Ecological Questions 34 (2023) 3: 43–53 http://dx.doi.org/10.12775/EQ.2023.030

Sacred groves: the gene banks of threatened and ethnomedicinal flora, associated taboos and role in biodiversity conservation in the Peer Panchal range of North Western Himalayas, India

Mushtaq Ahmed, Vandana Sharma, Manjul Dhiman*

Plant Taxonomy and Conservation Laboratory, Department of Botany, KLDAV PG College Roorkee (HNB Garhwal University), Uttarakhand, India
*Corresponding author: competitivebotany@gmail.com

Received: 12 November 2022 / Accepted: 2 March 2023

Abstract. Sacred groves are the traditionally managed small or large patches of relict vegetation conserved on religious beliefs and representing the climax vegetation. These sacred patches have some set of traditional rules or protocols called taboos, which are key to the conservation of the sacred groves and the diversity within. Interestingly, every sacred grove has its legends, myths, taboos, and lores which are an integral part of the sacred groves. Sacred groves act as a gene bank for the threatened and endemic flora and fauna diversity, which are either diminishing from the open forest areas are somewhere some species get cleared however, these are still found in good numbers in the sacred groves. The sacred forests are the powerhouse of important ethnomedicinal flora, and several important medicinal plants are housed in these sacred patches. In the Peer Panchal region, these sacred patches play a pivotal role in the conservation of vegetation, however, in the present era of modernity and development, these sacred patches are facing high anthropogenic pressure due to the erosion of traditional knowledge and beliefs, leading to high rate of deteriorations of these life savior patches of forests. The present work reviews the sacred groves in the Peer Panchal region of Northwestern Himalayas, intending to highlight their role in maintaining a balance in our ecosystem and the need to recognize their values and the proper need for the conservation of these life-savior patches of forests.

Keywords: Sacred groves, North Western Himalayas, gene banks, conservation, medicinal plants, sacred plants, threatened and rare taxa.

1. Introduction

India consists of a population belonging to diverse religions, castes, tribes, clad, and creeds, and hence they have thousands of local folk deities associated with their traditional beliefs inhabited throughout the country. The indigenous groups coexists in the country from time immemorial, ultimately the deities and the place of residence with their associated biodiversity or water bodies were conserved there as such conditions with their traditional or religious beliefs having some set taboos and protocols. The taboos and set protocols lead the sacred groves to be conserved in their antique and relict form thus representing the climax vegetation. The history of sacred groves is

traced back to the time of the pre-agricultural hunting and gathering stage, before human settlement and the rising of livestock or tilling of land (Gadgil &Vartak, 1976, 1981a,b), hence the concept is pre-Vedic in origin. The essence of sacred groves was also observed in the Vedic period. The concept of sacred groves and new environment values were assimilated by Vedic people from the inhabitants of the Indian subcontinent and it became a widespread practice. In addition to considering complete landscapes as sacred micro units, individual species also began to be treated as sacred.

The objects of worship in traditional Hindu society were selected based on their specific use values and knowledge. Due to high proximity to the deities and their associated ethnobotanical values some species are regarded as sacred having high importance in religious ceremonies and as a part of socio-cultural traditions. Pipal (*Ficus populifolia* Vahl) earlier is one of the important species in this regard. In Upanishads and Bhagwat Gita, references have been made to pipal *Bhagawat Gita*10.26; 15.1, acc. to Ramakrishnan (1998). The concept of sacred groves is found in Islam too, since the time of Prophet Mohamad. The sacred groves are called Hima in Islam. Hima is the unused areas protected by the government or the ruler. Development and building something on such sites is prohibited. The Hima can be still seen in the practice in certain Muslim countries like Saudi Arabia, and this concept of conservation is still practiced by the respective governments for the protection of wildlife. The practice of Hima is somehow still carried on by some tribes' likely Bedouin tribes as a custom inherited from their ancestors (Wahbah, 1985). Likewise, in the other regions of the country, the Peer Panchal region is also blessed with several such pockets of biodiversity or the powerhouse of the biodiversity belonging to different local folk deities and ancestral spirits associated with different clad of the indigenous communities. In the rural areas as well as urban areas number of sacred groves are present, however, still, most of them are not explored properly yet, mostly in the rural areas. Every village of the inhabited areas in the Peer Panchal range has one or more sacred groves varying in size from a cluster of few trees to the area of acres of forest land dedicated to different local folk deities and spirits. Most sacred groves in this region are associated with Hinduism or Islam managed either by the governmental or non-governmental organizations or inhabitants surrounding the sacred grove, or somewhere tribal peoples (nomads).

2. Literature Review

2.1. Taboos, myths and their role in conservation of sacred groves

Taboos and traditional beliefs are the backbones of the conservation of sacred groves and the biodiversity associated with the sacred sites. The deterioration of these set of rules and beliefs called taboos leads to the destruction of sacred groves (Vartak & Gadgil, 1981; Tiwari et al., 1998, 1999). All the sacred groves belonging to any religion or caste it has their unwritten traditional quotes or protocols which transmits from generation to generation through the transfer of traditional knowledge from older to younger generations which are followed by all the peoples or inhabitants of that area surrounding the sacred groves. These traditional beliefs and protocols are the rules to conserve biodiversity and the socio-cultural values of the sacred groves. It has been observed that these traditional/religious beliefs and taboos that are the basic rules for the conservation of sacred groves are being eroded with passing time due to different reasons like modernization and erosion of traditional beliefs, overexploitation of biodiversity, urbanization, developmental activities, consequently the status of sacred groves in the present time is more precarious (Fig. 1). The anthropogenic disturbances are the chief and only major reason of loss of biodiversity in the sacred groves and outside of sacred groves too. The status of some of the sacred groves from the Himalayan region indicated that the traditional communities discarded the community-oriented protection of these groves and they are now being exploited (Saxena & Singh, 1998). One of the important sacred groves in the Darhal tehsil of Rajouri district at Topa has tall giant *Quercus* trees conserved from the time when the ancestral spirit of that sacred groves was live and still the trees are protected in their natural form. On interacting with the informant of that area a person dictated some myths and taboos associated with the sacred groves based on which no one can even break a single branch of this forest if anyone does so by even a mistake a hailstorm or thunderstorm rise in the whole area which destroys the crops, animals and another livelihood of the inhabitants of that area. So it was indicated that the taboos and myths associated with the sacred groves are the only reason that no one dares to disturb the vegetation of the sacred groves. However, still, some anthropogenic disturbances like the construction of religious buildings inside the sacred groves and the creation of multiple footpaths destroyed the seedlings of the tree species or the lower story vegetation like herbs and shrubs. In a similar study of the sacred grove of Hasab Chambitrar Rahwali indicated that if someone deliberately or by mistake breaks a single branch from the sacred trees of the grove, this leads to the rise of terrific thunderstorms in the area which destroys the crops and affects the overall livelihood of the inhabitants.

2.2. Biodiversity conservation via sacred groves

Biodiversity is the total of life forms at all levels of organization in the biological system from where we directly or indirectly draw ecological, economic, and aesthetic benefits. As more and more natural vegetation is lost in the inhabited areas, the remaining patches of forests in the form of sacred groves come to acquire a crucial role in buffering biodiversity. Thus, sacred groves acquire importance from the point of view of ecology and conservation of biological diversity. The most tangible evidence of the deterioration of biodiversity

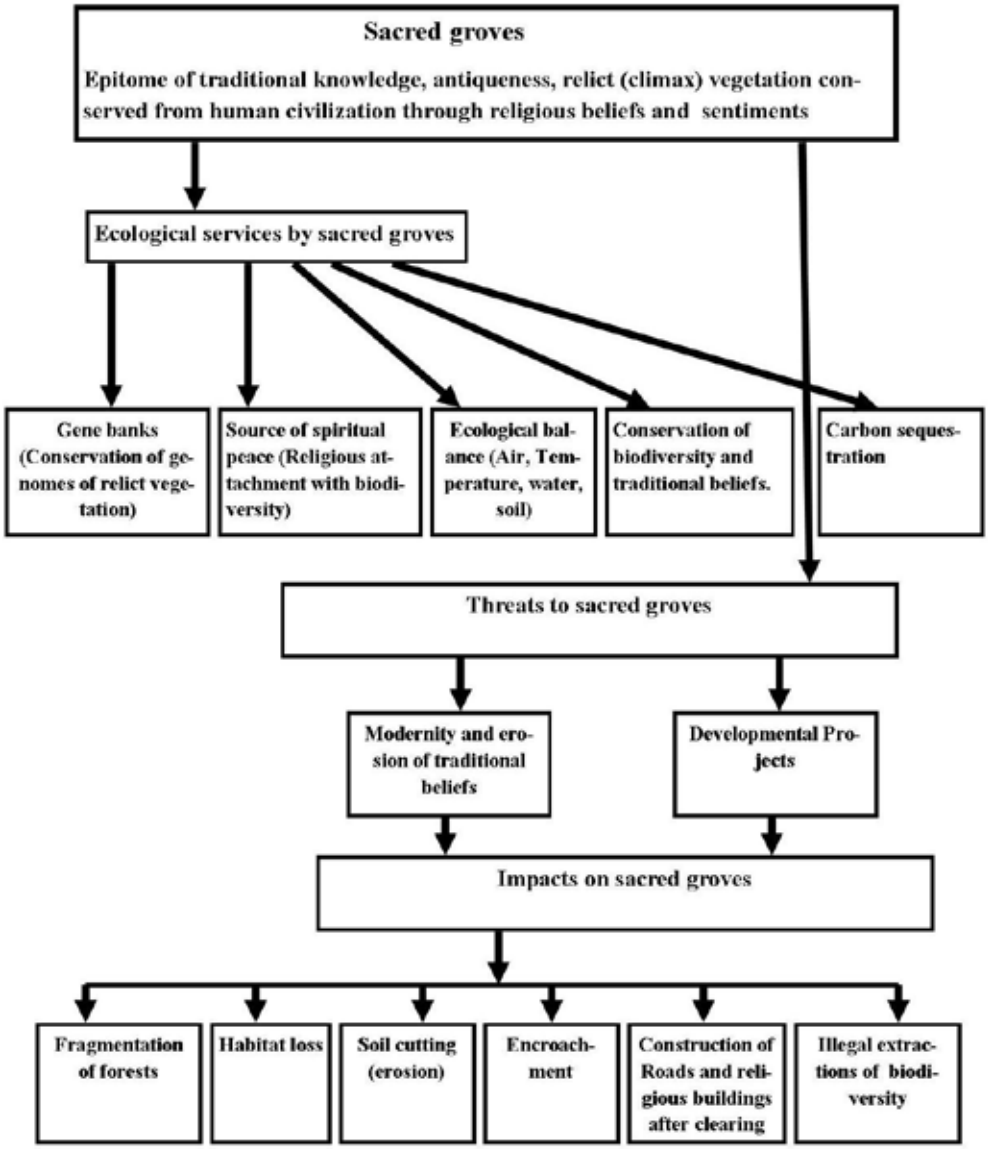

Figure 1. The graphical representation of sacred groves, associated services, taboos, myths and threats to the sacred groves

is seen in tropical vegetation. The forests are disappearing at a fast pace threatening the existence of a major portion of global biodiversity and therefore challenging the very process of organic evolution. The genes are the product of millions of years of evolution. It is of immense importance to look for existing remnants of climax communities for the sustenance of genetic diversity. Despite the widespread destruction of forests, there are still left aside certain natural landscapes in various countries which are culturally protected as sites of worship by local people. What remains after destruction, offers a refuge for species. Such refugia, even though fragmented, may be maintaining the minimum viable population of some species and are therefore capable of maintaining biodiversity. The sacred groves are highly pivotal in the conservation of biological diversity and are well recognized Gadgil and Vartak (1975, 1976) found a grove in the Koloba district of Maharashtra harboring a solitary specimen of the liana *Entadaphas eoloides* (L.) Merr. A new species of leguminous climber *Kunstleria keralensis* C.N. Mohanan & N.C. Noir, has been reported from one of the sacred groves of Kerala (Gadgil & Chandran, 1992). They observed that *Gurjan* tree (*Dipterocarpus indicus* Bedd.) has its northern limit in the Western Ghats in a couple of sacred groves of Uttara Kannada. In the Peer Panchal range number of tree species like *Quercus leucotrichophora* A.Camus ex Bahadur (=*Q. oblongata* D.Don), *Pyruspashia* Buch.-Ham. ex D.Don, *Aesculus indica* (Wall. ex Cambes.) Hook., *Pinus roxburghii* Sarg., etc. are the keystone species in different

sacred groves and provide a niche for the number of flora and fauna diversity. *Ficus benghalensis* L. in sacred groves at Suriampettai plays the role of a keystone species (Oliver King et al., 1997). Chandrashekara and Sankar (1998) recorded 73 species in three sacred groves of Kerala, and among them, 13 are endemic to the south Western Ghats, 3 are endemic to the Western Ghats and 1 is endemic to peninsular India. Khan et al. (1997) reported that about 4% of the total plant species found in Meghalaya are confined to sacred groves. Gadgil and Chandran (1992) have also noticed a small population of endangered primates, and lion tailed macaques in and around Katlekan sacred grove of Uttara Kannada. The sacred groves are the powerhouse of biodiversity, housing all forms of life in almost all parts of the Peer Panchal range and providing refuge to rare and threatened taxa from the animal, plant, and microorganism kingdoms.

3. Material and Methods

3.1. Study area

Peer Panchal region is part of the lesser Himalayas situated in the extreme northwestern region of the Indian Himalayan Region (IHR) in Jammu and Kashmir (J&K). The J&K is known as the land of mountain ranges starting from the south side with Shiwaliks followed by the Peer Panchal range of Lesser Himalayas, then the Greater Himalayas, the Zanskar range, and in the north the Karakorum range. The Peer Panchal range which separates the subtropical Jammu from the temperate Kashmir valley consists of rich biodiversity with different habitats and hence the variety of life. This region is also rich in spirituality and sacredness with numerous small and large patches of sacred forests distributed throughout the range. The twin districts of the Peer Panchal range fall under Jammu province along with the Kashmir valley and consist of indigenous peoples belonging to different religions hence sacred groves of different religions and creeds are found in this range. Even in the uninhabited areas in the alpine range, few sacred groves are found of the ancestor spirits considered sacred by almost all the peoples of different religions (Fig. 2).

3.2. Methodology

The study was carried out aiming at the sacred groves, their status, myths, taboos, role in biodiversity conservation, the threatened flora inside the sacred groves, and the ethnomedicinal traditional knowledge of the tribal and indigenous peoples residing surrounding the sacred groves. The study was conducted with regular field surveys for over 4 consecutive years involving the indigenous experienced

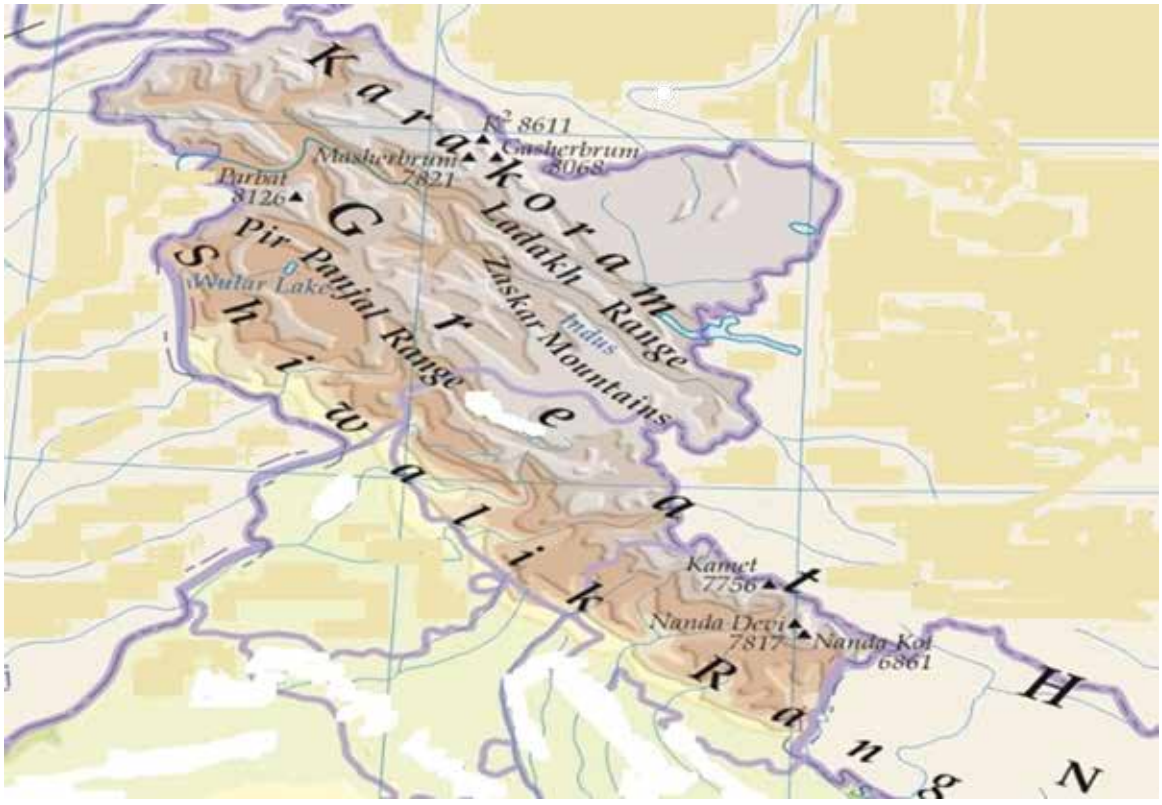

Figure 2. The study area (Peer Panchal) region of Lesser Himalayas

peoples as informants and the information was gathered using semi-structured questionnaires and interviews. The present study on the sacred groves, status involves a collection of 14 species belonging to 11 genera and under 11 families as sacred plants considered sacred in different sacred groves and also used in different religious rituals. While the data about the ethnomedicinal usages of the plants from different sacred groves consists of therapeutic application of 47 plant species representing about a similar number of genera and 42 families. The nomadic tribe of Gujjar and Bakerwal were analyzed as the backbone of traditional knowledge and they uses those ethnomedicinal plants practically till date in their lives for getting rid of different ailments in the uninhabited hills of the Himalayas where life is next to impossible. The identification of the plant species and their nomenclature has been analyzed with the help of online available resources like world online flora (http://www.worldfloraonline.org). The questionnaire studies regarding all the important details about the traditional beliefs for sacred groves and ethnomedicinal usages of the plants were gathered from the experienced peoples of this community.

4. Results and Discussion

The ethnomedicinal usages of the plants from different sacred groves consists of therapeutic application of 47 plant species representing about a similar number of genera and 42 families. A total of 18 species of herbs are used by the local people to cure various ailments (56.25%) followed by shrubs with 13 species (25%), climbers with 3 species (9.37%), and trees with 5 species (9.37%). Family Asteraceae is dominant over the others with 6 species followed by Rosaceae with 3 species, Amaranthaceae, Malvaceae, Cleomaceae, and Menispermaceae with 2 species while many other families contribute one species. The majority of preparations are taken orally or locally applied in the form of fresh juice or kadhai extracted from freshly collected plant parts in the wild. The third important aspect studied during this study was the threatened and rare species conserved in the sacred groves involves a collection of a total of 19 plant species belonging to different families that have been recorded from the sacred groves and are listed as threatened, vulnerable, or rare in Table 3. The population of some threatened taxa is declined in areas other than the sacred groves or somewhere a few species are disappeared while these are still found in the sacred groves, and these sacred patches are acting as gene banks to store the genome of these rare and threatened taxa. Other important details regarding the role of taboos and myths in the conservation of biodiversity and anthropogenic disturbances are also discussed in detail in their respective subheadings.

4.1. Sacred plants of the studied area

From the pre-historic time, plants and animals are the part of our life. Some plant species are grown in sacred places because people think that ancestors and deities live in these plant species and they protect their life. Plants are the oldest creation of God on earth and their conscious about them is as the human civilization. Plant worship and the use of plants in worshiping God is one of the earliest and most religious aspects in India. In the scriptures, there are plants like *Kalpavrisksha, Chaitya vrisksha*, Peepal, Banana, Tulsi, etc., indicating that worship of the plants is an ancient Indian tradition. These plants are often grown along and within the temples and can be considered **"sacred plants"**. Various religious ceremonies are based on these trees or plants. In India, there are many festivals, which are based on local flora. The sacred plants play a vital role in the maintaining of the sacred groves and their biodiversity, as some species are also the keystone species for these sacred groves. there are about 14 plant species of the sacred plants documented from different sacred groves of the studied area (Table 1).

Table 1. Sacred plants of the studied area

S.No.	Plant name	Vernacular name	Family	Habit
1	*Ficus religiosa* L.	Peepal	Moraceae	Tree
2	*Ficus benghalensis* L.	Bargad	Moraceae	Tree
3	*Mangifera indica* L.	Aam	Anacardiaceae	Tree
4	*Aegle marmelos* (L.) Corrêa	Bael	Rutaceae	Tree
5	*Phyllanthus emblica* L.	Amla	Phyllanthaceae	Tree
6	*Aesculus indica* L. (Wall. ex Cambess.) Hook.	Khori	Juglandaceae	Tree
7	*Celtis australis* L.	Khirak	Cannabaceae	Tree
8	*Rhododendron arboretum* Sm.	Harduli	Ericaceae	Shrub
9	*Bombax ceiba* Burm. f.	Simbal	Malvaceae	Tree
10	*Ocimum tenuiflorum* L.	Tulsi	Lamiaceae	Herb
11	*Ocimum basilicum* L.	Baburi	Lamiaceae	Herb
12	*Quercusleuco trichophora* A.Camus	Ree	Fagaceae	Tree
13	*Bauhinia variegata* L.	Kalyari	Fabaceae	Tree
14	*Azadirachta indica* A.Juss.	Neem	Meliaceae	Tree

4.2. Sacred groves as the repository of ethnomedicinal plants

Traditional medicine or ethnomedicine, a set of empirical practices, found in social groups is transmitted orally from generation to generation to cure the health ailment. There

are strongly related to religious beliefs and indigenous culture. Traditional medicinal knowledge of indigenous people has a fundamental importance in the management of local resources, in the husbandry of regional biodiversity, and in providing locally valid models for sustainable living. The ethnic people have an emotional and symbiotic relationship with the biodiversity of which they are protectors and conservators either based on religious beliefs or social and cultural taboos. Today, when there is an enormous loss in the world's biodiversity due to overexploitation for economic purposes, urbanization, population growth, and changes in climatic conditions, sacred groves are acting as gene sanctuaries for several RET and ethnomedicinal plant species. The sacred groves in the hilly areas of the Peer Panchal range are full of highly important medicinal vegetation with highly effective traditional usages of ethnomedicinal plants for different ailments, the list of the ethnomedicinal plants are presented in the Table 2.The tribal peoples (Gujjar and Bakerwals) live a nomadic lifestyle and they have great traditional knowledge they are the actual source of traditional knowledge of ethnomedicinal usages of the plants in this range of Himalayas. However, traditional knowledge is declining in younger generations due to changes in life style and anticipations towards modernity leading to the erosion of traditional knowledge. There is a dire need to document properly the antique traditional knowledge before it gets diminished already a lot of concepts are in illusion now, informants dictate that our parents used this but we forget how properly they were using it, and this is becoming a common sentence in most of the middle-aged and young peoples.

Table 2. The ethnomedicinal uses of the plant species

S.No.	Plant Name	Verna-cular name	Family	Ethno medicinal use
1	*Abrus precatorius* L.	Ratti	Fabaceae	Seeds are given to dogs affected from a disease in which salivery glands discharge extra saliva locally called „Zahrwad".
2	*Achyranthes aspera* L.	Puthkanda	Amarantha-ceae	Plant is used to cure cough and blood purifier.
3	*Achillea millefolium* L.	Madra	Asteraceae	The decoction of whole plant is used in cold, cough, and fever. Leaves are chewed to treat toothache and gum pain.
4	*Amaranthus blitum* L.	Ganhari	Amarantha-ceae	It is used by the patients of diabetes and considered helpful in this fast growing disease.
5	*Asparagus racemosus* Willd.		Asparaga-ceae	Macerated roots are taken on weakness and internal fever.
6	*Bauhinia variegata* L.	Kalyari	Caesalpini-aceae	Tea prepared from the fresh barks is taken on nausea, headache and mild fever.
7	*Bergenia ciliate* (Haw.) Sternb.	Badmavo	Saxifraga-ceae	Almost whole plant is used to cure stomach ulcers and intestinal issues. Besides this plant are also useful in treating fever.
8	*Berberis lycium* Royle.	Simblu	Berberida-ceae	Root barks are crushed into powder or decoction of barks is used to cure fever, jaundice and liver complications.
9	*Bistorta amplexicaulis* (D.Don) Greene	Masloon	Polygona-ceae	Root together with seeds are crushed and made into paste and this paste is applied externally in body ache and joint pain. The crushed root alone is used for pneumonia and gently warmed seed oil is massaged in stomach pain. The paste of root is applied on swollen veins
10	*Cassia fistula* L.	Karangal	Fabaceae	Dried pod is boiled in water for an hour or more to get its juice, which is used as gargles to cure aching gums and teeth to treat toothache and related problems.
11	*Centella asiatica* (L.) Urb	Bramhi	Apiaceae	Leaves are chewed to treat mouth ulcers.
12	*Cissampelos parierra* L.	Batbael	Menisper-maceae	Juice of climber is obtained and taken on a belly pain mostly in Childs. Complication is called „Phali" in local language.
13	*Cynodon dactylon* (L.) Pers.	Khabal	Poaceae	Leaf paste is commonly used externally in headache, rheumatism, neuralgia and to enhance blood circulation. Paste obtained from plant is applied on fractured bone for fast recovery.
14	*Datura stramonium* L.	Tatura	Solanaceae	Leaves are crushed to prepare a solutice which is taken to cure urinary infections.
15	*Euphorbia hirta* L.	Dhodal	Euphorbia-ceae	Latex is applied on skin infections like ringworm.
16	*Ficus carica* L.	Anjeer	Moraceae	Fruits are edible taken to cure intestinal problems like fissures and ulcers. Latex is useful in skin disorders.

S.No.	Plant Name	Verna-cular name	Family	Ethno medicinal use
17	*Gonostegia hirta* Miq.	Jhirbali	Urticaceae	Leaves are crushed to make a paste that is applied on a disease locally called Ilat by tribal peoples (pus formation in finger tips leads to spoilage of nail and meat).
18	*Hedychium spicatum* Buch.-Ham. ex Sm.	Ban haldi	Zingibera-ceae	Rhizome is used as spice for the treatment of respiratory troubles. Decoction of the leaves is useful in joint pain.
19	*Gerbera gossypiana* (Royle) Beauv.	Karangal	Asteraceae	Root is medicine for blood pressure and gastric troubles.
20	*Gloriosa superb* L.	Aghnibhuti	Colchicaceae	Juice is applied on wound and infections.
21	*Justicia adhatoda* L.	Baykad	Acanthaceae	Leaves and flowers are beneficial in respiratory troubles.
22	*Melia azedarach* L.	Dharaink	Meliaceae	Leaves are macerated to get juice and taken empty stomach to boost immunity.
23	*Mentha spicata* L.	Pudina	Lamiaceae	Leaves are used to treat nausea cooling and mild fever.
24	*Moringa oleifera* Lam.	-	Moringaceae	This plant is a pack of important ingredients vitamins and minerals. Powdered leaves are taken to boost immunity and to cure fever.
25	*Myrsine africana* L.	Googl	Primulaceae	Leaves are considered to be blood purifier and taken on empty stomach.
26	*Nasturtium officinale* R.Br.	Chuu	Brassicaceae	Plant is cooked as vegetable and taken as a medicine for fever cold and cough.
27	*Ocimum tenuiflorum* L.	Tulsi	Lamiaceae	The plant is sacred and used as medicinal against fever cold and cough etc. also drinked in tea for increasing immunity.
28	*Oxalis corniculata* L.	Khati	Oxalidaceae	Plant extract is applied on eye infection, and to get relief from headache.
29	*Plantago lanceolata* L.	Chamchepa-ter	Plantagina-ceae	Leaves are cooked as vegetable and used to cure fever.
30	*Prinsepia utilis* Royle	Phulwara	Rosaceae	Leaves are powdered and taken to cure fever.
31	*Prunus cerasoides* D.Don	Banaro	Rosaceae	2.5 ml of juice of barks is taken on empty stomach to cure boils and abscesses.
32	*Phyllanthus emblica* L.	Masloon	Phyllantha-ceae	Fruits are a rich source of vitamin C, and are taken to cure digestion and intestinal complications.
33	*Rumex dentatus* L.	Hula	Polygona-ceae	Leaves are cooked as vegetable and roots is crushed and applied on swelling and skin troubles.
34	*Reinwardtia indica* L.	Linaceae	Valeriana-ceae	Leaves are crushed to make a paste which is applied on boils and abscesses.
35	*Sarcococca saligna* Müll.Arg	Rainthali	Buxaceae	Juice of leaves is useful in treating skin infections.
36	*Rosa sempervirens*L.	*Phulwari*	Rosaceae	Flowers are grinded to juice and given to the patient of fever and cough.
37	*Senecio nudicaulis* Buch.-Ham.	Lal bhuti	Asteraceae	Leaves are soaked in water overnight and juice obtained by grinding these leaves is taken to cure fever and to boost immunity.
38	*Skimmia laureola* (DC) Decne.	Patla	Rutaceae	Dried leaves are given to the patient of colic pain.
39	*Solanum nigrum* L.	Makoi	Solanaceae	Fruits are edible and given in diarrhea and fever. Leaf is given in dysentery, eye complications, inflammation of scrotum, testicles, kidney, bladder, piles and the paste of whole plant is useful in jaundice.
40	*Sonchus arvensis* L.	Hand	Asteraceae	Whole plant is used in cholera, dysentry and jaundice.
41	*Taraxacum officinale* F.H.Wigg.	Phulwari	Asteraceae	Powder of root and leaves dried in shade is given 2.5 to 5g. twice a day for 30-45 days to cure migraine, cardiac and abdominal complaints, Jaundice and as blood purifier. Paste of root and leaves is applied externally on wounds twice a day for a week as an antiseptic.
42	*Urtica dioica* L.	Kinji	Urticaceae	Leaves are cooked as vegetable to get rid of stomach problems.
43	*Valeriana jatamansi* Jones	Balo	Valeriana-ceae	Powdered root dried in shade and given approximately ½ teaspoonful twice a day, in morning and at night for 2-3 months in the treatment of hysteria and urinary disorders. The plant is used in various rituals and religious ceremonies.
44	*Viburnum grandiflo-rum* Wall. ex DC.		Viburnaceae	Leaves are chewed to treat mouth ulcers.
45	*Viola odorta*L.	Banksha	Violaceae	Plant is grinded to get juice and taken on throat and respiratory problems.
46	*Vitis heyneana* Roem & Schult.	Dakh	Vitaceae	Fruits are edible and unripe fruits are used to cure throat infections.
47	*Zanthoxylum arma-tum* DC.	Timru	Rutaceae	Stem is used as brush to get relief from toothache, besides this tea prepared is useful in fever. It is quite useful as antibiotic.

3.3. Sacred grove as the gene bank of the threatened flora

In last few decades, many plant species have become threatened due to various anthropogenic pressures and their high demand in Pharmaceutical market. These plants are used in various forms and are utilized by both native and non natives of the area for their benefits. Anthropogenic disturbances are the main threat in the said region responsible for degradation of the biodiversity. According to range of distribution and size of population of plants, they are categories under different names i.e., rare, endangered, vulnerable, low risk, least concern. Many threatened, endangered and rare species find safe refuge in the sacred groves. The lists of rare and threatened taxa are shown in the Table 3. The groves also house many species that are not found elsewhere in the region. Several RET plant species such as *Aquilegia nivalis*, *Taxus baccata*, *Swertia alata*, *Daphne papyracea*, *Cornus oblonga*, *Goodyera repens* and *Valeriana jatamansi* in Dana Hasab sacred grove (2185 m) having the highest number 7 species of RET status werer recorded. Similarly second highest 6 species, *Paris polyphylla*, *Bergenia ciliata*, *Hedychium spicatum*, *Acer caesium*,*Valeriana jatamansi* were found in Matha Tika Rati Baas sacred grove (1923 m), have been documented form these studied traditional conserved pockets. According to IUCN status *Taxus baccata*, *Paris polyphylla*, *Habenaria intermedia*, *Coriaria nepalensis*, *Polygonatum verticillatum*, *Daphne papyracea* and *Valeriana jatamansi* are endangered species while *Acer caesium*, *Bergenia ciliata*, *Goodyera repens*, *Hedychium spicatum*, *Gloriosa superba*, *Cornus oblonga*, *Hypericum perforatum*,*Valeriana jatamansi* and *Zanthoxylum armatum* etc. are vulnerable species and *Daphne papyracea*, *Parietaria judaica* and *Swertia alata* are rare species (Pant & Pant, 2011; Rao et al., 2003; Kumari et al., 2012, Hamid et al., 2019). Sacred groves are treasure house of rare and endemic flora (Gadgi & Vartak, 1975). The present study showed a total of 19 plant species belonging to different families have been recorded from the sacred groves are listed as threatened, vulnerable or rare in Table 3. The population of some threatened taxa is declined in the areas other than the sacred groves or somewhere few species are disappeared while these are still found in the sacred groves, and these sacred patches are acting as gene banks to store the genome of these rare and threatened taxa.

4. Conclusions

The sacred groves are the powerhouse of biodiversity which provide refuge to floristic, faunal, and microbial diversity conserved on traditional beliefs and sentiments from time

Table 3. List of threatened and rare taxa found in the sacred groves

S.No.	Plant species	Family	Vernacular Name	Status	Sacred grove
1	*Acer caesium* Wall. ex Brandis	Aceraceae	_	V	MathatikaRatibaas
2	*Aquilegia nivalis* (Brühl.) Falc. ex Munz	Ranunculaceae	_	E	Madoon Dana Hasab
3.	*Bergenia ciliate* (Royle) A. Braun ex Engl.	Saxifragaceae	Badmaevo	V	MathatikaRatibaas
4	*Coriaria nepalensis* Wall.	Coriariaceae	_	E	Mata ManglaDevi
5	*Cornus oblonga* Wall.	Cornaceae	_	V	Madoon Dana Hasab
6	*Daphne papyracea* Wall. ex G.Don	Thymelaeaceae	_	R	Madoon Dana Hasab
7.	*Dioscorea deltoidea* Wall.	Dioscoraceae	Suramgando	E	KulDevtatempleKhambi
8	*Goodyera repens* (L.) R.Br. in W.T.Aiton	Orchidaceae	_	V	Madoon Dana Hasab
9.	*Gloriosa superba* L.	Colchicaceae	Ang jadi	V	KulDevtaSialsui
10	*Habenaria intermedia* D.Don	Orchidaceae		E	PeerMasoomShahBarsala
11	*Hedychium spicatum* Buch.-Ham. ex Sm.	Zingiberaceae	Ban Haldi	V	MathatikaRatibaas
12	*Hypericum perforatum* L.	Hypericaceae	Chi	V	Madoon Dana Hasab
13	*Paris polyphylla* Sm.	Melanthiaceae	Mithi-bach	E	MathatikaRatibaas
14	*Parietaria judaica* L.	Urticaceae	_	R	KulDevtaSialsui
15	*Polygonatum verticillatum* (L.) All.	Asparagaceae	_	E	MathatikaRatibaas
16	*Swertia alata* Royle ex D.Don	Gentianaceae	_	R	Madoon Dana Hasab
17.	*Taxus baccata* L.	Taxaceae	Thuner	E	Madoon Dana Hasab
18.	*Valeriana jatamansi* D.Don.	Valerianaceae	Balo	V	MathatikaRatibaas
19.	*Zanthoxylum armatum* DC	Rutaceae	Timur	V	AsthanKotedhera

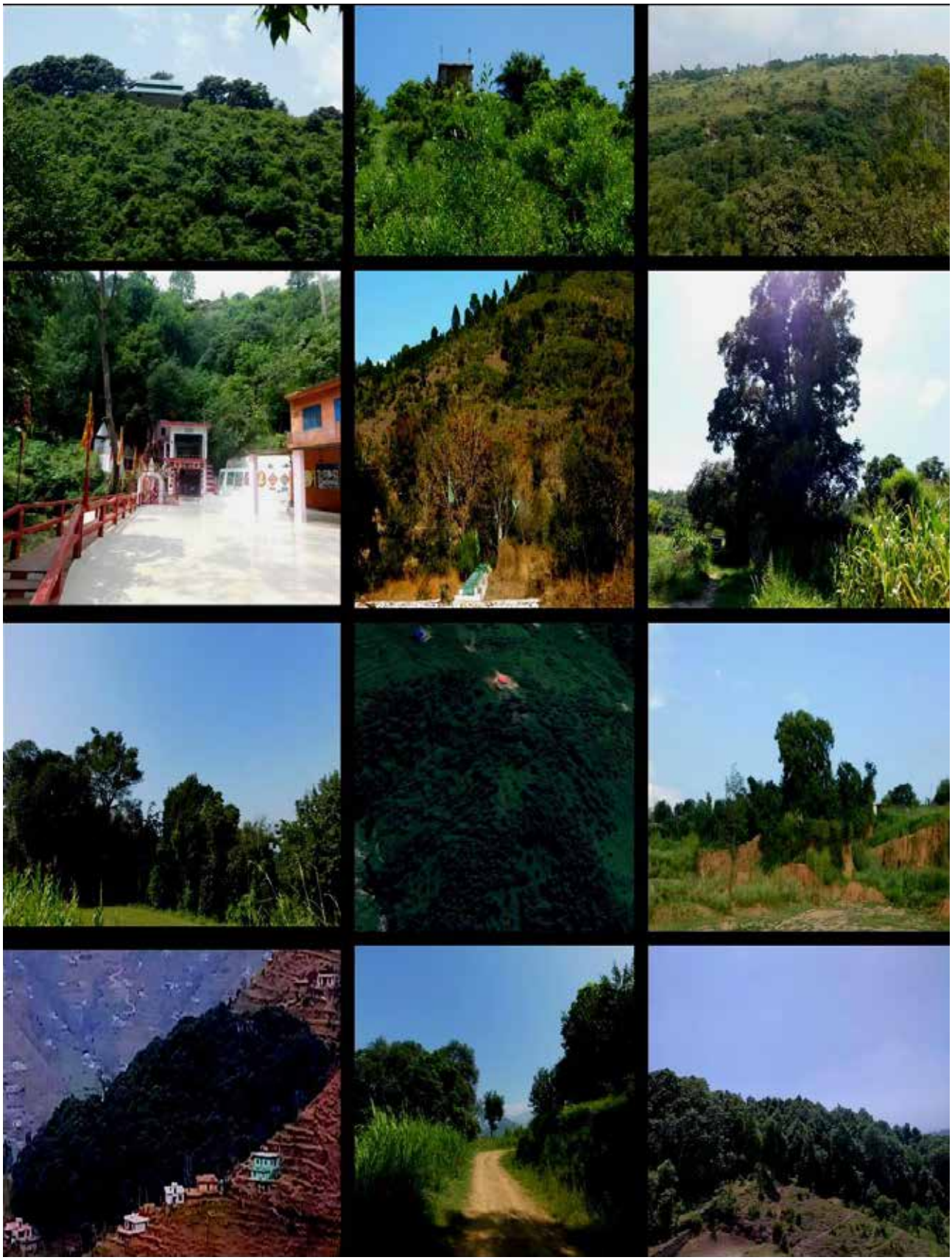

Figure 3. Pictures of some sacred groves from the Peer Panchal region, of Jammu and Kashmir (photo by Mushtaq Ahmed)

immemorial in their natural form. It was analyzed in the Peer Panchal region that several threatened and rare flora which is cleared from open forests are still found in good number in these sacred patches. The sacred groves are the primitive but most effective method of conservation of biodiversity, traditional beliefs, and socio-cultural practices, however, in the present scenarios; these pockets of biodiversity are in danger due to overexploitation of resources, erosion of traditional beliefs, and rise in developmental activities without implementing the EIA before setting any project. It is highly recommended to document the traditional knowledge followed by the spread of awareness among younger generations. The construction of new religious buildings should be constructed at some distance from the sacred groves or somehow should be built without clearing the vegetation. Implementation of EIA before setting up any project can minimize biodiversity loss, habitat loss, and fragmentation of habitat was one of the serious issues in the region of Peer Panchal. In concluding remarks the sacred groves are the life savior patches of forests that maintain ecological balance, provide fresh air, water, and soil, help in carbon sequestration, and maintain a balanced temperature which helps the living world to survive a healthy life, so there is dire need to conserve the sacred groves for a better tomorrow for all form of lives on the planet.

Acknowledgements

The first author (MA) is grateful to the Ministry of Tribal Affairs for the financial support in the form of NFST fellowship for carrying out the research work.

References

Chandrashekara U.M. & Sankar S., 1998, Structure and functions of sacred groves: Case studies in Kerala, p. 323–335, [in:]P.S.Ramakrishnan, K.G. Saxena, U.M. Chandrashekara (eds.), Conserving the Sacred for Biodiversity Management. UNESCO and Oxford-IBChandran M.D.S., 1992, Sacred groves,p. 183–187, [in:] G.Sen (ed.), Indigenous Vision. Sage Publications (India) and International Centre, New Delhi.

Gadgil M. &Vartak V.D., 1975, Sacred groves of India: A plea for continued conservation. J. Bom. Nat. Hist. Soc. 72: 314–320.

Gadgil M. & Vartak V.D., 1976, Sacred groves of Western Ghats of India. Ecological Botany 30: 152–160.

Gadgil M. &Vartak V.D., 1981a, Studies on sacred groves along the Western Ghats from Maharashtra and Goa: Role of beliefs and folklores,p. 272–278, [in:] S.K. Jain (ed.), Glimpses of Indian Ethnobotany. Oxford University Press, Bombay, India.

Gadgil M. &Vartak V.D., 1981b, Sacred Groves of Maharashtra: An inventory, p. 279–294, [in:] S.K. Jain (ed.) Glimpses of Indian Ethnobotany. Oxford University Press, Bombay.

Hamid M., Khuroo A.A., Ahmad R., Rasheed S., Malik A.H. & Dar G.H., 2019, Threatened Flora of Jammu and Kashmir, [in:] G.H. Dar, A.A. Khuroo (eds.), Topics in Biodiversity Conservation. Biodiversity of the Himalaya: Jammu and Kashmir. Vol. 18, Springer, p. 957–995.

Khan L.M., Menon S. & Bawa K.S., 1997, Effectiveness of the protected area network in biodiversity conservation: A case–study of Meghalaya state. Biodiver. Conser. 6: 853–868.

Kumari P., Joshi G.C. & Tewari L.M., 2012, Biodiversity status, distribution and use pattern of some ethnomedicinal plants. Int. J. Conser. Sci. 3: 309–318.

Oliver King I.E.D., Viji C. &NarasimhanD., 1997, Sacred groves: Traditional ecological heritage. International Jounal of Ecology and Environmental Sciences 23: 463– 470.

Pant S. & Pant V.S., 2011, Status and conservation management strategies for threatened plants of Jammu and Kashmir. J. Phytology 3: 50–56.

POWO, 2022, Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. http://www.plantsoftheworldonline.org/ [Accessed on 03.11.2022].

Ramakrishnan P.S., Saxena K.G. & Chandrasekhara U.M. (eds.), 1998, Conserving the Sacred for Biodiversity Management. Oxford-IBH Publishing Co. Pvt. Ltd., New Delhi, India, 480 pp.

Rao C.K., Geetha B.L. & Suresh G., 2003, Red List of Threatened Vascular Plant Species in India. BSI, Calcutta, 144 pp.

Saxena K.G., Rao K.S.G. & Maikhuri R.K., 1998, Religious and cultural perspective of biodiversity conservation in India: A review, p. 153–161, [in:] P.S. Ramakrishnan, K.G. Saxena, U.M. Chandrasekhara (eds.), Conserving the Sacred for Biodiversity Management. UNESCO and Oxford-IBH Publishing, New Delhi, India.

Singh G.S. & Saxena K.G., 1998, Sacred groves in the rural landscapes: A case study of Shekhala village in Rajasthan, p. 277–288, [in:] P.S. Ramakrishnan, K.G. Saxena, U.M. Chandrasekhara (eds.), Conserving the Sacred for Biodiversity Management. UNESCO and Oxford-IBH Publishing, New Delhi.

Tiwari B.K., Barik S.K. & Tripathi R.S., 1998b, Biodiversity value, status and strategies for conservation of sacred groves of Meghalaya, India. Ecosystem Health 4(1): 20–32.

Tiwari B.K., Barik S.K. & Tripathi R.S., 1999, Sacred Forests of Meghalaya: Biological and Cultural Diversity: Regional Centre, National Afforestation and Eco-Development Board, North-Eastern Hill University, Shillong, 120 pp.

Vartak V.D. & Gadgil M., 1981, Studies on sacred groves along the Western Ghats from Maharashtra and Goa; Role of beliefs and folklores, p. 272–278, [in:] S.K. Jain (ed.), Glimpses of Indian Ethnobotany. Oxford & IBH, New Delhi.

Wahbah M.Z., 1985, Al-Fiqh al-IslamiwaAdilatuhu, Vol. 1–8. Mu'assasat al-Risalah,Damascus, Syria.