

THE BIOLOGICAL VALUES AND CONSERVATION STATUS OF SACRED GROVES IN THE BALASORE WILDLIFE DIVISION, ODISHA: A CASE STUDY

Raj Kishore MOHANTA^{1*}, Bhupendra Singh ADHIKARI¹,
Hemanta Kumar SAHU², Kedar Kumar SWAIN³

¹ Wildlife Institute of India, Dehradun, Uttarakhand, India

² Department of Zoology, North Orissa University, Takatpur, Baripada, Odisha, India

³ Divisional Forest Office, Wildlife Division, Kuruda, Balasore, Odisha, India

Abstract

On a global scale, the existing Sacred Groves (SGs) are based on ancestral worship and focus on the conservation of forest patches. Sacred groves are distributed over a wide ecosystem and help in the conservation of rare and endemic species. Well preserved sites are store houses of biological, ecological, medicinal, ethno-cultural and religious values. We documented the state of 13 Sacred Groves in Balasore, Odisha during March 2011. For a detailed investigation, sample areas were set, for the assessment of floral and faunal diversity, ethno-cultural values and management status. A total of 58 floral species and 13 faunal species were recorded. In Balasore, Sacred Groves are small in size and can act as starting points for any long term conservation plan of biodiversity. The communities have kept their faith and traditions linked to these mini nuclei of rich biodiversity in the landscape. Therefore, any conservation program can begin from local communities, by taking them into consideration as trustworthy awareness building factors.

Keywords: *Biological value; ethno-cultural and religious values; anthropogenic pressure; conservation status; sacred groves.*

Introduction

Human Societies started their journey of evolution on this planet as hunters and gatherers. Such societies had intimate and harmonious relationship with their surrounding habitats, thus they were regarded as 'ecosystem people' [1]. Later in the search for better lives and to secure their survival, they started agriculture, by clearing small patches of forests and kept moving from one place to another and explored fresh areas of forests for their primitive agriculture. That is known as shifting cultivation or podu cultivation 'Jhum'. During this process of continuous exploration they realized the importance of the forest, as well as that of the natural surroundings, for their own survival and well being. Hence, they started conserving and worshiping small patches of original vegetation, of forests, or sometimes even small areas of their natural landscape as a sign of respect for Mother Nature. Those sacred patches of vegetation, or natural areas, which have ethnic and religious value, are known as "Sacred Groves". The sacred grove is known as 'Jahira' in Odhisa. Sacred groves are traditionally protected forest patches maintained by socio-religious grounds. Thanks to their social

* Corresponding author: brownbear143@gmail.com

protection, those groves support various plant and animal species, including rare and endemic taxa. Due to various developmental activities, such as road networks, touristic activities and urbanization fragmentation taking place, the natural landscapes tend to shrink. SGs are considered as an important store house of rare and endangered biodiversity and they are important as gene banks for the future and have a unique ethnic value for the local communities and are considered as important laboratories [2-5].

As far as the distribution of sacred groves is concerned, they are located almost in every part of the globe. SGs were documented in different parts of Africa, Asia, Europe, Australia and America [6]. Several studies were performed, on various aspects of SGs, in different parts of the country, such as in Maharashtra [2], in North-East and North-West Himalaya, including Darjeeling and Meghalaya [7], in Meghalaya, Manipur and Assam [8] and in different parts of India [9, 20]. Some focused on socio-cultural practices associated with sacred groves [2, 10-20] and on the floristic composition of SGs [21-26].

In the dry regions of central India, some perennial hill streams and riparian gallery forests receive protection as a result of religion-based traditions. In a village in the Koraput district (Odisha), for example, there is a shrine hidden under stones within some bushes that grow among tall trees. While the surrounding land is barren, the trees in the vicinity of the shrine remained untouched and protected because the shrine is considered sacred by the local community [27]. However, as a network, the sacred groves in a region can preserve a sizeable portion of the local biodiversity in areas where it would not be feasible to maintain large tracts of protected forests and where protected reserves would be unlikely to receive local support. However, such a network would depend on there being a certain number of forest patches, each covering a minimum area [28].

Materials and Methods

Study area

Balasore, a coastal district in the state of Odisha, lies on the most northern part between 21°15'0" to 21°45'0" N and 86°15'0" to 87°30'0" E. It is bordered by the Bay of Bengal in the East, Mayurbhanj district in the West, Midnapore (West Bengal) district in the North and Bhadrak district in the South. The district head quarter, Balasore, is 204 kms from the State Capital, Bhubaneswar. May is usually the hottest month and reaches up to 44°C in the district, not with high humidity. The occurrence of a large number of fire incidents is a regular feature of the district during the summer months, i.e. April to May. December is the coolest month of the year and monsoon generally commences in June, every year. The rainfall from June to December constitutes 75% of the annual rainfall of the district. The study was carried out in two ranges i.e. Jaleswar and Soro, of the Balasore Wildlife Division (BWD), mainly the Buffer zone of Kuldhia Wildlife Sanctuary, for detailed investigation on the biodiversity of the sacred groves (Fig. 1).

All the available publications were gathered from the libraries of Wildlife Institute of India, Dehradun and North Orissa University, Baripada, Odisha. The study was carried out during 2011, to document the biodiversity of sacred groves, for which a broad methodology was followed. A consultative meeting of forest staff and officials and local villagers was organized in Jaleswar and Soro ranges at the beginning. It has provided necessary information to design the questionnaire to be used for the survey and initial short listing of sacred groves of the area for the purpose of study. Questionnaire consisting of open and close ended questions was later tested in the field with the villagers of nearest SGs of BWD. Basic information on the ecological, socio-cultural and status of different sacred groves was gathered through semi-structured interviews [26] with local villagers using the questionnaire format. A total of 13 SGs were listed from the study area and for detailed investigation, 4 SGs were randomly selected to know the floral and faunal wealth, ethno-cultural values and existing management status of

these groves. The major plant species were identified in filed and remaining were identified from North Orissa University, Baripada and Wildlife Institute of India, Dehradun. In these groves to capture the plant diversity, ten 10x10m quadrats were laid, while in remaining sites which are in small area plant species were counted. For faunal diversity, direct (sightings) and indirect evidences (pellets, foot prints and calls) were recorded [26]. The birds were listed based on direct sighting and through discussions with local people [29].

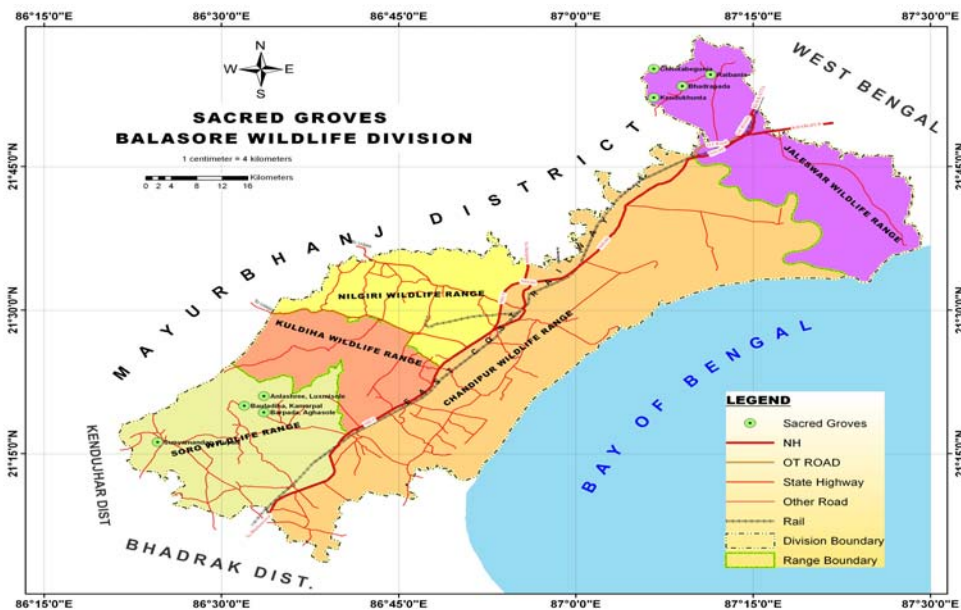


Fig. 1. Location of Sacred Groves in Soro and Jaleswar Wildlife Ranges in Balasore Wildlife Division, Odisha.

Results and Discussions

The detailed study on the SGs of Orissa [30] recorded the presence of 322 such areas in the state. This work does not mention any SGs from this area (BWD). In the present study 13 sacred groves were documented within BWD, in one district and two range of the BWD. Additionally, the present study also identified 13 new such patches of forest and groves, important from the point of view of long term conservation of BWD. Field surveys revealed that even within the Kuldiha Wildlife Sanctuary, there were originally 4 sacred groves, which had strong mythological values for the local communities. Similarly, the existing reserve forest area also had the tradition of such sacred patches of forest. After the declarations of these areas as reserve forests/protected areas, those SGs were no longer being managed by the local communities. Therefore, the SGs present in BWD (excluding the protected areas) are recorded in the present study. A high number of SGs are located in the Jaleswar range (9) followed by Soro range (4). As compared to another study [30], 322 SGs were recorded in the Odisha state, which does not provide any information on the SGs from Balasore.

The status of sacred groves in and around BWD is as follows: Jaleswar (n = 9), area = 0.01 to 0.5 ha, Soro (n = 4), area = 1 to 3 ha. The size of SGs as per the study is quite variable and ranges from 0.01 (Bad Begunia, Khuad, Purnapani, Luhapoda, Bakulapoda) to 3.0 ha (Anala Sree). The total area covered by 13 SGs is ca. 10.15 ha approximately (Table 1).

Table 1. Range-wise distribution of Sacred Groves in BWD.

Range (Number of SGs)	Total area covered (hectare)	Important plant species recorded	Ecological Importance
Jaleswar (9)	2.7	<i>Madhuca latifolia</i> , <i>Ficus</i> spp., <i>Terminalia belerica</i> , <i>Shorea robusta</i>	High, because of Reserve Forest
Soro (4)	7.5	<i>Diospyros melanoxylon</i> , <i>Shorea robusta</i> , <i>Schleichera oleosa</i> , <i>Madhuca latifolia</i>	Very High, because of traditional corridor areas for wild animals and connectivity to Kuldiha Wildlife Sanctuary

The linkages between sacred groves and villages differ from place to place and in most of the areas villages have their own sacred groves. However, Raibania and Sunya mandap sacred grove is being worshipped by as many as 5 villages. The geographical location of sacred groves in BWD is also quite variable, as few of the sacred groves are located on foot hills and road side (Bauladiha, Anala Sree, Barapada and Sunya mandap), some are on the plane areas (Raibania, Khuad, Chhot Begunia, Bad Begunia), while others are on village and human habitation areas. The observation on the canopy structure reveals that the groves with large area have good canopy and smaller groves have often open canopy due to various stages of degradation because of biotic pressures. The study carried out by forest department has identified a list of sensitive areas, which have the potential of possible wild animal corridors between Kuldiha WS and Reserve Forest. The present study reveals the presence of at least three SGs in these areas, which are very critical from the landscape connectivity view point. A list of documented SGs as per the current study along with approximate areas is given in table 2.

Ecological Values

Through rapid surveys and discussions with village communities in different areas the information on ecological attributes of 13 SGs was gathered. The herbarium specimens along with photographs were taken from most of the SGs, while plant specimens could not be collected from few SGs due to restrictions. During the study, 58 species of plants belonging to 53 genera and 36 families were recorded from 13 SGs in the following order: trees (40 species) > shrubs and herbs (7 species each) > grasses (4 species). The dominant species recorded include *Shorea robusta*, *Cynodon dactylon*, *Madhuca latifolia*, *Holarrhena pubescens*, *Ziziphus oenoplea*, *Azadirachta indica*, *Cassia fistula*, *Diospyros melanoxylon*, *Phoenix sylvestris*, *Terminalia belerica*, *Flaucortia indica*, *Syzygium cumini* and *Ficus* sp. Similarly, looking at the overall composition of plant species over 13 sacred groves, Fabaceae and Combretaceae are the most dominant families; while other families are widely represented include Anacardiaceae, Apocynaceae, Malvaceae, Moraceae, Myrtaceae, Poaceae, Arecaceae, Asteraceae and Sapotaceae. The frequency distribution of plant species shows that *Cynodon dactylon* was 84.6% and *Shorea robusta* 76.9% present in different SGs followed by *Phoenix sylvestris* (46.2%), *Terminalia belerica* and *Ficus* sp. (38.5%, each species), *Cassia fistula*, *Facourtia indica* and *Azadirachta indica* (30.5% each species).

Even though the survey carried out in 13 SGs was rapid and just over a time, it revealed that the presence of 2 mammal and 11 species of birds, which were direct or indirectly sighted in the SGs. The important faunal species recorded in the study area were *Funambulus pennant* and *Macaca mulata* among mammals and *Dendrocitta vagabunda*, *Accipiter badius* and *Dendrocopos mahrattensis* among birds. Even through the area covered by SGs was a small fraction of the total area of Balasore Wildlife Division, though from the point of biodiversity the area is rich in plant as well as animal diversity.

Ethno-cultural and religious values

The SGs are categorized among communities and are associated with certain deity. In such groves annual rituals and ceremonies are performed to propitiate the deity. These rituals are performed for the well-being of the people, animals, crops, disease and protection of villagers etc. During these rituals sacrifices of animals (such as fowl, goat, pig etc.) are made, while in sanskritized groves offerings of vegetable items (Banana, Coconut, Orange, Guava, Mango and other fruit as well as flowers and leaves) are made. SGs have important socio-cultural functions, in addition to the religious functions. Several festivals are performed at SGs. It is reported that, among the tribals of Orissa, social gatherings takes place in these groves on the occasion of Salai, Karama, Maghae, Asali, Bodam, Jahira pooja as well as wedding ceremonies.

Each village normally has one or two ‘*Dehuri* or *Nayaki*’ and they worship their Gods in their respective SGs. Tribes recognize and worship a number of Gods symbolized in the form of old trees (*Shorea robusta* and *Ficus* sp.), wild animals (i.e. *Durga maa* (Tiger), *Laxmi maa* (Elephant), Nagdevta (Snake) and ancestral spirits (*Thakurani*). Wherever, a new settlement is initiated; the nearest small patch of forest is recognized and worship as SG, which is locally known as ‘*Jahira* or *Thakuranisal*’. Worship and celebrations are linked to the SGs and organized by the village in their respective SGs normally every year. Mainly during *Salai* (harvest festival), a special occasion, at the time of worships sacrifice of domestic animals, such as hen, pigeon, goat, pig etc. is a common practice. Prayers are offered for rains, protection from animals and diseases as well as the overall well being of the village. They also believe that the constellation of stars has power and these represents the spirits, hence, animals must be scarified to these spirits.

Anthropogenic pressure on SGs

Thirteen SGs have an association of 13 villages comprised of 8980 human souls and 15719 livestock. Villagers are dependent on forest resources, such as Non Timber Forest Products. Simultaneously, there is the problem of extraction of more and more resources from the forest area due to less income because of inadequate marketing support and lack of communication. Unplanned development, particularly in the form of horticulture is another issue, detrimental to long term conservation of forests and its resources. Due to these factors, the biotic pressure was observed on existing SGs in the form of cuttings, over grazing, hunting and forest fires, which are neglected by the local people, leads to gradual degradation these groves. The small SGs have been impacted more due to these factors as compared to the large ones. A meeting was organized with the village heads (*Mukhia*) during the study and information on the existing conservation status of different SGs was discussed (Table 2).

Table 2. Floral and faunal diversity in various SGs in BWD, Odisha

Common name	Botanical name	Frequency, (%)	Presence in SGs
Plants			
Amori	<i>Ipomoea carnea</i>	23.1	1,4,5
Ankle	<i>Alangium lamarckii</i>	23.1	4, 10,13
Apamarga, Chirchiti	<i>Achyranthes aspera</i>	7.7	2
Arjuno	<i>Terminalia arjuna</i>	15.4	2,4
Asana	<i>Terminalia tomentosa</i>	15.4	2,4
Asastha, Jali	<i>Ficus religiosa</i>	23.1	1,2,4
Atandi	<i>Combretum roxburghii</i>	7.7	5
Ato	<i>Anona squamosa</i>	15.4	1,4
Bahada	<i>Terminalia belerica</i>	38.5	2,3,4,9,10
Baincho	<i>Facourtia indica</i>	30.8	2,4,6,8
Bajarmuli(Jhadu)	<i>Sida acuta</i>	15.4	4,5
Bamboo	<i>Bambusa arundinacea</i>	7.7	3
Bamboo (Kanta)	<i>Dendrocalamus giganteus</i>	23.1	3,5,13
Baula	<i>Mimusops elengi</i>	7.7	1
Bel	<i>Aegle marmelos</i>	15.4	3,4
Bichhuati	<i>Fleurya inturrupta</i>	15.4	4,8
Boro	<i>Ficus</i> sp.	38.5	1,2,8,10
Char	<i>Buchanania lanzan</i>	15.4	2,4
Dimiri	<i>Ficus carica</i>	7.7	1

Dubo	<i>Cynodon dactylon</i>	84.6	1,2,3,4,5,6,8,9,10,11,13
Harida	<i>Terminalia chebula</i>	15.4	2,4
Jackfruit	<i>Artocarpus heterophyllus</i>	7.7	1
Jamu	<i>Syzygium cumini</i>	30.8	1,2,3,4
Kadali	<i>Musa paradisiaca</i>	7.7	1
Kadambo	<i>Anthocephalus cadamba</i>	15.4	1,2
Kagjifulo	<i>Bougainvillea</i> sp.	7.7	2
Kaju	<i>Anacardium occidentale</i>	7.7	1
Kankuli	<i>Ziziphus oenopila</i>	30.8	2,3,5,8
Karanja	<i>Derris indica</i>	7.7	13
Kendu	<i>Diospyros melanoxylon</i>	23.1	2,4,6
Khajuri	<i>Phoenix sylvestris</i>	46.2	1,2,4,6,7,13
Khirkuli	<i>Carissa</i> sp.	7.7	1
Kochila	<i>Strychnos nux-vomica</i>	7.7	5
Kulchi	<i>Holarrhena pubescens</i>	53.8	1,2,4,5,6,7,8,9,10,13
Kusum	<i>Schleichera oleosa</i>	7.7	10
Mahulo/ Mohua	<i>Madhuca latifolia</i>	46.2	2,3,4,8,9,10
Mango	<i>Mangifera indica</i>	15.4	1,2
Mayurchulia	<i>Elephantopus scaber</i>	15.4	2,4
Muthaghass	<i>Cyperus rotundus</i>	7.7	1
Neem	<i>Azadirachta indica</i>	30.8	1,2,4,13
Nodia	<i>Cocos nucifera</i>	23.1	1,10,11
Palasa	<i>Butea monosperma</i>	15.4	1,1
Papeya	<i>Carica papaya</i>	15.4	1,2
Piasal	<i>Pterocarpus marsupium</i>	7.7	4
Pijuli/Guava	<i>Psidium guajava</i>	7.7	1
Poksungha	<i>Blumea lacera</i>	7.7	4
Potash	<i>Eucalyptus</i> sp.	15.4	2,9
Putus	<i>Lantana camara</i>	7.7	5
Radha chuda	<i>Peltophorum ferrugineum</i>	15.4	2,4
Saguan	<i>Tectona grandis</i>	7.7	1
Sahada	<i>Streblus asper</i>	15.4	3,4
Sal	<i>Shorea robusta</i>	76.9	1,2,3,4,6,7,8,9,10,11
Saru	<i>Colocasia esculenta</i>	15.4	1,4
Simuli	<i>Bombax ceiba</i>	7.7	1
Sunari	<i>Cassia fistula</i>	30.8	4,5,11,13
Tal/Palm	<i>Borassus flabellifer</i>	7.7	2
Tentuli	<i>Tamarindus indica</i>	15.4	2,4
Thalkudi	<i>Centella asiatica</i>	7.7	1
Mammals			
Indian five striped palm squirrel	<i>Funambulus pennantiae</i>	30.8	1,2,3,4
Rhesus macaca	<i>Macaca mulata</i>	7.7	1
Birds			
Asian-pied Starling	<i>Sturnus contra</i>	15.4	2,3
Black drongo	<i>Dicrurus macrocercus</i>	38.5	1,2,3,4,6
Common hoopoe	<i>Upupa epops</i>	23.1	2,3,4
Common myna	<i>Acridotheres tristis</i>	53.8	1,2,3,4,5,6,13
House crow	<i>Corvus splendens</i>	46.2	1,2,3,4,5,6
Red vented bulbul	<i>Pycnonotus cafer</i>	38.5	1,2,3,4,6
Red whiskered bulbul	<i>Pycnonotus jocosus</i>	23.1	2,3,4
Rufous treepie	<i>Dendrocitta vagabunda</i>	15.4	2,3
Shikra	<i>Accipiter badius</i>	23.1	2,3,4
Spotted dove	<i>Streptelia chinensis</i>	30.8	1,3,4,5
Yellow-crowned Woodpecker	<i>Dendrocopos mahrattensis</i>	15.4	2,3
Lizards			
Common Brahminy Skink	<i>Mabuya carinata</i>	53.8	1,2,3,4,5,10,13
Common Garden Lizard	<i>Calotes versicular</i>	69.2	1,2,3,4,5,6,9,12,13

*1: Sunya Mandap, 2: Bauladiha, 3: Barapada, 4: Anala Sree, 5: Chhot Begunia, 6: Bad Begunia, 7: Khuad, 8: Purnapani, 9: Kendu Khunta, 10: Luhapoda, 11: Bakulapoda, 12: Bhadrpada, and 13: Raibania

Traditional Management

The *Mukhia* (Village Headman) is the overall manager of a Village and all the villagers abide his rules and regulations, as he is supposed to be responsible for the protection, management, well-being and discipline of the village and has the power to punish the guilty in the village. With this much recognition, the *Mukhia* is also responsible for the management and well being of the SGs of the village. He carries out annual worshipping along with the villagers and any activity in the SG is allowed only with the permission of the *Mukhia*.

Existing Threat Status

Of the total 13 surveyed sacred groves, 4 SGs still harbor good vegetation; however, the remaining nine SGs are degraded due to anthropogenic pressures. The major factors responsible for the degradation of SGs include dilution of traditional values, such as expansion of agriculture and settlement areas, unplanned development, illegal tree felling, poaching,

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unsustainable collection of NTFP, lack of awareness and poor institutional strength. Indirect factors responsible for enhance exploitation of natural resources and thereby pressures on these areas include lack of communication facilities, poor marketing of forest produce and weakening of traditional community organization (Table 3). However, communities still take pride and have values for the traditional areas, *i.e.* SGs. They are keen to rejuvenate the traditional ways to conserve these areas with little support and encouragement by the government. Even other stakeholders (forest officials) also showed their desire to protect these areas in the long term interest of the health of BWD.

Table 3. Major threats, conservation status and associated communities of SGs in BWS.

Name of SGs	Location	Total household population (Approx)	Total cattle population (Approx)	Affiliated community	Conserving authority	Nearest forest reserve	Conservation Status	Major threats
Sunya Mandap	Road side	150	400	Brahmin	Brahmin	Ramda Hill	Poor	Human habitat
Bauladiha	Road side and Hill	250	550	Dehuri	Dehuri	Kuidiha WS	Good	Human settlement , Livestock
Barapada	Hill	65	170	Ho	Ho	Kuidiha WS	Moderate	Human settlement, expansion of agricultural land
Anala Sree	Human habitation, Hill	85	200	Bhumijo	Dehuri	Kuidiha WS	Good	Human settlement, Livestock
Chhot Begunia	Reserve forest, Village	520	850	Santal	Santal	Raibania RF	Moderate	Habitat destruction, expansion of agricultural land
Bad Begunia	Human habitation	600	800	Santal	Santal	Nil	Very poor	Habitat destruction,
Khuad	Human habitation, Road side	280	320	Soren	Soren	Khuad RF	Very poor	Habitat destruction
Purnapani	Road side, Village RF	350	500	Santal	Santal	Purnapani RF	Very poor	Habitat destruction
Kendu Khunta	Human habitation, Agriculture land	250	650	Bhatudi	Nayak	Nil	Very poor	Habitat destruction
Luhapoda	Road side, Village	170	520	Santal	Santal	Luhapoda RF	Very poor	Habitat destruction
Bakulapoda	Road side, Village	-	-	-	-	-	Very poor	Habitat destruction
Bhadrapada	Human habitation	260	750	Patra	Patra	Bhadrapada RF	Moderate	expansion of agricultural land, Livestock
Raibania	Road side	6000	10000	Santal	Palei (Gauda)	Raibania RF	Moderate	Habitat destruction, expansion of agricultural land

RF: Reserve Forest and WS: Wildlife Sanctuary.

Conclusions

The present study shows that these small forest patches of SGs play an important role in the conservation of biodiversity. Furthermore, natural sacred sites are maintained in a traditional way of life, as community based conservation, which does not require governmental involvement. Incorporating these sites into conservation networks could enhance the effectiveness of the protected areas, by covering a wider variety of habitats and by harnessing the support of local people. In this paper, we listed current threats to SGs that need to be addressed through management interventions. However, the traditional institutions are currently facing new threats that need to be recognized. There is a need to recognize the nature and extent

of these threats, which vary among regions and sites. The integration of SGs and other sacred natural sites into the existing protected area network must take into account the local ecology as well as the prevailing threats of the area. As a result, it would be unwise to prescribe a single management approach. More research on the ecological values and the socio-cultural mechanisms underlying sacred natural sites is needed to thoroughly understand and realize their potential for biodiversity conservation in the future.

Balasore Forest Division (BFD) is sacrificing local biodiversity due to a wide spread agricultural expansion and to human habitation. Protected Areas in the state are like islands surrounded by large landscapes, which are under process of degradation due to unplanned developmental activities. Most of the land within BFD is non-governmental and comprises village forests and agricultural areas. In spite of these problems the communities are still dependent and linked to the forests in terms of their economy and livelihoods. Sacred groves, even though small in size, can act as starting points for any long term conservation of biodiversity and of ecologically rich landscapes. The communities have their faith and traditions linked to these mini nuclei of rich biodiversity in the landscape. Therefore, any conservation program can begin from these sacred groves by taking the communities into consideration. This program should then gradually expand to the surrounding landscapes with the support of the stakeholders.

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