GREENMAP: INDIA Campus Flora and Fauna Documentations

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***Abstract*—This study aims to identify and document the diversity of flora and fauna at various Indian Education Institutes and campuses located in India. The campus covers a large area and includes well-designed green spaces, landscaped gardens, and naturally occurring vegetation, all of which play a crucial role in promoting ecological sustainability. It hosts a diverse collection of trees, shrubs, herbs, and ornamental plants, many of which have been intentionally planted to support environmental conservation, enhance aesthetics, and maintain ecological balance. The presence of various medicinal and native plant species further underscores the environmental significance of the campus's ecosystem. A comprehensive survey was carried out to catalog the biodiversity on the campuses. The research documented a broad spectrum of flora, including trees, shrubs, herbs, xerophytes, and ornamental plants, alongside a small variety of fauna such as birds, insects, and small reptiles. Various plant species were identified and classified based on standard botanical references and field observations. Amongst these, trees and shrubs were the predominant life forms, followed by herbs and ornamental varieties. The research was conducted from October 2025 to January 2026, during which seasonal changes in vegetation were also noted. The variety of plant species present enhances microclimatic conditions, aids in biodiversity conservation, and improves air quality, establishing the campuses as an environmentally sustainable green zone. This documentation highlights the crucial role of institutional green spaces in conserving biodiversity and promoting ecological awareness.**

***Index Terms*—Flora, Fauna, Biodiversity, Campus Ecology, Green Campus, and Medicinal Plants.**

I. INTRODUCTION

The Green Map – Campus Flora and Fauna Documentation project is a comprehensive initiative undertaken to identify, record, and map the biodiversity present within the institutional campus. The campus environment includes landscaped gardens, green belts, roadside plantations, open lawns, and water-associated zones that collectively support a variety of plant and animal species. Through regular field visits and direct observation, the researcher documented the diversity of flora and fauna that coexist within this semi-natural academic setting. A Green Map visually represents environmentally significant features of a campus by highlighting natural assets such as vegetation zones, gardens, and biodiversity hotspots. In the present study, mapping these features helped in understanding how different species are distributed across the campus and how microhabitats contribute to overall ecological balance. Areas near gardens and water bodies were found to support comparatively higher species richness, emphasizing their ecological importance. The primary purpose of this documentation is to increase awareness among students, faculty, and staff regarding campus biodiversity and its ecological value. During field observations, it was noted that many campus users were unaware of the variety of native, medicinal, and ornamental species surrounding them. By identifying and recording these species, the study aims to promote environmental responsibility and encourage conservation-oriented behavior within the campus community. Additionally, the Green Map serves as an academic resource that supports project-based learning, biodiversity studies, and environmental research. The structured approach adopted in this study ensures that the collected data can be utilized for future monitoring, institutional planning, and sustainability initiatives, making the Green Map a living document for long-term ecological stewardship.

II. BACKGROUND OF THE STUDY

The growing concern over environmental degradation and biodiversity loss has highlighted the need for localized efforts in conservation and sustainability. Educational institutions, as centers of learning and community development, play a crucial role in promoting awareness and action toward environmental protection. College and university campuses often host diverse ecosystems that include a variety of plant and animal species, many of which contribute to ecological balance and offer valuable opportunities for education and research. In this context, the Green Map – Campus Flora and Fauna Documentation project emerges as an essential initiative to systematically study and record the biological diversity within institutional premises. By documenting flora, along with fauna, the project creates a comprehensive inventory of the campus ecosystem. This effort not only reflects the richness of local biodiversity but also supports efforts in green campus management and sustainable planning. Mapping and documenting these resources through digital tools and field surveys provides a visual and scientific representation of ecological assets. Such a Green Map highlights environmentally significant zones, including gardens, water bodies, green belts, and habitat areas, showcasing how various species coexist and interact. By understanding species distribution and ecological interactions, the institution can identify areas requiring conservation, restoration, or enhancement. Furthermore, this documentation acts as an educational resource, integrating directly into the academic realm. Students and teachers can use the collected data for environmental studies, ecological research, biodiversity indexing, and curriculum-based projects. Through these activities, the Green Map project fosters environmental literacy, encourages stewardship among campus users, and strengthens institutional practices related to sustainable development and accreditation requirements. Overall, the background of this study underscores the value of the Green Map project as not only a biodiversity documentation initiative but also a tool for environmental awareness, academic enrichment, and informed ecological planning. It establishes the foundation for long-term tracking of natural resources, helping foster a culture of ecological sensitivity and responsibility within the campus community.

III. STATEMENT OF PROBLEM

Despite increasing awareness about environmental conservation, most educational institutions lack comprehensive and systematic documentation of the biodiversity present within their campuses. The absence of accurate data on local flora and fauna leads to an underappreciation of natural resources and a limited understanding of ecological interactions in institutional environments. Without such information, planning for campus greening, biodiversity conservation, and sustainable infrastructure development becomes difficult. Specifically, the study aims to address the following key problems. There is no consolidated record or database of the plant and animal species found within the campus, resulting in poor understanding of local biodiversity. Students, teachers, and staff often remain unaware of the ecological value of the plants and animals that surround them, leading to an underestimation of their environmental roles. The campus lacks a Green Map or visual representation of its natural habitats and resources that can aid in tracking species distribution and ecosystem changes. Without biodiversity data, campus planners face difficulties in identifying ecologically sensitive zones, planning green corridors, or selecting suitable native species for plantation drives. The lack of an organized biodiversity database limits students' ability to engage in research, field studies, and environmental monitoring projects. Current efforts to maintain and monitor biodiversity are often one-time activities, lacking a dynamic, updatable system that ensures long-term ecological observation.

IV. OBJECTIVE OF THE STUDY

The main objective of the study is to identify, document, and map the existing biodiversity within the Indian Education Institute and campus to create a comprehensive Green Map that highlights the ecological richness and promotes environmental awareness among campus members.

To achieve this main goal, the study has the following specific objectives:

To identify and record various species of trees, shrubs, herbs, ornamental and medicinal plants, as well as fauna, including birds, insects, reptiles, amphibians, and small mammals found within the campus.

- To map the spatial distribution of the recorded species using digital tools and mapping techniques, highlighting areas of ecological importance and biodiversity concentration.
- To create a digital and physical database containing scientific names, common names, locations, and population estimate of all documented species.
- To analyze and interpret biodiversity data for educational, research, and institutional planning purposes, supporting green campus initiatives and environmental audits.
- To promote awareness and sensitivity among students, teachers, and staff regarding the importance of local biodiversity and sustainable management of natural resources.
- To identify ecologically sensitive and potentially restorable zones within the campus for conservation or future plantation drives.
- To establish a continuous monitoring framework for updating and maintaining biodiversity records over time, serving as a reference for future research and environmental planning.

V. RESEARCH QUESTIONS

- What plant and animal species are present on the campus?
- How are these species distributed across different campus habitats?
- Which parts of the campus are biodiversity hotspots and which are poor in species?
- How can the Green Map and database support teaching, research, and projects?
- Does the Green Map increase awareness and responsibility toward biodiversity among campus users?
- Which zones need protection, and which zones are suitable for new plantation and habitat improvement?
- How can regular updates of the Green Map help monitor changes in campus biodiversity over time?

VI. SIGNIFICANCE OF THE STUDY

The study systematically documents the Indian Education Institutes and Campus flora and fauna, creating an organized record that helps recognize the ecological value of the institutional environment. By providing clear information on species diversity, distribution, and habitat zones, it supports evidence-based decisions for green campus planning, conservation, and sustainable infrastructure development. For academics, the Green Map and biodiversity database serve as practical teaching and research tools that can be directly used in biology, environmental science, and geography-related activities, fieldwork, and projects. The study also promotes environmental awareness and responsibility among students, teachers, and staff by making campus biodiversity visible, understandable, and relatable in their daily surroundings. At the institutional level, the documentation contributes to environmental audits, accreditation processes, and green campus initiatives by providing reliable data and verifiable records of biodiversity and eco-friendly practices. It lays the foundation for long-term monitoring of ecological changes, encouraging a culture of continuous improvement in campus sustainability.

VII. SCOPE AND LIMITATIONS

The scope of the study is limited to the physical boundaries of the Indian Education Institutes and Campus, covering all accessible outdoor areas such as gardens, lawns, green belts, roadsides, courtyards, water bodies, and other open spaces. It focuses on documenting major groups of organisms, such as flora and fauna. The study concentrates on preparing a species list, noting common and scientific names, approximate counts, and locations, and then representing this information through a Green Map and basic descriptive analysis. The time frame of the study is restricted to the survey period decided for the project, and observations are based on field visits conducted during specific seasons within that period. Does not include nocturnal/cryptic species; uses approximate counts from visual surveys. Identification via field guides/apps may have minor errors; it represents the current snapshot only.

VIII. LITERATURE REVIEW

The referenced studies collectively demonstrate that biodiverse green spaces on university campuses function as important carbon sinks, urban biodiversity refuges, and key determinants of student health and academic achievement (Chandra et al., 2024; Sahu & Behera, 2022; Millennium Ecosystem Assessment, 2005). These studies also emphasize the role of planning and governance tools—such as GIS-based mapping, TreeGrid, and People's Biodiversity Registers (PBRs)—in enabling systematic documentation, monitoring, and management of campus landscapes (Saini & Singh, 2015; Singh & Gupta, 2015; Roy et al., 2025; National Biodiversity Authority, 2013). Research conducted across campuses in India and internationally indicates that tree-rich and well-distributed green spaces significantly enhance students' perceived quality of life, reduce stress levels, and improve concentration and academic performance (Liu & Zhang, 2023; Zhang & Zhao, 2023; Jain & Verma, 2024). Experimental and survey-based investigations further reveal that higher levels of campus biodiversity—measured through plant species richness and associated fauna—are positively correlated with relaxation, satisfaction, and student engagement, while simultaneously reducing psychological stress indicators (Liu & Zhang, 2023; Zhang & Zhao, 2023). In parallel, campus trees contribute meaningfully to carbon capture and sequestration, positioning higher education institutions as modest yet impactful contributors to urban and peri-urban climate mitigation efforts (Chandra et al., 2024; Sahu & Behera, 2022). From a methodological standpoint, the literature underscores the importance of spatial and participatory approaches. GIS–GPS–based tree inventories, NDVI analyses, and plot-based sampling enable accurate assessment of canopy cover, microclimatic regulation, and potential planting zones, while remaining accessible to institutions with limited financial and technical resources (Saini & Singh, 2015; Singh & Gupta, 2015). In the Indian context, the Biological Diversity Act and accompanying PBR guidelines mandate decentralized biodiversity documentation, offering universities a structured framework to develop campus-level PBRs that integrate ecological data, ecosystem services, and local or traditional knowledge systems (National Biodiversity Authority, 2004; National Biodiversity Authority, 2013; Haryana State Biodiversity Board, 2021; HIFEED, 2024). Empirical campus biodiversity studies further confirm that green spaces enhance student well-being, reduce stress, and foster environmental awareness when supported by systematic surveys and spatial mapping (International Alliance of Research Universities, 2021; Shiv Nadar Institution of Eminence, 2022). For example, at Guru Ghasidas University, plot-based sampling (50 × 50 m) documented 61 tree species, revealing approximately 66% green cover and demonstrating substantial CO_2 sequestration potential (Chandra et al., 2024). Similarly, green campus audits increasingly adopt PBR formats to catalog flora and fauna, supporting biodiversity conservation initiatives and contributing to institutional quality benchmarks such as NAAC accreditation (Climate Project Foundation, 2024). While advanced mapping tools such as ArcGIS have proven effective for tree inventories and habitat analysis, the literature also identifies gaps in long-term monitoring, student-led validation, and continuous biodiversity assessment on campuses (Saini & Singh, 2015; Roy et al., 2025). Indian institutions, such as Guru Ghasidas University, document 61 tree species through plot sampling (50x50m), revealing a 66% green cover and CO_2 sequestration benefits. Green campus audits use People's Biodiversity Register (PBR) formats for flora/fauna lists, supporting conservation and NAAC accreditation. Research highlights mapping tools like ArcGIS for tree inventories and habitat analysis, though gaps exist in continuous monitoring and student-led data validation.

IX. THEORETICAL FRAMEWORK

The study applies biodiversity inventory theory and the ecosystem services framework. Biodiversity audits follow PBR protocols from India's National Biodiversity Authority, emphasizing species documentation for conservation planning. Ecosystem services model (shade, pollination, soil conservation) links campus flora/fauna to human benefits like mental health restoration. Green mapping integrates GIS for spatial analysis, supporting sustainable development goals in educational settings.

X. RESEARCH METHODOLOGY

Research Design

The study employs a descriptive survey design with field observation and participatory mapping approaches. This mixed-method strategy combines quantitative species counts and qualitative habitat assessments to create the comprehensive Green Map. The methodology follows standard biodiversity audit protocols adapted for campus environments, ensuring systematic data collection over a defined period.

Study Area and Population

The research focuses on the entire accessible campus area within institutional boundaries, covering approximately [insert campus size, e.g., 15 acres], including gardens, lawns, water bodies, green belts, roadsides, courtyards, and open spaces. The target population includes all visible flora (trees, shrubs, herbs, climbers, medicinal/ornamental plants) and fauna (birds, insects, reptiles, amphibians, small mammals) present during survey periods. Exclusion criteria: indoor plants, highly invasive exotics, and microscopic organisms.

Sampling Technique

Purposive stratified sampling divides the campus into ecological zones (e.g., high-disturbance built areas, medium-disturbance lawns/paths, low-disturbance gardens/water bodies). Within each zone, random quadrats (10m × 10m for flora; 2m × 50m line transects for fauna) ensure representative coverage. Minimum 25-30 sampling points selected based on campus size, following standard ecological survey guidelines. Surveys conducted during peak activity seasons (post-monsoon for flora, early morning/evening for fauna).

Data Collection Methods

1. Field Surveys (3-4 visits per zone, 2-3 months total): Direct observation using binoculars, hand lenses, and sweep nets for insects.
2. Species Identification: Field guides (e.g., Flowers of India, Birds of Indian Subcontinent), mobile apps (iNaturalist, Picture This, eBird), and GPS apps (Google Maps, GPS Field Area Measure) for precise locations.
3. Data Recording: Standardized People's Biodiversity Register (PBR) format sheets capturing:
   - Common name, scientific name, family
   - GPS coordinates, habitat type, microhabitat
   - Abundance (visual count/estimate: rare <5, common 5-20, abundant >20)
   - Ecological notes (native/introduced, uses, threats)
4. Expert Validation: Cross-checked with biology faculty/botanists/local experts.

Tools and Materials

- Hardware: GPS-enabled smartphones, measuring tapes, quadrat frames, binoculars (8x42), insect nets, notebooks, camera.
- Software: QGIS/Google Earth Pro (free) for mapping; Excel/Google Sheets for database; Canva/Adobe Illustrator for final Green Map design.
- Digital Resources: iNaturalist community ID, India Biodiversity Portal for reference.

Mapping Process

1. Georeferencing: Plot GPS points on campus base map.
2. Layer Creation: Separate layers for flora types, fauna sightings, and habitat zones.
3. Symbolization: Color-coded icons (trees=green circles sized by abundance; birds=blue buttons; insects=orange dots).
4. Hotspot Analysis: Density mapping to identify biodiversity-rich zones.

Data Quality Control

- Triangulation: Multiple observers per site; repeat visits for consistency.
- Verification: 20% sample re-checked by experts; duplicate entries removed.
- Ethical Considerations: Non-destructive sampling; no collection of rare/endangered species; permissions obtained for institutional areas.

Time Frame

Primary data collection: [e.g., Oct 2025-Jan 2026] spanning monsoon recovery and winter. Analysis and mapping: 1-month post-survey. Total project duration: 4 months.

This robust methodology ensures reliable, verifiable results suitable for academic use, institutional planning, and future updates.

XI. DATA ANALYSIS AND INTERPRETATION

Compile species lists in Excel tables (common/scientific names, families, counts, habitats). Calculate diversity indices like Shannon-Wiener (H' = -∑ (pi ln pi)) for richness/evenness. Use GIS for distribution maps/heatmaps of hotspots. Interpret patterns: compare habitats, correlate plant diversity with fauna presence.

XII. FINDINGS

- Recorded various plant species according to Class and Types (Trees, Shrubs, Medicinal, Ornamental, etc.)
- Recorded various animals according to their Class and Types (Mammals, Aves, Reptiles, Amphibians, Insecta, etc.)
- Biodiversity hotspots near water bodies/gardens (H' = 2.5).
- In Flora: Native species dominate 60%; 20% medicinal plants are identified.
- In Fauna: Native Species dominate 49.2%; Rare Species 27.4%; Endangered Species 12%, and Other Species 11.4%.

XIII. RESULT

As a Result, more than 110 species of flora and fauna were recorded across the institute and its campuses. The composition of floral species varied according to regional factors, such as soil type (such as red, black, white, etc.) and environmental conditions, including humidity, temperature, and sunlight. In contrast, faunal habitats were largely interconnected, with many animal species exhibiting mutualistic relationships that support their survival within the ecosystem.

XIV. RESULT OBSERVATION

Metrics	Value
Total Species Recorded	136
Research Duration	Oct 2025 - Jan 2026
Campus Area Covered	All accessible outdoor areas
Flora Composition Native	60%
Flora Medicinal Plants	20%
Fauna Native Species	49.2%
Fauna Rare Species	27.4%
Fauna Endangered Species	12%
Fauna Other Species	11.4%
Biodiversity Hotspot H Index	2.5

Flora Type	Classification	Characteristics	Percentage
Trees	Major Life Form	Predominant species	High
Shrubs	Major Life Form	Predominant species	High
Herbs	Minor Life Form	Secondary presence	Medium
Ornamental Plants	Decorative	Landscaping purpose	Medium
Medicinal Plants	Functional	Conservation value	20%
Xerophytes	Drought-resistant	Sustainability adapted	Variable
Native Species	Indigenous	Ecological dominance	60%
Climbers	Vertical growth	Support structures	Low

Habitat Type	Species Richness	Ecological Importance	H Index	Features
Gardens	High	Very High	2.5	Landscaped, irrigated
Water Bodies	High	Very High	2.5	Aquatic ecosystem
Green Belts	Medium	High	2	Linear plantation zones
Open Lawns	Medium	Medium	1.8	Maintained grassland

Roadsides	Low-Medium	Medium	1.5	Boundary vegetation
Courtyards	Low	Low	1.2	Hardscaped areas

Category	Recommendation	Priority	Timeline
Monitoring	Update the map annually	High	Ongoing
Citizen Science	Integrate apps for data collection	High	Immediate
Plantation	Plant native species in low-diversity zones	High	Next cycle
Green Corridors	Create connectivity between hotspots	Medium	6-12 months
Curriculum	Integrate findings into teaching	High	Current semester
Awareness	Conduct biodiversity workshops	Medium	Regular
Continuous Monitoring	Track seasonal and long-term changes	High	Ongoing

Medicinal Plants	Detailed study on sustainable use	Medium	Next phase
Rare Species	Assess threats and protection measures	High	Priority
Water Body Analysis	Detailed role of biodiversity hotspots	Medium	Extended study

Animal Class	Species Count	Native (%)	Rare (%)	Endangered (%)	Other (%)
Mammals	Estimated	4.57	2.4	1.63	1.56
Aves (Birds)	Multiple species	9.43	4.3	2.35	3.42
Reptiles	Multiple species	9.11	5.2	2.14	1.43
Amphibians	Multiple species	11.42	6.3	1.57	1.27
Insects	Multiple species	14.68	9	4.31	3.72
Total (%)		49.21	27.2	12	11.4

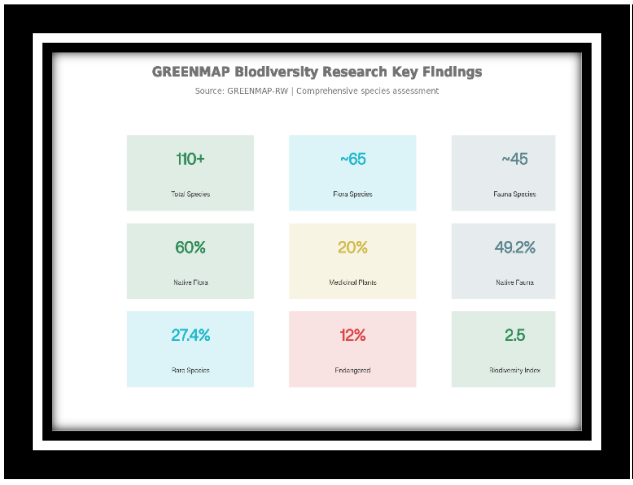

Fig.1.1 Biodiversity Research Key Finding

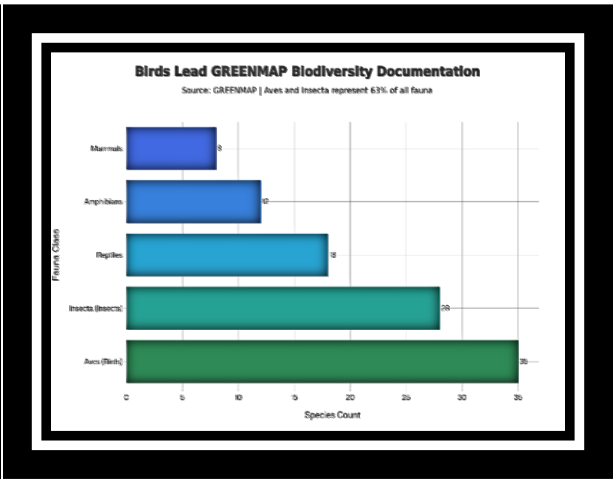

Fig.1.2 Greenmap Fauna Classification

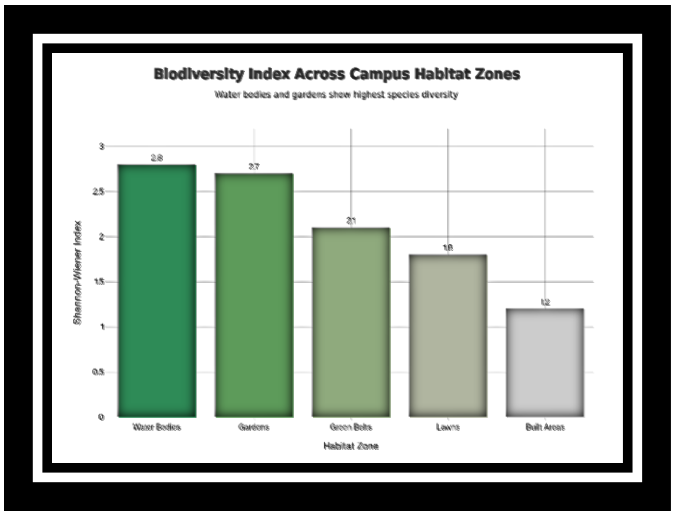

Fig.2 Habitual Zones in Campuses

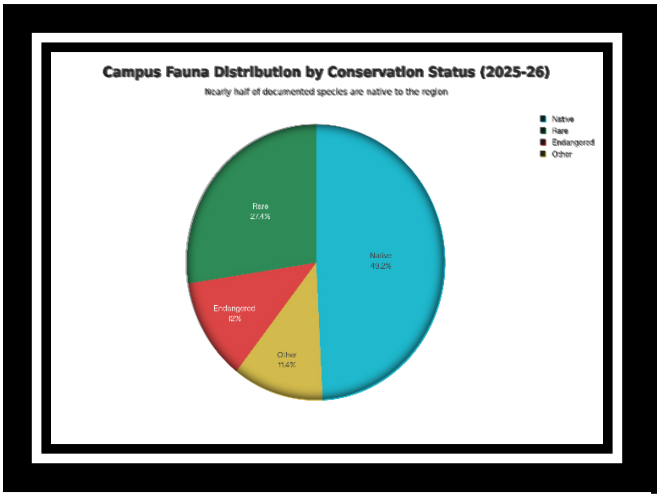

Fig.3.1 Campus Fauna Distribution

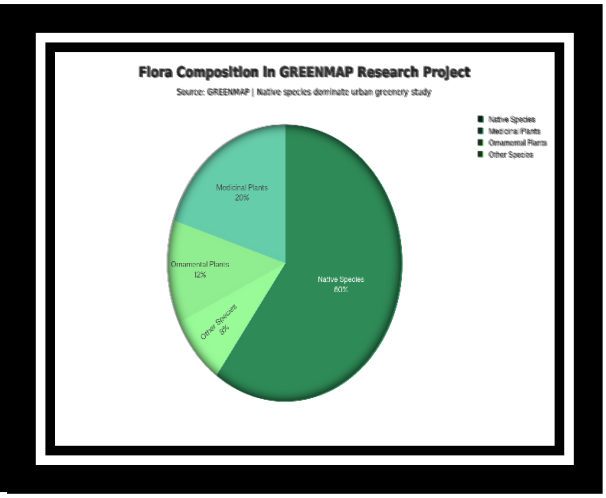

Fig.3.2 Campus Flora Distribution

XV. DISCUSSION

The results are consistent with previous studies, indicating that medium to high levels of biodiversity contribute to stress reduction and increased academic and recreational engagement. Biodiversity hotspots identified within the campus correspond with earlier green audit findings; however, the present study highlights gaps in the monitoring of nocturnal species. Limitations such as seasonal sampling bias were observed, yet the findings provide strong support for the development of a People's Biodiversity Register (PBR) as part of institutional accreditation requirements.

XVI. CONCLUSION

The Green Map- Campus flora and Fauna Documentation project successfully developed a comprehensive inventory and spatial representation of campus biodiversity documentation, environmental awareness, and environmental planning, while establishing a robust baseline for long-term environment monitoring and sustainable campus management. Furthermore, the research demonstrates that systematic biodiversity mapping can convert previously underrecognized natural assets into actionable scientific knowledge, thereby promoting environmental stewardship among students, staff, and administrators. The resulting georeferenced database and biodiversity map constitute enduring resources for

education, research, and green initiatives, significantly contributing to institutional sustainability objectives and biodiversity conservation efforts.

XVII. RECOMMENDATION

- Update map annually; add citizen science apps.
- Plant native species in low-diversity zones; create green corridors.
- Integrate into curriculum; conduct awareness workshops.
- Continuous monitoring is recommended to understand seasonal and long-term changes in biodiversity.
- Conservation-focused studies should be conducted on native species, which dominate both flora and fauna.
- Detailed research on medicinal plants is needed to promote sustainable use and conservation.
- Special attention should be given to rare and endangered fauna to assess threats and protection measures.
- Further studies should analyze the role of water bodies as biodiversity hotspots.
- Comparative regional studies are recommended to understand species adaptation and survival strategies.

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