

Tree Species Diversity and Community Structure across Forest Stands of Orang National Park, Assam

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ABSTRACT

The present study was conducted in the Orang National Park (ONP), which is the core area of Orang Tiger Reserve (OTR), Assam. Different category of forest, i.e., Eastern Himalayan Moist Mixed Deciduous Forest (EHMMDF) dense forest, Eastern Himalayan Moist Mixed Deciduous Forest (EHMMDF), Open forest, and swampy Forest (SF) were sampled for detailed investigation of tree species diversity using quadrat method. A total of 45 tree species were recorded from 38 genera and 24 families. There were 39 species belonging to 34 genera and 23 families in the dense forest, whereas 33 species belonging to 29 genera and 20 families were in the open forest, and 17 species belonging to 15 genera and 11 families were recorded in the swampy forest stand. Margalef's species richness index was found to be highest in dense (5.440) and open (5.359) forests and lowest in swampy forest stand (2.312). Based on the Importance Value Index, *Bombax ceiba* is the dominant species in both the dense forest stand and the open forest stand. In the swampy forest stands *Trewia nudiflora*, had highest IVI value exhibiting a dominant species. The Shannon-Weiner diversity index (H') was computed highest (3.198) in the open forest, followed by the dense forest stand (2.845) and swampy forest stand (2.328). On the other side, the Simpson's index of dominance (D) was found to be 0.047, 0.087, and 0.12 in the dense, open, and swampy forest stands, respectively. The Pielou's evenness index (J') was computed as 0.777, 0.915 and 0.822 for the dense, open, and swampy forest stands, respectively. The highest similarity was recorded between dense and open forest (80.55%), followed by dense and swampy (53.57%), and lowest was recorded between open and swampy forest stand (40.8%). The findings from this study provide valuable insights into tree species diversity and the status of the forest which will be helpful for forest biodiversity conservation. Additionally, they can contribute to enhancing future management strategies.

Key words: Orang Tiger Reserve, Forest stands, Tree diversity, Quantitative parameters

INTRODUCTION

Across the globe, forests are complex ecosystem composed of trees, which serve as a buffer for a variety of life forms and creating a distinctive environment (Borah et al. 2021). They act as the main reservoir for biodiversity and are vital for maintain nature's ecological balance (Wapongnungsang et al. 2021). Approximately 4.06 billion ha, which account nearly one-third of the Earth's land, are covered by forests (Anonymous 2020). Tropical forests make up the largest part of the world's forests (45%), followed by boreal (27%), temperate (16%), and subtropical (11%) forest (Anonymous 2020). The Northeastern (NE) region of India is one of the 36 biodiversity hotspots in the world which covers an area of 7,15,342.61 km² (21.76%) of the total surface area of India (Anonymous 2023). Assam is one of the India's largest biodiversity-rich states and holds a vast amount of phytodiversity (Joshi 2020). The forests of Assam had been classified into seven

groups, viz., tropical wet evergreen forests, tropical semi-evergreen forests, tropical moist deciduous forests, tropical dry deciduous forests, subtropical pine forests, subtropical broadleaved hill forests, and littoral and swamp forests (Champion and Seth 1968). The Eastern Himalayan biome represents the region's ecological model, and it is very abundant in endemism when it comes to both floral and faunal diversity (Giri et al. 2019). The present study aims to assess the diversity of trees in different forest types in the core area of Orang Tiger Reserve of Assam, India.

MATERIAL AND METHODS

Study area

The study was carried out in the Orang National Park (ONP), the core area of Orang Tiger Reserve (OTR) in Assam, located about 130 km from the state capital, Guwahati. The park is under the jurisdiction of the Mangaldai Wildlife Division of

the Department of Environment and Forests, Govt. of Assam. Covering an area of 279.60 km², Orang National Park (ONP) extends across the districts of Darrang and Sonitpur along the northern bank of the Brahmaputra River, forming an ecologically significant landscape within the floodplain ecosystem (Fig. 1). The Orang National Park (ONP) lies between the latitudes 26°29' N to 26°36' N and the longitudes 92°15' E to 92°25' E (Anonymous 2021). According to the Biogeographic classification, the ONP comes under 9A: North-East Brahmaputra Valley Province (Rodgers and Panwar, 1988). The habitat of the forest is composed of mainly Eastern Himalayan Moist Mixed Deciduous Forest (3C/C3b), Eastern Seasonal Swamp Forest (4D/SS1), Khair-Sissoo Forest (5/1S2), Eastern Wet Alluvial Grassland (4D/2S2), and Plantations (Champion and Seth 1968). Based on the extent of land cover of the core area and satellite imagery, the wildlife habitat types in the core area of OTR were categorized into nine classes (Sarma 2010). The extent of land cover of the core area of OTR according to satellite imagery data of 2019 is Eastern Himalayan Moist Mixed Deciduous Forest (Dense and Open) (11.2 km² and 12.01 km²), Dry Savannah Grassland (15.52 km²), Wet alluvial Grassland (17.14 km²), Eastern Seasonal Swamp Forest (3.87 km²), Degraded Grassland (8.16 km²), water body (7.05 km²) and sandy area (Dry and Moist) (2.94 km² and 1.4 km²) (Tiger Conservation Plan 2021-30). The ONP has

a Brahmaputra Valley-type mesothermal humid climate (Anonymous 2021). The annual temperature ranges between 18-34°C, and humidity falls under 66%-95% (Begum and Hynniewta 2009). Most of the year's rainfall is concentrated between June and September. The average rainfall in the pre-monsoon period is 400 mm, and the annual rainfall is 2000 mm (Anonymous 2021).

Selection of study sites

Three distinct forest stands within the Orang Tiger Reserve were selected for the study: Eastern Himalayan Moist Mixed Deciduous Forest (EHMMDF) dense, Eastern Himalayan Moist Mixed Deciduous Forest (EHMMDF) Open, and swampy Forest (SF) (Tiger Conservation Plan 2021-30). Sampling was systematically carried out across these forest stands to obtain the requisite data for analysis.

Methods

The study was conducted during the years 2024-2025 using the quadrat sampling method. A total of 200 quadrats (10 x 10 m) were randomly laid across different forest stands comprising 85 quadrats each in dense and open Eastern Himalayan Moist Mixed Deciduous Forest, and 30 quadrats in swampy forest stands. Following (Pandey and Shukla 1999), all adult tree individuals with girth at breast height >30 cm, measured at 1.37 m above ground, were

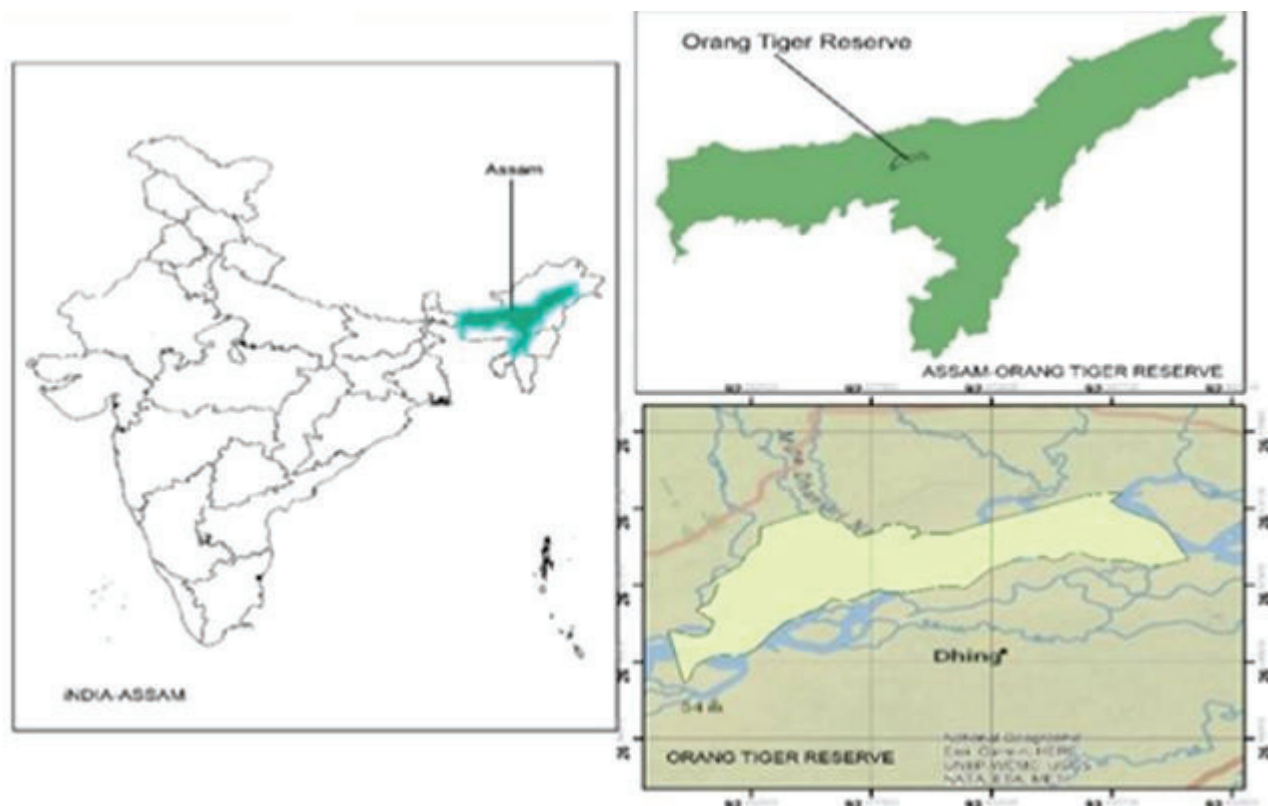


Figure 1. Study area map of the core area of Orang Tiger Reserve, Assam

considered for data collection and analysis. Species identification was carried out using standard floristic references, including 'Flora of Assam' (Kanjilal et al. 1934-1940) and 'The Flora of British India' (Hooker 1872-1897) with additional verification through consultation with plant taxonomists. Species nomenclature was authenticated using online databases such as world flora Online (Anonymous 2025a) and Plants of the World Online (Anonymous 2025b).

Data analysis

Various quantitative characteristics and biodiversity indices were calculated to assess community structure and composition following (Misra 1968) and (Mueller-Dombois and Ellenberg 1974). Biodiversity indices included the Importance Value Index (IVI), (Phillips 1959), Species diversity index (Shannon and Weiner 1949), Species Dominance Index (Simpson 1949), Species Evenness Index (Pielou 1966), Species Richness Index (Margalef 1958), and Sorensen's Similarity Index (Sorensen 1948), were computed.

RESULTS AND DISCUSSION

A total of 45 tree species representing 38 genera and 24 families were recorded from the study area. Among these, 39 species (34 genera and 23 families) were recorded in the dense forest stand, 33 species (29 genera and 20 families) in the open forest stand, and 17 species (15 genera and 11 families) in the swampy forest stand (Table 1). The three forest stands exhibited clear variation in species composition and site-specific distribution patterns (Table 2). Thirteen species were common to all the forest stands, comprising 12 genera and 10 families (Table 2). Sixteen species (15 genera under 14 families) were shared between the dense and open forest stands. Only two species, *Careya arborea* and *Dalbergia sissoo* occurred in both the dense and swampy forest stands. No species were recorded exclusively in

both the open forest and swampy forest stands. Eight species were restricted to the dense forest, whereas four species were confined to the open forest stand. The swampy forest stand contained two unique species, *Dysoxylum binectariferum* and *Ficus* sp.

Margalef's richness index (Dmg) was 5.440 in the dense forest stand, 5.359 in open forest stand, and 2.312 in the swampy forest stand. These values fall within the range reported for Indian forests (4.54 to 23.41) by (Kumar et al. 2010) and (Sathish et al. 2013). The richness value of the swampy stand was also comparable to that reported by (Kumar et al. 2022) (0.57-2.25). Overall, the dense forest stand exhibited the highest species richness, followed closely by the open forest stand, whereas the swampy forest stand showed markedly lower richness. The tree diversity recorded in the present study (45 tree species belonging to 38 genera and 24 families) was lower than that reported from Jeypore Reserve Forest of Assam (94 tree species, belonging to 61 genera under 34 families), Hollongapar Gibbon Wildlife Sanctuary of Assam (75 tree species, belonging to 60 genera under 40 families) (Sarkar and Devi 2014), and Behali Reserve Forest of Assam (118 woody species belonging to 83 genera under 43 families) (Borah et al. 2021). However, species richness was higher than that documented for the Kamrup Sal forest of Assam (25 tree species) (Deka et al. 2012). At the family level, Fabaceae and Meliaceae were the most dominant families in the dense and open forest stands, whereas Fabaceae remained the dominant family in the swampy forest stand.

Tree density varied markedly among the three forest stands, with the highest density recorded in the dense forest (1081 individual ha⁻¹), followed by the swampy forest (1013 individual ha⁻¹) and the open forest stand (392 individual ha⁻¹) (Table 1). These values were comparable to those reported from natural forests of Assam (1045 individuals ha⁻¹) (Gogoi et al. 2021), Gotanagar Reserve Forest, Assam (1008 individuals ha⁻¹) (Kalita and Yumnarn 2025), the edge and interior habitat of Poba Reserve Forest

Table 1. Community characteristics of tree species in the three forest stand of Orang National Park

Phytosociological attributes	Dense forest	Open forest	Swampy forest
Number of species	39	33	17
Number of genera	34	29	15
Number of families	23	20	11
Tree density (individuals ha ⁻¹)	1081	392	1013
Basal area (m ² ha ⁻¹)	82.62	23.54	39.43
Shannon diversity index (H')	2.845	3.198	2.328
Simpson dominance index	0.087	0.047	0.12
Margalef's species richness index (Dmg)	5.440	5.359	2.312
Evenness index (E)	0.777	0.915	0.822

Table 2. Density (individuals ha⁻¹), basal area (m² ha⁻¹) and IVI values of tree species in the three different forest stands of Orang National Park

Species name	Family	Dense forest			Open forest			Swampy forest		
		Density	Basal area	IVI	Density	Basal area	IVI	Density	Basal area	IVI
<i>Acacia catechu</i> (L.F) Wild	Fabaceae	18	2.11	6.54	11	0.409	6.34	10	0.43	3.85
<i>Albizia procera</i> (Roxb.) Benth	Fabaceae	5	0.87	2.66	8	2.644	14.95	3	0.45	2.35
<i>Alstonia scholaris</i> (L.) R.Br.	Apocynaceae	6	0.17	2.22	8	0.121	4.82	23	0.44	4.31
<i>Amoora</i> sp.	Meliaceae	-	-	-	6	0.194	3.49	-	-	-
<i>Aphanamixis polystachya</i> (Wall.) R.Parker	Meliaceae	8	0.29	2.00	12	0.236	6.33	13	0.34	3.95
<i>Bauhinia purpurea</i> L.	Fabaceae	7	0.1	1.07	9	0.146	4.58	-	-	-
<i>Bischofia javanica</i> Blume	Phyllanthaceae	29	2.53	8.14	15	0.613	10.69	37	3.22	13.55
<i>Bombax ceiba</i> L.	Bombacaceae	159	29.82	66.96	33	2.114	28.05	130	9.37	50.75
<i>Bridelia retusa</i> (L.) spreng	Phyllanthaceae	22	1.19	6.45	9	0.552	6.77	-	-	-
<i>Callicarpa arborea</i> Roxb.	Verbenaceae	1	0.02	0.43	-	-	-	-	-	-
<i>Careya arborea</i> Roxb.	Lecythidaceae	2	0.05	0.87	-	-	-	10	0.63	5.23
<i>Cassia fistula</i> L.	Fabaceae	-	-	-	4	0.126	2.60	-	-	-
<i>Chukrassia tabularis</i> A. Juss	Meliaceae	9	0.28	2.09	6	0.873	6.00	-	-	-
<i>Cordia grandis</i> Roxb.	Lamiaceae	2	0.03	0.55	-	-	-	-	-	-
<i>Dalbergia sissoo</i> Roxb.ex DC	Fabaceae	14	1.74	5.47	-	-	-	23	1.67	11.84
<i>Dillenia indica</i> L.	Dilleniaceae	7	0.31	1.32	-	-	-	-	-	-
<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	7	0.62	2.58	15	0.508	10.73	-	-	-
<i>Dysoxylum binectariferum</i> (Roxb.) Hook.f.ex Bedd.	Meliaceae	-	-	-	-	-	-	73	2.05	17.75
<i>Ficus fistulosa</i> Reinw.ex Blume	Moraceae	4	0.35	1.34	-	-	-	-	-	-
<i>Ficus glomerata</i> Roxb.	Moraceae	1	0.79	1.36	1	0.012	0.74	-	-	-
<i>Ficus</i> sp.	Moraceae	-	-	-	-	-	-	7	0.66	3.22
<i>Gmelina arborea</i> Roxb.	Lamiaceae	19	2.58	7.80	16	2.119	18.66	-	-	-
<i>Hymenodictylon excelsum</i> (Roxb.)	Rubiaceae	2	0.04	0.56	-	-	-	-	-	-
<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae	26	0.91	4.68	12	0.234	7.47	-	-	-
<i>Lagerstroemia reginae</i> Roxb.	Lythraceae	180	10.8	43.84	39	1.704	27.90	123	2.74	33.27
<i>Lagerstroemia speciosa</i> (L.) Pers	Lythraceae	118	5.6	28.25	29	2.002	24.96	87	2.37	25.17
<i>Litsea glutinosa</i> (Lour)	Lauraceae	-	-	-	2	0.018	1.58	-	-	-

Species name	Family	Dense forest				Open forest				Swampy forest			
		Density	Basal area	IVI	Density	Basal area	IVI	Density	Basal area	IVI	Density	Basal area	IVI
<i>Litsea</i> sp.	Lauraceae	85	3.97	19.12	27	1.21	19.44	-	-	-	-	-	-
<i>Mallotus philippensis</i> (Lam.) Muell-Arg	Euphorbiaceae	49	0.91	9.49	20	0.214	10.86	140	2.93	34.52	-	-	-
<i>Mallotus tetracoccus</i> (Roxb.) Kurz.	Euphorbiaceae	8	0.3	1.72	1	0.113	1.17	-	-	-	-	-	-
<i>Melia azederach</i> L.	Meliaceae	1	0.21	0.66	-	-	-	-	-	-	-	-	-
<i>Michelia champaca</i> Linn.	Magnoliaceae	9	1.76	3.88	9	1.717	10.01	-	-	-	-	-	-
<i>Neolamarekia cadamba</i> (Roxb.)	Rubiaceae	41	5.46	13.95	14	2.433	17.44	-	-	-	-	-	-
<i>Oroxylum indicum</i> (L.) Vent	Bignoniaceae	9	0.3	2.12	2	0.053	1.60	3	0.11	1.50	-	-	-
<i>Schinus wallichii</i> (DC.) Korth	Theaceae	4	0.06	0.99	-	-	-	-	-	-	-	-	-
<i>Sterculia villosa</i> Roxb.ex DC	Malvaceae	34	1.15	7.79	16	0.313	9.04	30	2.42	13.52	-	-	-
<i>Streblus asper</i> Lour	Moraceae	20	0.43	4.43	8	0.273	4.83	67	2.17	19.17	-	-	-
<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	8	0.13	1.51	6	0.509	4.56	-	-	-	-	-	-
<i>Syzygium</i> sp.	Myrtaceae	25	1.34	7.44	8	0.273	5.21	-	-	-	-	-	-
<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.	Combretaceae	-	-	-	1	0.211	1.45	-	-	-	-	-	-
<i>Terminalia myriocarpa</i> Heurck & Muell-Arg	Combretaceae	7	0.4	1.72	1	0.076	1.01	-	-	-	-	-	-
<i>Tetrameles nudiflora</i> R.Br.	Tetrameleaceae	1	0.08	0.49	-	-	-	-	-	-	-	-	-
<i>Toona hexandra</i> (Wall.ex Roxb.) Roem	Meliaceae	2	0.08	0.91	4	0.165	2.77	-	-	-	-	-	-
<i>Trewia nudiflora</i> L.	Euphorbiaceae	119	4.65	24.56	20	1.035	15.67	233	7.43	56.02	-	-	-
<i>Ziziphus</i> sp.	Rhamnaceae	11	0.19	2.09	16	0.325	8.31	-	-	-	-	-	-

(1000 and 1033.33 individuals ha^{-1} , respectively) (Yumnam and Deori 2024), while they exceed those documented for Hojai and Kumorakata Reserve Forest (240 and 138 individuals ha^{-1} , respectively) (Dutta and Devi 2013). At the species level, *Lagerstroemia reginae* exhibited the highest density in both the dense forest stand (180 individuals ha^{-1}) and open forest stand (39 individuals ha^{-1}), whereas *Trewia nudiflora* showed the highest density in the swampy forest stand (233 individuals ha^{-1}) (Table 2). *Bombax ceiba* also contributed substantially to stand structure, with densities of 159 individuals ha^{-1} in dense forest and 130 individuals ha^{-1} in swampy forest. Basal area was highest in dense forest stand ($82.62 \text{ m}^2 \text{ ha}^{-1}$), followed by the swampy forest stand ($39.43 \text{ m}^2 \text{ ha}^{-1}$) and open forest stand ($23.54 \text{ m}^2 \text{ ha}^{-1}$). In both the dense forest and swampy forest, *Bombax ceiba* accounted for the highest basal area having $29.82 \text{ m}^2 \text{ ha}^{-1}$ and $9.37 \text{ m}^2 \text{ ha}^{-1}$, respectively. *Lagerstroemia reginae* ($10.8 \text{ m}^2 \text{ ha}^{-1}$) in dense forest stand and *Trewia nudiflora* ($7.43 \text{ m}^2 \text{ ha}^{-1}$) in swampy forest stand were the co-dominant species. The open forest stand exhibited relatively low basal area ranging from $0.012 \text{ m}^2 \text{ ha}^{-1}$ (*Ficus glomerata*) to $2.644 \text{ m}^2 \text{ ha}^{-1}$ (*Albizia procera*). Variations in tree density and basal area among stands may be attributed to differences in species composition, age structure, and successional stage of the forest ecosystem (Sarkar and Devi 2014).

Based on the Importance Value Index (IVI) values, *Bombax ceiba* emerged as the most

dominant tree species in the dense forest stand (IVI of 66.96), followed by *Lagerstroemia reginae* (43.84), *Lagerstroemia speciosa* (28.25), and *Trewia nudiflora* (24.56) (Table 2). In the open forest stand, *Bombax ceiba* was identified as the predominant species with an IVI of 28.05, followed by *Lagerstroemia reginae* (27.90), *Lagerstroemia speciosa* (24.96) and *Litsea* sp. (19.44). In contrast, the swampy forest stand was dominated by *Trewia nudiflora* (IVI of 56.02), followed by *Bombax ceiba* (50.75), *Mallotus philippensis* (34.52) and *Lagerstroemia reginae* (33.27). Higher IVI values indicate greater ecological dominance, reflecting a species' competitive ability, regeneration potential, and broader ecological amplitude (Yumnam and Ronald 2022). The highest similarity was recorded between dense and open forest stands (80.55%), followed by dense and swampy forest stands (53.57%). The lowest similarity was observed between open and swampy forest stands (40.8%) (Fig. 2).

A total of 13 species were common across all the three forest stands (Table 2), namely *Acacia catechu*, *Albizia procera*, *Alstonia scholaris*, *Aphanamixis polystachya*, *Bischofia javanica*, *Bombax ceiba*, *Lagerstroemia reginae*, *Lagerstroemia speciosa*, *Mallotus philippensis*, *Oroxylum indicum*, *Sterculia villosa*, *Streblus asper*, and *Trewia nudiflora*. Several species exhibited restricted distribution across forest stands. The dense forest stands have seven unique species: *Callicarpa arborea*, *Dillenia*

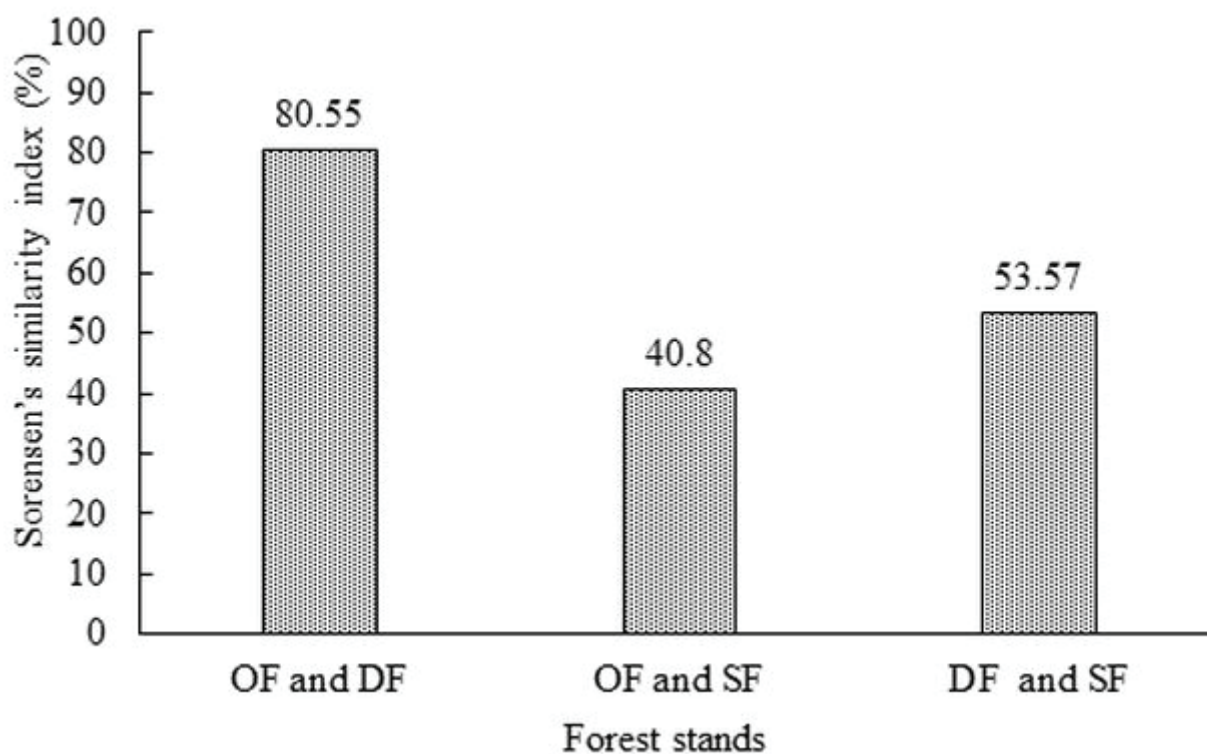


Figure 2. Sorensen's similarity index of tree diversity in forest stands (DF- Dense Forest, OF- Open Forest, SF- Swampy Forest) of Orang National Park

indica, *Ficus fistulosa*, *Hymenodictylon excelsum*, *Melia azederach*, *Schima wallichii*, and *Tetrameles nudiflora*. The open forest stand supported three exclusive species: *Cassia fistula*, *Litsea glutinosa*, and *Terminalia arjuna*. In the swampy forest stand, two species were recorded exclusively: *Dysoxylum binectariferum* and *Ficus* sp. (Table 2). Overall, tree species was predominantly deciduous.

The Shannon-Weiner diversity Index (H') indicates that the open forest stand supported highest diversity index ($H' = 3.198$), followed by the dense forest stand ($H' = 2.845$), whereas the swampy forest stand exhibited the lowest diversity index ($H' = 2.328$). The observed Shannon-Weiner values were higher than those reported from the Hojai Reserve Forest and Kumorakata Reserve Forest, Assam (1.52 and 2.15, respectively) (Dutta and Devi 2013). However, they were comparable to values recorded in planted and natural forests of Assam (2.90 and 2.52, respectively) (Gogoi et al. 2021) and lower than that reported from Kaziranga National Park, Assam (3.59) (Chaudhury et al. 2022). The Simpson's Index of Dominance (D) was recorded as 0.087 in dense forest stand, 0.047 in the open forest stand, and 0.120 in the swampy forest stand. These values were consistent with those reported for Hollongapar

Gibbon Wildlife Sanctuary, Assam (0.05) (Sarkar and Devi 2014); tropical moist deciduous forest of Mizoram (0.07) (Wapongnungsang et al. 2021); and primary and secondary moist deciduous forests of Tripura, Northeast India (0.05-0.13) (Majumdar et al. 2012). Pielou's evenness index (J') was 0.777 in the dense forest stand, 0.915 in the open forest stand, and 0.822 in the swampy forest stand. The value were comparable to that reported from Hollongapar Gibbon Wildlife Sanctuary, Assam (0.82) (Sarkar and Devi 2014), and lower than those documented from Abhoypur Reserve Forest of Assam (0.93-0.99) (Barua and Hazarika 2020).

Analysis of girth class distribution indicated that the 31-60 cm girth class contributed the highest proportion of individuals across all forest stands. The dense forest stand exhibited highest tree density (ha^{-1}) in most girth classes, with 247 individuals ha^{-1} in the 61-90 cm class, 166 in the 91-120 cm class, 96 in the, 121-150 cm class, and 80 individuals in the >150 cm class. However, in the 31-60 cm class, swampy forest stand recorded the highest density (593 individuals ha^{-1}), exceeding that of the dense forest (492 individuals ha^{-1}). Despite having the lowest density (80 individuals) in the >150 cm class, the dense forest stand contributed highest basal area

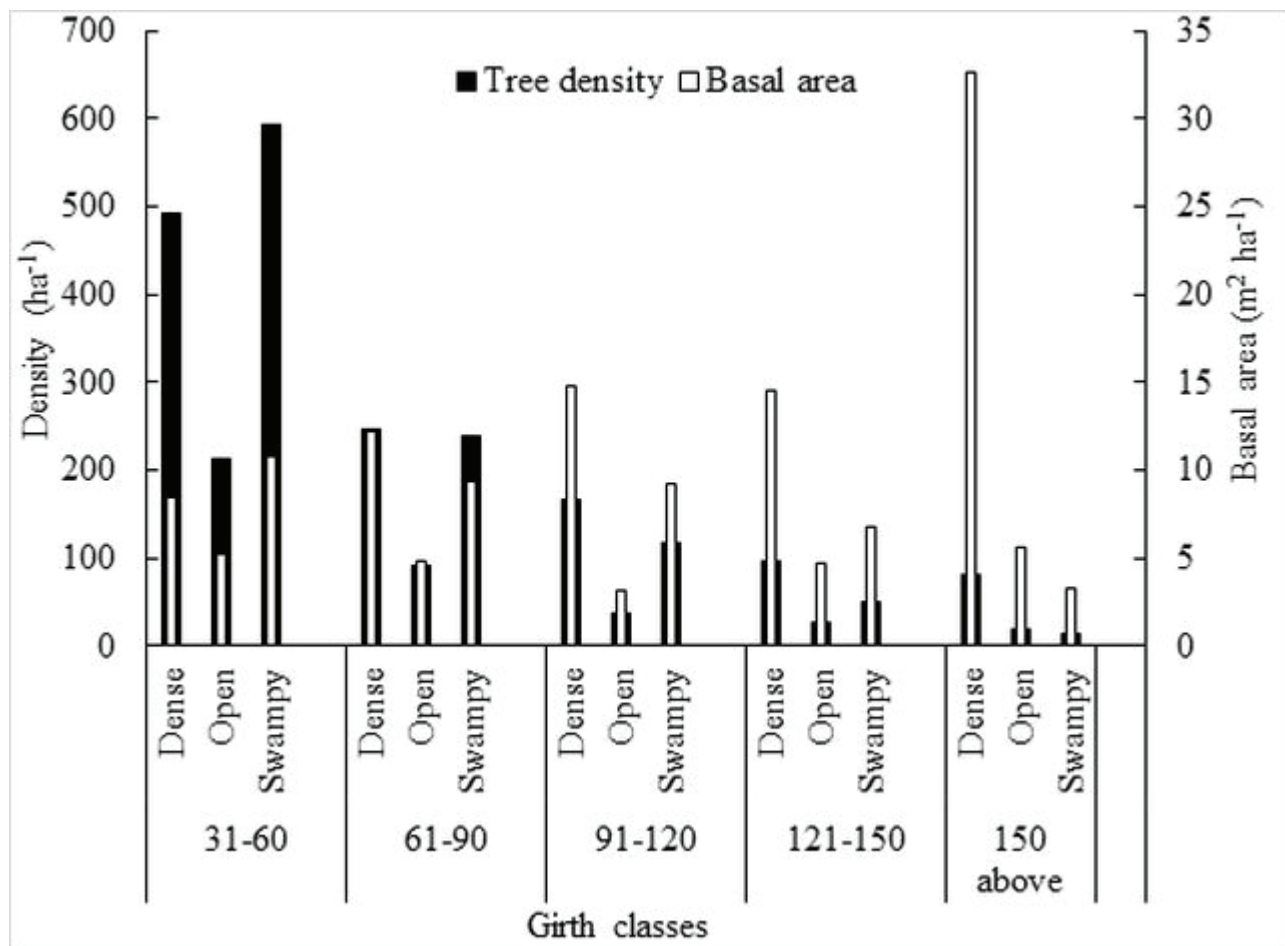


Figure 3. Density (individuals ha^{-1}) and basal area ($\text{m}^2 \text{ha}^{-1}$) recorded in each of the girth class in the three forest stands of Orang National Park

(32.69 m² ha⁻¹), reflecting the dominance of large-sized trees. This trend was consistent when compared with the other forest stands (Anbarashan and Parthasarathy 2012, Naidu and Kumar 2016, Naidu et al. 2018). In contrast, the swampy forest exhibited markedly lower density in the >150 cm girth class, with only 13 individuals (Fig. 3). This pattern may be attributed to differences in site stability and edaphic conditions. The dense forest likely provide more stable soils conditions that support deeper root development, thereby facilitating the growth and persistence of large-girth trees. In contrast, swampy forest is frequently disturbed by seasonal flooding and siltation, resulting in prolonged soil saturation and reduced oxygen availability. Such conditions can constrain root respiration and weaken soil anchorage, making, large trees more susceptible to uprooting in the unstable, waterlogged substrates.

CONCLUSIONS

Vegetation constitutes a fundamental component of major ecosystems and plays a critical role in maintaining biodiversity and providing essential ecosystem services, including habitat provision, carbon storage, and carbon sequestration, highlighting its ecological significance. The present study assessed the structural characteristics of three forest stands in Orang Tiger Reserve, Assam, with particular emphasis on species diversity, density, basal area, and girth class distribution. The findings of the present study highlight significant variation in tree species diversity across different forest types within Orang National Park. The dense and open Eastern Himalayan Moist Mixed Deciduous Forests exhibited comparatively higher species richness and diversity, indicating more favorable ecological conditions for sustaining a wide range of species. In contrast, the swampy forest showed lower richness and diversity, likely due to environmental constraints such as waterlogging and limited habitat heterogeneity. *Lagerstroemia reginae* exhibited the highest density in both dense and open forest stands, whereas *Trewia nudiflora* showed the highest density in the swampy forest stand. Basal area was highest in the dense forest stand, followed by the swampy forest, and lowest in the open forest stand. The dominance of *Bombax ceiba* in both dense and open forests and *T. nudiflora* in swampy forests reflects species-specific adaptation to distinct habitat conditions. Diversity indices further revealed that open forests maintain a more even distribution of species, while swampy forests are comparatively more dominated by fewer species. The high similarity between dense and open forests suggests ecological continuity, whereas the lower similarity with swampy forests indicates distinct species composition.

Across all forest stands, the majority of individuals were concentrated in the lower girth classes, indicating active regeneration and a stable

population structure. The observed dominance of lower girth classes suggests a generally favorable regeneration status for most species. Overall, the results demonstrate that Orang Tiger Reserve harbors considerable tree species diversity. Overall, it emphasize the ecological importance of maintaining all forest types to preserve biodiversity and support informed conservation and management strategies in the region.

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