IJIRR

International Journal of Information Research and Review
Vol. 05, Issue, 08, pp.5654-5656, August, 2018

SHORT COMMUNICATION

ROLE OF CULTURE FOR *IN-SITU* CONSERVATION OF PLANT DIVERSITY

***Uday Kumar Sen**

Ecology and Taxonomy Laboratory, Department of Botany & Forestry, Vidyasagar University, Midnapore 721102, West Bengal, India

ARTICLE INFO

Article History:

Received 20th May, 2018
Received in revised form
27th June, 2018
Accepted 06th July, 2018
Published online 30th August, 2018

Keywords:

APG IV; Biodiversity conservation; Community; Biological spectrum; Leaf spectra; Life form; Sacred grove.

ABSTRACT

Sacred groves are near climax forest patches conserved by the indigenous communities intertwined with their socio-cultural and religious practice. An inextricable link between present society and past in terms of biodiversity, culture, religious and ethnic heritage exists in sacred groves. In this perspective, the present study was carried out to exploring the biological spectrum, leaf size spectra, conservation status, management and utility of the existing vegetation of a sacred grove in the West Midnapore district of West Bengal state in India. The vegetation of the grove was diverse and composed of 177 species belonging to 165 genera distributed in 59 families from 31 orders according to APG IV classification. The study area being a sacred grove may be well protected by further understanding its importance to the ecosystem of the locality and its useful resources for the future as well.

INTRODUCTION

Local communities in many parts of the world have conserved sacred forests or groves based on spiritual and cultural values. India is a land of diverse natural resources. It is also a country with the strongest tradition of nature conservation. Since time immemorial, conservation of natural resources has been an integral aspect of many indigenous communities all over the world in general and in India in particular. It is true that India has suffered an almost unabated devastation of its natural biological heritage, and much of what remains has been preserved throughout the ages because of a host of conservation-oriented socio-cultural and religious traditions. One such significant tradition of nature conservation is that of dedicating patches of forests or groves to some deities and spirits by the local people, both tribals and non-tribals (Ormsby and Bhagwat, 2010). Such forest pockets, referred to as sacred groves, are more or less small to large chunk of traditionally preserved near-virgin forests maintained through people's participation (Schneider, 2018). And folklores play a significant role in confirming the beliefs associated with the sacred groves. Though most of the indigenous people are illiterate, they have scrupulously nurtured their traditional customs, rituals, ceremonies and a way of forest life through folk beliefs with great fervor (Sen, 2018).

Corresponding Author:* **Uday Kumar Sen,
Ecology and Taxonomy Laboratory, Department of Botany & Forestry, Vidyasagar University, Midnapore 72102, West Bengal, India.

Although named differently in different states of India and managed by local people for various reasons, all sacred forests are islands of biodiversity protecting a good number of plant and animal species including some rare, threatened and endemic taxa (Kothari, 2015). Sacred groves, in general, are repositories and nurseries of many of the local ayurvedic, unani, tribal and other folk medicines which are the original sources that slowly got entry into the modern medicines after careful screening. Keeping this in mind, this article provides a glimpse into the phenomenon of sacred groves highlighting how human values, norms, social practices and ethics help preserve plants through a sacred grove in a tribal area of West Midnapore district in West Bengal.

MATERIALS AND METHODS

The study was conducted in an isolated sacred grove namely Joypur Joysini Matar Than spread over an area of approx. 2 ha on a public land in the outer edges of two tribal dominated villages (Joypur and Sinhajora in Lalgeria gram panchayet) under Pirakata police station in Salboni block (latitude 22°34'49.71"- 22° 34'51.69" N and longitude 87°11'03.51"-87°11'05.32"E, average altitude 57 m asl) in West Midnapore district of West Bengal. This terrestrial grove stands as an island of forest amidst the crop fields. The forest represents approx. 350-year old relict vegetation consisting of evergreen and deciduous trees. The grove is located about 32 km. north-west from district headquarters at Midnapore town, located in the southern part of West Bengal, India (Fig. 1).

a b c

Fig. 1. Location of the study area (A: West Midnapore district with Salboni block, B: Google Earth image showing Joypur Joysini sacred grove, C: Deity Joysini)

In addition to weekly worship offered to the deity of the grove, local people, both tribal and non-tribal of the surrounding villages visit the forest *en masse* during the day after annual *Makar Sankranti* (middle of January) when village fair is held for one day. Since the grove is the abode of goddess, people neither cut any plant of the grove nor foul the serenity of the area, thus strictly adhering to the taboos and ethics. The folk belief goes that worshipping the deity gives people immunity against small pox and chicken pox, and heralds' well-being and prosperity of the villages (Sen, 2018). Phytosociological data were collected by laying 10m x 10m quadrates for tree species, 5m x 5m for shrubs and lianas, 1m x 1m for herbs and grasses. A brief floristic survey was carried out through "spot identification" and modern herbarium techniques (Jain and Rao, 1977) basis. For identification purpose, different relevant catalogue, regional floras (Hooker, 1872-1897; Prain, 1903a, 1903b), monographs, revision works and other literature were consulted. In the systematic enumeration of the taxa; clade, order, family, species along with habit, life-span, flowering and fruiting time, Raunkiaer's life-form with sub-type (Raunkiaer, 1934), leaf spectra (Raunkiaer, 1934), IUCN status (IUCN, 2018) and distribution of the plants in the grove were arranged according to Angiosperm Phylogeny Group IV classification (Chase *et al*., 2016). Information about local inexpensive but useful plants was collected through literature (Pakrashi and Mukhopadhyay, 2004; Sen, 2018) and by interviewing and cross-interviewing the local people.

RESULT AND DISCUSSION

In the present study, a total of 177 species belonging to 165 genera distributed in 59 families from 31 orders were recorded from the sacred grove according to the APG IV (Chase *et al*., 2016) classification. The top two clades were Rosids and Asterids. More than 80% of the flora were represented by orders of Eudicot and Core Eudicot, of which the major contributions in terms of descending species number (≥10 species) were from Lamiales (12.99%), Gentianales (10.73%), Fabales (9.04%), Poales (9.04%), Malpighiales (7.91%), Asterales (6.21%) and Malvales (5.65%). The ten well represented families in species (≥5 species) quantity were: Fabaceae (9.04%), Apocynaceae (6.78%), Asteraceae (60.21%), Poaceae (5.65%), Malvaceae (5.08%), Lamiaceae (5.08%), Acanthaceae (4.52%), Euphorbiaceae (3.95%), Cyperaceae (3.39%) and Rubiaceae (3.39%).

The ten dominant plant families encompassed more than 53% genera with descending numbers (≥6 species) were Fabaceae (7.88%), Apocynaceae (6.67%), Asteraceae (6.67%), Poaceae (6.06%), Lamiaceae (5.45%), Malvaceae (5.45%), Acanthaceae (3.64%), Cyperaceae (3.64%), Euphorbiaceae (3.64%) and Rubiaceae (3.64%). The twelve well represented genera containing 2 species were *Barleria*, *Crotalaria*, *Dioscorea*, *Euphorbia*, *Ficus*, *Justicia*, *Mimosa*, *Phyllanthus*, *Rauvolfia*, *Senna*, *Solanum* and *Terminalia*. Another 141 species contained single genus respectively. The present floristic study of the sacred grove showed that it harbored a total of 177 plant species [dicots 142 (80.22%) and monocots 35 (19.78%)] belonging to genera [dicots 134 (81.21%) and monocots 31 (18.79%)] of 59 families [dicots 46 (77.97%) and monocots 13 (22.03%)] under 31 orders [dicots 22 (70.97%) and monocots 9 (29.03%)]. Among these, 79 (44.63%) of the reported species were herbs. Other reported species were shrubs 30 (16.95%), trees 32 (18.08%) and climbers 36 (20.34%) respectively. Amongst the total dicots 142 (80.23%) and monocots 35(19.77%), herbs, shrubs, trees and climbers represented 55, 29, 28, 30 and 24, 1, 4, 6 species respectively, representing 31.07%, 16.38%, 15.82%, 16.95% and 13.56%, 0.56%, 2.26%, 3.39% of the total species. In the sacred grove, 67 (37.86%) annual plants would go through their life cycle in one growing season. There were 1 (0.56%) biennial plant whose life cycle spanned two years and 109 (61.58%) perennial plants that could survive most unfavorable conditions and stay alive more than two years.

Chromolaena odorata, *Sida cordifolia*, *Ficus benghalensis*, *Gymnema sylvestre* showed the highest species importance value index 28.32, 35.74, 34.58, 23.62 and family Asteraceae, Malvaceae, Moraceae, Apocynaceae showed the highest family importance value index 56.21, 82.64, 76.36, 73.21 of herb, shrub, tree, climber respectively. The biological spectrum shows that phanerophytes (38.42%) was the dominant, followed by therophytes (29.38%), chamaephytes (16.95%), hemicryptophytes (8.47%) and cryptophytes (6.78%). Of the phanerophytes, nanophanerophytes (24.29%) was the dominant than megaphanerophytes (7.34%) and mesophanerophytes (6.78%). It reveals that therophytes and chamaephytes constituted the higher percentage 16.38% and 7.95% respectively than the normal spectrum exhibiting "thero-chamaephytic" phytoclimate (cryptophytes was negligible, because it showed only 0.78% deviation from the Raunkiaer's normal spectrum). Further, the number of hemicryptophytes

(17.53%) and phanerophytes (7.58%) was comparatively smaller in percentage than the normal spectrum. Of the phanerophytes, nanophanerophytes (9.29%) and megaphanerophytes (4.34%) were somewhat larger and mesophanerophyte (21.22%) was a comparatively smaller value than the normal spectrum. Such phytoclimate indicated the important role of the upper canopy in regulating the microclimate, controlling the regeneration, establishment of herbaceous plants, maintenances of diversity and functioning of the ecosystem were influenced by the phytoclimate, which was of vital importance influencing ecosystem processes. The dominance of therophytes indicated that the investigated area was under biotic pressure due to deforestation, overgrazing and agricultural land encroachment (Shaheen *et al*., 2017). As regards the leaf size spectra, mesophyll (23.16%) was found to be high followed by notophyll (18.64%), microphyll (18.08%), nanophyll (16.38%), macrophyll (13.56%), leptophyll (7.34%) and megaphyll (2.82%). Poaceae (2.82%), Fabaceae (2.82%), Asteraceae (3.38%), Fabaceae (3.38%), Apocynaceae (2.26%), Malvaceae (2.26%) and Araceae (1.69%) were dominant families of leptophyll, nanophyll, microphyll, notophyll, mesophyll, macrophyll and megaphyll respectively. Among these 177 plants, 153 plants have not been evaluated till now. There were 21 Least Concerned, 1 Vulnerable, 1 Lower Risk/ Least Concerned and 1 Data Deficient species. *Cleistanthus collinus* is the vulnerable tree species according to the IUCN (IUCN, 2018). The grove supported 26 timbers-yielding plant species and a good number of non-timber forest products, of which, 8 species produced dye, 28 species bore edible parts, 7 species produced fiber, 27 species had fodder value, 3 species yielded gum, 9 species had insecticidal properties, 161 species had medicinal properties, 7 species yielded oil, 10 species had ornamental value, 23 species had sacred value, 1 species yielded spices and 9 species were yielding tannin.

Conclusion

The grove in essence represents the traditional Indian way of *in-situ* conservation of plant resources. It is also an indicator of the rich vegetation that had existed here in the past. Furthermore, the grove, from time immemorial, has been acting as a social space where people not only get chance to exchange their cultural identities but also get enough scope for community solidarity during festivals. At present the sacred grove, though well protected, has to face some threats due to agricultural encroachment, dying of old trees and exotic weed invasion. Therefore, there is an urgent need for better protection of the very grove.

Acknowledgments

Author likes to express his gratitude to supervisor for providing help and facilities to work in the Department of Botany and Forestry.

The author is also thankful to the local communities for sharing their knowledge of plants and help during the field survey.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declarations of interest: None

REFERENCES

Chase, MW., Christenhusz, MJM., Fay, M., Byng, FJW., Judd, W,, Soltis, SDE., … Stevens, PF. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Bot J Linn Soc.*, 2016; 181: 1-20.

Hooker, JD. *The flora of British India*. Vol. I-VII, Reeve and Co.: 1872-1897.

IUCN. The IUCN Red List of Threatened Species. Version 2018-1. <www.iucnredlist.org>. Downloaded on 25 July: 2018.

Jain, SK. and Rao, RR. A Handbook of field and herbarium methods. *Today and Tomorrow's Printers and Publishers*: 1977.

Kothari, A. Indigenous peoples' and local community conserved territories and areas. *Oryx.*, 2015; 49: 13-14.

Ormsby, AA. and Bhagwat, SA. Sacred forests of India: A strong tradition of community-based natural resource management. *Environ Conserv.*, 2010; 37: 320-326.

Pakrashi, SC. and Mukhopadhya, S. (eds). Medicinal and aromatic plants of red laterite region of West Bengal (Bankura, Medinipore and Purulia). *West Bengal Academy of Science and Technology*: 2004.

Prain, D. *Bengal Plants.* Vol. 1, Botanical Survey of India: 1903a.

Prain, D. *Bengal Plants*. Vol. 2, Botanical Survey of India: 1903b.

Raunkiaer, C. The life forms of plants and statistical plant geography. *Clarendon Press*: 1934.

Schneider. H. What role for culture in conservation? *Oryx.*, 2018; 52: 199-200.

Sen, UK. Assessing the social, ecological and economic impact on conservation activities within human-modified landscapes: a case study in Jhargram district of West Bengal, India. *Int J Conserv Science,* 2018; 9: 319-336.

Shaheen, H., Aziz, S. and Dar, MEUI. Ecosystem services and structure of western Himalayan temperate forests stands in Neelum valley, Pakistan. *Pak J Bot.*, 2017; 49: 707-714.

****