CHAPTER 8

VISIT, PROMOTE & SAVE

NAORADEHI
Wildlife Sanctuary
(The Natural Home of Indian Wolf)

Summary & Conclusions
The interest of man in forests goes back to his own origin and history. From stone stage to modern atomic age, there has been a drastic change in the demands of man from the forests ranging from food and shelter to timber, fuel, medicines, pulp and a variety of other products. A sudden explosion in human population and multifarious needs of man has put the existence of forests to a stake. Majority of original forests have been reduced to secondary forests with low productivity and the extent of wild area is also decreased significantly.

Species diversity is the most important component of biodiversity, which stands for species richness. Like other natural resources the distribution of living species in the world is not uniform. India has a rich diversity of flora and fauna due to immense variety of climate and altitudinal zone coupled with varied ecological habitats. Diversity is essential for proper functioning of food chain, hence ecosystem diversity could be best understood if we study the communities in various ecological niches within the tropical ecosystem. Each community has its own relative abundance of species and population complex, which are all related to composition and structure of the biodiversity.

Madhya Pradesh state holds a place of pride in protecting wildlife and wilderness areas and is blessed with breath taking wilderness, splendorous, flora and fauna, with rich biodiversity. Encompassing the major hill systems of natural significance and upper catchments of 4 main river systems, the forest types vary with the agro-climatic zones,
giving rise to at least 5 principal types from the tropical dry thorn forests through tropical dry deciduous forests, tropical semi-moist deciduous forests, tropical moist deciduous forest and to tropical evergreen forests. The state has been known for its rich forest wealth for hundreds of years and finds numerous well deserved eulogistic references in many old nature classics and epics of high reverence.

The specific area of study for the present research work is Naoradehi wild life sanctuary of Sagar, M.P., which was established in 1975, and located at the trijunction of Sagar, Damoh and Narsinghpur districts. It includes reserved and protected forests of Sagar, Damoh and Narsinghpur forest divisions. Geographically it is located at 79°05' and 79°25' East longitude and 23°05' and 23°43' North latitude, at an altitude of about 400-600 (M.S.L.). The sanctuary is situated in the Vindhyan sand stone formation near two major river basins of India, namely Biarma and Bamner, covering total 1,97,042 sq. km. area. Since, there is a difference in actual area and notified area, hence study area was extended to a radius of 65 km in Sagar district.

The sanctuary encloses an entire ecosystem self sufficient with wide range of ecological and geomorphological features of typical Deccan peninsula. All the important wild life species complete their different stages of life cycle with in the sanctuary.

The study (2003-05) was carried out in the dry deciduous forest of Naoradehi sanctuary of Sagar, representing teak mixed forest. The
sanctuary is divided into five ranges. The range wise abstract of study sites is given below.

<table>
<thead>
<tr>
<th>Study site</th>
<th>Area in Hectares</th>
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</thead>
<tbody>
<tr>
<td>(i) Mohali</td>
<td>22,397,251</td>
</tr>
<tr>
<td>(ii) Singhpur</td>
<td>16,209,251</td>
</tr>
<tr>
<td>(iii) Naoradehi</td>
<td>21,433,747</td>
</tr>
<tr>
<td>(iv) Sarra</td>
<td>36,567,999</td>
</tr>
<tr>
<td>(v) Dongargaon</td>
<td>23,095,930</td>
</tr>
<tr>
<td><strong>Total area</strong></td>
<td><strong>1,19,704,278</strong></td>
</tr>
</tbody>
</table>

The present work is attempted to evaluate the current status of forest vegetation of Naoradehi sanctuary. The following aspects were taken into consideration to work out the vegetational ecology of these communities.

- Study of phytosociological attributes, vegetation dynamics and identify the various plant communities occurring at different sites of Naoradehi sanctuary.

- Study of floristic composition and identification of biological spectrum.

- Study of phenological pattern of the vegetation.

- Study of natural regeneration status of various forest trees.

- Study of economically important plants and their utilization for various purposes.
Results of the study showed that, in general *Tectona grandis* appears to be the dominant trees species in five different sites. The other associated species were *Terminalia tomentosa, Butea monosperma, Lagerstroemia parviflora, Diospyros melanoxylon, Cassia fistula, Anogeissus latifolia, Aegle marmelos* and *Zizyphus xylopyra*.

There are shrubs and herbs *Carissa spinarum, Annona squamosa, Cassia tora, Helicteres isora, Nyctanthes arbortristis, Lantana indica, Euphorbia nerifolia, Tribulus terrestris, Vitex negundo* and *Zizyphus mauritiana* are very common alongwith some climbers, epiphytes and grasses.

Floristic composition of the vegetation showed that total 196 species belonging to 152 genera and 49 families of angiosperms have been recorded in different plant communities of Naoradehi sanctuary. Out of these 93 species were of trees, 25 of shrubs, 17 of herbs, 23 of climbers, 3 of epiphytes and 35 of grasses. They belong to 49 families including 44 of dicotyledons and 7 monocotyledons. Depending upon the number of inclusion of species, top-most position is occupied by family *Leguminosae* (Fabaceae) (27 genera, 37 species) followed by Gramineae (Poaceae) (26 genera, 35 species), Rubiaceae (7 genera, 9 species), Combretaceae (3 genera, 7 species), Verbenaceae (5 genera, 6 species) and Euphorbiaceae (5 genera, 6 species).
On the basis of high percentage of generic co-efficient (77.55%) in the sanctuary, it can be inferred that more intergeneric and intragenic competitions exit in the area.

On the basis of the position of the perennating buds on the plants and the degree of their protection during adverse conditions, five different classes of life forms have been reported in the study area.

1. Phanerophytes - 102 species (52.0%)
2. Chamaecophytes - 31 species (15.8%)
3. Geophytes - 4 species (2.0%)
4. Therophytes - 56 species (28.5%)
5. Epiphytes - 3 species (1.5%)

The biological spectrum of the study area has been obtained by calculating the percentage of life forms and compared with Raunkiaer's normal biological spectrum, which indicated the dominance of phanerophytes followed by therophytes, chamaeophyte, geophytes and epiphytes. This pattern of life form showed the overall association of life forms for the study area as "Phanero-therophytic type".

The ethnomedicinal and economical surveys carried out during the study period have revealed valuable informations regarding the uses of various plants. More than 80 medicinal plant species have been short listed after the survey, the information collected from the local people and other sources. Their botanical names, parts used and utility are also provided for the purposes like food, fuel, fodder, resin, gum, clothing, paper, dyes and agricultural implements etc.
Seasonal visits were made for the study of various phenological characteristics such as leaf-fall, leaf lesseness, leafing, flowering and fruit-fall of 35 economically important tree species. The vegetative and reproductive phase of trees has been considered for phenological study and on the basis of certain inter relationships between phenological events, six groups of species has been formed.

1. Species showing discontinuous flowering and leafing periods.
2. Species showing continuous flowering and leafing periods.
3. Species showing overlapping in flowering and leafing periods.
4. Species showing discontinuous periods of fruit-fall and leaf-fall.
5. Species showing continuous periods of fruit-fall and leaf-fall.
6. Species showing overlapping fruit-fall and leaf-fall.

Wild life species are individually adopted to combinations of different types of vegetation cover for feeding and reproduction. If the relationship of individual wild life species to the available vegetational cover is known, then it becomes easier to evaluate the response of wild life to the changes that occur in that particular vegetational cover. The knowledge on this relationship will also help to formulate habitat planning, for a particular wild life species in the area.

The study of natural regeneration of important forest tree species under the existing, silvicultural systems has been made along with various interrelations of environmental factors and the forest trees.
Tectona grandis showed homogenous distribution in most of the area. This species indicated its dominance and ecological success due to its good power of regeneration and greater ecological amplitude and overall influence on the vegetation. The regeneration of Tectona grandis, Terminalia tomentosa, Butea monosperma and Diospyros melanoxylon at all sites observed was better in comparison to the other species viz. Albizzia lebbek, Anogeissus latifolia, Bauhinia racemosa, Aegle marmelos, Randia dumetorum, Wrightia tinctoria and Zizyphus xylopyra etc. Mohali sites was found to have a maximum number of saplings (322), coppices (422) and trees (520); however Dongargaon site has a minimum number of saplings (90), coppices (112) and (512) of Tectona grandis. At Mohali and Naoradehi, Tectona grandis indicated its R.I. values higher (1.43 and 1.28), however at Dongargaon its R.I. value obtained was minimum (0.39). Various assessment attributes of natural regeneration showed that it is poor in these forests. However, coppices regeneration is adequate in different forest trees.

On the basis of information available, it is suggested that for the improvement of teak and other species, grazing and repeated incidences of fire should be controlled and selection-cum-improvement and coppice with standard system should be applied for better natural regeneration and soil and water conservation, in the area.

Phytosociological studies regarding various parameters like, frequency, density, abundance, relative frequency, relative density, relative dominance and importance value index (IVI) have been made in different sites.
Site - I (Mohali):

Among tree species, *Tectona grandis* was the dominant species with highest IVI = 36.48 followed by *Terminalia tomentosa* IVI = 32.01 and *Lagerstroemia parviflora* IVI = 13.29. The other co-dominant species were *Buchanania lanzan* IVI = 10.93, *Butea monosperma* IVI = 10.37, *Diospyros melanoxylon* IVI = 9.32, *Emblica officinalis* IVI = 12.7, *Flacourtia indica* IVI = 8.48, *Miliusa tomentosa* IVI = 7.43 and *Zizyphus xylopyra* IVI = 10.61. The density values for different species varied from a maximum of 2.93, for *Tectona grandis* to a minimum of 0.4, for *Acacia catechu*.

Site - II (Singhpur):

Among tree species, *Tectona grandis* was the dominant species with highest IVI = 25.89 followed by *Terminalia tomentosa* IVI = 24.57 and *Butea monosperma* IVI = 18.61. The other co-dominant species were *Acacia catechu* IVI = 11.05, *Albizzia lebbek* IVI = 8.73, *Cassia fistula* IVI = 7.89, *Diospyros melanoxylon* IVI = 12.6, *Flacourtia indica* IVI = 9.94, *Mitragyna parvifolia* IVI = 12.99, *Wrightia tinctoria* IVI = 7.11 and *Zizyphus xylopyra* IVI = 8.53. The density values for different species varied from a maximum of 3.16, for *Tectona grandis* to a minimum of 0.5, for *Emblica officinalis*.

Site - III (Naoradehi):

Among tree species, *Tectona grandis* was recorded to be main dominant species with highest IVI = 41.72 followed by *Terminalia*
tomentosa IVI = 33.23 and Diospyros melanoxylon IVI = 22.21. The other co-dominant species were Bridelia retusa IVI = 8.4, Butea monosperma IVI = 14.54, Dalbergia paniculata IVI = 9.67, Holoptelea integrifolia IVI = 8.82, Lagerstroemia parviflora IVI = 9.39, Mitragyna parvifolia IVI = 7.51, Pterocarpus marsupium IVI = 10.33 and Zizyphus xylopyra IVI = 8.53. The density values for different species varied from a maximum of 3.06, for Tectona grandis to a minimum of 0.4, for Flacourtia indica.

**Site - IV(Sarra):**

Among tree species, Tectona grandis was recorded to be main dominant species with highest IVI = 39.52 followed by Terminalia tomentosa IVI = 26.81 and Butea monosperma IVI = 27.18. The other co-dominant species were Adina cordifolia IVI = 11.03, Anogeissus pandula IVI = 9.78, Bauhinia racemosa IVI = 12.09, Cassia fistula IVI = 11.89, Emblica officinalis IVI = 12.21, Diospyros melanoxylon IVI = 9.88, Randia dumetorum IVI = 8.24, Wrightia tictoria IVI = 10.17 and Zizyphus xylopyra IVI = 9.66. The density values for different species varied from a maximum of 3.00, for Tectona grandis to a minimum of 0.7, for Randia dumetorum.

**Site - V (Dongargaon):**

Among tree species, Tectona grandis was the main dominant species with highest IVI = 32.23 followed by Terminalia tomentosa IVI = 28.67 and Anogeissus pendula IVI = 22.94. The other co-dominant
species recorded were *Acacia leucophloea* IVI = 8.36, *Bauhinia racemosa* IVI = 9.84, *Bridelia retusa* IVI = 12.03, *Butea monosperma* IVI = 14.35, *Emblica officinalis* IVI = 10.63, *Flacourtia indica* IVI = 8.48, *Randia dumetorum* IVI = 10.07, *Schleichera oleosa* IVI = 8.69 and *Zizyphus xylopyra* IVI = 8.95. The density values for different species varied from a maximum of 3.2, for *Tectona grandis* to a minimum of 0.4, for *Chloroxylon swietenia*.

In conclusion it can be said that the phytosociological studies reveal a reliable picture of vegetation and distribution of species of an area and also to some extent the factors operating on them. These data, thus, are more useful to evaluate the floristic composition of this site.

Importance value index (IVI) is one of the important phytosociological attributes used for community identification and three tree species as per highest value of IVI following community structure were recognized at different study sites. Major type of plant community *Tectona - Terminalia - Butea monosperma* was found in the sanctuary. A total of five different plant communities have been identified in the study area.

The investigation was made in five selected forest sites, which are heterogeneous in their vegetational structure, composition, quality, density and extent. Thus over an area with fairly uniform climate, micro climatic conditions affect the vegetation, resulting in segregation of species to form different stands. Some suggestions have also been proposed for better management of the sanctuary. These include to provide natural habitat to
threatened plant species, use of scientific methods of growing and extraction of economically important species, ban on further construction of any kind of afforestation by fodder tree species, curb on cutting and lopping of trees, plantation of exotic species, renovation of silvicultural nurseries and involvement of local people for better management of the sanctuary.

Results of the phytosociological studies of Naoradehi sanctuary of Sagar district, revealed that the communities are mostly dry deciduous forests having five different vegetation types. The vegetation showed comparatively higher, species richness, diversity and heterogeneity. It is experienced that vegetation is a stress of biotic pressure is gradually transforming into xeric nature. The vegetation can be easily conserved for its diversity and growth by adopting the strategy of reduction of biotic pressure. In this way simply the protection would subsequently produce vegetation with higher proportion of indigenous species.
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