society*, 4(2):325-346.
- Verschuuren, B, Mcneely, J, Wild, R and Oviedo, G (2010) Sacred Natural Sites: Conserving Nature and Culture, Earthscan.