

FLORISTIC DIVERSITY OF SINGHORI WILDLIFE SANCTUARY, RAISEN DISTRICT, MADHYA PRADESH, INDIA

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ABSTRACT

The present paper is aimed to study the floristic diversity of Singhori Wildlife Sanctuary of Raichur district situated in Vindhyan Ranges of Madhya Pradesh, India. A total of 570 species (119 trees, 57 shrubs, 339 herbs, 55 climbers) belonging to 382 genera and 120 families were recorded. Among these, families, Papilionaceae (55 species), Poaceae (47 species), Asteraceae (26 species), Acanthaceae (26 species), Euphorbiaceae (23 species) were most dominant families. Of these, Ficus and Ipomoea are largest genera, represented by 9 species, followed by Euphorbia (7) and Indigofera (7). 300 plant species have been recorded and categorized with their uses and 30 medicinal plants were documented for the cure of different diseases by the ethnic people of the study area. The present study is probably first of its kind where the description of plants has been supplemented by photographs, illustrations and herbarium of the species reported from the Singhori Wildlife Sanctuary. Besides, the time consuming process of correct identification of plant species can be minimized, if such flora is easily available at the nearest reference point. Therefore, such kind of flora is the need of time, today and in future.

KEYWORDS: Floristic diversity, Conservation, Singhori Wildlife Sanctuary, Raichur, Madhya Pradesh.

INTRODUCTION

Biological diversity or biodiversity refers to all forms of life, including all species, genetic variants within species and all ecosystems that contain and sustain those diverse forms of life.

Many definitions of biodiversity have been proposed in decades from conservation point of view. According to Conservation on Biological diversity (CBD, 1991) Biological diversity' means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.^[1]

India has rich and varied heritage of biodiversity, encompassing a wide spectrum of habitats from tropical rain forest to alpine vegetation and from temperate forest to coastal vegetation, as well as coastal wetlands.^[2] With only 2.4% of world's total geographic area, India constituted around 8% of world's known biodiversity including high percentage of endemics.^[3]

Many essential elements of biodiversity conservation require sustained commitment, but will not show immediate results. Policies, institutions, laws and attitude

of people, do not change overnight; expanding human capacity, carrying out first-grade research and conducting biodiversity inventories take time and money but may have no immediate pay-off. They create the larger context in which enduring change can take hold and emergency measures have at least a hope of success.

The earth summit in Rio de Janeiro, in 1992 was called for an urgent necessity to conserve biological diversity of the world. It was felt that there is an alarming trend of forests getting transformed in agro-industries.^[4] Natural forests are depleting at a very fast rate. Thus, to protect and conserve the remaining biodiversity, the ministry of Environment and Forest declared certain protected areas.

Biodiversity at all its level, as genetic, species and as intact ecosystems, can be best preserved *in situ* by setting aside an adequate representation of wilderness as protected areas.^[5] These should consist of a network of National parks and Wildlife Sanctuaries with each distinctive ecosystem included in the network. Such a network would preserve the total diversity of life of a region.

The Biogeographic unit of Madhya Pradesh is one of the richest units. There are several protected areas in the state, which have been regarded as fairly large, in terms

of area as well as the vegetation cover. *Kanha National Park* of Madhya Pradesh is one of the best managed National Parks of the country.

The state has 9 National Parks and 25 Wildlife Sanctuaries covering an area of 10,814.76 km,^[2] constituting 3.51% of the total geographical area.^[7] There are 5 Tiger Reserves too.^[6] *Singhori Wildlife Sanctuary* is one of the Wildlife Sanctuaries of the state which is selected for the present treatise.

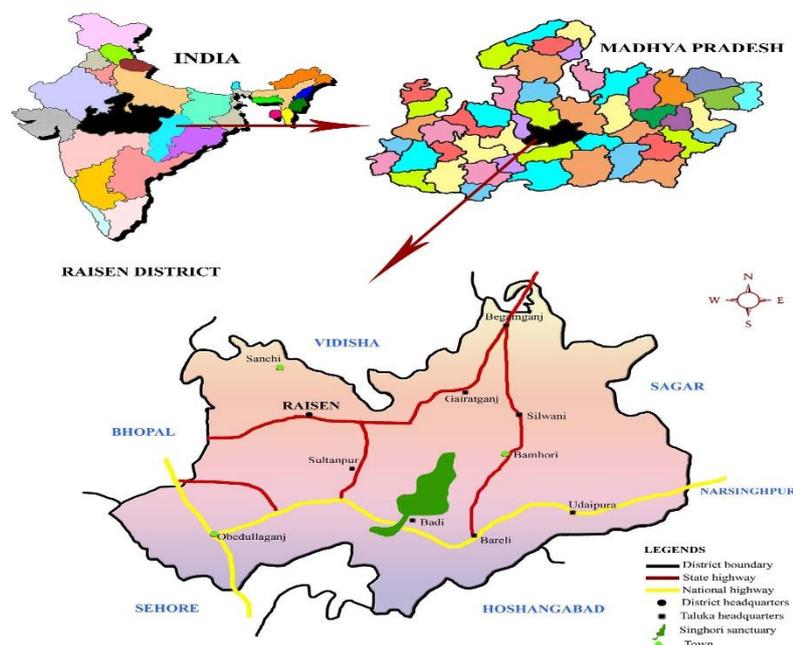
Systematic botany is the field of science that provides for the organisms (a) scientific names (b) description of specific features (c) identification of the taxa (d) assignment to a particular classification system (e) preservation of collected specimen (f) information about their distributions (g) tracing the evolutionary history (h) their adaptations in that particular environment.

The floristic diversity of *Singhori Wildlife Sanctuary* has not been taken up earlier. The exhaustive plant exploration in such areas of the Raisen district whose floristic wealth was not explored earlier, therefore, would definitely result in better understanding of taxonomic status, recent nomenclatural updates, taxonomic clarifications of the existing *Angiospermic* flora and conservation of its phytodiversity.

2. MATERIAL AND METHODS

2.1. Study Area

The *Singhori Wildlife Sanctuary* (hence after referred as Sanctuary) is situated in Raisen district of Madhya Pradesh. It is located at a distance of about 95 km away from Bhopal on National highway No. 12 (Jaipur-Jabalpur Road). The Sanctuary is situated between 22°45'28.45" North latitudes and 77°15'79.0" East longitudes. Sanctuary is extended over 2 Forest Ranges (Bari and Bamhori), comprising of 29 Forest Beats and 94 Compartment numbers. At the time of establishment, its total area was recorded as 287.91km² (28791.42 h) but according to current Management Plan, area of the Sanctuary is extended to 337.62425 km² (33762.425 h), out of which 290.0991 km² is defined as Reserved Forest, 16.508 km² Protected forest and 31.017 km² as Unclassified Forest.^[7]



[Map not to the scale]

Figure 1: Location of Singhori Wildlife Sanctuary, Madhya Pradesh.

According to revised classification of forests by Seth and Champion, the flora of the Sanctuary is categorized into type “5A Southern Tropical Dry Deciduous Forest” and further be placed under the following sub-groups: Southern Tropical Dry Deciduous Dry Teak Forest, Southern Tropical Dry Deciduous Mixed Forest,

Deciduous Dry Scrub (Degradation stage) and Dry Grassland (Degradation stage).^[8]

About 60 % area of Sanctuary is occupied by *Dry Teak Forests*, whereas *Mixed forest* was found to cover 40 % of the study area. Bamboo (*Dendrocalamus strictus*) was found in the area overlapped by the other two types.

2.2 Floristic studies

1. Extensive and intensive field surveys were carried out from July 2010 to June 2014 in all the 29 Forest Beats and 94 Compartments of Bari and Bamhori ranges of the Sanctuary, to identify the *Angiospermic* plant species.
2. Photographs help to a greater extent for identifying plant species, so the snaps of plant representatives found in the Sanctuary, were taken at flowering and fruiting stages.
3. Illustrations were drawn from fresh plant specimens.
4. The plants were identified either by their diagnostic characters in published Floras or by the help of subject experts.^[9-20] These identifications were then confirmed by consulting types and protologues from Herbarium specimens available at Botanical Survey of India, Central Region, Allahabad, National Botanical Research Institute, Lucknow and Grass & Fodder Research Institute, Jhansi.
5. Nomenclature was followed as per the recent *International Code of Botanical Nomenclature* (2000) and the recent monographic and revisionary works are also consulted for the nomenclature.
6. Classification system was followed as proposed by Bentham and Hooker,^[21] with some modification suggested by recent workers and accepted by Botanical Survey of India.
7. Herbarium specimens were prepared by following the method of Jain & Rao (1978).^[22]

3. OBSERVATION AND RESULTS

During the surveys, various sites of the Sanctuary were observed with reference to the life cycle pattern of plant species. The leaf fall and development of new vegetative plant parts, specially the leaves, flowers and fruits was recorded. The woody plants exhibited variation in flowering and fruiting pattern, while the herbaceous flora exhibited short life cycle usually completing in one season (Table-1).

Table 1: Tree species of the Sanctuary with their flowering period and time required for fruiting activity.

Name of Tree species	Flowering period	Fruiting duration (In months)
<i>Holoptelia integrifolia</i>	March-April	Less than 2
<i>Anogeissus latifolia</i>	March-June	3-4
<i>Boswellia serrata</i>	March-June	3-4
<i>Lannea coromandelica</i>	March-June	3-4
<i>Ehretia laevis</i>	September-December	3-4
<i>Semecarpus ancardium</i>	April-July	3-4
<i>Cassia fistula</i>	March-July	4-5
<i>Pterospermum marsupium</i>	June-October	4-5
<i>Wrightia tinctoria</i>	March-July	4-5
<i>Dalbergia latifolia</i>	October-March	5-6
<i>Hardwickia binata</i>	October-March	5-6
<i>Kydia calycina</i>	October-March	5-6
<i>Terminalia chebula</i>	March-August	5-6
<i>Diospyros melanoxylon</i>	March-September	6-7
<i>Lagerstroemia parviflora</i>	March-September	6-7

The tree species were grouped in three categories as "Common", "Abundant" and "Uncommon" to ascertain their occurrence and frequency in the study area (Table-2).

Table 2: Tree species evaluated on the basis of their occurrence.

1	Abundant	13
2	Common	50
3	Uncommon	56

The reported *Angiospermic* flora in the Sanctuary revealed that 570 plant species belonging to 382 genera and 120 families were found. The ratio of number of plant species in Dicotyledonae to that in Monocotyledonae was recorded as 4.37: 1 for plant species and the same ratio was found 4.3: 1 for genera and for 3.8: 1 for families (Table-3).

Table 3: Floristic diversity of Angiosperms in the Sanctuary.

Angiosperm	Families	Genera	Species
Dicotyledons	95	309	463
Monocotyledons	25	73	107
Total	120	382	570
Ratio of Dicot:Monocot	3.8: 1	4.2: 1	4.32: 1

The class wise analysis revealed that the class Dicotyledonae was represented by 463 plant species under 309 genera and 95 families, whereas Monocotyledonae by 107 plant species belonging to 73 genera and 25 families.

Ten dominant families with largest number of representatives were reported. The *Papilionaceae* was found as the largest family with 55 representatives, followed by *Poaceae* (47), *Asteraceae* (26) *Acanthaceae* (26) and *Euphorbiaceae* (23) and so on (Table-4).

Table 4: Ten Dominant families with maximum number of plant species found in the Sanctuary.

S. No.	Families	Number of species
1	Papilionaceae	55
2	Poaceae	47
3	Asteraceae	26
4	Acanthaceae	
5	Euphorbiaceae	23
6	Malvaceae	19
7	Caesalpiniaceae	17
8	Amaranthaceae	12
9	Scrophulariaceae	10
10	Cucurbitaceae	10

The genera represented by largest number of 9 species are *Ficus* and *Ipomoea*, followed by 7 species in *Euphorbia*, *Indigofera* and so on. 62 families were recorded as monogeneric, being represented by single genus and only species (Table-5).

Table 5: Ten Largest Genera with maximum number of plant species found in the Sanctuary.

S. No.	Genera	Number of Species
1	<i>Ficus</i>	9
2	<i>Ipomoea</i>	
3	<i>Euphorbia</i>	7
4	<i>Indigofera</i>	
5	<i>Hibiscus</i>	6
6	<i>Grewia</i>	
7	<i>Phyllanthus</i>	
8	<i>Sida</i>	
9	<i>Acacia</i>	5
10	<i>Albizia</i>	

A comparative statement was prepared taking the two ranges in record. The data revealed that Bari range is more rich with 570 plant species belonging to 382 genera and 120 families, whereas in Bamhori range only 528 plant species were found under 363 genera and 114 families. There were found six families which are represented only in Bari and not at all in Bamhori. There were 20 families represented by more number of plant species in Bari range, as compared to that in Bamhori range.

During the informal surveys, specific efforts were made to interact with the inhabitants closely and to document the primary information regarding specific uses of plants by the people living inside the villages of the study area. About 300 plant species have been recorded and categorized according to their uses and 30 plant species were enlisted for their ethno-medicinal importance (Table-6).

Table 6: Number of Plant species categorised in different groups of economic potential found in the Sanctuary.

S. No.	Categories	Number of Pant species
1.	Cereals	5
2.	Pulses	6
3.	Vegetables	20
4.	Timber yielding plants	33
5.	Wild-edible fruits and Seeds	26
6.	Tannin yielding plants	22
7.	Gum-yielding plants	19
8.	Fibre yielding plants	18
9.	Dye yielding plants	23
10.	Fodder plants	22
11.	Medicinal plants	106
	Total	300

4. DISCUSSION AND CONCLUSIONS

The result indicated that the Sanctuary is rich in its Angiospermic flora accounting for 570 plant species distributed in 382 genera and 120 families.

The habit wise analysis revealed that there are trees, shrubs, climbers and herbs. The herbaceous flora dominates over trees shrubs and climbers. It is interesting to note that about 62 families are represented only by

single genus, of which 15 are of woody plant species and rest herbaceous.

Bari range shows plants belonging to six families which are exclusively found in Bari and are not seen in Bamhori range. In addition, 30 plant species are documented as ethnobotanically purpose. These plant species are used by tribes namely Bheel and Daroi.

Conservation of Nature and Natural resources is by far the most challenging task for the policy planners and academicians in general and scientists in particular. Depletion of flora and fauna has acquired a serious magnitude. Every day large number of plant and animal species are facing the risk of extinction. There is a critical situation never faced before.

The floristic diversity of Sanctuary is said to be very rich. However, for many decades, like-wise world's biological threat, this region has also many causes responsible for the loss of pytodiversity. Human population growth is the sole factor for the loss of natural resources. Reckless hacking and cutting of forests, forest fire, expansion of agricultural lands, construction of dams, roads, over exploration of natural habitats and over-grazing of forest areas have been defined as the main causes for the rapid loss of phytodiversity in the area. It has, therefore necessitated the present work to undertake an extensive study and assessment of the current status of floristic diversity in Singhori Wildlife Sanctuary.

The present study is probably first of its kind where the description of plants has been supplemented by photographs, illustrations and herbarium of the species reported from the *Singhori Wildlife Sanctuary*. Moreover, this research work will give a complete account of the members of Angiospermic in the flora, morphological accounts, distribution status and conservation priorities for *in situ* conservation, relationship among taxa and ethno-botanical species found in the Sanctuary. Besides, the time consuming process of correct identification of plant species can be minimized, if such flora is easily available at the nearest reference point. Therefore, such kind of flora is the need of time, today and in future.

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