



Tree Diversity Assessment and Conservation of Singhori Wildlife Sanctuary, Madhya Pradesh, India

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Abstract

Tree diversity in Singhori Wildlife Sanctuary of Madhya Pradesh was studied during the year 2010 Jan -2013 May. Diversity assessment of tree is important for in-situ conservation and deriving diversified uses of valuable flora on a sustainable basis. In the present study, 126 species of trees belonging to 91 genera and 45 families have been reported. Ficus is the most dominated genera in the area, followed by Albizia, Terminalia, Grewia. It is interesting to note that Tectona grandis L. f. is the most dominant species of Singhori Wildlife Sanctuary while Shorea robusta Gaertn. f. is absent from this plateau. An assessment of economics potential of the trees has also been made based on the first hand information generated from local inhabitants mainly Bheel and Gond adivasis. The economically potential species are categorised into different groups based on their uses. The present study deals with several angiosperm plant species and suggests certain that should be taken immediately steps under a well-planned strategy to conserve the rich tree diversity of study area. The investigation is of special significance and could help to conserve the loss of tree diversity over long period.

Keywords: Tree diversity, conservation, Singhori wildlife sanctuary, Madhya Pradesh.

Introduction

Indian subcontinent represents a very rich wealth of natural resources and diversified wildlife. Wildlife defined as the uncultivated flora and the undomesticated fauna. According to Mahajan it is meant, by the life in any form (plant or animals) existing in natural surroundings.

The protected area network was initiated to extend legal protection to forest in undisturbed condition and facilitate human forest interaction under certain rules and regulation. The needs for protected areas arise in order to provide protection and management based on conservation-oriented lines. This need to be a further strengthened in order to have a complete representation of all geographical zones and forest communities¹⁻⁵.

Under the wildlife (Protection) Act 1972, State governments are empowered to declare any areas as a Sanctuary for the purpose of protecting, developing wildlife therein or its environment. Madhya Pradesh has a total geographical area of 30, 8245 km.² out of which 31,098 km.² is under protected forests. There are 9 National Parks and 25 Wildlife Sanctuaries⁶.

Assessment of regional plant diversity is widely accepted for exploring natural flora as a source for identifying gene bank in various plant groups. Plant diversity documentation requires surveying, sorting, cataloguing and quantifying⁷.

Trees are the basic lifelines of the terrestrial ecosystems. They not only preserve the physical feature of the earth, but also stop

soil erosion, mitigate floods, make the streams flow perennially and help in sustaining river flows. Besides, trees meet the need of timber, fuel, medicine and other commercial products, which are indispensable requirement of human being⁸⁻⁹.

It has observed that people living inside that sanctuary very depend on forests. The forests provide them employment opportunities and cater for many requirements of daily life. There is an age-old culture and social relationship between the inhabitants and forests but with the increase to demographic pressure the forests resources have come under tremendous pressure and the ecological balance of the area has been disturbed. As is reflected from the above analysis the villages of the sanctuary are socially, economically backward and they solely depend upon adjoining forests.

Indiscriminate grazing and illicit cutting of trees and grasses has increased with the increased interference of human and cattle populations which led to the deforestation and degradation of natural resource. Hence, the study on tree diversity of Singhori wildlife Sanctuary is fascinating from the botanical, utilitarian as well as conservation point of view. Conservation requirements are based on the natural resources values of an area. Today, there is very little awareness about the importance and the preservation of flora and fauna and conservation of forests by local peoples.

Keeping this in mind an attempt has been made for the first time to explore the tree diversity of this protected area i. e. Singhori wildlife sanctuary. The manuscript will serve as a reference for all ongoing and future plans based on developmental and conservation activities.

Material and Methods

The Sanctuary derives its name from Singhori village and the only highest hill of the area. The Sanctuary is located in Raisen district of Madhya Pradesh and has been notified as *Singhori Wildlife Sanctuary* vide Madhya Pradesh State Forest Department Notification No.15/4/761-x-(2) Bhopal, dated the 2-6-1976 for the purpose of protection, propagation and developing Wildlife and its environment. It is situated on the NH- 12 at 22°45'28.45" North latitudes and 77°15'79.0" East longitudes. It covered 287.91 sq km area in the forest of Vindhyan ranges sprawling on the North of Narmda River in the State. The altitude ranges from 550 to 600 meters.

The type of vegetation is dependent on climatic and biotic factors of that particular area. Climate of sanctuary is generally dry. There are three distinct seasons summer (March to June), winter (November to February) and rainy season (July to September). In March-June with 43°C as average maximum and 27°C as the average minimum temperature. November-February is the coldest months with 10°C as average minimum temperature. The pre-monsoon showers are usually experienced as early as in the end of May, heavy rains come in July, and August after which there is gradual diminution until the monsoon ends in October.

We were the studies during 2010 Jan - 2013 May in selected forest sites included in Badi (16 forest beats) and Bamhori (13 forest beats) range. At each site, survey of both protected and its surrounding forests were carried on. During the field studies, surveys were planned specifically so that flowering and fruiting period of plants should be covered. Generally, plant parts bearing flowers or fruits are selected as the representing herbarium specimens. After collection, poisoning, pressing and drying are the next steps and blotters are used for drying the materials, which are changing at regular intervals till its get dry. Drying specimens then transferred to the ordinary newspapers and kept its ready for poisoning and mounting by following the routine herbarium practices recommended by Singh and Subramaniam¹⁰⁻¹². The specimens are mounted in the standard sized of herbarium sheet and finally data from field books are transferred to the permanent labels of sheets.

Various plants species were studied for the morphological nature of different plants part. All these collection were identified with help of the consultation of relevant literature¹³⁻¹⁷. Specimens were confirmed with the help of Regional Herbarium "Madhya Pradesh" of Botanical Survey of India, central circle at Allahabad. Besides, Information on various uses of plants were recorded from the knowledgeable informants, particularly elderly tribal people.

Results and Discussion

Present study mainly deals with diversity in trees of Singhori Wildlife Sanctuary. In all 126 species belonging to 91 genera and 45 families were recorded. Comprehensive account of trees diversity in the study area is presented in figure 1.

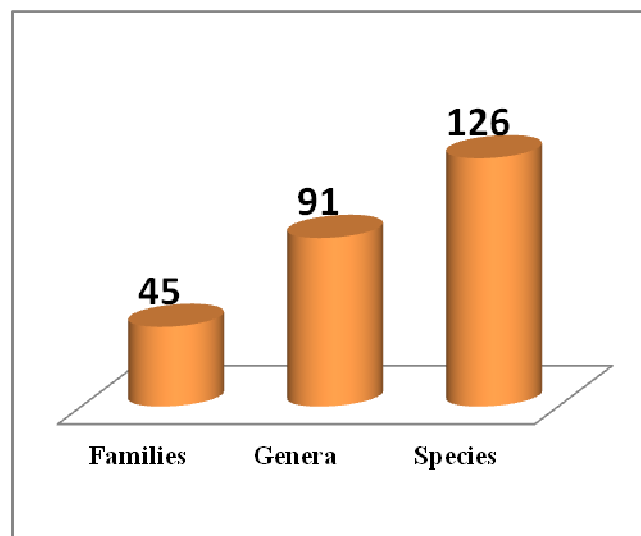


Figure - 1
Tree diversity assessment of SWS

From the above observation, it can be concluded that Papilionaceae was the most dominant family with 7 genera and 9 species, followed by Caesalpiniaceae, Mimosaceae, Euphorbiaceae (list of families with number of genera: species are provided in table 1.) *Ficus* is the most dominated genera in forest, followed by *Albizia*, *Terminalia*, *Grewia* (Genera according to number of species in SWS is provided in table 2.)

Table - 1
Ten most dominant families with Maximum no. of genera and species in the study area

S. No.	Family	No. of Genera	No. of Species
1.	Papilionaceae	7	9
2.	Caesalpiniaceae	7	8
3.	Mimosaceae	6	12
4.	Euphorbiaceae	6	7
5.	Rutaceae	5	6
6.	Tiliaceae	4	4
7.	Anacardiaceae	4	4
8.	Meliaceae	4	4
9.	Moraceae	2	10
10.	Combretaceae	2	7

Table - 2
Five dominant genera based on the number of species.

S. No.	Name of genus	No. of species
1.	<i>Ficus</i>	9
2.	<i>Albizia</i>	5
3.	<i>Terminalia</i>	4
4.	<i>Grewia</i>	3
5.	<i>Acacia</i>	3

In Bamhori range, most dominant species is *Tectona garndis* L. f. *Acacia catechu*, *Buchanania lanzan*, *Butea monosperma*, *Chloroxylon swietenia*, *Diospyros melanoxylon*, *Lannea coromandelica*, *Madhuca longifolia*, *Terminalia alata* are

commonly found in the area. *Acacia pennata*, *Adenia cordifolia*, *Holarrhena antidysenterica*, *Lagerstromia parviflora*, *Sterculia urens*, *Terminalia bellerica*, *Wrightia tomentosa* are common in Bari range of this sanctuary.

A total area is covered with species like *Albizzia odorattissima*, *Anogeissus latifolia*, *Bauhinia racemosa*, *Boswellia serrata*, *Careya arborea*, *Dolichandrone fulcata*, *Flacourtia indica*, *Garuga pinnata*, *Maytenus senegalensis*, *Phyllanthus emblica*, *Terminalia arjuna*. The details of five most dominant species of Singhori Wildlife Sanctuary are given in figure. 2. It is interesting to note that *Tectona grandis* L. f. is the dominant species of Singhori Wildlife Sanctuary while *Shorea robusta* Gaertn. f. is absent from this plateau.

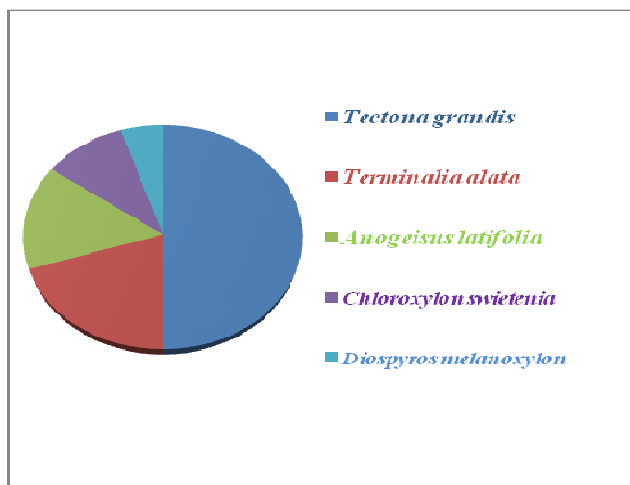


Figure - 2
Five most dominant species of SWS

The dominance of Species like *Tectona grandis* (Teak) in Singhori wildlife Sanctuary area may due to the climatic and physiognomic condition such as presence of low soil moisture and nutrient status. The details of forest type and economics potential of the studied area have been discussed below.

Forest type: Singhori Wildlife Sanctuary is rich in biodiversity, which are frequently interrupted in buffer zone by scrub jungles, grassy patches, crop fields and major concentration of forest is found in the hilly portion. Most of the forests are open and subjected to heavy biotic pressure. The forest adjoining village is a degraded while these are better and dense in the interior. According to revised classification of forests by Seth and Champion, the flora of the sanctuary can broadly be identified into type 5A Southern Tropical Dry Deciduous Forest¹⁸. They can further be placed under the following sub-group: i. 5A/CIV – Southern Tropical Dry Deciduous Dry Teak Forest, ii. 5A/CIII – Southern Tropical Dry Deciduous Mixed Forest, iii. 5A/DSI – Southern Tropical Dry Deciduous Dry Scrub (Degradation stage), iv. 5A/DS4 – Southern Tropical Dry Deciduous Forest Dry Grassland (Degradation stage).

About 60 % of the area of sanctuary bears Teak Forests whereas mixed forests cover 60% area. Bamboo (*Dendrocalamus strictus*) is found in a areas overlapping with the above two types.

The reserve forests and protected forests of Bamhori range occupying the northern, eastern and western part of the sanctuary comes under the dry teak bearing forest area. The most characteristic tree of this area is (Teak) *Tectona grandis* (90 % of the teak). The associates of teak (*Tectona grandis*) in these forest include like *Aegle marmelous*, *Albizzia odorattissima*, *Anogeissus latifolia*, *Azadirachta indica*, *Balanites aegyptiaca*, *Bauhinia racemosa*, *Boswellia serrata*, *Cassia fistula*, *Careya arborea*, *Cordia dichototm*, *Dalbergia paniculata*, *Dolichandrone falcata*, *Ficus benghalensis*, *Flacourtia indica*, *Garuga pinnata*, *Holoptelea integrifolia*, *Kydia calycina*, *Mangifera indica*, *Maytenus senegalensis*, *Mitragyna parviflora*, *Phyllanthus emblica*, *Schleichera oleosa*, *Tamarindus indica*, *Terminalia alata*, *Terminalia arjuna*.

Mixed dry deciduous forests, such type of trees are seen grown in these forests whose duration of leafless is long hence these forests are leafless for many weeks. This type covers the whole of Bari range of the Sanctuary. The altitude of this area ranges from 200 m to 500 m above sea level.. Mixed forest with less than 20 % of teak are common in parts of Bari range. *Acacia catechu*, *Boswellia serrata*, *Buchanania lanzan*, *Butea monosperma*, *Chloroxylon swietenia*, *Cordia gharaf*, *Diospyros melanoxylon*, *Lannea coromandelica*, *Madhuca longifolia*, *Terminalia alata* are commonly found in the area. *Acacia pennata*, *Adenia cordifolia*, *Alangium salvifolium*, *Bridelia retusa*, *Cleistanthus collinus*, *Diospyros cordifolia*, *Ehretia laevis*, *Ficus glomerata*, *Ficus microcarpa*, *Ficus mollis*, *Ficus religiosa*, *Gardenia latifolia*, *Holarrhena antidysenterica*, *Lagerstromia parviflora*, *Litsea chinensis*, *Mallotus phillipensis*, *Mimusops elengi*, *Ougeinia oogeinsis*, *Pongamia pinnata*, *Pterocarpus marsupium*, *Sapindus saponaria*, *Schrebera swieteniodes*, *Sterculia urens*, *Stereospermum chelenoides*, *Strychnos nux vomica*, *Terminalia bellerica*, *Terminalia chabula*, *Wrightia tomentosa*, *Xylia xylocarpa*, *Zizyphus mauritiana* are found in Bari range of Sanctuary. Some of the moist area of beats Kartoli, Bartipur and Bajni contain species such as *Terminalia arjuna* and *syzygium cumini*, *syzygium heyneanum* particularly along streams.

Economic potential of the trees diversity: The study on the plants used by primitive people has received tremendous importance in present time when scientists are searching alternate/additional sources of economics plants to meet the requirements of ever-growing population¹⁹.

The Bheel and Gond advises are main inhabitants living approximately Singhori Wildlife Sanctuary, who still depends largely on their surrounding forests for their sustenance. A considerable amount of knowledge on plant uses is concealed with these people.

An attempt has been made to closely interact with these inhabitants and document first hand information on the specific uses of plants along with their local names. Such economically potential trees of the area have been grouped under different categories as below based on their uses.

Wild- edible fruits: *Aegle marmelos* (Bel), *Annona squamosa* (Sitaphal), *Buchanania lanzan* (Achar), *Diospyros malabrica*, *Diospyros melanoxylon* (Tendu), *Feronia limonia*, *Ficus hispida*, *Ficus racemosa*, *Ficus virens*, *Madhuca longifolia* (Mahua), *Mangifera indica* (Aam), *Phyllanthus emblica* (Aonla), *Prosopis cineraria*, *Syzygium cumini* (Jamun), *Syzygium heyneanum*, *Tamarandus indica* (Imli).

Timber-yielding trees: *Acacia nilotica ssp. indica* (Babul), *Acacia catechu* (Khair), *Alilanthus excelsa*, *Anogeissus latifolia* (Dhaora), *Boswellia serrata*, *Buchanania lanzan* (Achar), *Butea monosperma* (Palas), *Dalbergia paniculata* (Dhobin), *Holarrhena antidysenterica*, *Kydia calycina*, *Lannea coromadelica* (Jhingan), *Mallotus phillippensis*, *Mitragyana parviflora* (Mundi), *Terminalia arjuna* (Arjun), *Tectona grandis* (Sagon), *Wrightia tinctoria*. (Dudhi).

Tannin yielding trees: *Acacia nilotica ssp indica* (Babul), *Anogeissus latifolia*, *Bauhinia racemosa* (Asta), *Buchanania lanzan* (Achar), *Cassia fistula* (Amaltas), *Lagerstromia parviflora* (Seja), *Terminalia alata* (Saj), *Terminalia arjuna* (Arjun), *Terminalia bellerica* (Bahera), *Terminalia chebula* (Harra), *Zizyphus mauritiana* (Ber).

Gum-yielding trees: *Acacia nilotica ssp indica* (Babul), *Acacia Senegal*, *Anogeissus latifolia* (Dhaora), *Boswellia serrata*, *Butea monosperma* (Palas), *Careya arborea* (Kumbhi), *Cochlospermum religiosum*, (Galgal) *Gardenia gummifera*, *Lannea coromandelica* (Jhingan), *Sterculia urens* (Kulu), *Terminalia alata* (Saj)

Rare species: Based on the survey and exploration as well as literature studies, about 18 species of plants have been identified as rare from SWS. *Breymia disticha*, *Crataeva adansonii*, *Cochlospermum religiosum*, *Diospyros cordifolia*, *Embelia basal*, *Gardenia gummifera*, *Hardwickia binata*, *Litsea glutinosa*, *Manikara hexandra*, *Mallotus phillippensis*, *Salvadora oleiodes*, *Schrebera swieteniodes*, *Soymida ciliata*, *Stereospermum tetragonum*, *Strychnos nux vomica*, *Soymida ciliata*, *Toona ciliata*, *Xylia xylocarpa* are rare in the study area.

Conclusion

The Sanctuary is surrounded by small village's insides. The villages of the sanctuary are mostly poor, undeveloped and neglected. However, villages on the periphery are comparatively rich and many developmental activities have benefited there. Almost all the forest villages inside the sanctuary lack basic amenities of food, water and shelter. Besides, all of these are dependent on the Sanctuary for daily needs. The villagers take

their nistar supplies from this area as a result of which whole of the sanctuary area is considerably disturbed.

Although Singhori Wildlife Sanctuary exhibited fare amount of biodiversity, it is under heavy anthropogenic pressure due to agricultural activities and grassing around the sanctuary, which led to habitat loss and degradation.

Over exploitation of biotic resources, need to be checked in order to preserve the precious Singhori Wildlife Sanctuary.

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