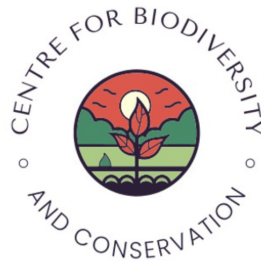




**O.P. JINDAL GLOBAL**  
INSTITUTION OF EMINENCE DEEMED TO BE  
**UNIVERSITY**  
*A Private University Promoting Public Service*



**JINDAL SCHOOL OF**  
**ENVIRONMENT & SUSTAINABILITY**  
*India's First Interdisciplinary Environment & Sustainability School*

# ANNUAL REPORT

**CENTRE FOR BIODIVERSITY AND CONSERVATION**

MAY 2025 - MAY 2026



# MESSAGE FROM THE DIRECTOR

Founded on International Biodiversity Day 2025, the Centre for Biodiversity Conservation (CBC) at the Jindal School of Environment and Sustainability was established to advance biodiversity research, documentation, education, and conservation outreach in response to accelerating global ecological change. The Centre's foundation on this globally significant day reflects its alignment with international biodiversity priorities and its commitment to science-based conservation action.

Since its inception, CBC has evolved as an interdisciplinary platform integrating rigorous research with experiential learning and public engagement. One of the Centre's early documentation efforts, *Winged Residents of JGU: A Photographic Guide*, highlights the rich biodiversity thriving within the O.P. Jindal Global University campus and reimagines the university landscape as a dynamic urban biodiversity hotspot. Extending beyond the campus, CBC initiated the *Photographic Guide to the Birds of the Himalaya - Series 1*, the first volume in a planned Himalayan biodiversity series grounded in original field observations and visual documentation.

CBC's commitment to research excellence is further reflected in its contribution to peer-reviewed international scientific scholarship, including a research article published in the Elsevier open-access journal *Trees, Forests and People*. This study addresses the largely underexplored tree diversity of the Eastern Himalaya, documenting how temperate forest ecosystems harbour the highest levels of tree diversity in the region. The research demonstrates that each study site supports distinct tree community assemblages, with temperate forests exhibiting pronounced alpha and beta diversity patterns. Importantly, the findings underscore that expanding protected area networks is critical for conserving endemic and regionally unique Himalayan tree species, providing strong evidence to inform conservation planning and policy.

Experiential learning has remained central to CBC's approach through expert lectures, interactive workshops, and immersive field experiences—from urban forests such as Sanjay Van, Delhi, to the ecologically significant wetlands of Dighal, Haryana. Complementing these initiatives, the *Campus Carbon Mapping Internship* stands as a landmark effort combining biodiversity assessment, digital innovation, and student engagement, resulting in JGU's first comprehensive tree-level carbon and biodiversity database.

Collectively, these initiatives embody CBC's founding vision: to integrate research, documentation, outreach, and policy-relevant practice in meaningful and impactful ways. I extend my sincere gratitude to faculty colleagues, collaborators, students, and partners whose dedication continues to shape the Centre's journey. As CBC moves forward, we remain committed to nurturing future conservation leaders and contributing thoughtfully to biodiversity conservation at local, regional, and global scales.

Kumar Manish (Ph.D.)  
Director  
Jindal School of Environment and Sustainability

# INTRODUCTION OF THE CENTRE

Established on the occasion of International Biodiversity Day 2025, the Centre for Biodiversity Conservation (CBC) at the Jindal School of Environment and Sustainability (JSES) represents a strategic institutional commitment to advancing biodiversity research, education, and conservation practice. The Centre was conceived in response to accelerating global biodiversity loss and the urgent need for scientifically grounded, socially inclusive, and policy-relevant conservation solutions.

The CBC serves as an interdisciplinary hub that brings together researchers, educators, policymakers, and community stakeholders to address pressing challenges related to biodiversity conservation and sustainable resource management. Drawing expertise from ecology, conservation biology, environmental policy, and social sciences, the Centre aims to generate robust scientific knowledge while fostering meaningful engagement beyond academia.

A core focus of the CBC is to function as a research centre dedicated to biodiversity, ecology and evolution, invasive species management, and conservation science. The Centre actively supports the collection of baseline biodiversity data through field-based studies across diverse landscapes and taxonomic groups, enabling informed assessments of conservation status and ecological threats. Particular emphasis is placed on understanding the impacts of climate change, evaluating the effectiveness of protected area networks, and developing strategies for invasive species management.

In addition to research, the CBC is committed to capacity building, public outreach, and policy engagement. The Centre regularly organizes seminars, workshops, training programmes, and field-based learning activities to promote biodiversity awareness and experiential education. It also seeks to contribute evidence-based recommendations to policy processes while fostering collaboration among researchers, NGOs, government agencies, and local communities. Through student internships, knowledge exchange platforms, and community participation initiatives, the CBC aims to nurture the next generation of conservation practitioners and serve as a catalyst for innovative ideas and effective biodiversity conservation efforts at local, regional, and global scales.

# LIST OF ACTIVITIES

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# Winged Residents of JGU: A Photographic Guide

Winged Residents of JGU: A Photographic Guide documents the rich and often overlooked avian diversity thriving within the campus landscape of O.P. Jindal Global University (JGU). Curated and photographed by faculty members Dr. Kumar Manish and Dr. Neelu Anand Jha from the Jindal School of Environment & Sustainability (JSES) and the Centre for Biodiversity and Conservation (CBC), this guide highlights the university campus as a dynamic urban biodiversity hotspot.

The guide presents a visual record of common, resident, and frequently observed bird species inhabiting a variety of campus microhabitats, including gardens, parking areas, sports grounds, wooded patches, and open green spaces. Species featured include colourful insectivores such as the Asian Green Beeeater (*Merops orientalis*), nectar feeders like the Purple Sunbird (*Cinnyris asiaticus*), and frugivorous birds such as the Brownheaded Barbet (*Megalaima zeylanica*) and Yellowfooted Green Pigeon (*Treron phoenicoptera*).

Prominent and vocally active species commonly encountered on campus, including the Asian Koel (*Eudynamys scolopaceus*), Redvented Bulbul (*Pycnonotus cafer*), and Redwhiskered Bulbul (*Pycnonotus jocosus*), reflect the ecological connectivity between landscaped spaces and surrounding habitats. Grounddwelling and open-area specialists such as the Redwattled Lapwing (*Vanellus indicus*) and the iconic Indian Peafowl (*Pavo cristatus*), India's national bird, further illustrate habitat heterogeneity within the university grounds.

The guide also includes highly adaptable urban species such as the Common Myna (*Acridotheres tristis*), Roseringed Parakeet (*Psittacula krameri*), Jungle Babbler (*Turdoides striata*), Indian Whiteeye (*Zosterops palpebrosus*), and Rock Pigeon (*Columba livia*), emphasizing the coexistence of wildlife and human activity on campus.

Designed as an accessible educational and outreach resource, this photographic guide encourages observation, environmental awareness, and appreciation of everyday biodiversity. It serves as a valuable tool for students, visitors, and the wider community, reinforcing JGU's commitment to sustainability, conservation education, and biodiversity stewardship.



## WINGED RESIDENTS OF JGU *A Photographic Guide*



# Photographic Guide to the Birds of the Himalaya: Series 1

The Photographic Guide to Birds of the Himalaya - Series 1 is the inaugural volume in a planned series of ten photographic field guides developed by the Centre for Biodiversity and Conservation (CBC) at the Jindal School of Environment & Sustainability (JSES).

The guide documents the rich avian diversity of the Himalayan region, which hosts approximately 950 bird species—nearly eight percent of global avifauna. Owing to its altitudinal gradients and varied forest types, the Himalaya supports a unique assemblage of resident, migratory, and altitudinal migrant bird species.

This publication is based entirely on original field photographs captured during a Himalayan field expedition undertaken by CBC and JSES faculty members Dr. Kumar Manish and Dr. Neelu Anand Jha. The guide presents selected species with high-quality photographic documentation accompanied by concise ecological notes describing their habitat preferences, behavioural traits, and distribution. Species featured in this volume include insectivorous forest birds such as the Greyheaded Canary Flycatcher, Taiga Flycatcher, Verditer Flycatcher, and the distinctive Whitethroated Fantail. Thrushes such as the Greywinged Blackbird and the melodious Blue Whistling Thrush highlight the acoustic richness of Himalayan forests.

The guide also documents conspicuous and culturally familiar species such as the Redbilled Blue Magpie, Streaked Laughing Thrush, Oriental Turtle Dove, and Himalayan Bulbul, alongside forest specialists like the Bartailed Treecreeper, Fulvousbreasted Woodpecker, and Blackheaded Jay. Species associated with human modified landscapes, including the Russet Sparrow and Slatyheaded Parakeet, reflect the interface between biodiversity and Himalayan livelihoods.

Designed as an accessible visual reference, this guide supports ecological education, field-based learning, and biodiversity awareness among students, researchers, trekkers, and nature enthusiasts. As the first volume in the CBC Himalayan biodiversity series, it lays the foundation for sustained documentation, conservation outreach, and experiential learning initiatives in one of the world's most ecologically significant mountain systems.



# PHOTOGRAPHIC GUIDE TO BIRDS OF THE HIMALAYA



SERIES 1

JINDAL SCHOOL OF  
ENVIRONMENT & SUSTAINABILITY  
India's First Interdisciplinary Environment & Sustainability School



# Campus Carbon Mapping Project

The Campus Carbon Mapping Project 2025 was a hands-on sustainability initiative offered by the Office of Sustainability in collaboration with the Jindal School of Environment & Sustainability (JSES) and the Centre for Biodiversity and Conservation (CBC) at O.P. Jindal Global University (JGU). Designed as a data-driven experiential learning programme, the internship aimed to create JGU's first comprehensive digital carbon and tree database while building student capacity in biodiversity mapping, ecological assessment, and sustainability reporting.

As part of the project, students worked on detailed field-derived datasets covering 1,742 individual trees spread across the approximately 80-acre JGU campus. Each tree was documented using 10 ecological and biometric parameters, and individual QRI linked Word documents were generated for every tree, enabling species level traceability and future monitoring. These efforts culminated in the successful completion of the campus carbon mapping project, supported by structured datasets and digitally accessible records.

A key outcome of the internship was the quantification of campus level carbon storage. Using tree girth-based estimation methods, the analysis revealed that JGU's green cover has cumulatively stored 1,713 tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) over the campus's approximately 15-year development period. This translates to an average carbon sequestration of about 114 tonnes of CO<sub>2</sub>e per year, or 1.4 tonnes of CO<sub>2</sub>e per acre per year, highlighting the significant climate mitigation role played by campus plantations. These results directly align with the achievement of Sustainable Development Goals SDG 11 (Sustainable Cities), SDG 13 (Climate Action), and SDG 15 (Life on Land). Beyond quantification, the internship laid the groundwork for digital tree tagging through QR codes, strengthening transparency, outreach, and long-term sustainability planning.

Overall, the Campus Carbon Mapping Project represented a landmark collaborative effort at JGU, combining ecological science, digital innovation, and student engagement to support evidence-based sustainability governance and environmental stewardship on campus.



# Campus Carbon Mapping Internship 2025

**A Sustainability Collaboration at JGU**

*Offered by the Office of Sustainability in collaboration with*  
**Jindal School of Environment and Sustainability (JSES)**  
**&**  
**Centre for Biodiversity Conservation (CBC)**

## About the Internship

Join us this December for an exciting hands-on sustainability project!

As part of the Digital Tree Tagging Initiative, students will work to digitally map and document the trees across the JGU campus using QR-based tagging. Each tag will capture key data about the tree's identity, ecological value, age of the tree and carbon sequestration potential.

This project is an opportunity to combine environmental science, technology, and fieldwork, while contributing directly to JGU's journey toward a greener, data-driven campus.

## Scope of Work

*EcoTrace-Tracking Trees, Tracing Carbon*

Students will engage in:

- ✦ Working on the identified and collected data of trees and plants
- ✦ Calculating the age of the trees on campus through the provided data
- ✦ Collaborating on biodiversity mapping and sustainability reporting
- ✦ Assisting in the creation of JGU's first digital tree database

## Outreach Events

In 1 year, the Centre for Biodiversity Conservation (CBC) organized a series of well-curated outreach events and field trips aimed at strengthening ecological literacy, experiential learning, and public engagement with biodiversity conservation. These initiatives reflected CBC's commitment to linking academic knowledge with real-world ecological practice through expert interaction and hands-on field exposure.

The outreach component began with an academic session titled "Biodiversity and Sustainability in the Himalaya" (June 2025), which brought together experts including Prof. Abhiroop Chowdhury, Dr. Kumar Manish, Dr. Samjetsabam Bharati Devi, and Dr. Neelu Anand Jha. The session highlighted biodiversity patterns, sustainability challenges, and conservation efforts in the Himalayan region, while also showcasing institutional research perspectives.

This was followed by an interactive workshop, "Discovering Dragonflies: Indicators of a Healthy Ecosystem" (September 2025), led by Mr. Nikhil John. The session emphasized the role of dragonflies as bioindicators and encouraged participants to develop observational and ecological interpretation skills. Both outreach activities were designed to enhance awareness, stimulate curiosity, and promote interdisciplinary understanding among students and wider audiences.

**SESSION 3**  
4:00 PM - 6:00 PM

Join us on **Zoom**  
<https://tinyurl.com/59y17d3v>  
 Password: JGU

## Biodiversity and Sustainability in the Himalaya

**PROF. ABHIROOP CHOWDHURY**  
 Professor and Dean  
 Jindal School of Environment & Sustainability  
**Welcome Address**

**DR. KUMAR MANISH**  
 Associate Professor  
 Jindal School of Environment & Sustainability  
 and Founding Director CBC  
**Introduction to Centre for Biodiversity and Conservation (CBC)**

**DR. SAMJETSABAM BHARATI DEVI**  
 Assistant Professor  
 Department of Botany  
 SRM University, Sikkim  
**GUEST LECTURE**  
**Plan Bee: A Sustainable Ticket to Future Biodiversity Conservation in Sikkim**

**PROF. NEELU ANAND JHA**  
 Associate Professor  
 Jindal School of Environment & Sustainability  
**Concluding Remarks**



## DISCOVERING DRAGONFLIES: INDICATORS OF A HEALTHY ECOSYSTEM

VENUE: ELYSIUM | TIME: 9:00 AM | DATE: 10.09.2025

# Field Trips

CBC also organized immersive field-based learning experiences to complement classroom instruction. A field trip to Sanjay Van, Delhi (November 2025), guided by Dr. Neelu Anand Jha and Dr. Kumar Manish, exposed participants to urban forest biodiversity and ecological dynamics.

The experiential component concluded with a field-based workshop, "Celebrating Wetlands: Avian Behavioural Ecology in Wetland Landscapes" (February 2026), held at Dighal Wetlands, Haryana. Led by Mr. Arbin Kr Thakur along with CBC faculty, the workshop provided hands-on training in bird observation and behavioural ecology within a wetland ecosystem. Collectively, these outreach events and field trips reinforced CBC's role in fostering experiential education, ecological awareness, and applied biodiversity conservation.



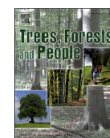
# Research Publication

## **VARIATION OF TREE DIVERSITY, STRUCTURE AND COMPOSITION IN THE DIFFERENT FOREST TYPES OF EASTERN HIMALAYA, INDIA**

The Eastern Himalaya is recognized as one of the world's most important biodiversity hotspots, yet its tree diversity and community structure remain insufficiently documented. This study investigated patterns of alpha diversity, beta diversity, and tree community composition across protected forest ecosystems in the Darjeeling Himalaya of India. Vegetation sampling was carried out in three protected areas: Mahananda Wildlife Sanctuary, Neora Valley National Park, and Singalila National Park, including both lower and upper elevational ranges.

Researchers established 32 plots and 128 quadrats to assess tree species with a girth at breast height of at least 10 cm. The survey recorded 2,137 individual trees belonging to 65 species, 47 genera, and 31 families, demonstrating substantial floristic richness in the region. Five tree species were endemic to the Eastern Himalaya, while four species were globally threatened according to the IUCN Red List, highlighting the conservation significance of these forests. Temperate forests, particularly in lower Singalila National Park, exhibited the highest alpha and beta diversity, indicating both high species richness and strong variation in species composition between sites. In contrast, the tropical moist deciduous forests of Mahananda Wildlife Sanctuary showed the greatest basal area, while sub-alpine forests of upper Singalila National Park had the highest tree density.

The study also revealed that each forest type supported distinct tree assemblages, largely driven by species replacement among sites. A total of 27 indicator species were identified, most of which were unique to specific habitats. Overall, the findings emphasize that the Darjeeling Himalaya contains diverse and ecologically unique forest communities with significant endemic and threatened tree species. The authors stress the urgent need to expand protected areas and strengthen conservation strategies to preserve Himalayan plant diversity in the face of environmental change.



## Variation of tree diversity, structure and composition in the different forest types of Eastern Himalaya, India

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### ARTICLE INFO

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Alpha diversity  
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Eastern Himalaya  
Indicator species  
Tree community

### ABSTRACT

Despite high biodiversity and endemism and decades of research, the tree diversity of the Eastern Himalaya remains poorly understood. To fulfill this gap, we examined the patterns of the alpha and beta diversity and tree community structure in the Darjeeling area of the Eastern Himalaya. We conducted primary vegetation sampling focused on the tree strata within 3 protected areas, including National Park (NP) and Wildlife Sanctuary (WLS) of the Darjeeling Himalaya, India. The study sites included Mahananda WLS, Neora Valley NP, and the lower and upper ranges of Singalila NP. A total of 32 sampling plots (each 200 m x 200 m) were established across these sites, within which 128 quadrats (20 m x 20 m) were laid out for detailed vegetation analysis. Within each quadrat, all trees with a girth at breast height (GBH) of  $\geq 10$  cm were measured and identified. We recorded a total of 2137 individuals belonging to 65 tree species, 47 genera and 31 families in our study. Out of all the recorded tree species, 5 species were found endemic to the Eastern Himalayan region, and 4 globally threatened as per the IUCN Red List. We observed the highest alpha and beta diversity in the temperate forests of lower Singalila NP. Tree basal area and the density were highest in the tropical moist deciduous forests of Mahananda WLS and the sub-alpine forests of upper Singalila NP, respectively. The study sites showed distinct tree community assemblages with high beta diversity determined by substitution components. We identified 27 indicator tree species (including 23 species from single sites) with significantly high Indicator Value (IndVal) across the different forest types of the Darjeeling Himalaya. We conclude that different forest types in the Darjeeling Himalaya support a high diversity and a unique assemblage of trees, including endemics. For efficient conservation of plant diversity in the Himalaya, there is an urgent need to create more protected areas.

### 1. Introduction

India, with approximately 2.4% of global geographical area, is one of the 12 mega biodiversity countries and harbours 4 biodiversity hotspots, namely the Himalaya, Indo-Burma, Western Ghats, and Sundaland (Mittermeier et al., 2011). The country harbours nearly 11% of the world's flora, with approximately 28–33% of the flora being endemic to the region (Chitale et al., 2014). However, environmental changes mainly driven by the increased rate of anthropogenic activities such as forest degradation, rampant and unplanned urbanization and other

developmental activities are greatly threatening its endemic flora and fauna, especially in the biodiversity hotspots like the Himalaya (Pandit et al., 2014; Manish et al., 2016; Pandit, 2017). The published national-level status of the forest report shows a consistent increase in forest cover in India, but a closer scrutiny reveals an increase only in the case of moderately dense and open forests, and a decline in very dense forests, particularly in the Himalayan region (ISFR, 2019). Thus, there is an urgent need to document the existing biodiversity of the Himalayan region through on-the-ground sampling and to assess pragmatic ways to conserve the increasingly threatened biodiversity of the region.

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## Team Members



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