

Phyto diversity of Chandaka-Dampada wildlife sanctuary of Bhubaneswar, Odisha

Bijaya Kumar Satapathy¹, Ram Prasad Panda², Nirmal Chandra Biswal^{1*}

1Department of Life science and Biotechnology, Gandhi Institute of Engineering and Technology University (GIETU), Gunupur, Rayagada, Odisha, pin-765022

2Gopalpur College, Gopalpur on Sea, Gopalpur city, Berhampur, Ganjam, Odisha – 761002

Correspondence:

Dr Nirmal Chandra Biswal, Assistant Professor, Department of Life science and Biotechnology Gandhi Institute of Engineering and Technology University (GIETU), Gunupur, Rayagada, Odisha, pin-765022.

Email- nirmalb@gmail.com, nirmalb@gieta.edu.

Abstract

The present study investigates the phytodiversity of the Chandaka-Dampara Wildlife Sanctuary, a prominent dry deciduous forest located on the eastern fringe of the Eastern Ghats near Bhubaneswar, Odisha. Comprehensive floristic surveys conducted between 2023-2024 resulted in the documentation of a rich variety of plant species representing different life forms and taxonomic families. Life form analysis revealed a dominance of trees (62.26%), followed by shrubs (37.74%), herbs (16.09%), climbers (12.49%), and grasses and bamboos (10.4%), indicating a structurally diverse and ecologically mature forest ecosystem. The family Fabaceae was identified as the most dominant, contributing nearly 16% of the total recorded flora, followed by Combretaceae, Lamiaceae, and Moraceae, among others. The presence of ecologically significant and ethnobotanically important plant groups reflects both the ecological resilience and socio-economic value of the sanctuary. This study highlights the sanctuary's role as a critical reservoir of biodiversity and underscores the need for ongoing conservation efforts to mitigate the impacts of habitat disturbance and invasive species. The findings serve as a baseline for ecological monitoring, conservation planning, and sustainable management of the region's unique forest resources.

Keywords: Floristic diversity, Chandaka-Dampada wildlife sanctuary, Ecological services, Eastern Ghats, Biodiversity conservation

Citation: Bijaya Kumar Satapathy¹, Ram Prasad Panda², Nirmal Chandra Biswal^{1*}. 2025. Phyto diversity of Chandaka-Dampada wildlife sanctuary of Bhubaneswar, Odisha. *FishTaxa* 36(1s): 192-201.

Introduction

Terrestrial forests constitute indispensable ecosystems, serving as repositories for the preponderance of Earth's telluric biodiversity. Beyond furnishing critical habitats for innumerable taxa, these biomes proffer indispensable ecosystem services to anthropogenic populations (Watson et al., 2018). These provisions encompass climate modulation, carbon sequestration, edaphic fertility sustenance, hydrological purification, and the derivation of sustenance, lignocellulosic materials, pharmacopoeia, and bioenergy (Wani and Sahoo, 2020). The taxonomic richness of arboreal flora, frequently termed phytodiversity or floristic diversity, is instrumental in upholding ecological functionalities and ensuring the homeostasis and adaptive capacity of ecosystems (Naeem et al., 2009). Each species, irrespective of its relative abundance, contributes distinctly to ecosystemic processes, including nutrient biogeochemical cycling, entomophilous or anemophilous pollination, and trophic energy transduction. Consequently, the comprehensive documentation and elucidation of plant biodiversity are imperative not only for conservation initiatives but also for the perpetuation of human socio-economic well-being and the mitigation of global climate alterations (Liu et al., 2018).

India is renowned worldwide for its extensive biological diversity, encompassing a wide array of forest ecosystems, from the alpine flora of the Himalayas to the tropical evergreen and deciduous forests (Singh and Chaturvedi, 2017). The Eastern Ghats, a prominent mountain range in peninsular India, extends across the states of Odisha, Andhra Pradesh, Tamil Nadu, Karnataka, and Telangana (Behera et al., 2024). Despite their considerable geological age and ecological importance, these ranges have historically been subjected to less scientific scrutiny compared to the Western Ghats (Pullaiah et al., 2017). This region sustains a heterogeneous collection of tropical moist deciduous, dry deciduous, and scrub forest biomes, which harbor a multitude of endemic, medicinal, and economically significant plant taxa (Panda et al., 2013). Nevertheless, comprehensive floristic evaluations within the Eastern Ghats have been comparatively infrequent, with only fragmented investigations attempting to catalog their botanical wealth (Tarakeswara et al., 2018).

The Chandaka-Dampada Wildlife Sanctuary, an ecologically significant forest fragment situated on the periphery of Bhubaneswar, the capital of Odisha, constitutes a unique and biologically rich biotope within the Eastern Ghats physiographic region. Spanning an

area of 193.39 square kilometers, the sanctuary is characterized by a mosaic of tropical dry and moist deciduous forest ecosystems. Its topography is defined by undulating relief, elevations, shallow depressions, and ephemeral hydrological features, collectively fostering the establishment of diverse vegetation strata. While primarily recognized for its resident population of *Elephas maximus*, the sanctuary also supports a rich floristic diversity, comprising arboreal, shrub, herbaceous, lianous, and graminoid species, many of which possess documented pharmacological, ecological, or ethnobotanical importance (Goncalves, 2018).

The sanctuary's proximate location to an urban conurbation renders it highly susceptible to ecological perturbation. It experiences escalating anthropogenic stressors, including, but not limited to, alterations in land-use patterns, fragmentation of critical habitats, unauthorized timber extraction, burgeoning infrastructure development, and heightened human-wildlife interactions (Tang et al., 2023; Singh et al., 2025). These multifaceted pressures, synergistically combined with climatic variability and a paucity of comprehensive ecological investigations, precipitate considerable risks to the viability of indigenous phytodiversity. Consequently, a meticulously executed floristic inventory is imperative for the identification of rare, imperiled, or endemic taxa, elucidating species spatial distribution, and informing the development of efficacious management and conservation paradigms (Qazi et al., 2022)

Although prior investigations across diverse Odishan locales, including the Gandhamardan, Mahendragiri, Boudh, and Malyagiri Hills, have yielded significant contributions to the understanding of regional phytodiversity and traditional ethnobotanical practices (Bhadra et al., 2018; Khadanga et al., 2023), comprehensive systematic documentation from the Chandaka-Dampada wildlife sanctuary is conspicuously sparse. Recognizing its considerable potential as a biodiversity hotspot, a thorough floristic assessment of this protected area is imperative. Such an assessment serves not only academic and taxonomic objectives but is also crucial for robust ecosystem surveillance, targeted habitat rehabilitation initiatives, and fostering heightened conservation awareness among indigenous populations and regulatory bodies.

The current research endeavor is designed to systematically catalog the botanical diversity within the Chandaka-Dampada Wildlife Sanctuary. This investigation will specifically classify plant taxa according to their growth habit namely, arborescent, fruticose, herbaceous, and lianous forms and further categorize them based on their utility, encompassing medicinal, silvicultural, alimentary, forage, and ornamental applications. A concurrent objective is to ascertain the presence of any rare or endemic species indigenous to the sanctuary. The ultimate aim of this comprehensive inventory is to establish foundational ecological data essential for subsequent ecological research, biodiversity surveillance, and conservation strategizing. Consequently, this floristic documentation will significantly contribute to biodiversity preservation initiatives in Odisha and facilitate the formulation of sustainable forest management paradigms that harmonize ecological integrity with socio-economic imperatives.

Materials and Methods

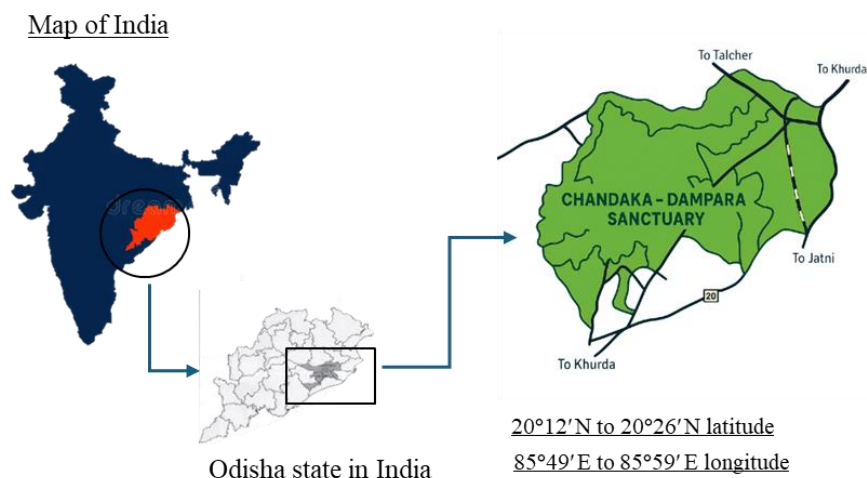


Figure 1. Geographical Position of Chandaka-Dampada Wildlife Sanctuary within Odisha and India

2.1 Field of Study

The Chandaka-Dampada Wildlife Sanctuary, an ecological preserve encompassing approximately 193.39 km², is situated within the Eastern Ghats physiographic province. Its geographical coordinates extend from 20°12' N to 20°26' N latitude and 85°49' E to 85°59' E longitude. This protected area is situated within the administrative boundaries of the Khordha and Cuttack districts of Odisha, serving as a critical ecological ameliorator on the northwestern periphery of Bhubaneswar, the state's principal urban center. The sanctuary's southern and western limits are conterminous with Khordha district, while its northern and eastern boundaries adjoin Cuttack district.

Designated as a wildlife sanctuary in 1982, Chandaka-Dampada is recognized for its substantial biological diversity, having been primarily established for the ex-situ conservation of the Asiatic elephant (*Elephas maximus*). The dominant vegetation community within the sanctuary is characterized as dry deciduous forest, with interspersed enclaves of moist deciduous forest, grasslands, lentic and lotic aquatic systems, and elevated geomorphological features. The peripheral human settlements comprise indigenous and tribal ethnolinguistic groups, including the Saora, Gond, and Munda communities, whose traditional subsistence strategies are intrinsically linked to forest-derived resources. The sanctuary fulfills crucial ecological, hydrological, and anthropogenic functions within the regional landscape, supporting a diverse array of biotas. Demographics from the 2011 Census indicate that Khordha district has a total population of 2,251,673, a segment of which exhibits direct or indirect socioeconomic dependence on the forest ecosystem.

2.2 Forested Landscape

The Chandaka-Dampara Wildlife Sanctuary, a critical biodiversity hotspot, occupies an area of approximately 193.39 km² on the northwestern periphery of Bhubaneswar, the capital city of Odisha. This sanctuary functions as a vital ecological corridor, integrated within the Eastern Ghats biogeographic zone. Its vegetation is primarily characterized by xeric deciduous forests, punctuated by mesic deciduous enclaves and herbaceous strata (Debata and Swain, 2020). Dominant arboreal species include *Shorea robusta*, forming extensive sal forests, alongside mixed deciduous formations, bamboo thickets, and open scrubland. According to Forest Survey of India (FSI) assessments, a substantial proportion of the sanctuary maintains moderate to high forest canopy density, underscoring its contribution to regional biodiversity and ecosystem equilibrium. This arboreal habitat provides crucial refuge for a diverse faunal assemblage, including *Elephas maximus*, *Panthera pardus*, *Muntiacus muntjak*, *Sus scrofa*, and a variety of avian species. Nevertheless, the sanctuary faces escalating anthropogenic pressures, including urban sprawl, habitat fragmentation, illicit encroachment, and other human-induced disturbances. Conservation strategies implemented by the Forest Department encompass habitat remediation, anti-poaching initiatives, and reforestation programs, aimed at safeguarding extant forest cover and sustaining ecological connectivity within the region (Negi and Hajra, 2007; Murphy, 2007; Dogra et al., 2010).

2.3 Climate

Chandaka-Dampada Wildlife Sanctuary is characterized by a tropical savanna climate (Aw), exhibiting well-defined phenological seasons: a hot and xeric pre-monsoon period (March to June) with ambient temperatures reaching hyperthermic levels (45oC); a comparatively thermic and xeric post-monsoon period (November to February) experiencing minimum temperatures approaching hypothermic values (12oC). The sanctuary's hydroperiod is predominantly influenced by the southwest monsoon (June to September), accounting for the majority of the annual precipitation (1200–1500 mm). Atmospheric humidity is typically elevated (>80%) during the monsoon, subsequently decreasing significantly during the winter. This seasonal pluviometric regime underpins the deciduous phenology and floristic composition of the sanctuary. The prevailing climatological parameters are conducive to the proliferation of tropical dry deciduous forest formations, which constitute the dominant vegetation physiognomy within the sanctuary. Nevertheless, recent anomalous precipitation patterns and protracted xerophytic conditions have presented significant challenges to vegetation recruitment and hydrological resource availability for the indigenous fauna (Mishra et al., 2022).

2.4 Sample collection and Identification

To achieve a robust and representative assessment of phytodiversity, sampling protocols employed both probabilistic and systematic approaches. Botanical specimens, encompassing arboreal, shrub, herbaceous, lianescent, and graminoid life forms, were meticulously collected in accordance with established herbarium methodologies. Concurrent field documentation included georeferenced coordinates, ecological niche characterization, developmental phenology, and any pertinent ethnobotanical applications. After collection, specimens underwent standardized processing, involving tagging, pressing, desiccation, and preparation for taxonomic assignment. Specimen identification was facilitated through reference to regional botanical treatises (“Flora of Odisha”), dichotomous keys, digital taxonomic repositories (The Plant List, eFloras), and collaborative validation with subject matter specialists. Verified accessions were subsequently accessioned into the institutional herbarium of the Department of Botany, serving as a permanent reference collection (Devi and Behera, 2003).

2.5 Herbarium Specimens preparation

The botanical samples acquired during the floristic inventory of the Chandaka-Dampada Wildlife Sanctuary underwent meticulous preparation following established herbarium protocols. Post-collection, specimens were promptly subjected to desiccation in situ utilizing absorbent paper and mobile ligneous plant presses. Each individual specimen was furnished with a preliminary data tag, delineating the unique accession number, date of procurement, precise geographic locality, prevailing habitat conditions, observed life form, and the name of the collecting botanist. Upon translocation to the laboratory, the pressed botanical materials were subjected to controlled dehydration under conditions of moderate thermic input and attenuated light to safeguard their structural integrity and intrinsic pigmentation. Subsequently, the desiccated specimens were affixed to standard herbarium sheets (measuring 42 × 28 cm) employing either adhesive resin or securing tape. A comprehensive taxonomic label was appended to each sheet, encompassing the definitive taxonomic designation, familial classification, precise collection locality, pertinent ecological data, phenological observations, and any documented ethnobotanical applications. Verification of identification was achieved through rigorous

comparative analysis with regional floristic treatments, specialized botanical monographs, and authenticated reference specimens housed in recognized herbaria. The resulting vouchered herbarium specimens were subsequently accessioned and systematically cataloged within the Department of Botany herbarium, serving as invaluable resources for future scholarly inquiry, pedagogical endeavors, and comprehensive biodiversity documentation (Jain and Rao 1977; Forman and Bridson, 1989)

Result

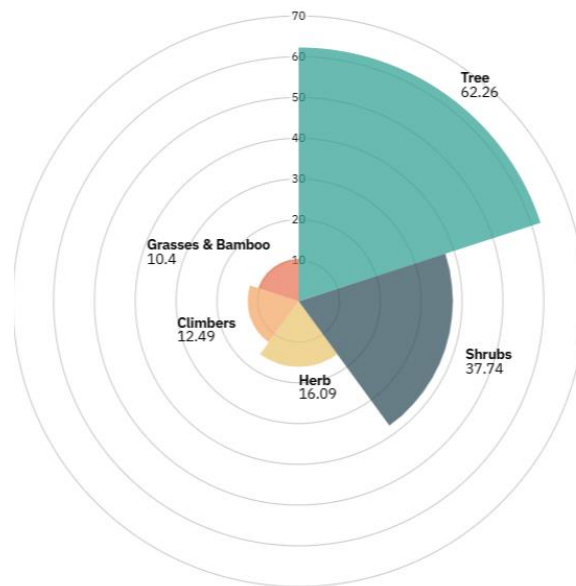


Figure 2. Life Form Distribution (%) of plant species in the Floristic Diversity of Chandaka-Dampara Wildlife Sanctuary, Bhubaneswar, Odisha, India

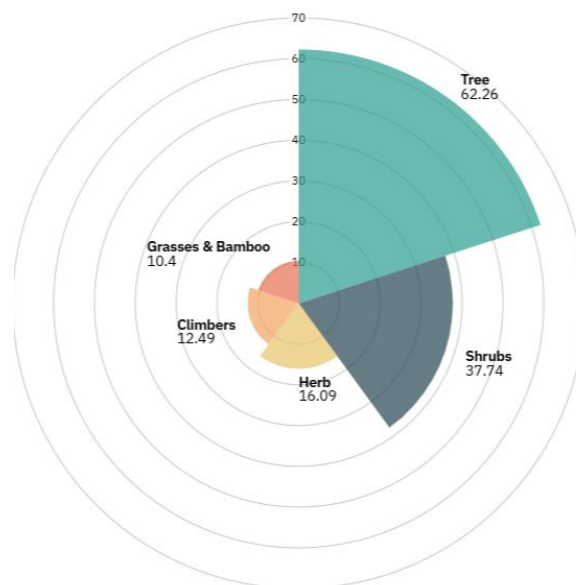


Figure 3. Dominant Plant Families from the floristic diversity of Chandaka-Dampara Wildlife Sanctuary, Bhubaneswar, Odisha

Table.1 Floristic Composition and Primary Uses of Tree Flora in Chandaka-Dampara Wildlife Sanctuary, Bhubaneswar

Sl. No.	Botanical Name	Family	Primary Uses	Habit
1	<i>Shorea robusta</i>	Dipterocarpaceae	Timber, medicinal	Tree
2	<i>Madhuca indica</i>	Sapotaceae	Edible, oil, medicinal	Tree
3	<i>Terminalia arjuna</i>	Combretaceae	Cardiovascular medicine	Tree
4	<i>Terminalia bellirica</i>	Combretaceae	Ayurvedic (Triphala)	Tree
5	<i>Terminalia chebula</i>	Combretaceae	Digestive, medicinal	Tree
6	<i>Diospyros melanoxylon</i>	Ebenaceae	Beedi leaf, fruit	Tree
7	<i>Syzygium cumini</i>	Myrtaceae	Edible fruit, diabetic aid	Tree
9	<i>Azadirachta indica</i>	Meliaceae	Medicinal, pesticidal	Tree
10	<i>Butea monosperma</i>	Fabaceae	Dye, fodder	Tree
11	<i>Albizia lebbek</i>	Fabaceae	Timber, shade	Tree
12	<i>Cassia fistula</i>	Fabaceae	Laxative, ornamental	Tree
13	<i>Pongamia pinnata</i>	Fabaceae	Biofuel, antimicrobial	Tree
14	<i>Mangifera indica</i>	Anacardiaceae	Edible fruit, timber	Tree
15	<i>Tamarindus indica</i>	Fabaceae	Edible fruit, digestive aid	Tree
16	<i>Ficus religiosa</i>	Moraceae	Sacred, soil binder	Tree
17	<i>Ficus benghalensis</i>	Moraceae	Shade, ecological significance	Tree
19	<i>Tectona grandis</i> (Teak)	Lamiaceae	Timber	Tree
20	<i>Ailanthus excelsa</i>	Simaroubaceae	Medicinal, timber	Tree
21	<i>Saraca asoca</i>	Fabaceae	Women's health	Tree
23	<i>Gmelina arborea</i>	Lamiaceae	Timber	Tree
24	<i>Dillenia indica</i>	Dilleniaceae	Edible, medicinal	Tree
25	<i>Ficus racemosa</i>	Moraceae	Medicinal, edible	Tree
26	<i>Mitragyna parvifolia</i>	Rubiaceae	Timber, medicine	Tree
28	<i>Diospyros peregrina</i>	Ebenaceae	Edible fruit, dye	Tree
29	<i>Careya arborea</i>	Lecythidaceae	Edible fruit, medicinal	Tree
30	<i>Anogeissus latifolia</i>	Combretaceae	Fuelwood, tannin	Tree
31	<i>Madhuca longifolia</i>	Sapotaceae	Timber, edible seed oil	Tree
32	<i>Pterospermum acerifolium</i>	Malvaceae	Ornamental, timber	Tree
33	<i>Spondias pinnata</i>	Anacardiaceae	Edible fruit	Tree

Table.2 Shrub Diversity and Ethnobotanical Uses in Chandaka-Dampara Wildlife Sanctuary, Bhubaneswar, Odisha

Sl. No.	Botanical Name	Family	Primary Uses	Habit
1	<i>Calotropis gigantea</i>	Apocynaceae	Fiber, traditional medicine	Shrub
2	<i>Clerodendrum infortunatum</i>	Lamiaceae	Treats fever, inflammation	Shrub
3	<i>Vitex negundo</i>	Lamiaceae	Anti-inflammatory agent	Shrub
4	<i>Lantana camara</i>	Verbenaceae	Ornamental, invasive species	Shrub
5	<i>Adhatoda vasica</i>	Acanthaceae	Respiratory medicine (cough, asthma)	Shrub
6	<i>Lawsonia inermis</i>	Lythraceae	Natural dye, hair care (henna)	Shrub
7	<i>Ziziphus mauritiana</i>	Rhamnaceae	Edible fruit, live fencing	Shrub
8	<i>Ipomoea carnea</i>	Convolvulaceae	Fodder, ornamental foliage	Shrub
9	<i>Rauvolfia serpentina</i>	Apocynaceae	Antihypertensive, tranquilizer	Shrub
10	<i>Flemingia strobilifera</i>	Fabaceae	Fodder, soil erosion control	Shrub
11	<i>Capparis zeylanica</i>	Capparaceae	Medicinal uses, edible flower buds	Shrub
12	<i>Flacourtia jangomas</i>	Salicaceae	Edible fruit, folk medicine	Shrub
13	<i>Carissa carandas</i>	Apocynaceae	Edible fruit, digestive & tonic	Shrub
14	<i>Vitex trifolia</i>	Lamiaceae	Insect repellent	Shrub
15	<i>Sarcandra glabra</i>	Chloranthaceae	Medicinal, ornamental foliage	Shrub
16	<i>Lasianthus ciliatus</i>	Rubiaceae	Used in traditional medicine	Shrub
17	<i>Leea indica</i>	Vitaceae	Diuretic, ornamental shrub	Shrub
18	<i>Sapindus mukorossi</i>	Sapindaceae	Soap-nut, natural detergent	Shrub
19	<i>Pterocarpus marsupium</i>	Fabaceae	Timber (young stage), antidiabetic remedy	Shrub
20	<i>Murraya koenigii</i>	Rutaceae	Culinary use (curry leaves), medicinal	Shrub

Table 3. Bamboo and Grass Diversity and Ethnobotanical Uses in Chandaka-Dampara Wildlife Sanctuary, Bhubaneswar, Odisha

Sl. No.	Botanical Name	Family	Primary Uses	Habit
1	<i>Cynodon dactylon</i>	Poaceae	Soil binder, wound healer	Grass
2	<i>Imperata cylindrica</i>	Poaceae	Fodder, erosion control	Grass
3	<i>Andropogon pumilus</i>	Poaceae	Grassland stabilizer	Grass
4	<i>Saccharum spontaneum</i>	Poaceae	Erosion control	Grass (Tall)
5	<i>Dendrocalamus strictus</i>	Poaceae (Bamboo)	Building material, furniture	Bamboo
6	<i>Bambusa bambos</i>	Poaceae (Bamboo)	Construction, crafts	Bamboo (Woody)
7	<i>Cenchrus ciliaris</i>	Poaceae	Fodder, grazing	Grass (Tufted)
8	<i>Vetiveria zizanioides</i>	Poaceae	Erosion control, perfume (vetiver oil)	Grass (Clumping)
9	<i>Eragrostis unioides</i>	Poaceae	Lawn cover, fodder	Grass
10	<i>Panicum repens</i>	Poaceae	Wetland groundcover, fodder	Grass (Creeping)
11	<i>Thysanolaena maxima</i>	Poaceae	Broom grass	Grass (Tall)
12	<i>Munroa squarrosa</i>	Poaceae	Forage, ground cover	Grass (Prostrate)
13	<i>Drepanostachyum falcatum</i>	Poaceae (Bamboo)	Bamboo craft	Bamboo
14	<i>Ochlandra travancorica</i>	Poaceae (Bamboo)	Mats, crafts	Bamboo
15	<i>Melocanna baccifera</i>	Poaceae (Bamboo)	Edible bamboo shoots	Bamboo
16	<i>Schizostachyum pergracile</i>	Poaceae (Bamboo)	Poles, construction	Bamboo

Table 4. Climber Diversity and Ethnobotanical Uses in Chandaka-Dampara Wildlife Sanctuary, Bhubaneswar, Odisha

Sl. No.	Botanical Name	Family	Primary Uses	Habit
1	<i>Cynodon dactylon</i>	Poaceae	Soil binder, wound healer	Grass
2	<i>Imperata cylindrica</i>	Poaceae	Fodder, erosion control	Grass
3	<i>Andropogon pumilus</i>	Poaceae	Grassland stabilizer	Grass
4	<i>Saccharum spontaneum</i>	Poaceae	Erosion control	Grass (Tall)
5	<i>Dendrocalamus strictus</i>	Poaceae (Bamboo)	Building material, furniture	Bamboo
6	<i>Bambusa bambos</i>	Poaceae (Bamboo)	Construction, crafts	Bamboo (Woody)
7	<i>Cenchrus ciliaris</i>	Poaceae	Fodder, grazing	Grass (Tufted)
8	<i>Vetiveria zizanioides</i>	Poaceae	Erosion control, perfume (vetiver oil)	Grass (Clumping)
9	<i>Eragrostis unioides</i>	Poaceae	Lawn cover, fodder	Grass
10	<i>Panicum repens</i>	Poaceae	Wetland groundcover, fodder	Grass (Creeping)
11	<i>Thysanolaena maxima</i>	Poaceae	Broom grass	Grass (Tall)
12	<i>Munroa squarrosa</i>	Poaceae	Forage, ground cover	Grass (Prostrate)
13	<i>Drepanostachyum falcatum</i>	Poaceae (Bamboo)	Bamboo craft	Bamboo
14	<i>Ochlandra travancorica</i>	Poaceae (Bamboo)	Mats, crafts	Bamboo
15	<i>Melocanna baccifera</i>	Poaceae (Bamboo)	Edible bamboo shoots	Bamboo
16	<i>Schizostachyum pergracile</i>	Poaceae (Bamboo)	Poles, construction	Bamboo

Table 5. Herb Diversity and Ethnobotanical Uses in Chandaka-Dampara Wildlife Sanctuary, Bhubaneswar, Odisha

Sl. No.	Botanical Name	Family	Primary Uses	Habit
1	<i>Achyranthes aspera</i>	Amaranthaceae	Kidney support, wound healing	Herb (Erect)
2	<i>Phyllanthus niruri</i>	Phyllanthaceae	Liver tonic, jaundice	Herb (Small)
3	<i>Solanum nigrum</i>	Solanaceae	Leafy vegetable, liver health	Herb (Annual)
4	<i>Ocimum tenuiflorum</i>	Lamiaceae	Sacred basil, immunity booster	Herb (Shrubby)
5	<i>Boerhavia diffusa</i>	Nyctaginaceae	Diuretic, anti-inflammatory	Herb (Spreading)
6	<i>Eclipta prostrata</i>	Asteraceae	Hair care, liver tonic	Herb (Prostrate)
7	<i>Abelmoschus moschatus</i>	Malvaceae	Perfumery, seed use	Herb (Tall)
8	<i>Cassia tora</i>	Fabaceae	Skin treatment, laxative	Herb (Weedy)
9	<i>Amaranthus spinosus</i>	Amaranthaceae	Edible green, medicinal	Herb (Spiny)
10	<i>Centella asiatica</i>	Apiaceae	Brain tonic, wound healing	Herb (Creeping)
11	<i>Emilia sonchifolia</i>	Asteraceae	Fever, skin ailments	Herb (Erect)
12	<i>Ageratum conyzoides</i>	Asteraceae	Wound healing, antifungal	Herb (Weedy)

13	<i>Piper longum</i>	Piperaceae	Spice, respiratory remedy	Herb (Climbing)
14	<i>Curcuma longa</i>	Zingiberaceae	Spice (turmeric), anti-inflammatory	Herb (Rhizomatous)
15	<i>Zingiber officinale</i>	Zingiberaceae	Digestive, spice (ginger)	Herb (Rhizomatous)
16	<i>Zea mays</i>	Poaceae	Fodder, edible corn	Herb (Tall grass)
17	<i>Mentha arvensis</i>	Lamiaceae	Medicinal, culinary (mint)	Herb (Aromatic)
18	<i>Datura metel</i>	Solanaceae	Sedative, toxic	Herb (Shrubby)
19	<i>Hyptis suaveolens</i>	Lamiaceae	Insect repellent	Herb (Aromatic)
20	<i>Ocimum gratissimum</i>	Lamiaceae	Medicinal, culinary	Herb (Shrubby)
21	<i>Acalypha indica</i>	Euphorbiaceae	Skin ailments, expectorant	Herb (Erect)
22	<i>Tridax procumbens</i>	Asteraceae	Wound healing, anticoagulant	Herb (Creeping)
23	<i>Justicia procumbens</i>	Acanthaceae	Pain relief, anti-inflammatory	Herb (Prostrate)
24	<i>Leucas aspera</i>	Lamiaceae	Fever, cough remedy	Herb (Aromatic)
25	<i>Lawsonia odorata</i>	Solanaceae	Aroma, traditional medicine	Herb (Scented)
26	<i>Paspalum scrobiculatum</i>	Poaceae	Edible millet, fodder	Grass-like herb

The Chandaka-Dampara Wildlife Sanctuary in Bhubaneswar, Odisha, boasts a rich and important plant community, showcasing a variety of growth forms and plant families. These plants have been grouped into five main categories, trees, shrubs, herbs, climbers, and grasses/bamboos (Table 1., Table 2., Table 3., Table 4., Table 5.).

As shown in the life-form distribution (Figure 2), trees are the most prominent vegetation in the sanctuary, making up 62.26% of all recorded species. This high percentage signifies a well-established, mature forest ecosystem, characteristic of the tropical dry deciduous forests found in eastern India. Key tree species like *Shorea robusta* (Sal), *Terminalia arjuna*, *Madhuca indica*, and *Azadirachta indica* form the primary canopy (Figure 3). These trees play a vital role in the ecosystem by sequestering carbon, regulating temperature, offering shelter to wildlife, and providing valuable ethnobotanical resources. Local communities extensively use these species for timber, medicinal compounds, edible fruits, oil, and cultural practices, highlighting their importance to both the environment and human life in the region. After trees, shrubs are the next most abundant life form, accounting for 37.74% of the species (Table 1.). Common shrub species include *Vitex negundo*, *Clerodendrum infortunatum*, *Rauvolfia serpentina*, and *Adhatoda vasica*, which thrive in the forest understory and along its edges. Shrubs contribute significantly to the ecosystem by supporting biodiversity, aiding in the regeneration of seedlings, and serving as crucial sources of traditional herbal medicine. They also help stabilize the soil and are frequently used by local communities for healthcare and various rituals (Table 2.).

Ground-level vegetation heavily features herbaceous species, which comprise over 16% of the local plant life. Among these are well-known medicinal and cooking herbs like holy basil (*Ocimum tenuiflorum*), *Centella asiatica*, *Phyllanthus niruri*, and *Leucas aspera* (Table 5.). Herbs are vital for nutrient cycling and provide essential resources for pollinators such as bees and butterflies. They also play a key role in local traditional medicine, with indigenous communities gathering them to treat various health issues, from indigestion to skin ailments. Climbers, making up almost 12.5% of the flora, uniquely contribute to the forest's structure. Important examples include *Guduchi* (*Tinospora cordifolia*), *Abrus precatorius*, and various *Ipomoea* species. These plants vertically link different forest layers by growing on trees and shrubs, facilitating epiphytic growth and creating small habitats for insects and birds. Many climbers are used in traditional medicine and handicrafts, and they also aid natural forest regeneration by expanding into canopy gaps and supporting ecological succession (Table 4.).

Though less abundant at 10.4%, grasses and bamboos are both ecologically and economically significant (Table 3.). These species commonly thrive in open, disturbed areas, along roadsides, and at forest edges. Grasses like doob grass (*Cynodon dactylon*) and bamboos such as *Dendrocalamus strictus* are crucial for preventing soil erosion, offering habitat for grazing animals, and providing raw materials for rural construction, fencing, and traditional tools. Bamboo, a rapidly growing grass, is also important for sustainable forestry (Table 5.). From a taxonomic viewpoint, the Fabaceae (Leguminosae) family is the most dominant, accounting for nearly 16% of all plant species in the sanctuary. This prevalence is ecologically significant because Fabaceae members have nitrogen-fixing root nodules, which boost soil fertility and benefit other plants through nutrient enrichment. Economically, this family includes a variety of trees, herbs, and shrubs used for food (*Tamarindus indica*), timber (*Dalbergia sissoo*), medicine (*Cassia fistula*), and fodder (*Sesbania* spp.).

The Chandaka-Dampara Wildlife Sanctuary boasts a rich and varied plant life, primarily dominated by trees, but also featuring a healthy mix of shrubs, herbs, climbing plants, and grasses, creating a complex and vibrant forest ecosystem. Key families like Fabaceae, Combretaceae, and Moraceae are particularly prevalent, highlighting the area's strong ecological health and its importance

for traditional plant-based knowledge. Among these, the Combretaceae family stands out as the second most dominant. It includes important species like *Terminalia arjuna*, *Terminalia bellirica*, and *Terminalia chebula*. These are not only vital to traditional medicine systems like Ayurveda (for example, in the Triphala formulation) but are also valued for their tannin-rich bark, timber, and medicinal fruits. The Lamiaceae family, known for aromatic herbs such as *Ocimum*, *Leucas*, and *Pogostemon*, plays a significant role in both traditional medicine and cooking. Moraceae, encompassing genera like *Ficus* and *Artocarpus*, is ecologically crucial as these plants act as keystone species, providing essential food for birds, bats, and primates.

Anacardiaceae, with economically valuable species like *Mangifera indica* (mango) and *Semecarpus anacardium*, is important for both fruit production and medicinal uses. The Rutaceae family, including aromatic and medicinal species like *Aegle marmelos* and *Citrus* species, contributes to the sanctuary's diverse chemical compounds. Apocynaceae, rich in alkaloids and cardiac glycosides, features species such as *Rauvolfia serpentina* and *Nerium oleander*, which have pharmaceutical applications. Further contributing to the sanctuary's ecological resilience and socio-economic value are families like Ebenaceae (*Diospyros* species, known for ebony wood and edible fruits), Rubiaceae (with ethnobotanical herbs like *Oldenlandia*), and Sapotaceae (fruit-bearing and latex-producing trees such as *Madhuca indica*). This wide array of life forms and plant families reflects a dynamic interaction between different ecological niches, traditional wisdom, and efforts in biodiversity conservation, making Chandaka-Dampara a significant location for ecological research, sustainable forest management, and responsible resource use.

Discussion

The Chandaka-Dampara Wildlife Sanctuary boasts a diverse and intricate dry deciduous forest ecosystem. Our recent floristic assessment revealed a significant presence of tree species, making up the majority (62.26%) of the total flora. This dominance of trees, along with the notable presence of shrubs (37.74%), herbs (16.09%), climbers (12.49%), and grasses/bamboo (10.4%), points to a mature forest structure, typical of dry deciduous forests in tropical and subtropical India. These findings align with other studies in Odisha, such as those by Sahu et al. (2012) and Sahu et al. (2007), which also highlighted the prominence of tree species in forest cover and structural integrity.

The Fabaceae family stands out as the most dominant botanical family, accounting for nearly 16% of all recorded plant species. This is consistent with observations in other Odishan reserve forests and globally in seasonally dry tropical forests, where Fabaceae species thrive in dry conditions. Their ability to fix nitrogen is crucial for soil fertility and overall ecosystem health. We found species like *Tamarindus indica*, *Dalbergia sissoo*, and *Cassia fistula* to be particularly abundant, underscoring their ecological adaptability and traditional uses. This trend is also supported by research from Panda et al. (2013) in the Eastern Ghats.

The presence of secondary growth and a substantial proportion of shrubs like *Vitex negundo* and *Clerodendrum infortunatum* suggests some level of human influence or forest edge effects, a pattern observed elsewhere in Odisha. These shrubs, along with herbs and climbers, are vital for the forest's understory, contributing to soil stability, biodiversity, and traditional medicine. While there are parallels with species distribution in other regions like Mahendragiri hill forests (Khadanga et al., 2023) and Kalrayan Hills (Kadavul & Parthasarathy, 1999a), the Chandaka-Dampara Sanctuary also exhibits unique adaptations influenced by its specific topography, microclimate, and human activities.

The occurrence of grasses and bamboo in open areas is important for preventing soil erosion and supporting wildlife, a common characteristic of dry deciduous forests facing periodic fires and human pressure. However, the presence of invasive species such as *Lantana camara* and *Chromolaena odorata* indicates ecological disturbance and necessitates active management to protect native flora, a concern echoed by researchers like Khajeddin et al. (2012). The sanctuary's floristic richness is further enhanced by the presence of other ecologically and economically important families like Combretaceae, Lamiaceae, Moraceae, Anacardiaceae, Rutaceae, and Apocynaceae. Genera such as *Terminalia* (from Combretaceae) are valuable for traditional medicine and agroforestry. This taxonomic diversity not only maintains ecological balance but also highlights the local community's reliance on these plant resources for healthcare, food, fuel, and cultural practices, similar to observations by Reddy & Pattanaik (2009) in central Odisha. Chandaka-Dampara's species density and life form structure are typical of tropical dry forests, aligning with observations from other tropical and sub-tropical systems like Brazil's Varzea forests (Valencia et al., 1994) and India's Western Ghats (Ayyappan & Parthasarathy, 1999; Chittibabu & Parthasarathy, 2000). Despite lower rainfall and seasonal droughts, tropical dry forests often exhibit greater compositional complexity than wet forests, as noted by Murphy & Lugo (1986). This rich diversity at Chandaka-Dampara emphasizes its conservation significance and the need for ongoing ecological monitoring, especially given growing human impacts and climate change. Our study confirms that Fabaceae is the dominant family and trees are the primary shapers of Chandaka-Dampara Wildlife Sanctuary's Forest structure, consistent with floristic patterns in similar tropical and Indian ecosystems. The vegetation's composition is significantly influenced by ecological, environmental, and human factors, necessitating strategic conservation and invasive species management to safeguard the sanctuary's biodiversity and ecological functions.

Conclusion

A recent floristic assessment of Chandaka-Dampara Wildlife Sanctuary has confirmed its significant biodiversity, characterizing it as a mature dry deciduous forest ecosystem. The study highlighted a strong presence of tree species (62.26%) and a notable abundance of leguminous plants, particularly within the Fabaceae family (16%), indicating the sanctuary's ecological robustness and ability to recover. The diverse array of climbers, shrubs, and herbs further suggests a complex habitat structure with numerous ecological opportunities. Furthermore, the discovery of a considerable number of medicinally and ethnobotanically significant species underscores the sanctuary's importance from both socio-economic and cultural perspectives. When compared to other tropical forest ecosystems in Odisha and India, Chandaka-Dampara exhibits typical features of dry tropical forests, alongside unique adaptations influenced by its terrain and human activities. Nevertheless, the spread of invasive species and evidence of ecological disruption necessitate specific conservation and restoration efforts. In essence, this research offers crucial understanding of the region's plant diversity, establishing a foundation for future ecological investigations, biodiversity preservation, and the implementation of sustainable forest management strategies within Chandaka-Dampara Wildlife Sanctuary.

References

1. Ayyappan, N., & Parthasarathy, N. (1999). Biodiversity inventory of trees in a large-scale permanent plot of tropical evergreen forest at Varagalaia, Anamalais, Western Ghats, India. *Biodiversity & Conservation*, 8, 1533-1554.
2. Behera, S., Pattanayak, S.K. and Bhadra, A., 2024. The Eastern Ghat of India: A review on plant ecological perspectives. *HORIZON*, 11(3), pp.441-449.
3. Bhadra, A.K. and Pattanayak, S.K., 2018. Geobotanical Study on Gandhamardan Hill Range, Odisha, India: Elevation Versus Plant Species Perspective. *Jour. of Econo and Taxonomic Botany*, pp.1-4.
4. Bhale, A., 2024. The Forest and Human Symbiotic Relationship in Achieving Sustainable Development Goals (SDGs).
5. Chittibabu, C.V. and Parthasarathy, N., 2000. Attenuated tree species diversity in human-impacted tropical evergreen forest sites at Kolli hills, Eastern Ghats, India. *Biodiversity & Conservation*, 9, pp.1493-1519.
6. Debata, S. and Swain, K.K., 2020. Mammalian fauna in an urban influenced zone of Chandaka-Dampara Wildlife Sanctuary in Odisha, India. *Journal of Threatened Taxa*, 12(8), pp.15767-15775.
7. Devi, U. and Behera, N., 2003. Assessment of plant diversity in response to forest degradation in a tropical dry deciduous forest of Eastern Ghats in Orissa. *Journal of Tropical Forest Science*, pp.147-163.
8. Dogra, K.S., Sood, S.K., Dobhal, P.K. and Sharma, S., 2010. Alien plant invasion and their impact on indigenous species diversity at global scale: A review. *Journal of ecology and the natural environment*, 2(9), pp.175-186.
9. Forman, L. and Bridson, D. eds., 1989. *The herbarium handbook* (p. 214). Kew: Royal Botanic Gardens.
10. Goncalves, F. M. 2018. Species diversity, population structure and regeneration of woody species in fallows and mature stands of tropical woodlands of southeast Angola. *Journal of Forestry Research*, 29(6), 1569–1579.
11. Jain, S.K. and Rao, R.R., 1977. *A handbook of field and herbarium methods*.
12. Kadavul, K. & Parthasarathy, N. (1999). Plant biodiversity and conservation of tropical semievergreen forest in the Shervarayan hills of Eastern Ghats, India. *Biodiversity & Conservation*, 8, 419-437.
13. Khadanga, S. S., Dar, A. A., Jaiswal, N., Dash, P. K., & Jayakumar, S. (2023). Elevation patterns of tree diversity, composition and stand structure in Mahendragiri Hill Forest, Eastern Ghats of Odisha, India. *Journal of Asia-Pacific Biodiversity*, 16(3), 391-405
14. Khadanga, S.S., Dar, A.A., Jaiswal, N., Dash, P.K. and Jayakumar, S., 2023. Elevation patterns of tree diversity, composition and stand structure in Mahendragiri Hill Forest, Eastern Ghats of Odisha, India. *Journal of Asia-Pacific Biodiversity*, 16(3), pp.391-405.
15. Khajeddin, S.J. & Yeganeh, H. (2012): The flora, life form and endangered species of karkas hunting prohibited region, Isfahan, Iran. – *Iranian Journal of Biology* 25 (1): 7-20
16. Liu, C.L.C., Kuchma, O., Krutovsky, K.V., 2018. Mixed-species versus monocultures in plantation forestry: Development, benefits, ecosystem services and perspectives for the future. *Global Ecology and conservation*, 15, p.e00419.
17. Mishra, S., Bhakta2Ψ, S. and Bastia, A.K., 2022. *Plant Science Research*.
18. Murphy, P.G. and Lugo, A.E., 1986. Ecology of tropical dry forest. *Annual review of ecology and systematics*, pp.67-88.
19. Murphy, S.T., 2001. Alien weeds in moist forest zones of India: population characteristics, ecology and implications for impact and management.
20. Naeem, S., Bunker, D.E., Hector, A., Loreau, M. and Perrings, C. eds., 2009. *Biodiversity, ecosystem functioning, and human wellbeing: an ecological and economic perspective*. OUP Oxford.
21. Negi, P.S. and Hajra, P.K., 2007. Alien flora of Doon valley, northwest Himalaya. *Current Science*, pp.968-978.
22. Panda, P.C., Mahapatra, A.K., Acharya, P.K. and Debata, A.K., 2013. Plant diversity in tropical deciduous forests of Eastern Ghats, India: A landscape level assessment. *Int J Biodivers Conserv*, 5(10), pp.625-639.
23. Pennington, R, Lewis, G.P. & Ratter, J.A. (2006). An overview of the plant diversity, biogeography and conservation of neotropical savannas and seasonally dry forests Neotropical savannas and dry forests: plant diversity, biogeography, and conservation. 69. 10.1201/9781420004496.ch1.

24. Pullaiah, T., Krishnamurthy, K.V., Bahadur, B. eds., 2017. Ethnobotany of India, Volume 4: Western and Central Himalayas. CRC Press.
25. Qazi, A.W., Saqib, Z. and Zaman-ul-Haq, M., 2022. Trends in species distribution modelling in context of rare and endemic plants: a systematic review. *Ecological Processes*, 11(1), pp.1-11.
26. Reddy, C. S., & Pattanaik, C. (2009). An assessment of floristic diversity of Gandhamardan hill range, Orissa, India. *Bangladesh Journal of Plant Taxonomy*, 16(1), 29
27. Sahu, S. C., Dhal, N. K., & Mohanty, R. C. (2012). Tree species diversity, distribution and population structure in a tropical dry deciduous forest of Malyagiri hill ranges, Eastern Ghats, India. *Tropical Ecology*, 53(2), 163-168.
28. Sahu, S. C., Dhal, N. K., Reddy, C. S., Chiranjibi Pattanaik, C. P., & Brahmam, M. (2007). Phytosociological study of tropical dry deciduous forest of Boudh District, Orissa, India. *Research Journal of Forestry*, Volume: 1(2), 66-72.
29. Singh, J.S. and Chaturvedi, R.K., 2017. Diversity of ecosystem types in India: a review. *Proceedings of the Indian National Science Academy*, 83(2), pp.569-594.
30. Tang, X.L., Adesina, J.A. and Ren, Y., 2023. Monitoring West Africa Sanctuary Encroachment and Degradation through Remote Sensing: A Focus on National Parks in Nigeria.
31. Tarakeswara Naidu, M., Premavani, D., Suthari, S. and Venkaiah, M., 2018. Assessment of tree diversity in tropical deciduous forests of Northcentral Eastern Ghats, India. *Geology, Ecology, and Landscapes*, 2(3), pp.216-227.
32. Valencia, R., Balslev, H. and Paz Y Miño C, G., 1994. High tree alpha-diversity in Amazonian Ecuador. *Biodiversity & Conservation*, 3, pp.21-28.
33. Vishvendra Raj Singh, B., Batar, A.K., Agarwal, V., Sen, A. and Kulhari, K., 2025. Forest Fragmentation and Human-Wildlife Conflict: Assessing the Impact of Land Use Land Cover Change in Ranthambhore Tiger Reserve, India. *Environmental Research Communications*.
34. Wani, A.M. and Sahoo, G., 2020. Forest ecosystem services and biodiversity. In *Spatial modeling in forest resources management: Rural livelihood and sustainable development* (pp. 529-552). Cham: Springer International Publishing.
35. Watson, J.E., Evans, T., Venter, O., Williams, B., Tulloch, A., Stewart, C., Thompson, I., Ray, J.C., Murray, K., Salazar, A. and McAlpine, C., 2018. The exceptional value of intact forest ecosystems. *Nature ecology & evolution*, 2(4), pp.599-610.