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Diversity and Distribution of Flora in Deoghar District Of Jharkhand, India –A Review

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Abstract - Study of floristic composition of a place, whether natural or man-made, at periodic intervals proves essential in assessment of biodiversity in spatial and temporal scales since many of the constituent species perceive various degrees of threats of extinction. In view of this, the present author prioritized identification and documentation of various plants inDeoghar District of Jharkhand State which is located at 24.48°N and 86.7°E with an average elevation of 254 meters (833 feet). The area proves to be the very important resource base in terms of biodiversity and economy of the region. For its long term sustainability and species conservation proper sustainable management practices and strategies need to be developed.

Keywords - Flora, Floristic, Temperature,Conservation,Sustainability

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INTRODUCTION

Biodiversity is a much-admired term in biological science and has ever in view of the fact that remained a central matter of curiosity in ecology and the science of biodiversity discipline. In current years, many countries have established biological monitoring programs in different ecosystems to assess their state and based on it necessary inference could be drawn to focus the change in state overtime (Yoccoz, et al. 2001).A number of definitions can be found in literature, all saying the same thing in different ways. According to biological diversity advisory committee (1992), Biodiversity can be defined as, “the variety of all life forms –the different plants, animals, and microorganisms; the genes. They contain and the ecosystems of which they form apart. It is not a fixed entity, but constantly changing; it is increased by genetic change and by evolutionary processes and reduced by extinction and habitat degradation.

REVIEW OF LITERATURE

The floristic work in India began with Roxburgh, regarded as the "Father of Indian Botany," who was the first botanist to attempt to create a systematic description of the plants in India in his book Flora Indica (1832), which was published in three volumes. His book, based on the Linnean system, served as the foundation for later study on Indian botany until the release of Hooker‘s monumental work —The Flora of British India (1872–97).

Brandis (1906) published the first comprehensive description of the whole country's tree species in his famous book 'Indian Trees' in the early twentieth century. He named 4,400 species from British India, including trees, shrubs, and woody climbers. Following that, there have been significant changes in the current political boundaries of India in terms of the number of species, distribution of species, and nomenclature of several taxa, but no efforts have been made in recent times to re-evaluate the Indian trees in a comprehensive manner, with the exception of some regional work.

Currently, India's flora is a vestige of just what existed prior to the arrival of civilizations (Mani, 1974). Warner (1982) predicted that around 3000 BC, 80% of India's geographical areas were covered in forest cover, which has since been reduced to 19.1% of the entire land area. Two of the 34 Biodiversity Hotspots (Myers et al., 2000; CIF, 2004) identified are in India. Peninsular India's most important topographic feature is the 1400 km long Western Ghats that run along its western coast, passing through Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra, and Gujarat. With 1550 endemics out of an estimated 4250 vascular plant species, the Western Ghats are India's second biggest endemic centre. According to recent studies (Sasidharan, 2007; Easa, 2003), Kerala has about 5000 kinds of vascular plants, including 1700 endemics. Because many hills in Peninsular India were constructed during the Archaean and Precambrian eras, the Western Ghats are more senile than the Himalayas (Mani, 1974), and hence the genetic stock of the

Western Ghats' biodiversity is the most appealing to both evolutionists and ecologists.

The reassessment of trees of the entire country can only be possible when the information on tree species of all the provinces or phytogeographic eco-regions is available. Thus, several state floras have been prepared and regional assessment have been conducted throughout the country

The initial collection and study of Jharkhand plants may be dated back to 1848-1851, when J.D. Hooker and T. Thomson collected a vast number of plants from various parts of India. The result of their investigation was published as "Flora indica"(1855), which was later expanded and rewritten in seven volumes by J.D.Hooker under the title "British India" (1972- 1897). Campbell spent nearly 30 years in Chotanagpur collecting for his notable study, "The descriptive catalogue of economic products of Chutianagpur (1886)." Ball (1887) worked on several forest products from the Hazaribagh and Manbhum districts. Haines (1910) conducted significant research on the Chotanagpur plateau and published a thorough report titled "A forest flora of Chotanagpur" in 1910, and subsequently published "Botany of Bihar and Orissa" in three sections between 1921 and 1925. Mooney (1950), published supplementary lists to the Haines “Botany of Bihar and Orissa” in which some new plants from Jharkhand region were included, Thompson (1951), Bressers (1955), Sanyal (1957), Ara (1960), Jha (1965), Paul (1967), Ghosh (1971), Majumdar and Biswas (1971), MehrHomji (1971), Mishra (1972), Jain(1973), Verma (1988), Das (1996), Srivastava (2002), Ray (2007) have also contributed towards different aspects of flora of Jharkhand.

The path of taxonomical examination regarding floristic account of the state's tree flora began with Duthie's work. He may be considered the first floristician in this field. However, his work Flora of the Upper Gangetic Plain and of the Adjacent Siwlaik and Sub-Himalayn Tracts (1903-15) has grown long out of date, yet academics still rely on it after a century. Although there is no dispute about the value of this flora even now, it has become significantly out of date due to various changes in the circumscription and naming of many species, as well as reorientation of the state's political limit.

Anburaja (2011) has studied biodiversity and ecosystem functioning of mid elevation forests of Pachamalai Hills, Tamil Nadu and a total of 1041 angiospermic and 4 pteridophytic plants were identified and these were representation form 134 families. In angiosperms, the dicots and monocot contributed 856 and 185 species respectively. They also reported a total number of 2034 species belonging to 903 genera and 171 families from an area of 2031 square kilometer form nearly 49% of the flora of the Kerala state (4679 taxa) and more than 10% of the flora of India.

Anup (2022) studied the plant diversity in six different randomly selected forest sites of the Banka district of Bihar, Eastern India and reported a total of 156 species from the study sites belonging to 131 genera and 58 families (110 dicotyledons, 19 monocotyledons, and 2 pteridophytes). The six largest families in the area were Fabaceae (16 spp.), Poaceae (11 spp.), Rubiaceae (8 spp.), Malvaceae (7 spp.), Moraceae and Euphorbiaceae (6 spp. each). On the basis of different biodiversity attributes, the most diverse site was the MandarBahar site (H=2.96), while the lowest diverse was Chaubatia Village (H=1.58). In the shrub layer, the highest diversity index (H=2.97) was recorded in the BiharuPahar site and the lowest in Chandam Dam (H=2.03). The herb layer had the highest diversity at the Maholia Jungle site (H=2.92) and the lowest at Chaubatia Village (H=2.30). Invasive species such as Chromolaenaodorata and Lantana camara were also reported from various sites. They further recommended that suitable forest management strategies may be devised for the conservation and sustainable utilization of biodiversity of Banka district, Bihar, Eastern India.

Bhellum (2012) assessed the floristic analysis of foot hills of Kashmir Himalayas, of Jammu and Kashmir State, India and a total number of taxa collected from the present area of floristic study was 812, comprising of 804 species, 23subspecies, 34 varieties and 1 forma representing 461 genera belonging to 120 families of the flowering plants.

Bouri and Mukherje (2011) researched floristic composition of the forest areas under Bankati Gram Panchayat in BurdwanDistrict, West Bengal and reported 41 plant species belonging to 40 genera and 29 families of angiosperms. The Generic Coefficient was found to be 97.56 indicating high diversification.

Chavda (2012) has given a contribution to the floristic study and soil characteristics of Victoria park reserve forest Bhavnagar and reported 233 species of plant species. Patel Yatin (2013) has given a contribution to the floristic and phytosociology of Banni region, kachchh district, Gujarat. Ankur and recorded a total number of 233 plant species.

Davidar et al. (2007) studied about 83 species, 68 genera and 40 families in 1.08 ha in the tropical montane forests of Palni hills of the Western Ghats.

Dhimen et al (2020) conducted a work on floristic diversity and vegetation analysis of the upper altitudinal ranges of Morni Hills, Panchkula, Haryana, India and a total of 96 plant species (27 trees, 16 shrubs, 46 herbs and 7 climbers) were recorded in Range-1 while a total of 88 plant species (22 trees, 18 shrubs, 42 herbs and 6 climbers) were recorded in Range 2. They also reported that the explored area was found to be colonized by various invasive plant species, which is an indicator of the area being under acute anthropogenic pressure. They

suggested that some immediate conservation efforts in order to prevent ongoing stress and degradation of the area.

Ekta et al (2020) investigated tree species composition and diversity in forest ecosystem of Ranchi, Jharkhand, India and a total of 30 tree species belonging to 14 families were recorded. Fabaceae was the dominant family having 12 species. Total stem density was found to be 1359.75 individual ha-1. Tree species density varied from 1.25-513.5 individual ha-1. Stem density was found to be maximum (545 ha-1) in the girth class 25-30 cm, which accounts for 40.08% of the total stem density. Basal area varies from 0.053–31.44 m2 ha-1 for different species. Shorearobusta exhibited the highest IVI (48.59) which indicates that the forest is dominated by Shorearobusta trees. Forest showed rich diversity as Shannon-Wiener's index and Simpson's index for trees was found to be 2.46 and 0.83 respectively.

Gopal et al (2017) studied diversity, structure and uses of plants of 100 home gardens in Gumla district of Jharkhand, India and reported a total of 116 species representing 50 families and 102 genera. Dominating family recorded in the gardens was Fabaceae with 20 species. The plant species in home garden were classified as four strata in which the first strata consist of annuals and herbaceous plants (vegetables, medicinal and ornamental). Out of the total documented species, leaves of the 44 species were used followed by fruits (31 species), flowers (25 species) and least one species each for bulb, culm, bark, pods and stem. Majority of the plant species were used as vegetables (51 species) followed by traditional medicines (30 species) and least with two species each for house construction, furniture and agricultural implements. This study presented the baseline data about plant diversity in the home gardens, uses of plants and arrangement of the plants in the home gardens.

Harikesh et al (2022) assessed floristic diversity and vegetation analysis of the community forests of south-west Haryana, India and reported a total of 76 plant species belonging to 37 families in the form of 11 trees, 13 species of shrubs, 46 species of herbs, and 6 species of climbers were also documented from all three sites. Poaceae was the most specious family in three sites. The highest tree diversity was recorded in Bhera forest followed by Daya and Dhanger. They also reported that the forest of Daya has a greater diversity than Bhera and Dhanger forests. Salvadoraoleoides was the dominant tree species in Daya site and Dhanger site while in Bhera the dominant tree species was Ailanthus excelsa. They alarmed that the incidence of rampant livestock grazing and other anthropogenic disturbances were visible in all three sites which are primarily responsible for the degradation of these already fragmented village community forests.

Jha and Khanna (2005) have recorded a total of 456 species of angiosperms in Kanger-valley National Park, Bastar district, Chhatisgarh. A perusal of literature has indicated that 12 species are newly recorded for Chhattisgarh state while 37 taxa are new records for the Bastar district.

Kapoor and Singh (2007) have worked on the biological spectrum, habit; ethnomedicine importance and floristic composition of plants around the railway tract embankment at Jaunpur and reported rich diversity of the area in terms of species richness.

Nainesh and Simesh (2013) studied biodiversity of Gujarat University Campus in Ahmedabad and reported a total of 451 species of flowering plants belonging to 338 genera and 101 families.

Oktavia et al (2021) investigated floristic composition and species diversity in three habitat types of heath forest in Belitung Island, Indonesia and recorded 157, 135, and 31 species in rimba, bebak, and padang, respectively. The top three dominant families of species found were Myrtaceae, Clusiaceae, and Euphorbiaceae. They found that in Rimba, Syzygiumlepidocarpa had the highest IVI for seedlings, Calophyllumlanigerum had the highest IVI for saplings, and Schimawalichii had the highest IVI for trees. In Bebak, Guioapleuropteris had the highest IVI for seedlings, Garciniahombroniana had the highest IVI for saplings, and Schimawalichii had the highest IVI for trees. In Padang, Fimbristylis sp. had the highest IVI for seedlings, while Leptospermum flavescens had the highest IVI for saplings and trees. Some pioneer species were found such as Rhodomyrtustomentosa, Rhodamniacinerea, Syzygiumbuxifolium. They also reported two carnivorous plants Droseraburmannii and Nepenthes gracilis in Padang, indicating that this habitat type is poor in nutrients in the soils. They suggested that the presence of species composition in the three habitat types of heath forest is an essential plant resource to be conserved and sustainably utilized. They further recommended that the establishing reserve areas to protect natural habitat and biodiversity is encouraged in order to provide proper ecosystem function for the people and nature

Padalia et al (2004) studied Andaman Islands of India and reported unique diversity of the area . Further reported that physical isolation of these islands has resulted in the evolution of unique floral and faunal components in this Indo-Malayan region.

Pandey and Pandey (2006) have focused on the species composition, tree density, basal cover and the dynamics of litter fall at Sitamata forest of Rajasthan and reported a total of 31 woody perennials. Total tree density averaged was found to be 2058 individuals per hector.

Pandey et al (2015) carried out work on *Saccharumspontaneum* as an underutilized tall grass for revegetation and restoration programs and reported that *S.spontaneum* has great ability to grow

on bare FA dump sand and can be used as an ecological tool in restoration of vast tracts of fly ash dumps across the world. They also reported that the change in physicochemical properties of abandoned site and compared with naturally colonized site with S. sponta-neum of FA dumps to assess its ecological suitability for restoration of bare FA dump. Further reported that the *S. spontaneum* is a promising and potential tall grass for the restoration of FA dumps.

Pant and Samant (2006) evaluated the plant diversity in a biodiversity rich Mornaula Reserve Forest of the western Himalaya and reported number of endangered plant species.

Patel (2002) have studied eco-floristic and ethno medicinal studies of Taranga Forest in North Gujarat and documented 523 species belonging to 105 families.

Patel (2013) carried out investigation on floral biodiversity of Jessore sanctuary and documented a total of 572 (including 477 dicots and 95 monocots) plant species belonging to 99 families (85 dicots and 14 monocots) and 413 genera (including 350 dicot and 63 monocot).

Prakasha (2007) has identified 415 species of flowering plants belonging to 302 genera and 105 families in the Bhadra Wildlife Sanctuary, Karnataka.

Samant and Joshi (2005) assessed the plant diversity and conservation status of Nanda Devi National Park (NDNP) and compare these with the Valley of Flowers National Park (VOFNP) and Great Himalayan National Park (GHNP). They suggested that monitoring of plant diversity including populations of rare endangered and endemic species are essential for the effective management of these National Parks.

Srivastavaet. al., (2005) have worked on vegetation and floristic account along with essential features of physiographic climate and soil of Sidhi district of Madhya Pradesh and found a total of 692 taxa of flowering plants from differed localities of the district along with the flowering and fruiting period.

Subrahmanya Prasad and Raveendran (2013) have studied floristic diversity in Niliarkottam Sacred Grove in Kannur District, Kerala and identified a total of 187 vascular plants falling under 154 genera and 81 families.

Sukumaran et al. (2008) reported a total of 329 species belonging to 251 genera of 100 families from the miniature sacred forests of Kanyakumari district.

Kumar and Saikia (2020) studied forest resources of Jharkhand, Eastern India and reported the the dominant plant species like Shorearobusta, Diospyrosmelanoxylon, Pterocarpusmersupium, Gloriosasuperba, Buteamonosperma, Madhucalongifolia, etc.

Rahaul and Jain (2014) carried out a work on Documentation of floristic inventory along the national highway of Dhanbad district, Jharkhand, India and recorded a total of 138 plant species belonging to Angiosperms, 2 plants to Pteridophytes and 2 plants toGymnosperms. Among under 53 families and 121 genera during 21 May, 2013 to 30 June, 2014

Supriyadevi and Yadava (2006) conducted the work on a floristic diversity of Manipur situated along the Indo-Myanmar border, North-Eastern India and found a total of 123 species belonging to 48 families. They concluded that the study of diversity index of shrubs and herbs were found to be higher than the tree species. The concentration of dominance was recorded highest in the tree species.

Thomas et al (2004) conducted a research on the study of Satpudamountains in the western Khandesh region and recorded about 1245 species of higher plants which are about 20-30% more than previous records.

Vediya and Kharadi (2011) have studied plant diversity in Megharj range forest District Sabarkantha, North Gujarat and reported 212 plant species and 66 families in particular zone of Isari.

Wanjohi et al (2017) investigated plant species composition, structure and diversity in Nabkoi forest reserve (Kenya) and a total of 285 species belonging to 206 genera and 73 families were recorded in the forest. About 6 species were of greatest importance for both woody and non-woody value in the forest namely Oleahochstetteri, Acanthus eminens, Scutiamyrtina (woody species) Digitariascalarum, Pennisetumcladestinum and Dichondrarepens (non-woody species). They found that the forest habitat had a significantly higher number of woody species than the grassland non-woody species ($P < 0.05$). Species diversity (H') was significantly higher in the forest habitat (3.5-4.5) than in the grassland (2.5 to 3.5). The results demonstrated high species abundance in the forest habitat, They recommended that a taxonomic key need to be generated and a checklist of plant species native to Nabkoi forest reserve to provide baseline information for the study and management of the forest.

CONCLUSION

Biodiversity plays an important role in the overall economy of the region but that is possible only when proper sustainable management of such resources is followed. Because from the last few decades due to the population explosion, industrialization and unsustainable practices of the human beings have put such an important resource at a risk and results in the loss of some very important species of the region.

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