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Tree Diversity of Low Elevation Area of Maand Forest Range, Mukundpur, District Satna (M.P.)

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ABSTRACT

Tree diversity was studied in low elevation of Maand forest range, Mukundpur in Satna Distt, of Madhya Pradesh. These forests were heavily exploited for various commercial and domestical purposes since their existence. The study was conducted during October 2011 to December 2011 using plot sampling. A total of 29 tree species were recorded. All of the species belong to 16 families. The most dominant family was Fabaceae with10 species. Maximum tree species were recorded in innermost part (18) and minimum on outer part (11) of the study site of the forest. Species relationship between the sites reveals that 15 tree species are common in all sites. The mean tree species richness was maximum in Western part (5.0 ± 0.3), followed by North (4.7 ± 0.2) and southern part (4.4 ± 0.2) and minimum in Eastern part (4.1 ± 0.2). Comparison similarity between the sites revealed maximum tree species similarity among Western and Northern sites (62.00%) and minimum between Eastern and Southern sites (41%) respectively. The high similarity index between Western and Northern sites may be due to similar ecological conditions and less human interferences in these regions.

Key words: Maand forest, tree diversity, species richness, similarity index

Introduction

Trees form the major structural and functional basis of tropical forest serving as robust indicators of alteration and stresses at the landscape scale. Tropical forests are often referred to as one of the most species diverse ecosystems, generating a variety of natural resources helping in sustaining the livelihood of local communities (Kumar *et al*., 2006). The vegetation communities in tropical dry forests have been identified as containing some of the most endangered species in the tropics (Hoekstra *et al*., 2005). These forests are deteriorating at an alarming rate due to deforestation mainly for timber and other forest produce (Murphy and Lugo 1986; Raghubanshi and Tripathi 2009). The over dependence and utilization of natural resources by the local communities, resulted in depletion of forest biodiversity (Ramakrishnan, 2003).

Conversion of forest land to other activities is a major threat to the ecosystem functioning and biodiversity depletion (Prentice and Parish, 1990). Species diversity of a given ecosystem represents and regulates its functioning. In tropical forest, soil nutrients play a significant role in the formation of plant communities, species and structural diversity, thus significant for biodiversity conservation and sustainable land use (Karpachevsky, 1977). It becomes necessary to monitor and clarify the spatial dimension of biodiversity and processes as a result of environmental and human land use change. Monitoring and assessing changes in diversity that takes place at a large scale is an important and meaningful biodiversity conservation and management strategy (Chen *et al.,* 2008). Consequently, there is a growing interest in quantifying habitat characteristics including structure, composition and species richness of Indian forests (Nirmal Kumar *et al*. 1999, 2000, 2001, 2002; Yadav & Yadav 2005).

The biodiversity varies with change in altitude and it has been observed that from high to low latitude the biological diversity increases. Therefore the present study undertaken with the objective to study the variations in species richness and species composition of tree species and their conservation status in low elevation of Maand forest range, Mukundpur in Satna District.

Methods

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Study site

The Maand forest is located at a distance of 13 km. in Rewa-Hardi road in Mukundpur, in Satna District, whose Divisional headquarter is Rewa. The Maand forest was declared a "High quality reserve forest" during Darbar period (Singh,1919). It is a type of mixed forest. The forest is known for the best quality of Teak tree in the region.

The 5 km surrounding areas of Maand forest, which is located in southern part of Rewa and Satna District was the study site of the research work. The study site was surrounded by 4 villages-Hardi in the north, Kapurahayee in the south, Semariya in east and Baansee in the west. The low lying 10 ha area of Maand forest was sampled. The study site was divided into 10 plots. Each plot were 1 ha in size. Three plots were located in western direction (Village Bansee, dense forest areas), three in southern (village Kapurahayee, bank of the forest), two in northern (Village Hardi, outer forest), and two were located in Eastern direction (Village Semariya, a distant area from the forest). All species were recorded from field surveys. It was assumed that species composition in each plot represents the species information of the corresponding. The vegetation data for frequency, density, abundance were calculated according to Curtis and McIntosh, (1950). The mean species richness was determined, based on Whittaker (1972). Standard literatures were concerned for identification of species using vegetative and reproductive characters (Gamble & Fischer, 1915–1936; Saldanha & Nicholson, 1976; Pascal & Ramesh, 1987; Saldanha, 1984; Matthew, 1999).

Results

A total of 29 tree species were present at low elevation of study site of Mukundpur forest (Table 3). Maximum tree species were recorded in Dense forest areas (18) and minimum on outer part (11) of the sites. Species relationship between the four sites indicates that 15 trees were common in all of the sites. The mean tree species richness was maximum in Western part (5.0 ± 0.3), followed by North (4.7 ± 0.2) and southern part (4.4 ± 0.2) and minimum on Eastern part (4.1 ± 0.2),) respectively (Table 1 and Fig. 1).

Table 1: Tree species richness at different sites of Maand forest

S.No.	Study site areas	Tree species/100 m2
1.	Northern part	4.7 ± 0.2
2.	Westernpart	5.0 ± 0.3
3.	Eastern part	4.1 ± 0.2
4.	Southern part	4.4 ± 0.2

The Comparison of tree species similarity between the sites revealed maximum similarity among Western and Northern sites (62.00%) and minimum between Eastern and Southern sites (41%) (Table 2).

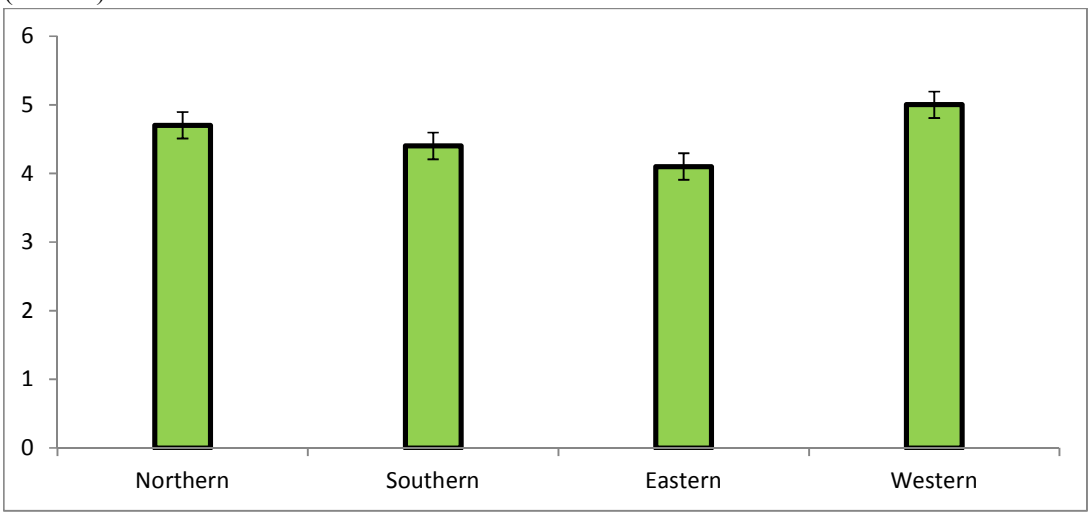

Fig. 1: Tree species richness at various study sites of Maand forest

Table 2: Similarity of Tree species (%) in different sites of Maand forest

Habitat	Northern part	Southern part	Eastern part	Western part
Northern part	100	60.65	55.00	62.00
Southern part		100	44.00	56.00
Eastern part			100	41.00
Western part				100

Table 3: List of tree species existing at the study site of Maand forest

Common name	Local name	Scientific name	Family	Conservation status
Indian laburnum	Amaltas	Cassia fistula L.	Fabaceae	NE
Mango	Mango	Mangifera indica L.	Anacardiaceae	NE
Indian gooseberry	Anwala	Emblica officinalis Gaertn.	Euphorbiacea	NE
Tamarind	Imli	*Tamarindus indica* L.	Fabaceae	NE
Cluster Fig	Goolar	*Ficus glomerata* Roxb.	Moraceae	NE
Common bur-flower	Kadamb	*Anthocephalus cadamba* (Roxb.)	Rubiaceae	NE
Arjun	Kahuya	*Terminalia arjuna* (Roxb.)	Combretaceae	EN
Indian Beech	Karanj	*Pongamia Pinnata*	Fabaceae	NE
Gum Arabic tree	Kikar	Acacia nilotica (L.)	Fabaceae	NE
Elephant apple	Kaitha	*Limonia acidissima* L.	Rutaceae	NE
White Barked Acacia	Reunja	Acacia leucophloea, Willd.	Fabaceae	NE
Indian Elm	Chirul	*Holoptelea integrifolia*	Ulmaceae	NE
Indian Red Wood	Rohina	*Soymida febrifuga* (Roxb.) A. Juss.	Meliaceae	EN
Crepe Myrtle	Senji, Bakli,	*Lagerstroemia parviflora* Roxb	Lythraceae	NE
Rain tree	Siris	*Albizia lebbeck* (L.) Benth.	Fabaceae	NE
Silk cotton tree, Kapok	Semul	Bombax malabaricum DC	Bombacaceae	NE
Sal	Sal	*Shorea robusta* Roth.	Dipterocarpaceae	LC
Teak	Sagon	Tictona grandis Linn	Lamiaceae	
Indian butter tree	Mahua	Madhuca indica	Sapotaceae	VU
Palash	Palas	*Butea monosperma (Lam). Taub.*	*Fabaceae*	NE
Indian Mahogany	Toon	*Toona ciliata*	Meliaceae	EN
Indian rosewood	Shisham	*Dalbergia sissoo*	*Fabaceae*	NE
Yellow Teak	Haldu	*Adina cordifolia* (Roxb.) Hook. f.	Rubiaceae	EN
Black catechu	Khair	*Acacia catechu* (L.f.) Willd. var.	*Fabaceae*	NE
Indian Lilac, Neem	Neem	*Azadirachta indica*	Meliaceae	NE
Java plum	Jamun	*Syzygium cumini* (L.) Skeels.	Myrtaceae	NE
Sandan	Sandan	Ougeinia dalbergioides Benth.	*Fabaceae*	NE
Bodhi tree	Pipal	*Ficus religiosa*	Moraceae	
Indian Tree of Heaven	Maharuk	*Ailanthus excelsa*	*Simaroubaceae*	EN

**EN- Endangered; VU-Vulnerable; LC-Least concerned; NE-Not Evaluated*

Discussion

The tree diversity of the Maand forest is severely threatened by natural, as well as anthropogenic disturbances, such as, tree cutting for fuel wood, fodder, grazing, lopping and litter removal. Various environmental factors, such as elevation and habitat influence the species richness and composition in the region.

Tree species richness shows significant variation in the study area. Greater tree richness was recorded in inner part (Western and Northern part)i.e, dense forest areas. Pant and Samant, (2007) observed that high richness is mainly due to diverse habitats and suitable soil and climatic factors supporting growth and survival of the species. High stem density, edge-core characteristics and high immigration are the important mechanisms of species enrichment in natural fragments (Brokaw, 1998).There is a great diversity in the floristic pattern due to altitudinal variation, and rainfall (Arora, 1995). Additionally, diversity change may be related to initial nutrient condition of the community,

for example, Theresa & Bowman (1997) showed that nutrient enrichment increased biodiversity in poor soils. It indicates that inner part with dense forestation favour the regeneration of many tree species because of the availability of sufficient moisture for seed germination and survival of seedlings and thus the tree species as a whole, and also due to less human interference.

Tree richness was less at outer part of the forest (Eastern and Southern part) which was closed to surrounding villages. The change in diversity components could be due to ecological processes, such as intraspecific aggregation, limited dispersal capacity, habitat selection (Veech *et al.* 2002), precipitation fluctuation and anthropogenic disturbances (Chen 2001; Chen *et al.*, 2002). Forest destruction and fragmentation increases vulnerability of forest community which leads to micro environmental changes that drastically influences the composition forest under-storey (Chen *et al*., 1992; Matlack, 1994; Kapos *et al*., 1995).

Conclusion

The study concludes that the forest area as well as the tree species of Maand forest range are depleting at an alarming rate. Some new decisions has been taken and announced by the government for this forest range that will create rippling in the surrounding ecological system, showing prolong impacts on the ailing forest. Therefore any type of developmental activity that must be designed and implemented should be ecofriendly for the sustainability of the wilderness of the Maand forest.

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