Biodiversity Assessment Report

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GLOSSARY

Term	Definition
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population, or ecological community, including any biotic or abiotic
Investigation area	The 10 km radius area subject to biodiversity assessment
Candidate species	A species that is the focus of a study or intended beneficiary of a conservation action or connectivity measure.
Locality	Within 10 km of the investigation area
Paradeep	The local government area named Wagga Wagga.
EIA	Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, considering interrelated socio-economic, cultural, and human-health impacts, both beneficial and adverse
EMP	A project-specific plan designed to ensure environmentally sustainable implementation. It identifies and addresses potential environmental risks, outlining measures to minimize them.
Biodiversity	The variety of life in a specific ecosystem, encompassing different species, genes, and ecosystems.
Species	A distinct group of organisms capable of interbreeding and producing fertile offspring.
Threatened	Species at risk of becoming endangered, often due to factors such as habitat loss, pollution, or over-exploitation.
Vegetation Mapping	The process of visually representing and classifying plant types and distribution across a specific area or region.

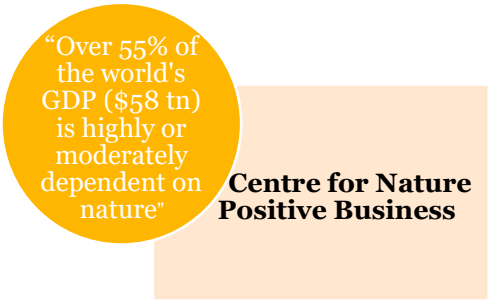
ABBREVIATION

BAR	Biodiversity Assessment Report
CBD	Convention of Biological Diversity
NGO	Non-Governmental Organization
IUCN	International Union for Conservation of Nature
LULC	Land Use Land Change
EIA	Environmental Impact Assessment
ICZN	The International Code of Zoological Nomenclature
EMP	Environment Management Plan
GPS	Global Positioning System
QGIS	Quantum Geographic Information System
NRSC	National Remote Sensing Centre
GOI	Government of India
IBAT	Integrated Biodiversity Assessment Tool
LAT	Latitude
LONG	Longitude
HA	Hectare

1 PROJECT BACKGROUND

1.1. Introduction

Biodiversity, which includes genetic traits, species diversity, and ecosystem variety, is vital for the functioning of our planet (Crozier, 1997) (Stange, (2021).) As environmental challenges grow, protecting biodiversity becomes crucial worldwide. Consequently, there is a growing realization that biodiversity conservation and assessment is a shared responsibility across society, extending beyond environmental groups. Simultaneously, there is an increasing acknowledgement of the business benefits associated with industries considering and mitigating risks related to biodiversity impacts (Tucker, 2006).



In the broader context of shared responsibility for biodiversity conservation and assessment, industries like Paradeep Phosphates Limited (PPL), a prominent Indian producer of phosphatic fertilizers, is crucial in advancing the agricultural sector, specializing in a diverse range of phosphatic fertilizers tailored to farmers' dynamic needs. Moreover, acknowledging its reliance on natural resources, PPL is keenly conscious of the biodiversity risks in its operations. Critical international agreements such as the Convention on Biological Diversity (CBD) are referenced to underscore the global importance of biodiversity (Le Prestre, 2017.). These agreements emphasize the collective responsibility to conserve and sustainably use biodiversity. By linking this global significance to the local context of the assessment in Paradeep, it becomes evident that biodiversity conservation efforts are interconnected and essential at both global and regional levels. This interconnectedness reinforces the impact of international agreements on local ecosystems, fostering a sense of shared responsibility and encouraging localized actions aligned with broader conservation aims.

The assessment's scope is inclusive, encompassing a comprehensive evaluation of flora through grid methods and fauna through activities like sightseeing, transect walks, opportunistic capture, and the use of secondary data relevant to Paradeep, Odisha.

Expanding on earlier assessments, which included an Environmental Impact Assessment (EIA,2015) by PPL and bird surveys conducted in collaboration with the District Forest Department (Palei, (2014)), the earlier assessments have supported ongoing endeavours concentrated on setting up baseline data and conducting assessments for biodiversity.

The roadmap involves:

- exploring the status of flora and fauna.
- Understanding the method employed.
- Exploring various calculations related to diversity indices, including Shannon, Berger-Parker, and Simpson's indices.

The comprehensive report includes a list of flora and fauna and their IUCN statuses, setting the stage for a detailed exploration of biodiversity in Paradeep, Odisha. This exercise aimed to develop a biodiversity baseline for PPL, which will provide a foundation for understanding the challenges faced by the region and the approach PPL needed to preserve and enhance its ecological richness.

1.2 Location

PPL is located at Paradeep in Jagatsinghpur District, Odisha. It is 90 km from Cuttack. The site is located at and around the 20°16'56" North Latitude and 86°38'52" East Longitude, west of the Paradeep Port. The plant encompasses area of 950 ha. Mahanadi River is 5 km from the plant site and meets the Bay of Bengal, which is 5.3 km away. Atharbanki Creek flows along the boundary wall between the Paradeep Port site and the factory.

Study Location: The study area within a 10 km radius around the plant site was considered an impact zone for the Biodiversity Assessment however, the marine assessment was not considered for this evaluation.

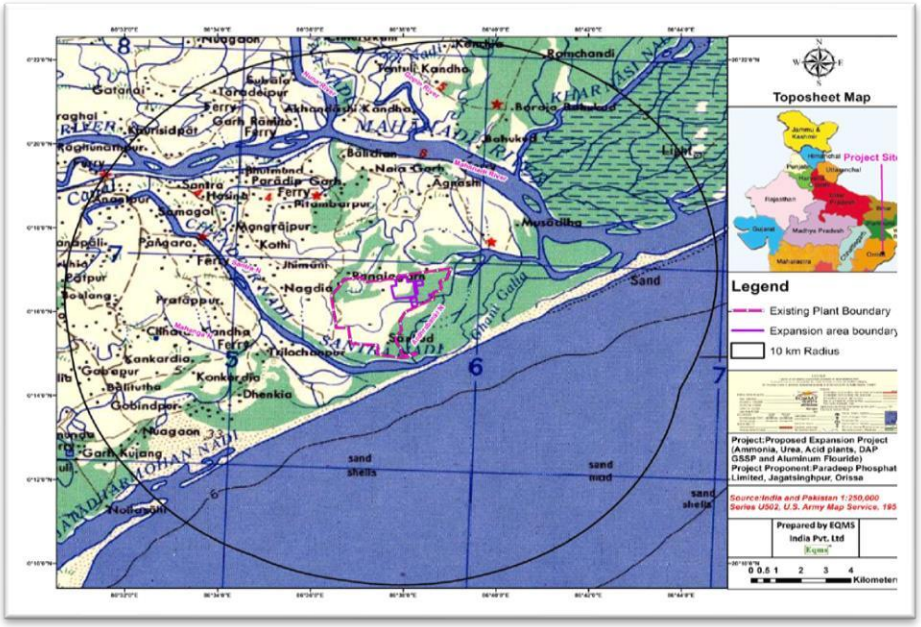


Image 1: Toposheet of 10 km survey area

The region encompasses diverse land cover and land use (LULC) types, including agricultural land, human settlements, vegetation, open shrub and grassland, water bodies, land, and marshes. Based on satellite imagery analysis obtained from the PPL EIA report (2015), the land use distribution reveals that approximately 31.31% of the area is dedicated to agriculture, around 41.80% is covered by water bodies, and 10.78% is characterized as open shrub and grassland. Settlements occupy about 3.34% of the land, vegetation covers 6.15%, and the remaining part serves various other purposes.

1.3 Purpose of This Report

The primary goal, focused on Baseline and Biodiversity Assessment, aimed to understand the ecological impact of PPL's activities on local flora and fauna. This involved utilizing established survey methodologies to quantify and monitor biodiversity within the target area.

2. Detailed Approach and Methodology

The following methods have been undertaken in the preparation of this Biodiversity Assessment Report (BAR)

2.1 Nomenclature

The nomenclature employed in this report for identifying vegetation communities draws upon a comprehensive compilation of scientific names from reputable sources. Names of plants used in this document follow PlantNet (plantnet, 2021). Scientific names for plant species are used in this report. Scientific and common names (where available) are provided throughout the report, with only scientific names in the plot data provided in the Annexure V.

Similarly, only some names of species were confirmed from Plantix. Additionally, references from the IUCN Red List contribute valuable insights into various plant species' conservation status and nomenclature. As a collaborative platform, the International Commission on Zoological Nomenclature (ICZN) has also been consulted to cross-reference and confirm the scientific names, ensuring a robust and reliable foundation for finding fauna communities in this report. Common names are used in the report for animal species. Both common and scientific names are provided in the Annexure III.

2.2 Background Research

The proposed approach for Biodiversity Assessment for Paradeep Phosphates Ltd. is based on five key pillars:

Figure 1 Proposed Approach and Methodology

The work includes desk research, primary data collection, focused group discussions and stakeholder consultations, analysis of data collected, and analysis of impacts concerning the stated goals of the assignment.

2.2.1 Desk Research

The initial step consisted of thorough desk-based research to understand existing data about different aspects of flora and fauna. This review included studying the influence of ecosystems, the effects of interventions on natural biodiversity, and the effectiveness of actions taken to counter anthropogenic pressures like habitat degradation. The research conducted with an informed approach to on-site assessments and strategies for sustaining and enhancing biodiversity.

Image 2 Project Site Boundary

DATABASE	AREA SEARCHED	REFERENCE
EIA/EMP REPORT	Biodiversity-related initiatives in under 10 km periphery	Paradeep Phosphate Limited. (2018). EIA/EMP Report
Business Responsibility & Sustainability Report 2022-23	Details about Environmental/ biodiversity-related actions	PPL Website
India Stat	Project Area- 10 km radius	Source: Data from Indiastat.com.
Restor Eco	Project Area- 10 km radius	Restor Eco AG (“Restor”)
Google Earth	Project Area- 10 km radius	Google Earth Pro
List of birds documented at Paradeep Phosphates Limited, Paradeep, Odisha.	Project Area- 10 km radius	Research Gate (Palei, (2014))
Endemic Freshwater Fish Diversity and Habitat Ecology of India	Paradeep – Mahanadi Area	Department of Biodiversity, University of Jeypore, Odisha, India

Table 1: Database - Desk Research

2.2.2 Data Collection and tools

The following tools and techniques involving collection of primary and secondary data were used:

Method	Description	Usage
	Primary data	
Direct field observation	Observation in the field site using essential tools like GPS, Camera, Measuring equipment etc. for quantitative enumeration.	Assessed the effectiveness of flora and fauna in term of diversity, richness, and dominance
Focus Group Interviews	A small group (8-10 people) were interviewed together on a limited set of topics to explore in-depth stakeholder opinions and perceptions of the biodiversity and its impact.	Assessed the impact on the biodiversity and involvement of the local community.
Key informant interviews	Qualitative in-depth interviews with those who have first-hand knowledge of the initiative, operations, and context.	Assessed the difficulties and gap areas in relevance and implementation.
Photos/images	High resolution photos to document the process and outputs.	Assessed the extent of the flora and fauna to document the interventions.
Remote Sensing& GIS	High-resolution raster data will be obtained (open source).	Assessed the impacts of interventions in the area.
	Secondary data	
Site level	Details of EIA and other site-specific documents	The local environment and its impact were assessed.

Table 2:Data Collection and tools

2.2.3 Inception Phase:

In the inception phase, a preliminary site visit was conducted to evaluate the nature-related linkages and dependencies at the designated PPL site. During this visit, major Land Use and Land Cover (LULC) and other significant factors that could influence biodiversity were identified. The goal was to gain insights into the specific types of flora and fauna existing near each site, informing the choice of taxa-specific survey methodologies.

Image 3: Interaction with the PPL Team at Paradeep Plant Site.

2.2.4 Assessment

A specific method was designed to ensure a thorough and systematic approach for the complete evaluation of flora and fauna in the designated study area.

2.2.4.1 Vegetation Assessment

Vegetation analysis was conducted using the quadrate method as explained below.

- Vegetation analysis was conducted using the quadrate method as explained below. 30 X 30 m for tree species (record trees >25 cm in GBH/species); GPS readings were taken for the four corners, and red tape and pegs was used to divide the subplots.

- 5 X 5 m [four plots] were laid along diagonals wherein all the shrubs and tree species <25 cm GBH was recorded; each plot will be divided into three subplots: (2 x 5 m), (2 x 5 m) and (1 x 5 m).

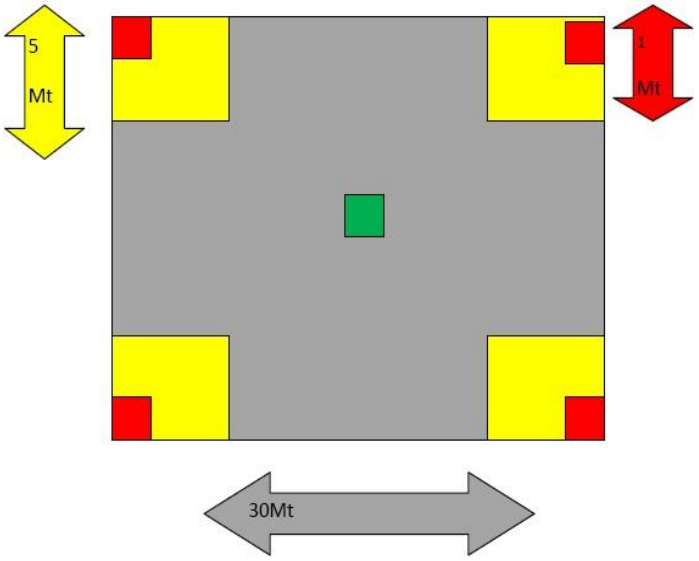


Figure 2 Sample Plot Method

- 1 X 1 m [five plots], one at the centre and four at corners per quadrate] were laid and herbs, grasses, and regeneration of tree species in five plots and above-ground biomass (green and then air-dry weight in one plot) was measured.

2.2.4.2 Faunal Assessment

The faunal assessment method included strategically configuring and placing sampling points, guided by local conditions, and employing a stratified sampling approach across study regions. Different methods were applied to assess various fauna.

1. Species Richness and Abundance (Density)- Avifauna

- Point count method (6-6.30 AM, 6-6.30 PM, MWF – one replicate)
- Additionally, opportunistic sightings and recordings will also be incorporated.
- The following attributes will be determined at the inception phase:
- Radius, Survey points , Final survey duration

2. Line/belt transect method- Mammals

- Density was calculated as:
- N/(L*W) and extrapolated for the area/site.
- The transects were laid using a stratified random sampling design, determined with the help of GIS/RS maps and primary information obtained during the inception visits.
- Opportunistic sightings of specific species were also incorporated into our results.

3. Amphibian aquatic biota surveys were designed within the survey boundary and included (as appropriate):

- Visual encounter surveys
- Call surveys

2.2.5. Overall Sampling Strategy

The activities within each category were assessed by evaluating samples of each activity and its subactivities. Methodological steps were adhered to for the selection of sample plots.

Methodological steps for the selection of sample plots

- Collected the LULC map from the Bhuvan portal (NRSC, Govt. of India).
- Extracted the relevant LULC data for the PPL buffer area using QGIS.
- Successfully generated 80 random points (40x2, double) through QGIS.
- Superimposed the random points onto the PPL LULC map.
- Exported latitude and longitude coordinates for all points in Excel format.
- Completed the selection of 40 points/plots based on specific LULC classes

Figure 3: Methodological Steps - Sample Plot

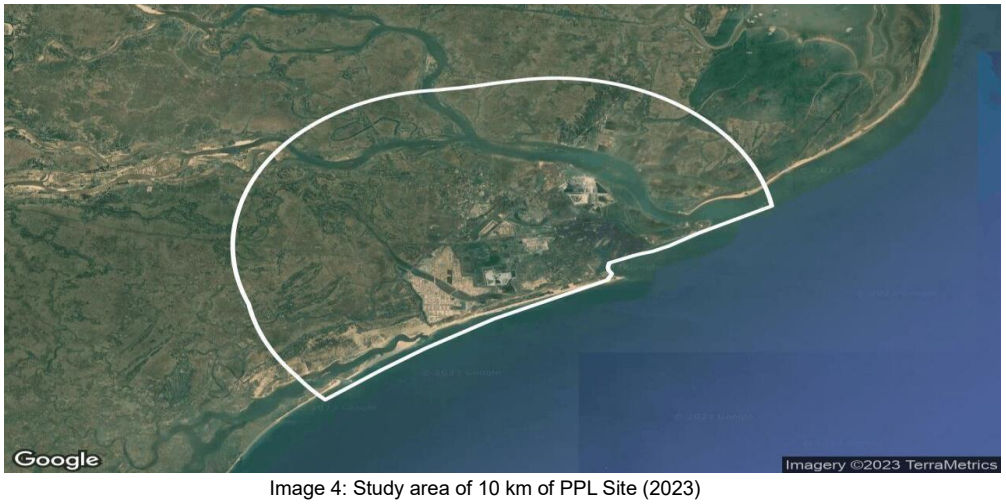


Image 4: Study area of 10 km of PPL Site (2023)

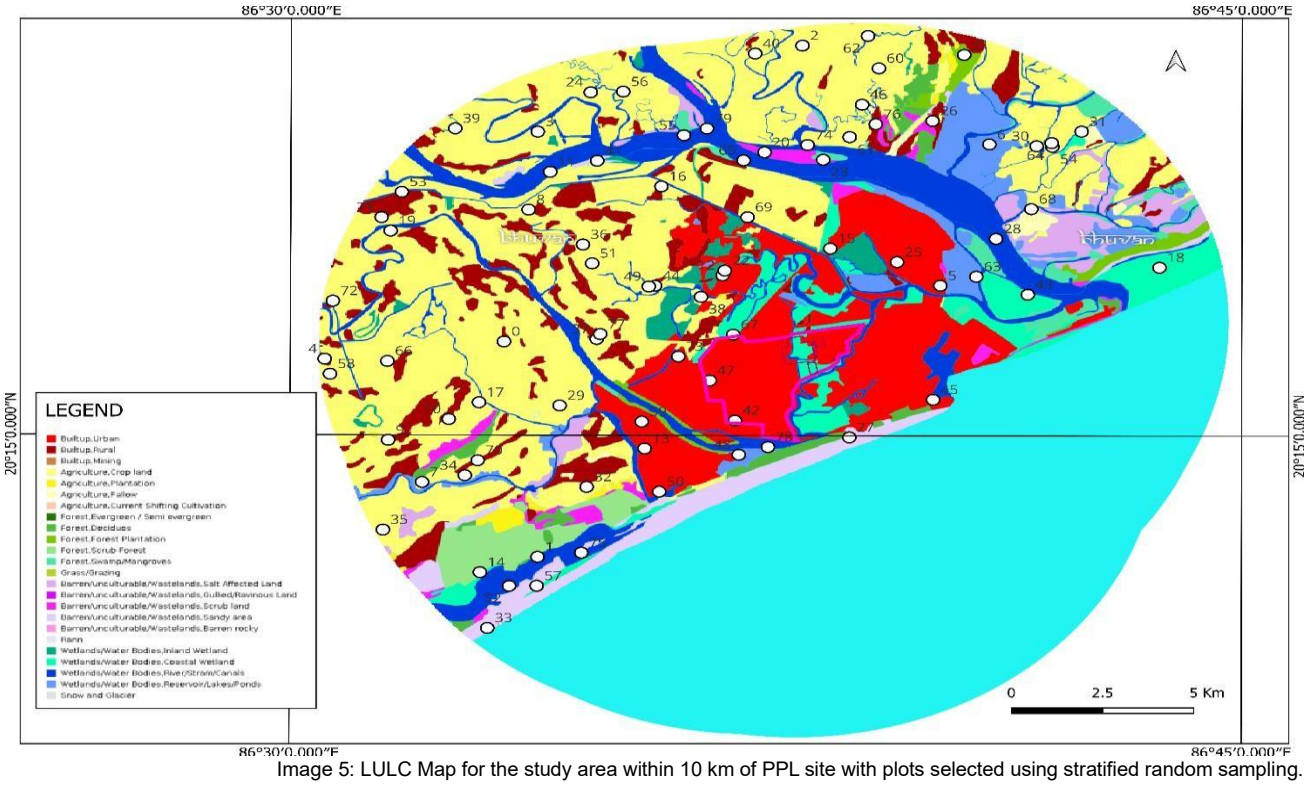


Image 5: LULC Map for the study area within 10 km of PPL site with plots selected using stratified random sampling.

The LULC map represented the area's land in different categories. Farmland was the most common land type, covering 14,058 hectares or 44.39%. Water areas, such as lakes and rivers, covering 6,470 hectares (20.43%), followed by built-up areas, like towns and factories, at 5,672 hectares (17.91%). There were shrub areas (2,179 hectares, 6.88%) and tree or mangrove zones (1,691 hectares, 5.34%). Grasslands were around 652.82 hectares (2.06%), areas with flooded vegetation covered 634.54 hectares (2.00%), and bare land was 310.24 hectares (0.98%). Colour segment were used to distinguish the types: yellow for agriculture, blue for water, red and brown for urban areas, green for forested regions, and pink for barren land. It also included 80 survey points chosen through stratified random sampling using GIS, ensuring a precise representation of the region.

2.2.6 Data Analysis

Data analysis included both primary and secondary data. This process aided in summarizing the data and interpreting the results to provide clear answers to questions that had initiated the study.

Spatial Data:

The following spatial data and reports were assessed to determine the landscape features and site values:
— Satellite imagery (Bhuvan Portal) —
Vegetation mapping (QGIS & Restor)

Field level data:

The data was obtained through an extensive field study that involved systematically sampling 40 plots, further detailed information on flora and fauna was meticulously collected at each site, cross-referenced, and verified through secondary databases. The dataset formed the basis for calculating three key biodiversity indices – the Shannon-Wiener Index, Berger-Parker Index, and Simpson's Diversity Index – for each sampled site. Mean values for these indices were computed to provide a summary of the overall biodiversity characteristics. Inferential statistics methods were used to interpret the biodiversity data, revealing valuable insights into the health and richness of the ecosystems under study. This methodical approach ensured the robustness and reliability of the findings, supporting informed decision-making in conservation and ecosystem management strategies.

2.2.7 Workflow:

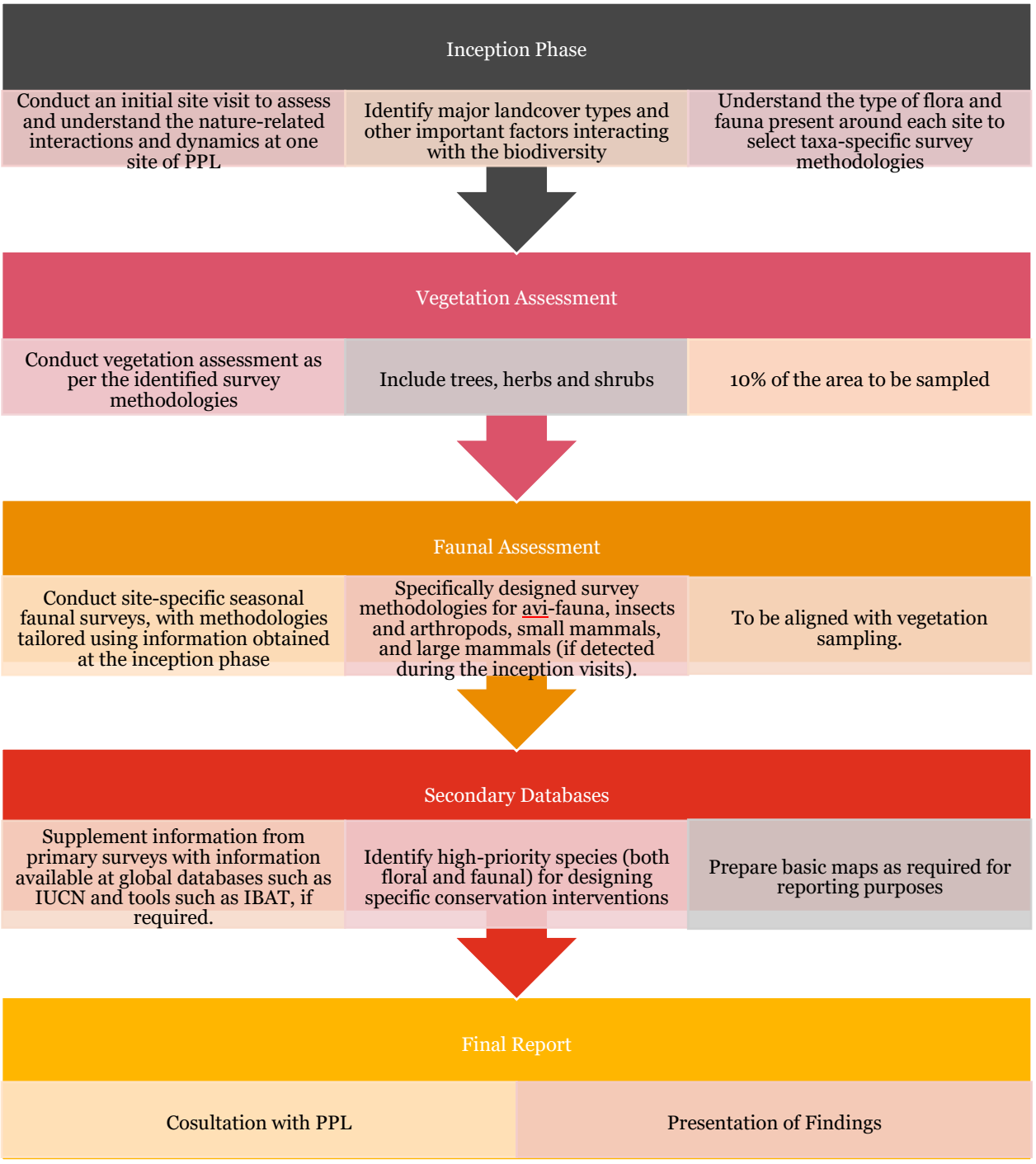


Figure 4: Process Consolidation

3. Survey- Flora

The area was surveyed from November 27 to November 30 and December 5 to December 11, 2023. Throughout these survey periods, two-field teams, consisting of five members, including two senior biodiversity experts, conducted the investigations. The primary focus of these surveys was to collect vegetation data and conduct species surveys following IUCN Guidelines.

3.1 Stratification – Desktop Analysis of Flora

Initial mapping of vegetation community boundaries involved analysing existing vegetation mapping and interpreting aerial photographs. Satellite imagery analysis was used to identify areas of disturbance, such as buildings, vehicle tracks, dams, and power lines, along with assessing vegetation structure and probable native versus exotic species composition across the investigation area. This process established a preliminary categorization of vegetation communities based on structural simplicity and disturbance, which was later confirmed during field surveys.

3.2 Field Verification of Flora Mapping

Field verification confirmed the vegetation structure, dominant canopy species, native diversity, condition, and the presence of ecological communities. The collected field data was compared and analysed against the secondary data. Identified vegetation zones and conditions following the IUCN Database relied on the field verification of vegetation type, class, and formation.

3.4 Flora Integrity Plots

Vegetation integrity plots were evaluated following the above-mentioned assessment methods, and a total of 37 vegetation integrity plots outlines the coordinates, orientations and vegetation type sampled for each plot. (For more details, please refer to **Annexure I)**

3.5 Flora – Biodiversity Assessment Index

The Flora Assessment involved evaluating abundance, species richness, and diversity using the indices mentioned below.

Index	Role in Biodiversity Assessment	Formula
Shannon Diversity Index	Measures species diversity in a community.	**$H = -\sum(Pi * \ln(Pi))$.** pi = proportion of individuals of the ith species, S = number of species.
Berger-Parker Index	Emphasizes the dominance of the most abundant species in a community.	**$d=N_{total}/N_{max}$** N_{max} = abundance of the most abundant species, N_{total} = total number of individuals in the community.
Simpson's Diversity Index	Quantifies the probability that two individuals randomly selected from a sample will belong to distinct species.	$D=1-\sum pi2$, where D is the diversity index and pi are the proportion of individuals in the i-th species.

Table 3 : Indices Formula

3.5.1 Index Range:

Diversity Index	Low Range	Moderate Range	High Range
Shannon Diversity	0-2.5	2.51-3.5	3.51-5
Simpson Diversity	0-0.6	0.61-0.8	0.81-1
Berger-Parker Index	0-0.2	0.21-0.4	0.41-1

Table 4: Index Range

3.5.2 Category wise analysis:

The site analysis for the 37 locations across the study area are as follows.

i) Category: Tree

Category	Shannon-Wiener Index ('H')	Berger-Parker Index	Simpson's Diversity Index ('D')	Dominant Species	Analysis	Lat	Long
Tree	2.09	0.326	0.83	*Vachellia nilotica*	Moderately Diverse, Some Dominance	20.278	86.6198
Tree	*1.01*	*0.5*	*0.611*	*Casuarina equisetifolia*	*Moderately Diverse, Some Dominance*	20.208	86.55
Tree	0	1	0	*Vachellia nilotica*	Not Diverse, Highly Dominated	20.333	86.5805
Tree	0	1	0	*Cocos nucifera*	Not Diverse, Highly Dominated	20.32996	86.56813

Tree	0.693	0.66	0.4	*No Dominant Species*	Moderately Diverse	20.415	86.7065
Tree	0.38	0.903	0.18	*Casuarina equisetifolia*	Moderately Diverse	20.254	86.5517
Tree	0	1	0	*Pandanus tectorius*	Not Diverse, Highly Dominated	20.234	86.578
Tree	0	1	0	*Azadirachta indica*	Not Diverse, Highly Dominated	20.236	86.5347
Tree	1.05	0.4	0.64	*No Dominant Species*	Moderately Diverse	20.228	86.5942
Tree	0.636	0.667	0.44	*No Dominant Species*	Moderately Diverse	20.327	86.6445
Tree	0	1	0	*Neolamarckia cadamba*	Not Diverse, Highly Dominated	20.272	86.5255
Tree	0	1	0	*Azadirachta Indica*	Not Diverse, Highly Dominated	20.302	86.5792
Tree	1.06	0.444	0.64	*No Dominant Species*	Moderately Diverse	20.274	86.6403
Tree	0.598	0.714	0.41	*Cedrus deodara*	Moderately Diverse	20.275	86.6219
Tree	0	1	0	*Borassus Flabellifer*	Not Diverse, Species Dominated	20.259	86.5708
Tree	0	1	0	*Borassus flabellifer*	Not Diverse, Highly Dominated	20.343	86.6093

Tree	0	1	0	*Azadirachta indica*	Not Diverse, Highly Dominated	20.312	86.5262
Tree	0	1	0	*Eucalyptus tereticornis*	Not Diverse, Highly Dominated	20.294	86.5123
Tree	1.277	0.429	0.694	Cocos nucifera	Moderately Diverse	20.366	86.6769
Tree	1.008	0.472	0.612	*Excoecaria agallocha*	Moderately Diverse	20.35	86.6878
Tree	0.679	0.583	0.53	*Anacardium occidentale*	Moderately Diverse	20.213	86.5651
Tree	0	1	0	Vachellia nilotica	Not Diverse, Highly Dominated	20.244	86.6179

Table 5: Tree- site wise Index Result

ii) Category: Shrub

Category	**Shannon-Wiener Index ('H')**	**BergerParker Index**	**Simpson's Diversity Index ('D')**	**Dominant Species**	**Analysis**	**Lat**	**Long**
Shrub	0	1	0	*Urena lobata var*	Not Diverse, Highly Dominated	20.278	86.6198
Shrub	0	1	0	*Carissa carandas*	Not Diverse, Highly Dominated	20.208	86.55
Shrub	0.898	0.5	0.56	*Lantana montevidensis*	Moderately Diverse, Some Dominance	20.333	86.5805

Shrub	0.47	0.87	0.23	*Acanthus ilicifolius*	Moderately Diverse	20.415	86.7065
Shrub	0.45	0.833	0.28	*Acanthus ilicifolius*	Moderately Diverse	2.3684	86.6344
Shrub	1.06	0.471	0.64	*Lycianthes rantonnetii*	Moderately Diverse	20.254	86.5517
Shrub	0	1	0	*Clerodendrum infortunatum*	Not Diverse, Highly Dominated	20.302	86.5792
Shrub	0	1	0	*Bonplad's croton*	Not Diverse, Highly Dominated	20.351	86.6501
Shrub	0	1	0	*Ceratopetalum gummiferum*	Not Diverse	20.234	86.578
Shrub	0	1	0	*Bonplad's croton*	Not Diverse, Highly Dominated	20.26	86.5496
Shrub	0.662	0.625	0.47	*No Dominant Species*	Moderately Diverse	20.228	86.5942
Shrub	0	1	0	*Euonymus fortunei*	Not Diverse, Highly Dominated	20.343	86.5431
Shrub	1.86	0.279	0.83	*Avicenia*	Moderately Diverse	20.327	86.6445
Shrub	0.693	0.5	0.5	*No Dominant Species*	Moderate Diverse	20.272	86.5255

Shrub	0.655	0.636	0.46	*Clerodendrum speciosissimum*	Moderately Diverse, Some Dominance	20.302	86.5792
Shrub	0	1	0	*Lantana montevidensis*	Not Diverse, Highly Dominated	20.274	86.6403
Shrub	0	1	0	*Lantana montevidensis*	Not Diverse, Highly Dominated	20.275	86.6219
Shrub	0.662	0.625	0.48	*Lantana montevidensis*	Moderately Diverse	20.259	86.5708
Shrub	0	1	0	*Lantana montevidensis*	Not Diverse, Highly Dominated	20.334	86.619
Shrub	1.099	0.333	0.666	*No Dominant Species*	Moderately Diverse	20.343	86.6093
Shrub	0	1	0	*Paddy clove plant*	Not Diverse, Highly Dominated	20.312	86.5262
Shrub	0	1	0	*Paddy clove plant*	Not Diverse, Highly Dominated	20.354	86.5787
Shrub	0	1	0	*Ludwigia grandiflora*	Not Diverse, Highly Dominated	20.338	86.696
Shrub	0	1	0	*Lantana montevidensis*	Not Diverse, Highly Dominated	20.354	86.5873

Shrub	0	1	0	*Lantana montevidensis*	Not Diverse, Highly Dominated	20.294	86.5123
Shrub	0.673	0.6	0.6	*Ipomoea carnea*	Moderately Diverse	20.213	86.5651
Shrub	0	1	0	Eichhornia crassipes	Not Diverse, Highly Dominated	20.244	86.6179

Table 6: Shrub- site wise Index Result

iii) Category: Herb

Category	**Shannon-Wiener Index ('H')**	**Berger-Parker Index**	**Simpson's Diversity Index ('D')**	**Dominant Species**	**Analysis**	**Lat**	**Long**
Herb	o.97	0.5	0.59	*Cynodon dactylon*	Moderately Diverse, Some Dominance	20.278	86.6198
Herb	*0.687*	*0.55*	*0.5*	*Bouteloua dactyloides*	*Moderately Diverse, Some Dominance*	20.208	86.55
Herb	1.14	0.555	0.89	*Cynodon dactylon*	Moderately Diverse, Some Dominance	20.333	86.5805
Herb	1.44	0.345	0.74	*Nymphaeaceae*	Moderately Diverse, Some Dominance	20.32996	86.56813
Herb	1.44	0.368	0.72	*Cynodon dactylon*	Moderately Diverse	20.415	86.7065
Herb	1.58	0.379	0.77	*Bouteloua dactyloides*	Moderately Diverse	2.3684	86.6344

Herb	2.28	0.188	0.9	*Cynodon dactylon*	Moderately Diverse	20.254	86.5517
Herb	1.54	0.339	0.78	*Bouteloua dactyloides*	Moderately Diverse	20.302	86.5792
Herb	1.95	0.268	0.84	*Bouteloua dactyloides*	Moderately Diverse	20.351	86.6501

Herb	2.3	0.125	0.89	*Bouteloua dactyloides*	Diverse	20.234	86.578
Herb	1.65	0.274	0.8	*Bouteloua dactyloides*	Moderately Diverse	20.26	86.5496
Herb	2.08	0.224	0.86	*Bouteloua dactyloides*	Moderately Diverse	20.236	86.5347
Herb	0.401	0.862	0.24	*Spinifex littoreus*	Low Diversity	20.228	86.5942
Herb	1.4	0.378	0.73	*Bouteloua dactyloides*	Moderately Diverse	20.343	86.5431
Herb	0.817	0.787	0.37	*Cynodon dactylon*	Moderately Diverse	20.327	86.6445
Herb	1.75	0.273	0.805	*Cynodon dactylon*	Moderately Diverse	20.257	86.6692
Herb	1.68	0.262	0.82	*Bouteloua dactyloides*	Moderately Diverse, Some Dominance	20.292	86.6079
Herb	1.98	0.25	0.85	*Cynodon dactylon*	Moderately Diverse	20.272	86.5255
Herb	2.47	0.14	0.91	*mikania*	Highly Diverse, Some Dominance	20.302	86.5792
Herb	0.968	0.541	0.6	*Cynodon dactylon*	Moderately Diverse	20.274	86.6403

Herb	1.083	0.416	0.66	*No Dominant Species*	Moderately Diverse	20.275	86.6219
Herb	1.58	0.273	0.788	*Cynodon dactylon*	Moderately Diverse	20.259	86.5708
Herb	0.77	0.45	0.84	*Typha angustifolia*	Moderately Diverse	20.334	86.619
Herb	1.72	0.267	0.795	*Typha angustifolia*	Moderately Diverse	20.343	86.6093
Herb	52.13	0.281	0.85	*Vigna mungo*	Moderately Diverse	20.312	86.5262
Herb	2.059	0.218	0.859	No Dominant Species	Moderately Diverse	20.354	86.5787
Herb	2.052	0.227	0.86	*Cynodon dactylon*	Moderately Diverse	20.308	86.5768
Herb	1.68	0.265	0.8	*Agrostis stolonifera*	Moderately Diverse	20.338	86.696
Herb	1.721	0.267	0.811	No Dominant Species	Moderately Diverse	20.316	86.62
Herb	2.149	0.177	0.878	*Cynodon dactylon*	Moderately Diverse	20.354	86.5873
Herb	2.314	0.192	0.892	*Cephalanthera longifolia*	Moderately Diverse	20.291	86.5111
Herb	1.556	0.319	0.761	*Cynodon dactylon*	Moderately Diverse	20.294	86.5123
Herb	1.208	0.429	0.665	No Dominant Species	Moderately Diverse	20.366	86.6769
Herb	0.472	0.82	0.291	*Typha angustifolia*	Not Very Diverse	20.35	86.6878
Herb	1.955	0.239	0.844	*Agrostis stolonifera*	Moderately Diverse	20.366	86.6219
Herb	1.37	0.302	0.76	*Nymphaeaceae*	Moderately Diverse	20.213	86.5651
Herb	1.73	0.267	0.81	Desmostachya bipinnata	Moderately Diverse	20.244	86.6179

Table 7: Herb - site wise Index Result

3.5.2 FloraTree Category:

The previously mentioned biodiversity indices were thoroughly examined, specifically focusing on selected sites. The following table presents the mean values for all sites, providing a summary of their respective biodiversity characteristics.

Category	Shannon-Wiener Index (Diversity)	Berger-Parker Index (Dominance)	Simpson's Diversity Index
Tree	0.23	0.51	0.18

Table 8 Tree Category - Biodiversity Index Mean Value

The biodiversity assessment of tree species across 37 sites was completed, revealing a complex ecological landscape. Among the 22 sites with trees, *Azadirachta indica, Pandanus tectorius, and Vachellia nilotica* dominated, contributing to a moderate level of dominance, as indicated by the Berger-Parker Index. However, the overall low Shannon-Wiener Index suggested a less varied distribution of tree species across the surveyed sites. Simpson's Diversity Index reinforced this observation, highlighting a high probability of individuals belonging to the same species. The prevalence of agricultural land over wetland and forest areas indicated potential human-induced influences on tree diversity patterns.

The overall dominating species under the tree category are provided in the table below. For a comprehensive list, please refer to the annexure titled "Relative Abundance (Annexure IV)" for additional information.

Dominance - Species	Common Name	Local Name(s)
Azadirachta indica	Neem Tree	Neem or Nim
Pandanus tectorius	Screw Pine	Pandan or Pandanus
Vachellia nilotica	Acacia Nilotica	Babul or Kikar, and others

Table 9 Dominating Species under Tree Category

The dominating species in **various land categories** are outlined below:

Wetland:

- *Pandanus tectorius*
- *Avicennia marina*
- *Excoecaria agallocha*

Forest:

- *Cedrus deodara*
- *Casuarina equisetifolia*

Agriculture:

- *Azadirachta indica*
- *Neolamarckia cadamba*
- *Borassus flabellifer*

Figure 5: Dominating Tree Species in Various Land Categories

3.5.3 Flora-
Shrub Category:

The table presented the mean values for overall sites, providing a concise summary of their respective biodiversity characteristics.

Category	Shannon-Wiener Index (Diversity)	Berger-Parker Index (Dominance)	Simpson's Diversity Index (Richness)
	Mean Value		
Shrub	0.20	0.6	0.15

Table 10 Shrub Category - Biodiversity Index Mean Value

The shrub assessment covered 37 sites, where shrubs were observed in 27 sites. The survey identif dominant shrub species, including *Lantana montevidensis, Acanthus ilicifolius, and Bonplad's croton*. The sites were primarily characterized by agricultural land, followed by wetland and forest areas. The Shannon-Wiener Index for shrubs was 0.20, indicating low diversity. This index, considering species richness and evenness, suggested room for improving diversity in the observed shrub category. The Berger-Parker Index for shrubs was 0.6, indicating a moderate level of dominance. This suggested a less even distribution of species due to a few prevalent shrub species. The dominance of Lantana montevidensis, Acanthus ilicifolius, and Bonplad's croton contributed to this higher dominance index. The Simpson's Diversity Index for shrubs was 0.15, signifying lower diversity. A value of 0.15 suggested a high chance of meeting the same shrub species, reinforcing lower diversity.

The dominance of specific shrub species, especially *Lantana montevidensis,* influenced the observed lower diversity indices. Additionally, the landscape composition, with a higher prevalence of agricultural land, contributed to observed biodiversity patterns in the limited shrub category.

The table below presents the overall **dominating species** in the Shrub category. For a comprehensive list, please refer to the annexure titled "Relative Abundance" for additional information.

Scientific Name	Common Name	Local Name(s)
Lantana montevidensis	Trailing Lantana	Putush
Acanthus ilicifolius	Holly-leaved Acanthus	Hargoza
Bonplad's croton	Bonpland's Croton	Bon-tulsi

Table 11 Dominating Species under Shrub Category

The dominating species in **various land categories** are outlined below:

Figure 6: Dominating Shrub Species in Various Land Categories

3.5.4 Flora-Herb Category:

The table below presents the mean values for ecological diversity indexes calculated for overall sites.

Category	Shannon-Wiener Index (Diversity)	Berger-Parker Index (Dominance)	Simpson's Diversity Index
	Mean Value		
Herb	1.47	0.35	0.74

Table 12 Herb Category - Biodiversity Index Mean Value

The biodiversity assessment of herbaceous plants covered 37 sites and revealed valuable insights into the ecological dynamics of these areas. The Shannon-Wiener Index, which measured diversity, indicated a notably diverse herbaceous ecosystem with a recorded value of 1.47, suggesting a rich variety of herbaceous species within the surveyed sites. The Berger-Parker Index, indicating dominance, stood at 0.35, reflecting a moderate level of dominance by specific herbaceous species, notably *Cynodon dactylon*. Simpson's Diversity Index further supported the findings of the Shannon-Wiener Index, emphasizing a balanced distribution of herbaceous species with a recorded value of 0.74. The identified dominant species, including *Cynodon dactylon, Bouteloua dactyloides, and Typha angustifolia*, highlighted their prevalence across all surveyed sites. The predominant presence of agricultural lands, followed by wetlands and forests, contextualized the herbaceous plant composition. This analysis established a baseline for future conservation efforts, emphasizing the need to preserve the observed diversity and address the implications of dominant species, particularly Cynodon dactylon, within the surveyed herbaceous ecosystems.

The overall dominating herbaceous species are detailed in the table below. For a comprehensive list, please refer to the annexure titled "Relative Abundance" for additional information.

Scientific Name	Common Name	Local Name
Cynodon dactylon	Bermuda Grass	Dhurva Grass (Local Name)
Bouteloua dactyloides	Buffalo Grass	Buffalo Grass
Typha angustifolia	Narrow-leaved Cattail	**N/A**

Table 13 Dominating Species under Herb category.

The dominating herb species in **various land categories** are outlined below:

Figure 7: Dominating Herb Species in Various Land Categories

4.0. Faunal Habitat Assessment.

The likelihood of faunal species occurring within the investigation area was assessed as part of this study. The land within a 10 km radius of the project site is mostly under cultivation, water bodies, shrubs and herbs, resulting in scanty vegetation and limited faunal biodiversity. Such regions provide habitat for species that are adapted to open environments and are tolerant of some disturbance. In addition, small patches of remnant native vegetation are present throughout the investigation area. This includes areas of remnant native trees and plantation by forest department. Its key habitat characteristics and limitations are:

- a lack of complex native layers strata (ground cover, shrubs, and plants – affecting bird and mammals' diversity, particularly small species)
- a lack of continuous vegetation such that connectivity is poor and small isolated fragments are characteristic across the investigation area.
- a low occurrence of old-growth woodland habitat and a lack of dense patch size. Most of the investigation area now exists as agricultural land. Most remaining old-growth trees exist as isolated paddock trees or are within small patches of fragmented woodland.

In addition, the lack of connectivity across the investigation area hinders the ability of less mobile species (particularly arboreal mammals) to disperse across the landscape.

4.1 Faunal Assessment:

Sample sites were chosen, taking into consideration anthropogenic factors such as human interference. Visits were conducted to all the designated locations, preferably in the morning hours, as this is when a majority of taxonomic groups (insects, birds, mammals, etc.) commence their activity period. The listed species were meticulously cross-checked against the IUCN Red List of Threatened Species.

a) Invertebrates

i) Insects

Insect sampling was executed through the adhesive glue trap method across three sites, with traps set from morning to late afternoon. Subsequently, the gathered insects were identified by referring to pertinent taxonomic literature. Thorough checklists of Hemiptera (Bugs), Coleoptera (Beetles), Chalcids, and Psocopterans in Paradeep were compiled by consulting existing literature and are presented in Table 13.

Taxonomic Group	Total Species	Families Represented	Conservation Status
Hemiptera	2	2	Refer Annexture III
Coleoptera	1	1	
Psocoptera			
Myriapoda	1	1	
Isopoda	1	1	
Apidae	1	1	
Araneidae	1	1	
Mollusca	1	1	
Decapoda	1	1	

Orthoptera	1	1	
Coccinellidae	1	1	

Table 14 Taxonomic Group – Insect

Note: The mentioned species, Hymenoptera, Lepidoptera, and Odonata, fall within the category of insects. Their respective roles in the ecosystem vary, hence the inclusion of separate sections.

ii) Ants (Hymenoptera: Formicidae)

Ants were primarily collected manually by hand-picking, and were identified using published literature (Bingham 1903, Bolton 1995). A thorough checklist of the ants within the 10 km area was compiled by referring to existing literature and is presented in Table 14.

Taxonomic Group	Total Species	Families Represented	Conservation Status
Ants	2	1	Least Concern

Table 15 Taxonomic Group – Ants

iii) Butterflies (Lepidoptera: Rhopalocera)

Butterfly diversity was investigated by utilizing established paths around the area as fixed transects. A total of 10 such transects were chosen to comprehensively cover the entire area. Each transect in the study area underwent weekly visits from 8:00 to 12:00 Hrs. on bright, rain-free days. Butterflies were directly observed and recorded in the field, with necessary precautions taken to minimize harm to living individuals. Photographs of butterflies were captured and preserved for future reference. Species identification was conducted using published literature (Kunte 2000, Kehimkar 2008). A comprehensive butterfly checklist was compiled and presented in Table 15.

Taxonomic Group	Total Species	Families Represented	Conservation Status (IUCN)
Butterflies	4	4	Refer Annexure III

Table 16 Taxonomic Group - Butterfly

iv) Dragonflies & Damselflies (Odonata)

Dragonflies in their adult stage were surveyed using a direct search technique from 8:00 to 12:00 Hrs. Opportunistic observations were also incorporated into the current list. The species were photographed and identified using a standard field guide (Subramanian 2009).

Taxonomic Group	Total Species	Families Represented	Conservation Status (IUCN)

Dragonflies and Damselflies	4	3	Refer Annexure III

Table 17 Taxonomic Group – Dragonfly

B) Vertebrates

i) Fishes (Chordata: Pisces)

Residents along the coast were surveyed using a semi-structured questionnaire, and the gathered data were cross-referenced with available secondary data for the region. This examination unveiled the predominance of notable brackish water fish species such as Cyanoglossus puncticeps, Terapon Jabua, Scatophagus argus, and Strongylura storgylura, notably abundant in Machhagaon, Ersama, and Paradeep areas (Nandi, 2021). A thorough checklist of the fishes was compiled by consulting existing literature and is presented in Table 17.

Taxonomic Group	Total Species	Families Represented	Conservation Status (IUCN)
Freshwater Fish	66	25	Refer Annexure III

Table 18 Taxonomic Group – Fishes

ii) Reptiles (Chordata: Reptilia)

Direct search techniques were employed for the reptilian survey, focusing on extended basking periods during cool weather. The presence of reptiles was documented by searching the edges of vegetation and sheltered areas. Published literature, specifically Whitaker and Captain (2004), was referenced for identification purposes. A thorough checklist of the reptiles was compiled and is depicted in Table 19.

Taxonomic Group	Total Species	Families Represented	Conservation Status (IUCN)
Reptiles	2	2	Refer Annexure

Table 18 Taxonomic Group- Reptiles

iii) Birds (Chordata: Aves)

For avian sampling, established paths along the PPL boundary and selected points were utilized. A total of 8 such transects were chosen to ensure a well-rounded representation of the study area. Each transect was traversed between 6:00-10:00 Hrs. Birds encountered within 25 m on both sides during the constant-paced walk along the transect were duly noted, and flying birds overhead were also recorded. Opportunistic sightings of birds were additionally documented. Field identification relied on published literature (Grimmett et al. 2011), and photographs of birds were taken whenever possible for future reference. A comprehensive bird checklist was compiled through consultation with existing literature.

Taxonomic Group	Total Species	Families Represented	Migration Type	Family with Highest Number of Species	Conservation Status (IUCN)
Birds	54	17	Refer annexure B 4.1	1. Anatidae- 9 Species 2. Scolopacidae- 9 Species	Refer Annexure III

Table 19 Taxonomic Group- Avifauna

v) Mammals (Chordata: Mammalia)

To explore the diversity of mammalian species, the transect method was employed, with paths serving as fixed transects. Four such transects were selected, and the entire length of each transect was traversed early in the morning during the survey period. A thorough checklist of mammals was compiled by referring to existing literature.

Taxonomic Group	Total Species	Families Represented	Conservation Status (IUCN)
Mammals (Jackal)	5	5	Refer Annexure III

Table 19 Taxonomic Group- Mammals

5.0 Community Perception

Introduction

Learning about the community's reliance on natural resources and their impacts was one of the objectives of the PPL Biodiversity Assessment. The assessment examined species diversity in the study area and the relationships between communities and nature. The overall understanding of the community in the evaluation may help assess the present status and strategies for decision-making. Therefore, community assessments for improving species diversity were integral to the study.

Methodology:

To capture community perception, discussions were held in five villages, involving both male and female participants aged between 25 to 60 years. These sessions included both group and individual discussions, employing qualitative questions to gather detailed insights. For the survey part, a stratified sampling method was used, where out of 40 predetermined biodiversity points, 5 were randomly selected to ensure unbiased representation. The survey's sample size was set at 10% of the total points, a sufficient sample size to provide a comprehensive understanding of the community's views, balancing both qualitative and quantitative data collection.

Study Area:

The study area within a 10 km radius around the plant site was considered an impact zone for the Biodiversity Assessment. The researcher's team selected five villages from the GPS survey points for conducting in-depth interviews to evaluate species diversity and villagers' dependency on the ecosystem.

Analysis:

Essential insights were revealed when analyzing the site's biodiversity status through the community's perceptions of flora and fauna. The dominating tree species, as detailed in Table 8, were found to have uniform relationships with the community. For example, a dual role was played by *Azadirachta indica*, known as Neem Tree. Its deep integration into traditional agriculture and herbal medicine contributed positively to biodiversity, aligning with the community's perception of the importance of these species. Similarly, it was acknowledged that Vachellia nilotica, or Acacia nilotica, played a crucial role as a habitat provider, supporting diverse species and enhancing soil fertility. However, concerns were raised within the community about its aggressive tendencies and significant **water consumption** in arid areas.

"Modimoni, a 55-year-old resident of *Kujanga*, said,"The most common tree in the area is *azadirachta indica*, the shrub is the Paddy Clove Plant, and the herb is *vigna mungo*".**Additionally, said**that, in the past, due to **high tides**, saltwater remained in the field, resulting in lower crop production and increased soil salinity. Over the past few years, these challenges have decreased due to infrastructural changes in the area."

During the interview, people held various opinions regarding Common Wireweed. Some favoured it for its medicinal uses, while others perceived it as a weed competing with other plants. Purple Lantana drew attention for its vibrant flowers, although some voiced disapproval due to its potential harm to local plants. Mangrove holly was considered by people for its role in coastal areas, providing habitats for animals. Doab Grass was perceived diversely, with some finding it robust and others expressing annoyance due to its extensive spreading. In the case of the invasive Lantana montevidensis within the shrub category (Table 11), its significant impact on biodiversity was observed. Its resourcefulness was acknowledged by the community, utilizing Lantana for furniture and fuel, illustrating a pragmatic approach to biodiversity management. The villagers held different opinions about these plants, recognizing their positive and negative effects on nature. In the herb category (Table 13), Bermuda Grass, scientifically known as Cynodon Dactylon, was noted for its complex impact on biodiversity. Native vegetation could be adversely affected by it, but the community acknowledged the resilience and erosion control benefits of Bermuda Grass, indicating a subtle perception.

"Kabindra, a 40-year-old resident of Patilipanka, Naldia, provided a different perspective, focusing on the flora within his surroundings. He said, "I've observed a significant prevalence of Kolikhiya (*Hygrophila auriculata*), a medicinal plant used in our region for treating pain, jaundice, and malaria."

Villagers of Kujanga provided valuable insights into the local fauna. Common animals in the locality included foxes, mongoose, and goats (livestock). The bird population was characterized by Herons (Baga), Pigeon, Kumadua, White-breasted waterhen (Dhauka), Hen (for Livestock), and the Black Drongo. Reptilian inhabitants encompassed Snakes such as Tampa, Dhamna, and Gokhara (local names). Notably, the villagers observed species that were once part of the local ecosystem but are no longer present, such as Vulture (Sokun) and Eagle (Cheel). The disappearance of species like Vultures and Eagles may suggest shifts in the food chain or environmental changes affecting their habitats. Similarly, the absence of specific bird species in recent years, including the Black Drongo, Kingfisher, and Bee-eater (Suichora), was highlighted by Tapas, a 45-year-old resident of Rajendra Nagar.

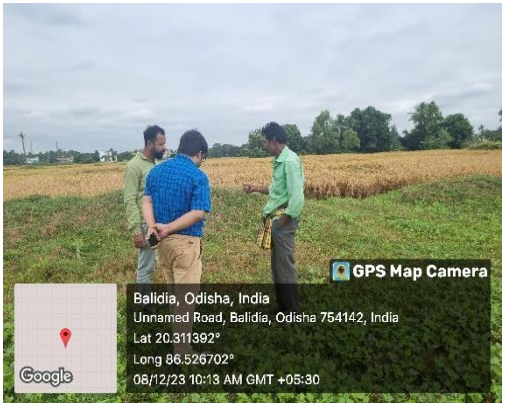


Image 6: Community Interaction in Baldia Village

On the perception of the **environment**, Community members in the study area shared their observations and concerns about the local environment. One resident, Tapesh1, aged 45 and residing in Rajendra Nagar, voiced a significant worry about the diminishing fruiting of coconut and other trees. He noticed that the fruits were turning light red, reducing market value. His initial assumption pointed towards pollution from the rising industries as a potential cause.

However, it is essential to consider that a range of factors, such as pests, diseases, or changes in climate conditions, may influence the decline in fruiting. The community's perception sheds light on the environmental issues and the need for a comprehensive understanding of contributing factors.

 Image 7: Community Interaction in Kharinasi Village	"Another significant concern was raised by **Tapesh**, a 45-year-old resident of Rajendra Nagar, regarding the declining fruiting of coconuttrees. The fruits were observed to turn light red, leading to a reduced market value. The cause was presumed by him to be pollution from the rising industries".

In conclusion, respondents across the area sought the need for biodiversity conservation of local species, realizing their importance in the ecosystem and aimed to facilitate collaborative efforts in preserving diverse natural environments for future generations.

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Annexure – Biodiversity Assessment

Annexure I – LULC Class (Site-wise)

The table below details the Land Use and Land Cover (LULC) classification for each site, including specific location details to provide a clear understanding of how land is utilized and the nature of the landscape in these areas.

Selected	Lat	Long	LULC_class (see LULC map)	Location point
1	20.27782	86.61983	Forest/Scrub	Near PPL Police Station
2	20.20836	86.55002	Forest/Scrub	Nuagan
3	20.33335	86.58047	Barren Unculturable land/sandy land	Pipal
4	20.32996	86.56813	Wetland/River/Canal	Jagati
5	20.41483	86.70651	Wetland/coastal wetland	Jambu Dweep
6	2.36842	86.63436	Agricultural- Crop Land	Rajendra Nagar
7	20.25351	86.55165	Forest- Plants	Jagatsinghpur (Bonapatta)
8	20.30219	86.57924	Agricultural- Crop Land	Siju
9	20.35052	86.65009	Agricultural- Crop Land	Bahakuda
10	20.23433	86.57796	Agricultural- Crop Land	Dhenkia
11	20.25995	86.54963	Agricultural- Crop Land	Banapatakandha, Odisha
12	20.23571	86.53472	Agricultural- Crop Land	Panigadiakandha, Odisha
13	20.2278	86.59423	Barren Unculturable land/sandy land	Nuagan
14	20.34310	86.54314	forest/Scrub	Patlipanka
15	20.32655	86.64451	Grass/wetland	Mahanadi Point
16	20.25696	86.66923	Mangrove- Planted	Paradeep
17	20.29207	86.60786	Agricultural- Crop Land	Niharunikandha, Odisha
18	20.27244	86.52551	Agricultural- Crop Land	Baulanga
19	20.27416	86.640273	Forest- Plants	Paradeep
20	20.275199	86.621897	Forest- Plants	Paradeep
21	20.25902	86.57080	Agricultural- Crop Land	Trilochanpur
22	20.33354	86.61896	Wetland/River/Canal	Nuagarh
23	20.34319	86.60931	Wetland/River/Canal	Balidia
24	20.31200	86.52624	Agricultural- Plantation	Kujang
25	20.35412	86.57872	Agricultural- Crop Land	Srima School
26	20.30791	86.57681	Agricultural- Crop Land	Narendrapur
27	20.2875	86.70116	Agricultural- Crop Land	Paradeep (New Pont)
28	20.33799	86.69598	Agricultural- Crop Land	Naladia

29	20.31628691	86.62003213	Agricultural- Crop Land	Paradeep
30	20.35434957	86.5872705	Agricultural- Crop Land	Gararomita
31	20.29068188	86.5111271	Agricultural- Crop Land	Balia
32	20.29388	86.51228	Agricultural- Crop Land	Balia 2
33	20.36568	86.67688	forest Scrubs	Ramnagar
34	20.34961	86.68779	Wetland/WB-reservior/pond/lake	Baratubi (Changed)
35	20.36599	86.62192	Agricultural- Crop Land	Rajendra Nagar
36	20.21305	86.56514	Wetland/River/Canal	Gobinadpur
37	20.24418	86.61792	Wetland/WB-reservior/pond/lake	Kansaripadia

Annexure II – Vegetation Population Size (Site-wise)

The table below offers detailed information on the population size of vegetation at each site, categorized by flora type, along with the latitude and longitude coordinates, giving a precise and site-specific understanding of the vegetation distribution.

Near Ppl Police Station		
Lat	Long	
20.27782	86.61983	
Species	Population Size	Category
Neolamarckia cadamba	**3**	Tree
Saraca asoca	**3**	Tree
Vachellia nilotica	**1**	Tree
Ficus hirta	**1**	Tree
Spathodea campanulate	**1**	Tree
Quercus phellos	**2**	Tree
Butea monosperma	**7**	Tree
Syzygium cumini	**1**	Tree
Vachellia nilotica	**15**	Tree
Cedrus deodara	**4**	Tree
Cuscuta	**6**	Tree
Ficus reliogosa	**2**	Tree
Urena lobata var	**1**	Shrub
Mikania	**5**	Herb
Cynodon dactylon	**20**	Herb
Bouteloua dactyloides	**15**	Herb

Nuagaon	
Lat	Long
20.20836	86.55002

Species Scientific Name	Population Size	Category
Casuarina equisetifolia	**2**	Tree
Anacardium occidentale	**1**	Tree
Pandanus tectorius		Tree
Carissa carandas	**3**	Shrub
Cynodon dactylon	**5**	Herb
Bouteloua dactyloides	**25**	Herb

Pi ɔal	
Lat	Long
20.33335	86.58047

Species Name	Population No	Category
Vachellia nilotica	**1**	Tree
Pithecellobium dulce	**1**	Shrub
Lantana montevidensis	7	Shrub
Calotropis gigantea	**6**	Shrub
Achyranthes aspera	**20**	Herb
Cynodon dactylon	**50**	Herb
Parthenium hysterophorus	**10**	Herb
Mikania	**10**	Herb

Jagati	
Lat	Long
20.32996	86.56813

Species Name	Population Size	Category
Cocos nucifera	**27**	Tree
Nymphaeaceae	**5**	Herb
Eichhornia crassipes	**10**	Herb
Mimosa pudica	**8**	Herb

Trifolium repens	**5**	Herb
Ipomoea aquatica	**1**	Herb

Jambu Dweep	
Lat	Long
20.41483	86.70651

Species Name	Population Size	Category
Azadirachta indica	**2**	Tree
Ficus microcarpa	**4**	Tree
Derris trifoliata lour	**2**	Shrub
Avicennia	**1**	Shrub
Acanthus ilicifolius	**20**	Shrub
Nymphaeaceae	**2**	Herb
Eichhornia crassipes	**2**	Herb
Mimosa pudica	**4**	Herb
Chloris virgata	**15**	Herb
Cynodon dactylon	**20**	Herb
Alternanthera philoxeroides	**25**	Herb

Rajendra Nagar	
Lat	Long
2.36842	86.63436

Species Name	Population Size	Category
Acanthus ilicifolius	**50**	Shrub
Bonplad's croton	**10**	Shrub
Cynodon dactylon	**14**	Herb
Veronica	**7**	Herb
Agrostis stolonifera	**10**	Herb
Hordeum brachyantherum	**8**	Herb

Vigna luteola	**2**	Herb
Bouteloua dactyloides	**25**	Herb

Jagatsinghpur (Bonapatta)	
Lat	Long
20.25351	86.55165

SPECIES NAME	ABUNDANCE	CATEGORY
Casuarina equisetifolia	**b**	**Tree**
Azadirachta indica	**1**	**Tree**
Anacardium occidentale	**2**	**Tree**
Ipomoea cairica	**5**	**Shrub**
Lycianthes rantonnetii	**8**	**Shrub**
Officinal breynia	**4**	**Shrub**
Nymphaeaceae	7	**Herb**
Saccharum spontaneum	**2**	**Herb**
Cynodon dactylon	**12**	**Herb**
Veronica	**6**	**Herb**
Agrostis stolonifera	**8**	**Herb**
Galium verum	**5**	**Herb**
Melilotus albus	**4**	**Herb**
Murdannia nudiflora	**11**	**Herb**
Chloris truncata	**10**	**Herb**
Amphiachyris	**8**	**Herb**
Bouteloua dactyloides	**16**	**Herb**

Sij 1	
Lat	Long
20.30219	86.57924

Species Name	Population Size	Category
Clerodendrum infortunatum	**9**	Shrub
Commelina diffusa	**8**	Herb
Cynodon dactylon	**14**	Herb
Agrostis stolonifera	**8**	Herb
Hordeum brachyantherum	**9**	Herb

Bouteloua dactyloides	**20**	Herb

Bahakuda	
Lat	Long
20.35052	86.65009

Species Scientific Name	Population Size	Category
Bonplad's croton	**8**	Shrub
Acanthus ilicifolius	**6**	Herb
Glyceria fluitans	**8**	Herb
Cynodon dactylon	**5**	Herb
Agrostis stolonifera	**4**	Herb
Amphiachyris	**2**	Herb
Limonium carolinianum	7	Herb
Hordeum brachyantherum	**9**	Herb
Bouteloua dactyloides	**15**	Herb

Dhen ia	
Lat	Long
20.23433	86.57796

Species Scientific Name	Population Size	Category
Pandanus tectorius	**4**	Tree
Ceratopetalum gummiferum	**3**	Shrub
Scoparia dulcis	7	Herb
Mikania	**5**	Herb
Mimosa pudica	**4**	Herb
Colocasia	**2**	Herb
Marsilea quadrifolia	**8**	Herb
Cynodon dactylon	**9**	Herb
Parthenium hysterophorus	**4**	Herb
Alternanthera philoxeroides	**8**	Herb
Agrostis stolonifera	**11**	Herb
Hordeum brachyantherum	**8**	Herb
Sisymbrium altissimum	**2**	Herb
Bouteloua dactyloides	**20**	Herb

Banap ıtakandha	
Lat	Long
20.25995	86.54963

Species Name	Population Size	Category
Bonplad's croton	**2**	Shrub
Cynodon dactylon	**18**	Herb
Agrostis stolonifera	**12**	Herb
Hordeum brachyantherum	**11**	Herb
Ageratum conyzoides	**10**	Herb
Ipomoea aquatica	**2**	Herb
Bouteloua dactyloides	**20**	Herb

Panigadiakandha	
Lat	Long
20.23571	86.53472

Species Name	Population Size	Category
Azadirachta indica	**1**	Tree
Sida acuta	**3**	Herb
Centella asiatica	**5**	Herb
Urospermum picroides	**4**	Herb
Mikania	**4**	Herb/
Nelumbo nucifera	**1**	Herb
Nymphaeaceae	**3**	Herb/
Cynodon dactylon	**12**	Herb
Agrostis stolonifera	**9**	Herb
Hordeum brachyantherum	**11**	Herb
Bouteloua dactyloides	**15**	Herb

Nu gan	
Lat	Long
20.2278	86.59423

Species Scientific Name	Population Size	Category
Casuarina equisetifolia	**2**	Tree
Pandanus tectorius	**2**	Tree
Azadirachta indica	**1**	Tree
Calotropis gigantea	**5**	Shrub
Euphorbia peplis	**3**	Shrub
Nymphaeaceae	**4**	Herb
Spinifex littoreus	**25**	Herb

Patlipanka	
Lat	Long
20.3431	86.54314

Species Scientific Name	Population Size	Category
Euonymus fortunei	**2**	Shrub
Coldenia procumbens	**4**	Herb
Sphaeranthus indicus	**3**	Herb
Misopates orontium	**6**	Herb
Cynodon dactylon	**15**	Herb
Bouteloua dactyloides	**17**	Herb

Mahanadi Point	
Lat	Long
20.32655	86.64451

Species Name	Population Size	Category
Pandanus tectorius	**2**	Tree
Phoenix dactylifera	**1**	Tree
Derris trifoliata lour	**4**	Shrub
Avicennia	**17**	Shrub
Crotalaria incana	**2**	Shrub
Acanthus ilicifolius	**14**	Shrub
Caesalpinia bonduc	**8**	Shrub
1phyllanthus Reticulatus	**4**	Shrub
Laggera crispata	**9**	Shrub
Justicia adhatoda	**3**	Shrub

Nymphaeaceae	**3**	Herb
Sisymbrium loeselii	**2**	Herb
Tridax procumbens	**1**	Herb
Eichhornia crassipes	**Na**	Herb
Mimosa pudica	**8**	Herb
Xanthium strumarium	**5**	Herb
Cynodon dactylon	**70**	Herb

Hanuman Ma ıdir (Baliyatra)	
Lat	Long
20.25696	86.66923

Species Name	Population Size	Category
Pseudoconyza viscosa	9	Herb
Mikania	3	Herb
Reichardia picroides	5	Herb
Ipomoea pes-caprae	4	Herb
Chloris virgata	1	Herb
Cynodon dactylon	10	Herb
Bouteloua dactyloides	12	Herb
Conocarpus erectus	84	Mangrove

Niharunikan lha, Odisha	
Lat	Long
20.29207	86.60786

Eichhornia crassipes	6	Herb
Typha angustifolia	5	Herb
Cynodon dactylon	10	Herb
Agrostis stolonifera	8	Herb
Hordeum brachyantherum	2	Herb
Bouteloua dactyloides	11	Herb

Baulanga	
Lat	Long
20.27244	86.52551

Species Name	Population Size	Category
Neolamarckia cadamba	1	Tree

Pithecellobium dulce	1	Shrub
Solanum viarum dunal	1	Shrub
Glyceria fluitans	4	Herb
Mikania	3	Herb
Achyranthes aspera	5	Herb
Saccharum spontaneum	4	Herb
Cynodon dactylon	12	Herb
Agrostis stolonifera	7	Herb
Hordeum brachyantherum	5	Herb
Bouteloua dactyloides	8	Herb

Siju	
Lat	Long
20.30219	86.57924

Species Scientific Name	Population Size	Category
Azadirachta indica	2	Tree
Ipomoea carnea	4	Shrub
Clerodendrum speciosissimum	7	Shrub
Colocasia	2	Herb
Mikania	8	Herb
Basella alba	3	Herb
Cyanthillium cinereum	5	Herb
Lactuca virosa	4	Herb
Hygrophila	6	Herb
Marsilea quadrifolia	2	Herb
Cynodon dactylon	5	Herb
Asystasia gangetica	3	Herb
Echinochloa	4	Herb
Agrostis stolonifera	8	Herb
Hordeum brachyantherum	4	Herb
Bouteloua dactyloides	3	Herb

Paradee › (Ppl Site1	
Lat	Long
20.27416	86.640273

Species Name	Population Size	Category
Ficus benghalensis	2	Tree
Azadirachta indica	4	Tree
Ficus religiosa	3	Tree
Lantana montevidensis	10	Shrub
Cynodon dactylon	20	Herb
Mikania scandens	5	Herb
Bouteloua dactyloides	12	Herb

Paradeep (Ppl Site2	
Lat	Long
20.275199	86.621897

Species Scientific Name	Population Size	Category
Cedrus deodara	15	Tree
Acacia auriculiformis	6	Tree
Lantana montevidensis	10	Shrub
Cynodon dactylon	11	Herb
Cynodon dactylon	10	Herb
Bouteloua dactyloides	15	Herb

Trilochanpur	
Lat	Long
20.25902	86.5708

Species Name	Population Size	Category
Borassus flabellifer	2	Tree
Paddy clove plant	3	Shrub
Lantana montevidensis	5	Shrub
Cynodon dactylon	12	Herb
Agrostis stolonifera	7	Herb
Hordeum brachyantherum	10	Herb
Bouteloua dactyloides	9	Herb
Hygrophila auriculata	6	Herb

Nuagarh	
Lat	Long
20.33354	86.61896

Species Name	Population Size	Category
Avicennia marina	14	Mangrove
Lantana montevidensis	10	Shrub
Nymphaeaceae	5	Herb
Eichhornia crassipes	2	Herb
Mimosa pudica	15	Herb
Typha angustifolia	18	Herb

Bali ia	
Lat	Long
20.34319	86.60931

Species Scientific Name	Population Size	Category
Borassus flabellifer	1	Tree
Ziziphus mauritiana	1	Shrub
Akant	1	Shrub
Mauritanian convolvulus	1	Shrub
Gandhi	1	Herb
Sida cordifolia	1	Herb
Parthenium hysterophorus	8	Herb
Commelina communis	2	Herb
Nymphaeaceae	10	Herb
Eichhornia crassipes	10	Herb
Mimosa pudica	1	Herb
Typha angustifolia	12	Herb

Kujang	
Lat	Long
20.312	86.52624

Species Name	Population Size	Category
Azadirachta indica	1	Tree
Paddy clove plant	2	Shrub
Cynodon dactylon	5	Herb
Desmostachya bipinnata	8	Herb

Chloris virgata	7	Herb
Cynodon dactylon	7	Herb
Agrostis stolonifera	5	Herb
Hordeum brachyantherum	2	Herb
Bouteloua dactyloides	7	Herb
Vigna mungo	18	Herb
Hygrophila auriculata	5	Herb

Srima School	
Lat	Long
20.35412	86.57872

Species Name	Population Size	Category
Paddy clove plant	5	Shrub
Cynodon dactylon	12	Grass
Desmostachya bipinnata	8	Grass
Chloris virgata	2	Grass
Cynodon dactylon	10	Grass
Agrostis stolonifera	5	Grass
Hordeum brachyantherum	5	Grass
Bouteloua dactyloides	5	Grass
Vigna mungo	2	Grass
Hygrophila auriculata	6	Grass

Narend apur	
Lat	Long
20.30791	86.57681

Species Scientific Name	Population Size	Category
Cynodon dactylon	10	Herb
Desmostachya bipinnata	5	Herb
Ludwigia grandiflora	2	Herb
Chloris virgata	6	Herb
Agrostis stolonifera	5	Herb

Hordeum brachyantherum	2	Herb
Bouteloua dactyloides	4	Herb
Vigna mungo	8	Herb
Hygrophila auriculata	2	Herb

Nal dia	
Lat	Long
20.33799	86.69598

Species Name	Population Size	Category
Ludwigia grandiflora	6	Shrub
Chloris virgata	6	Grass
Cynodon dactylon	12	Grass
Agrostis stolonifera	13	Grass
Hordeum brachyantherum	5	Grass
Bouteloua dactyloides	10	Grass
Hygrophila auriculata	3	Grass

Para leep	
Lat	Long
20.31628691	86.62003213

Species Name	Population Size	Category
Cenchrus purpureus	5	Grass
Chloris virgata	8	Grass
Cynodon dactylon	5	Grass
Agrostis stolonifera	4	Grass
Hordeum brachyantherum	2	Grass
Bouteloua dactyloides	6	Grass

Garar omita	
Lat	Long
20.35434957	86.58727051

Species Name	Population Size	Category
Lantana montevidensis	4	Shrub

Cynodon dactylon	4	Grass
Desmostachya bipinnata	7	Grass
Ludwigia grandiflora	8	Grass
Chloris virgata	5	Grass
Cynodon dactylon	11	Grass
Agrostis stolonifera	8	Grass
Hordeum brachyantherum	7	Grass
Bouteloua dactyloides	8	Grass
Hygrophila auriculata	4	Grass

Balia	
Lat	Long
20.29068188	86.51112714

Species Name	Population Size	Category
Cynodon dactylon	9	Grass
Desmostachya bipinnata	6	Grass
Ludwigia grandiflora	6	Grass
Cephalanthera longifolia	15	Grass
Chloris virgata	4	Grass
Cynodon dactylon	7	Grass
Agrostis stolonifera	9	Grass
Hordeum brachyantherum	4	Grass
Bouteloua dactyloides	4	Grass
Hygrophila auriculata	6	Grass
Sicyos angulatus	8	Grass

Balia 2 (Updated)	
Lat	Long
20.29388	86.51228

Species Name	Category	Population Size
Eucalyptus tereticornis	Tree	2
Lantana montevidensis	Shrub	5

Cephalanthera longifolia	Grass	2
Chloris virgata	Grass	10
Saccharum spontaneum	Grass	5
Cynodon dactylon	Grass	15
Agrostis stolonifera	Grass	13
Hordeum brachyantherum	Grass	2

Ram nagar	
Lat	Long
20.36568	86.67688

Species Name	Category	Population Size
Cocos nucifera	Tree	3
	Tree	1
Borassus flabellifer	Tree	1
Mangifera indica	Tree	2
Commelina communis	Grass	5
Cynodon dactylon	Grass	15
Bouteloua dactyloides	Grass	18
Sporobolus indicus	Grass	4

Baratubi	
Lat	Long
20.34961	86.68779

Species Name	Category	Population Size
Avicennia marina	Tree	20
Conocarpus erectus	Tree	8
Excoecaria agallocha	Tree	25
Eichhornia crassipes	Shrub	Na
Mimosa pudica	Grass	22
Typha angustifolia	Grass	100

Rajendra Nagar	
Lat	Long

20.36599	86.62192	
Species Name	Category	Population Size
Lantana montevidensis	Herb	6
Chloris virgata	Herb	15
Saccharum spontaneum	Herb	14
Cynodon dactylon	Herb	20
Agrostis stolonifera	Herb	26
Hordeum brachyantherum	Herb	5
Bouteloua dactyloides	Herb	15
Sporobolus indicus	Herb	8

Govindpur		
Lat	Long	
20.21305	86.56514	
Species Name	Category	Population Size
Casuarina equisetifolia	Tree	5
Anacardium occidentale	Tree	7
Ipomoea carnea	Shrub	2
Nymphaeaceae	Herb	13
Calotropis gigantea	Shrub	3
Mimosa pudica	Herb	10
Typha angustifolia	Herb	12
Sporobolus indicus	Herb	8

Kansaripa lia		
Lat	Long	
20.24418	86.61791533	
Species Scientific Name	Category	Population Size
Vachellia nilotica	Tree	1
Sida acuta	Herb	3
Cynodon dactylon	Grass	5
Desmostachya bipinnata	Grass	10
Nymphaeaceae	Herb	12

Eichhornia crassipes	Shrub	5
Mimosa pudica	Herb	8
Sporobolus indicus	Herb	5

Annexure II- Fauna Species

Section A

1. Insects

Species Scientific Name	*Species common Name*	*Family*	*Conservation Status (IUCN)*
Aleurocybotus occiduus Maria	White fly	Aleyrodidae	Least Concern
Vespa	hornets	Vespidae	Least Concern
Geophilomorpha	Centipede	Geophilid	Least Concern
Gastropoda	Snail	phylum Mollusca	Least Concern
Svistella bifasciata	Gold Bell	Cerambycidae	Least Concern
Aratus pisonii	Mangrove tree Crab	Sesarmidae	Least Concern
Coccinella septempunctata	Red ladybug	Coccinellidae	Least Concern
Omocestus viridulus	Grasshopper	Acrididae	Least Concern
Graptostethus servus	Potato bug	Miridae	Least Concern
Chrysocoris stollii	Green Jewel bugs	Scutelleridae	Least Concern
Argiope anasuja	Signature Spider	Araneidae	Least Concern
Xylocopa latipes	Tropical Carpenter Bee	Apidae	Least Concern
Polished lady beetle	Cycloneda munda	Coccinellidae	Least Concern

2. Ants (Hymenoptera: Formicidae)

Species Scientific Name	*Species common Name*	*Family*	*Conservation Status (IUCN)*
Solenopsis	Red Ants	Formicidae	Least Concern
Lasius niger	Black garden ant	Formicidae	Least Concern

3. Butterflies (Lepidoptera: Rhopalocera)

Species Scientific Name	*Species common Name*	*Family*	*Conservation Status (IUCN)*
Nymphalidae	Brush-Footed Butterflies	Nymphalidae	Least Concern

Eurema brigitta	Common Grass Yellow	Pieridae	Least Concern
Papilio polytes	Common Mormon	Papilionidae	Least Concern
Catopsilia pomona	Common emigrant	Nymphalidae	Least Concern
Mycalesis perseus	Common bush brown	Nymphalidae	Least Concern

4. Dragonflies & Damselflies (Odonata)

Species Scientific Name	*Species common Name*	*Family*	*Conservation Status (IUCN)*
Tachopteryx thoreyi	gray petaltail	Petaluridae	Least Concern
Pantala flavescens	globe skimmer, Dragon Fly	Libellulidae	Least Concern
Austrolestes colensonis	Common blue damselfly	Coenagrionidae	Least Concern
Sympetrum fonscolombii	Red-veined darter	Libellulidae	Least Concern

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Section B

1. Reptiles and Amphibians

Species Scientific Name	*Species common Name*	*Conservation Status (IUCN)*
Gavialis gangeticus	Crocodile	Critically Endangered
Enhydris bocourti	Bocourt's Water Snake	Least Concern
Gecko	Tucktoo	Least Concern
Hemidactylus leschenaultii	Tree Gecko	Least Concern
Hemidactylus flaviviridis	Wall Lizard	Least Concern
Calotes versicolor	Garden Lizard	Least Concern
Trimeresurus gramineus	Bamboo Pit Riper	Least Concern
Varanus sp	Water Monitor	Least Concern
Ptyas mucosus	Common Rat Snake	Least Concern
Vipera russelli	Ressell's Viper	Least Concern
Naja naja	Indian Cobra	Least Concern
Bungarus caeruleus	Common indian krait	Least Concern
Bungarus fasciatus	Sakhamuti	Least Concern

2: Birds (Chordata: Aves)

Scientific Name	Common Name	Family Name	*Conservation Status (IUCN)*
Anastomus oscitans	Asian Openbill Stork	Ciconiidae	Least Concern

Threskiornis melanocephalus	Black-headed Ibis	Threskiornithidae	Near Threatened
Ardea alba	Great White Egret	Ardeidae	Least Concern
Dendrocygna javanica	Lesser Whistling Duck	Anatidae	Least Concern
Hypsipetes leucocephalus	Black Bulbul	Pycnonotidae	Least Concern
Corvus splendens	House Crow	Corvidae	Least Concern
Dicrurus macrocercus	Black Drongo	Dicruridae	Least Concern
Tachybaptus ruficollis	Little Grebe	Podicipedidae	Least Concern
Phalacrocorax carbo	Great Cormorant	Phalacrocoracidae	Least Concern
Phalacrocorax fuscicollis	Indian Shag	Phalacrocoracidae	Least Concern
Phalacrocorax niger	Little Cormorant	Phalacrocoracidae	Least Concern
Anhinga melanogaster	Oriental Darter	Anhingidae	Near Threatened
Bubulcus ibis	Cattle Egret	Ardeidae	Least Concern
Ardea cinerea	Grey Heron	Ardeidae	Least Concern
Ardeola grayii	Indian Night Heron	Ardeidae	Least Concern
Ardeola grayii	Indian Pond Heron	Ardeidae	Least Concern
E. intermedia	Intermediate Egret	Ardeidae	Least Concern
Egretta garzetta	Little Egret	Ardeidae	Least Concern
Ardea purpurea	Purple Heron	Ardeidae	Least Concern
Mycteria leucocephala	Painted Stork	Ciconiidae	Least Concern
Plegadis falcinellus	Glossy Ibis	Threskiornithidae	Least Concern
Anas crecca	Common Teal	Anatidae	Least Concern
Anas Penelope	Eurasian Wigeon	Anatidae	Least Concern
Anas stre	Gadwall	Anatidae	Least Concern
Anas querquedula	Garganey	Anatidae	Least Concern
Nettapus coromandeltanus	Indian Cotton Teal	Anatidae	Least Concern
Anas acuta	Northern Pintail	Anatidae	Least Concern
A. clypeata	Northern Shoveler	Anatidae	Least Concern
Tadorna ferrugineas	Brahmani Ruddy Shelduck	Anatidae	Least Concern
Fulica atra	Common Coot	Rallidae	Least Concern
Gallinula chloropus	Common Moorhen	Rallidae	Least Concern
Porphyrio porphyrio	Purple Swamphen	Rallidae	Least Concern
Gallicrex cinerea	Watercock	Rallidae	Least Concern
A. phoenicurus	White-breasted Waterhen	Rallidae	Least Concern
Metopidius indicus	Bronze-winged Jacana	Jacanidae	Least Concern
Hydrophasianus chirurgus	Pheasant-tailed Jacana	Jacanidae	Least Concern
Limosa limosa	Black-tailed Godwit	Scolopacidae	Near Threatened
Himantopus himantopus	Black-winged Stilt	Recurvirostridae	Least Concern

Tringa nebularia	Greenshank	Scolopacidae	Least Concern
Actitis hypoleucos	Common Sandpiper	Scolopacidae	Least Concern
Gallinago gallinago	Common Snipe	Scolopacidae	Least Concern
Tringa ochropus	Green Sandpiper	Scolopacidae	Least Concern
Vanellus cinereus	Grey-headed Lapwing	Charadriidae	Least Concern
Charadrius alexandrinus	Kentish Plover	Charadriidae	Least Concern
Charadrius dubius	Little-ringed Plover	Charadriidae	Least Concern
Calidris minuta	Little Stint	Scolopacidae	Least Concern
Tringa stagnatilis	Marsh Sandpiper	Scolopacidae	Least Concern
Vanellus indicus	Red-wattled Lapwing	Charadriidae	Least Concern
Calidris temminckii	Temminck's Stint	Scolopacidae	Least Concern
Tringa glareola	Wood Sandpiper	Scolopacidae	Least Concern
Alcedo atthis	Common Kingfisher	Alcedinidae	Least Concern
Ceryle rudis	Pied Kingfisher	Alcedinidae	Least Concern
Halcyon smyrnensis	White-throated Kingfisher	Alcedinidae	Least Concern
Sterna aurantia	River Tern	Laridae	Vulnerable

B 2.1 Migration Type

1. *Anastomus oscitans* (Asian Openbill Stork): Partial migratory, with some populations being sedentary.
2. *Threskiornis melanocephalus* (Black-headed Ibis): Nomadic or partially migratory, depending on food availability.
3. *Ardea alba* (Great White Egret): Migratory, especially in the northern parts of its range.
4. *Dendrocygna javanica* (Lesser Whistling Duck): Resident, but some populations may undertake local movements.
5. *Hypsipetes leucocephalus* (Black Bulbul): Resident with some local movements but can be nomadic in search of food.
6. *Corvus splendens* (House Crow): Sedentary but may disperse locally.
7. *Dicrurus macrocercus* (Black Drongo): Resident with some local movements.
8. *Tachybaptus ruficollis* (Little Grebe): Sedentary, but some populations may undertake shortdistance movements.
9. *Phalacrocorax carbo* (Great Cormorant): Highly mobile, with populations displaying various migratory patterns.
10. *Phalacrocorax fuscicollis* (Indian Shag): Migratory, with movements in response to food availability.
11. *Phalacrocorax niger* (Little Cormorant): Sedentary, with some local movements.
12. *Anhinga melanogaster* (Oriental Darter): Migratory, with movements in search of suitable breeding and feeding sites.

B 3: Fishes

Fish Species	Common Name	IUCN Conservation Status	Use
Cirrhinus reba	Reba Carp	Least Concern	Commercial Food Fish
Puntius sarana	Systomus Sarana	Least Concern	Commercial Food Fish
Notopterus notopterus	Bronze featherback	Least Concern	Commercial Food Fish
Labeo catla	Catla	Least Concern	Commercial Food Fish
Cirrhinus mrigala	Mrigal	Least Concern	Commercial Food Fish
Labeo bata	Minor Carp	Least Concern	Commercial Food Fish
Labeo calbasu	Karnataka Labeo	Least Concern	Commercial Food Fish
Bangana dero	Kalabans	Least Concern	Commercial Food Fish
Labeo rohita	Rohu	Least Concern	Commercial Food Fish
Sperata aor	Long-whiskered catfish	Least Concern	Commercial Food Fish
Sperata seenghala	Giant river-catfish	Least Concern	Commercial Food Fish
Wallago attu	Freshwater shark	**Vulnerable**	Commercial Food Fish
Clarias batrachus	Walking catfish	Least Concern	Commercial Food Fish
Heteropneustes fossilis	Singee	Least Concern	Commercial Food Fish
Anabas testudineus	Climbing Perch	Least Concern	Commercial Food Fish
Channa striata	Snakehead Murrel	Least Concern	Commercial Food Fish
Planiliza tade	Gray Mullet	Data Deficient	Commercial Food Fish
Apolocheilus panchax	Blue Panchax	Data Deficient	Ornamental Fish
Danio rerio	Zebrafish	Least Concern	Ornamental Fish
Puntius ticto	Ticto Barb	Least Concern	Ornamental Fish
Puntius sophore	Spotfin Swamp Barb	Least Concern	Ornamental Fish
Paracanthocobitis botia	Mottled Zipper Loach	Least Concern	Ornamental Fish

Lepidocephalus guntea	Guntea loach/ Scavenger loach	Data Deficient	Ornamental Fish
Rasbora daniconius	Slender Barb	Least Concern	Ornamental Fish
Chaca chaca	Gajeb-bakau	Least Concern	Ornamental Fish
Terapon jarbua	Tiger Perch	Least Concern	Ornamental Fish
Badis badis	Blue Perch	Least Concern	Ornamental Fish
Scatophagus argus	Spotted Scat	Least Concern	Ornamental Fish
Chanda nama	elongate glassy perchlet	Least Concern	Ornamental Fish
Nandus nandus	Gangetic leaffish	Least Concern	Ornamental Fish
Trichogaster fasciata	Striped Gourami	Least Concern	Ornamental Fish

3. Mammals

S. No.	Scientific Name	Common Name	IUCN Conservation Status
1	Macaca mulatta	Rhesus Monkey	Least Concern
2	Presbytis entellus	Langur	Data Deficient
3	Funambulus pennant	Palm Squirrel	Least Concern
4	Hystrix indica	Procupine	Least Concern
5	Canis aureus	Jackal	Least Concern

Annexure III – Photograph

i) Field Survey and Community Discussions

Image 8: 30 by 30 plot mapping for tree evaluation

Image 9: Evaluation of tree (Girth)

Image 10: plotting of 30 by 30 grid with cross staff

Image 11: Grid alignment by field team

Image 12: herb identification with villagers

Image 13: Grid formation of shrub (5 by 5)

Image 14: herb evaluation in 1 by 1 grid

Image 15: data collection process(1 by 1 grid)

ii) Site-wise Photograph

Site: Bahakuda	Lat N 20.35052	Long: E 86.65009
		
	Limonium carolinianum Britton	Croton Bonplandianus Baill
Site: Near PPL Police Station	Lat N 20.27782	Long: E 86.61983
		
	Macleaya Cordata	
Site: Nuagan	Lat N 2 20.20836	Long: E 86.55002
		
(*Casuarina ccunninghamiana*)	Calotropis gigantea	Argiope anasuja Thorell
Site: Pipal	Lat N 20.33335	Long: E 86.58047
		
Ipomoea aquatica Forssk	Hygrophila auriculata	Lantana camara
Site: Jagati	Lat N 20.32996	Long: E 86.56813
		

Iochroma arborescens	Pennisetum purpureum	

Site: Jambu Dweep	Lat N 20.41483	Long: E 86.70651
		
Eleusine Tristachya	Calophyllum inophyllum	Acanthhus ilicifolius
Site: Rajendra Nagar	Lat N 2.36842	Long: E 86.63436
		
Bouteloua dactyloides	Rumex acetosella	Sporobolus Spicatus
Site: Jagatsinghpur (Bonapatta)	Lat N 20.25351	Long: E 86.55165
		
Murdannia nudiflora	*Casuarina ccunninghamiana*	Merremia tridentata
Site: Siju	Lat N 20.30219	Long: E 86.57924
		
Mikania micrantha Kunth	Hygrophila auriculata	
Site: Dhenkia	Lat N 20.23433	Long: E 86.57796
		

Theretra oldenlandiae	Mimosa pudica	Mimosa pudica
Site: Banapatakandha	Lat N 20.25995	Long: E 86.54963

		
Pinus roxburghii	Merremia tridentata	
Site: Panigadiakandha	Lat 20.23571	Long: E 86.53472
		
Ursopermum picrodes	Sida Acuta Burm	Centella Asiatica
Site: Patlipanka	Lat N 20.3431	Long: E 86.54314
		
Chrysocoris stollii	Hygrophila auriculata	*Coldenia procumbens*
Site: Mahanadi Point	Lat N 20.32655	Long: E 86.64451
		
Avicennia Marina	Acanthus ilicifolius	Crotalaria Pallida Aiton
Site: Hanuman Mandir (Baliyatra)	Lat N 20.25696	Long: E 86.66923

		
Dicrurus macrocercus	Raichardia Picroides	Conocarpus erectus
Site: Niharunikandha, Odisha	Lat N 20.29207	Long: E 86.60786
		
Pontederia crassipes	Typha Angustifolia	Typha Angustifolia
Site: Baulanga	Lat N 20.27244	Long: E 86.52551
		
Sida rhombifolia	Boerhaavia Diffusa	Solanum viarum Dunal

Site: Trilochanpur	Lat N 20.25902	Long: E 86.5708
		
Anastomus oscitans	Dendrocygna javanica	Cynodon dactylon
Site: Nuagaon	Lat N 20.33354	Long: E 86.61896
		
Threskiornis melanocephalus	Pandanus tectorius Parkinson (fruit)	Pandanus tectorius Parkinson
Site: Nuagarh	Lat N 20.35052	Long: E 86.65009
		
Mimosa pudica	Eichhornia crassipes	Avicennia marina
Site: Kujang	Lat N 20.312	Long: E 86.52624
		
Hygrophila auriculata	Vigna Mungo	Bouteloua dactyloides
Site: Srima School	Lat N 20.35412	Long: E 86.57872
		
Hordeum brachyantherum	Hygrophila auriculata	Marsilea quadrifolia
Site: Narendrapur	Lat N 20.30791	Long: E 86.57681

		
Scientific name here	Commelina communis	Hygrophila auriculata
Site: Kansaripadia	Lat N 20.24418	Long: E 86.6179153297407
		
Calotropis gigantea	Corvus splendens	Nymphaeaceae
Site: Paradeep New Point	Lat N 20.2875	Long: E 86.70116
		
Excoecaria agallocha	Avicennia marina	Avicennia marina
Site: Naladia	Lat N 20.33799	Long: E 86.69598
		
Coccinella septempunctata	Omocestus viridulus	Hygrophila auriculata
Site: Gararomita	Lat N 20.35434957	Long: E 86.58727051
		
Lantana montevidensis	Chloris Virgata	Omocestus viridulus
Site: Ram nagar	Lat N 20.36568	Long: E 86.67688

Site: Balia	Lat N 20.29068188	Long: E 86.51112714

		
Mikania micrantha Kunth	Omocestus viridulus	Chloris Virgata
Site: Balia (New Point)	Lat N 20.29388	Long: E 86.51228
		
Eucalyptus teriticornis	Desmostachya bipinnata	Eucalyptus teriticornis

Site: PPL Site 1	Lat N 20.27416	Long: E 86.640273
		
Lantana montevidensis	Tachopteryx thoreyi	Ficus Benghalensis

Site: PPL Site 2	Lat N 20.275199	Long: E 86.621897
		
Cedrus deodara	Mikania micrantha Kunth	Bouteloua dactyloides

Annexure IV- Site Wise Relative Abundance (Dominant – Species)

In the annexure, data on the relative abundance of each site is represented. This information was gathered and analysed to show the varying levels of species presence across different sites. The findings were tabulated, indicating the percentage of species recorded at each location. The data was compiled to provide a comprehensive overview of biodiversity distribution and density in the region, highlighting the sites with the highest abundance of species.

Site	Tree	R.A (%)	Shrub	R.A (%)	Herb	R.A (%)

Near Ppl Police Station	*Vachellia nilotica*	*39*	*Urena lobata var.*	*100*	*Cynodon dactylon*	50
Nuagaon	*Pandanus tectorius*	*50*	*Carissa carandas.*	*100*	*Cynodon dactylon*	55
pipal	*Vachellia nilotica*	*100*	*Lantana montevidensis*	*50*	*Cynodon dactylon*	77
Jagati	*Cocos nucifera.*	*100*			*Eichhornia crassipes*	34
Jambudweep	*Ficus microcarpa*	*66*	*Acanthus ilicifolius*	*80*	*Alternanthera philoxeroides*	36
Rajendra Nagar			*Acanthus Ilicifolius*	*83*	*Bouteloua Dactyloides*	38
Bonapatta	*Casuarina equisetifolia*	*90*	*Lycianthes rantonnetii*	*47*	*Bouteloua dactyloides*	18
Siju	*Na*		*Clerodendrum infortunatum.*	*100*	*Bouteloua dactyloides*	34
Bahakuda	*Na*		*Bonplad's croton.*	*100*	*Bouteloua dactyloides*	27
Dhenkia	*Pandanus tectorius.*	*100*	*Ceratopetalum gummiferum.*	*100*	*Bouteloua dactyloides*	23
Banapatakandha	*Na*		*Bonplad's croton*	*100*	*Bouteloua dactyloides*	28
Panigadiakandha	*Azadirachta indica.*	*100*	*na*		*Bouteloua dactyloides*	23
Nuagan	*Casuarina Equisetifolia and Pandanus Tectorius*	*40*	*Calotropis Gigantea*	*62*	*Spinifex Littoreus*	86
Patlipanka	*Na*		*Euonymus fortunei.*	*100*	*Bouteloua dactyloides*	37
Mahanadi Point	*Pandanus tectorius*	*66*	*Avicennia*	*28*	*Cynodon dactylon*	79
Baliyatra	*Conocarpus erectus*	*100*	*na*		*Bouteloua dactyloides*	28

Niharunikandha	*Na*		*Na*		*Bouteloua dactyloides*	27
Baulannga	*Neolamarckia cadamba*	*100*	*Pithecellobium dulce and solanum viarum dunal*	*50*	*Cynodon dactylon*	25
Siju	*Azadirachta indica*	*100*	*Clerodendrum speciosissimum*	*63*	*Mikania*	14
PPL Site 1	*Azadirachta indica*	*44*	*Lantana montevidensis*	*100*	*Cynodon dactylon*	54
PPL Site 2	*Cedrus deodara*	*71*	*Lantana montevidensis*	*100*	*Bouteloua dactyloides*	60
Trilochanpur	*Borassus flabellifer*	*100*	*Lantana montevidensis*	*62*	*hordeum brachyantherum*	22
Nuagarh	*Avicennia marina*	*100*	*Lantana montevidensis*	*100*	*Typha angustifolia*	45
Balidia	*Borassus flabellifer*	*100*	*Ziziphus mauritiana*	*33*	*Typha angustifolia*	26
Kujang	*Azadirachta indica*	*100*	*Paddy clove plant*	*100*	*Vigna mungo*	28
Sirma School	*Na*		*Paddy clove plant*	*100*	*Cynodon dactylon*	40
Narendrapur	*Na*		*na*		*Vigna mungo*	18
Naladia	*Na*		*Ludwigia grandiflora*	*100*	*Agrostis stolonifera*	26
Paradeep	*Na*		*na*		*Chloris virgata*	26
Gararomita	*Na*		*Lantana montevidensis*	*100*	*Cynodon dactylon*	24
Balia	*Na*		*na*		*Cephalanthera longifolia*	19
Balia 2	*Eucalyptus tereticornis*	*100*	*Lantana montevidensis*	*100*	*Cynodon dactylon*	31
Ramnagar	*Cocos nucifera*	*42*	*na*		*Bouteloua dactyloides*	42

Baratubi	*Excoecaria agallocha*	*47*	*na*		*Typha angustifolia*	81
Rajendra Nagar	*Na*		*na*		*Agrostis stolonifera*	23
Govindpur	*Anacardium occidentale*	*58*	*Calotropis gigantea*	*60*	*Typha angustifolia*	27
Kansaripadia	*Vachellia nilotica*	*100*	*Nymphaeaceae*	*100*	*Desmostachya bipinnata*	26

Annexure V- Flora - Site wise (IUCN, Common Name List)

The table presents a comprehensive list of flora at each site, detailing both their IUCN status and common names, providing an overview of the plant diversity and conservation status in these areas.

Near PPL Polic ; Station				
Lat		Long		
20.27782		86.61983		
Species Scientific Name	Species Common Name	**Availability**	IUCN Category	Category
Neolamarckia cadamba	Kadam	Yes	Least Concern (LC)	Tree
Saraca asoca	Saraca indica	Yes	Least Concern (LC)	Tree
Vachellia nilotica	Vachellia nilotica	Yes	Least Concern (LC)	Tree
Ficus hirta	Hairy Fig	Yes	Least Concern (LC)	Tree
Neolamarckia cadamba	Kadam Tree	Yes	Least Concern (LC)	Tree
Spathodea campanulata	African Tulip Tree	Yes	Least Concern (LC)	Tree
Quercus phellos	Oak Willow	Yes	Least Concern (LC)	Tree
Urena lobata var	Burr Mallow	Yes	Least Concern (LC)	Shrub
Butea monosperma	Flame of the Forest	Yes	Least Concern (LC)	Tree
Syzygium cumini	Jamun	Yes	Least Concern (LC)	Tree
Vachellia nilotica	Acacia	Yes	Least Concern (LC)	Tree
Cedrus deodara	Deodar	Yes	Least Concern (LC)	Tree
Cedrus deodara	Siris	Yes	Least Concern (LC)	Tree
Mikania	Hempvine	Yes	Data Deficient (DD)	Herb
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 2: Nuagaon

Nuagaon	
Lat	Long
20.20836	86.55002

	SPECIES COMMON NAME	AVAILABILITY	IUCN CATEGORY	CATEGORY
Casuarina equisetifolia	Casuarina (Australian pine)	Yes	Least Concern (LC)	Tree
Anacardium occidentale	Cashew	Yes	Least Concern (LC)	Tree
Carissa carandas	Bengal Currant	Yes	Least Concern (LC)	Shrub
Pandanus tectorius	Tahitian Screw-Pine	Yes	Least Concern (LC)	Tree
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 3:

Pi ɔal	
Lat	Long
20.33335	86.58047

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Vachellia nilotica	Vachellia nilotica	Yes	Least Concern (LC)	Tree
Pithecellobium dulce	Madras thorn	Yes	Least Concern (LC)	Shrub
Lantana montevidensis	Purple Lantana	Yes	Least Concern (LC)	Shrub
Mikania	Hempvine	Yes	Data Deficient (DD)	Herb/Vine
Calotropis gigantea	Crown Flower	Yes	Least Concern (LC)	Shrub
Achyranthes aspera	Prickly Chaff Flower	Yes	Least Concern (LC)	Herb
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Parthenium hysterophorus	Gajar Grass	Yes	Least Concern (LC)	Herb

Site 4:

Ja ɡati	
Lat	Long
20.32996	86.56813

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Cocos nucifera	Coconut	Yes	Least Concern (LC)	Tree

Nymphaeaceae	Water Lily	Yes	Least Concern (LC)	Herb
Eichhornia crassipes	Water Hyacinth	Yes	Least Concern (LC)	Herb/Aquatic
Mimosa pudica	Touch-me-not	Yes	Least Concern (LC)	Herb
Trifolium repens	Clover	Yes	Least Concern (LC)	Herb
Ipomoea aquatica	Chinese Water Spinach	Yes	Least Concern (LC)	Herb/Aquatic

Site 5:

Jambu Dweep	
Lat	Long
20.41483	86.70651

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Azadirachta indica	Neem	Yes	Least Concern (LC)	Tree
Derris trifoliata Lour	Three-leaf Derris	Yes	Data Deficient (DD)	Shrub
Avicennia	Grey Mangrove	Yes	Least Concern (LC)	Mangrove/Shrub
Ficus microcarpa	Indian Laurel	Yes	Least Concern (LC)	Tree
Acanthus ilicifolius	Mangrove-Holly	Yes	Least Concern (LC)	Shrub
Nymphaeaceae	Water Lily	Yes	Least Concern (LC)	Herb
Eichhornia crassipes	Water Hyacinth	Yes	Least Concern (LC)	Herb/Aquatic
Mimosa pudica	Touch-me-not	Yes	Least Concern (LC)	Herb
Chloris Virgata	Feather Finger Grass	Yes	Least Concern (LC)	Herb/Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Alternanthera philoxeroides	Alligator Weed	Yes	Least Concern (LC)	Herb

Site 6:

Rajendr Nagar	
Lat	Long
2.36842	86.63436

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Acanthus ilicifolius	Mangrove-Holly	Yes	Least Concern (LC)	Mangrove/Shrub
Bonplad's Croton	Ban Tulsi	Yes	Data Deficient (DD)	Shrub
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Veronica	Speedwell	Yes	Least Concern (LC)	Herb
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Vigna luteola	Dalrymple Vigna	Yes	Least Concern (LC)	Herb
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 7:

Jagatsinghpur (Bonapatta)	
Lat	Long
20.25351	86.55165

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Casuarina equisetifolia	Casuarina (Australian pine)	Yes	Least Concern (LC)	Tree
Azadirachta indica	Neem	Yes	Least Concern (LC)	Tree
Anacardium occidentale	Cashew	Yes	Least Concern (LC)	Tree
Ipomoea cairica	African Morning Vine Shrub	Yes	Least Concern (LC)	Shrub
Officinal Breynia	Indian Snowberry	Yes	Least Concern (LC)	Shrub
Nymphaeaceae	Water Lily	Yes	Least Concern (LC)	Herb/Aquatic
Saccharum spontaneum	Wild Sugarcane	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Veronica	Speedwell	Yes	Least Concern (LC)	Herb
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass

Galium verum	Lady's Bedstraw	Yes	Least Concern (LC)	Herb
Lycianthes rantonnetii	Potato Bush	Yes	Least Concern (LC)	Shrub
Melilotus albus	White Sweet Clover	Yes	Least Concern (LC)	Herb
Murdannia nudiflora	Naked Stem Dew Flower	Yes	Least Concern (LC)	Herb
Chloris truncata	Australian Finger Grass	Yes	Least Concern (LC)	Grass
Amphiachyris	Broomweed	Yes	Least Concern (LC)	Herb
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 8:

Sij u	
Lat	Long
20.30219	86.57924

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Commelina diffusa	Climbing Dayflower	Yes	Least Concern (LC)	Herb
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Clerodendrum infortunatum	Hill Glory Bower	Yes	Least Concern (LC)	Shrub
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 9:

Bah kuda	
Lat	Long
20.35052	86.65009

SPECIES SCIENTIFIC SPECIES POPULATION IUCN CATEGORY NAME COMMON NAME SIZE CATEGORY

Acanthus ilicifolius	Mangrove-Holly	Yes	Least Concern (LC)	Mangrove/Shrub
Bonplad's Croton	Ban Tulsi	Yes	Data Deficient (DD)	Shrub

Glyceria fluitans	Floating Manna Grass	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Amphiachyris	Broomweed	Yes	Least Concern (LC)	Herb
Limonium carolinianum	Carolina Sea Lavender	Yes	Least Concern (LC)	Mangrove/Shrub
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 10:

Dhenkia	
Lat	Long
20.23433	86.57796

SPECIES SCIENTIFIC SPECIES POPULATION IUCN CATEGORY NAME COMMON NAME SIZE CATEGORY

Scoparia dulcis	Scoparia Weed	Yes	Least Concern (LC)	Herb
Mikania	Hempvine	Yes	Data Deficient (DD)	Herb/Vine
Pandanus tectorius	Tahitian Screw-Pine	Yes	Least Concern (LC)	Tree
Mimosa pudica	Touch-me-not	Yes	Least Concern (LC)	Herb
Colocasia	Elephant Ear	Yes	Least Concern (LC)	Herb
Marsilea quadrifolia	European Water-Clover	Yes	Least Concern (LC)	Herb/Aquatic
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Parthenium hysterophorus	Gajar Grass	Yes	Least Concern (LC)	Herb
Alternanthera philoxeroides	Alligator Weed	Yes	Least Concern (LC)	Herb
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Ceratopetalum gummiferum	Christmas Bush	Yes	Least Concern (LC)	Shrub
Sisymbrium altissimum	Tumble Mustard	Yes	Least Concern (LC)	Herb

Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 11:

Banapatakandha	
Lat	Long
20.25995	86.54963

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Bonplad's Croton	Ban Tulsi	Yes	Data Deficient (DD)	Shrub
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Ageratum conyzoides	Tropical Whiteweed	Yes	Least Concern (LC)	Herb
Ipomoea aquatica	Chinese Water Spinach	Yes	Least Concern (LC)	Herb
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 12:

Paniga iakandha	
Lat	Long
20.23571	86.53472

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Azadirachta indica	Neem	Yes	Least Concern (LC)	Tree
Sida acuta	Common Wireweed	Yes	Least Concern (LC)	Herb
Centella asiatica	Gotu Kola	Yes	Least Concern (LC)	Herb
Urospermum picroides	False Hawkbit	Yes	Least Concern (LC)	Herb
Mikania	Hempvine	Yes	Data Deficient (DD)	Herb/Vine
Nelumbo nucifera	Lotus	Yes	Least Concern (LC)	Herb/Aquatic
Nymphaeaceae	Water Lily	Yes	Least Concern (LC)	Herb/Aquatic

Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 13:

Nu gan	
Lat	Long
20.2278	86.59423

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Casuarina equisetifolia	Casuarina (Australian Pine)	Yes	Least Concern (LC)	Tree
Azadirachta indica	Neem	Yes	Least Concern (LC)	Tree
Nymphaeaceae	Water Lily	Yes	Least Concern (LC)	Herb/Aquatic
Spinifex littoreus	Spinifex	Yes	Least Concern (LC)	Grass
Calotropis gigantea	Crown Flower	Yes	Least Concern (LC)	Shrub
Pandanus tectorius	Tahitian Screw-Pine	Yes	Least Concern (LC)	Tree
Euphorbia peplis	Purple Spurge	Yes	Least Concern (LC)	Shrub

Site 14:

Patlipanka	
Lat	Long
20.3431	86.54314

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Euonymus fortunei	Climbing Euonymus	Yes	Least Concern (LC)	Vine/Shrub
Coldenia procumbens	Seruppadi	Yes	Least Concern (LC)	Herb
Sphaeranthus indicus	East Indian Globe Thistle	Yes	Least Concern (LC)	Herb
Misopates orontium	Corn Snapdragon	Yes	Least Concern (LC)	Herb
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass

Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 15:

Mahana li Point	
Lat	Long
20.32655	86.64451

SPECIES SPECIES POPULATION IUCN CATEGORY SCIENTIFIC NAME COMMON NAME SIZE CATEGORY

Derris trifoliata Lour	Three-leaf Derris	Yes	Least Concern (LC)	Shrub
Avicennia	Grey Mangrove	Yes	Least Concern (LC)	Mangrove/Shrub
Phoenix dactylifera	Date Palm	Yes	Least Concern (LC)	Tree
Sisymbrium loeselii	False London Rocket	Yes	Least Concern (LC)	Herb
Crotalaria incana	Woolly Rattlepod	Yes	Least Concern (LC)	Shrub
Acanthus ilicifolius	Mangrove-Holly	Yes	Least Concern (LC)	Mangrove/Shrub
Caesalpinia bonduc	Bonduc	Yes	Least Concern (LC)	Shrub
Xanthium strumarium	Common Cocklebur	Yes	Least Concern (LC)	Herb
Phyllanthus reticulatus	Bush Potato	Yes	Least Concern (LC)	Shrub
Laggera crispata	Curly Blumea	Yes	Least Concern (LC)	Shrub
Justicia adhatoda	Malabar Nut	Yes	Least Concern (LC)	Shrub
Nymphaeaceae	Water Lily	Yes	Least Concern (LC)	Herb/Aquatic
Pandanus tectorius	Tahitian Screw-Pine	Yes	Least Concern (LC)	Tree
Tridax procumbens	Dagad-phul	Yes	Least Concern (LC)	Herb
Eichhornia crassipes	Water Hyacinth	Yes	Least Concern (LC)	Herb/Aquatic
Mimosa pudica	Touch-me-not	Yes	Least Concern (LC)	Herb
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 16:

Hanuman Mandir (Baliyatra)	
Lat	Long
20.25696	86.66923

SPECIES	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	SCIENTIFIC NAME
Pseudoconyza viscosa	Pseudoconyza Viscosa	Yes	Least Concern (LC)	Herb
Mikania	Hempvine	Yes	Data Deficient (DD)	Herb/Vine
Reichardia picroides	Common Brighteyes	Yes	Least Concern (LC)	Herb
Ipomoea pes-caprae	Beach Morning Glory	Yes	Least Concern (LC)	Herb/Vine
Chloris Virgata	Feather Finger Grass	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass
Conocarpus erectus	Button Mangrove	Yes	Least Concern (LC)	Mangrove/Shrub

Site 17:

Niharunikandha, Odisha	
Lat	Long
20.29207	86.60786

Eichhornia crassipes **HYACINTH**	**WATER**	**YES**	**LEAST CONCERN (LC)**	**HERB/AQUATIC**
Typha angustifolia	Narrow-leaf Cattail	Yes	Least Concern (LC)	Herb/Aquatic
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 18:

Baul nga	
Lat	Long
20.27244	86.52551

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY NAME
Neolamarckia cadamba	Kadam	Yes	Least Concern (LC)	Tree
Pithecellobium dulce	Madras Thorn	Yes	Least Concern (LC)	Shrub
Glyceria fluitans	Floating Manna Grass	Yes	Least Concern (LC)	Grass
Mikania	Hempvine	Yes	Data Deficient (DD)	Herb/Vine
Solanum viarum Dunal	Tropical Soda Apple	Yes	Least Concern (LC)	Shrub
Achyranthes aspera	Prickly Chaff Flower	Yes	Least Concern (LC)	Herb
Saccharum spontaneum	Wild Sugarcane	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 19:

Siju	
Lat	Long
20.30219	86.57924

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY NAME
Azadirachta indica	Neem	Yes	Least Concern (LC)	Tree
Ipomoea Carnea	Bush Morning Glory	Yes	Least Concern (LC)	Shrub/Vine
Mikania	Hempvine	Yes	Data Deficient (DD)	Herb/Vine
Clerodendrum speciosissimum	Java Glorybower	Yes	Least Concern (LC)	Shrub
Colocasia	Elephant Ear	Yes	Least Concern (LC)	Herb
Basella alba	Indian Spinach	Yes	Least Concern (LC)	Herb
Cyanthillium cinereum	Little Ironweed	Yes	Least Concern (LC)	Herb
Lactuca virosa	Bitter Lettuce	Yes	Least Concern (LC)	Herb

Hygrophila	Swamp Weed	Yes	Least Concern (LC)	Herb
Marsilea quadrifolia	European Water-Clover	Yes	Least Concern (LC)	Herb/Aquatic
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Asystasia gangetica	Chinese Violet	Yes	Least Concern (LC)	Herb/Shrub
Echinochloa	Barnyard Grass	Yes	Least Concern (LC)	Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 20:

Paradeep (PPL Site1	
Lat	Long
20.27416	86.640273

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Ficus Benghalensis	Banyan	Yes	Least Concern (LC)	Tree
Azadirachta indica	Neem	Yes	Least Concern (LC)	Tree/Shrub
Ficus religiosa	Peepal	Yes	Least Concern (LC)	Tree
Azadirachta indica	Neem	Yes	Least Concern (LC)	Tree/Shrub
Lantana montevidensis	Purple Lantana	Yes	Least Concern (LC)	Shrub
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Mikania scandens	Climbing Hempweed	Yes	Data Deficient (DD)	Herb/Vine
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Site 21:

Paradeep (PPL Site2	
Lat	Long
20.275199	86.621897

SPECIES SCIENTIFIC	SPECIES COMMON	POPULATION	IUCN	CATEGORY

NAME	NAME	SIZE	CATEGORY	
Cedrus deodara	Deodar	Yes	Least Concern (LC)	Tree
Acacia	Acacia	Yes	Data Deficient (DD)	Tree/Shrub
Lantana montevidensis	Purple Lantana	Yes	Least Concern (LC)	Shrub
Cynodon Dactylon	Doab Grass	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass

Siter 22:

Trilo hanpur	
Lat	Long
20.25902	86.5708

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	NAME CATEGORY
Borassus flabellifer	Palm	Yes	Least Concern (LC)	Tree
Lantana montevidensis	Purple Lantana	Yes	Least Concern (LC)	Shrub
Paddy Clove Plant		Yes	Data Deficient (DD)	Tree/Shrub
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Herb/Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Herb/Grass
Hygrophila auriculata	Kolikhiya (Local Name)	Yes	Least Concern (LC)	Herb

Site: 23

Nuagarh	
Lat	Long
20.33354	86.61896

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Avicennia marina	Grey Mangrove	Yes	Least Concern (LC)	Mangrove

Lantana montevidensis	Purple Lantana	Yes	Least Concern (LC)	Shrub
Nymphaeaceae	Water Lily	Yes	Least Concern (LC)	Herb/Aquatic
Eichhornia crassipes	Water Hyacinth	Yes	Least Concern (LC)	Herb/Aquatic
Mimosa pudica	Touch-Me-Not	Yes	Least Concern (LC)	Herb
Typha angustifolia	Narrow-leaf Cattail	Yes	Least Concern (LC)	Herb/Aquatic

Site 24:

bali lia	
Lat	Long
20.34319	86.60931

SPECIES SCIENTIFIC NAME	**SPECIES COMMON NAME**	**POPULATION SIZE**	**IUCN CATEGORY**	**CATEGORY**
Borassus flabellifer	Palm	Yes	Least Concern (LC)	Tree
Ziziphus Mauritiana	Indian Bair (Jujube)	Yes	Least Concern (LC)	Tree/Shrub
Akant		Yes	Data Deficient (DD)	Tree/Shrub
Mauritanian Convolvulus	Pokosuna	Yes	Least Concern (LC)	Herb/Shrub
Gandhi		Yes	Data Deficient (DD)	Herb
Sida Cordifolia	Bajramuli	Yes	Least Concern (LC)	Herb
Parthenium Hysterophorus	Parthenium	Yes	Least Concern (LC)	Herb
Commelina communis	Asiatic Dayflower	Yes	Least Concern (LC)	Herb
Nymphaeaceae	Water Lily	Yes	Least Concern (LC)	Herb/Aquatic
Eichhornia crassipes	Water Hyacinth	Yes	Least Concern (LC)	Herb/Aquatic
Mimosa pudica	Touch-Me-Not	Yes	Least Concern (LC)	Herb
Typha angustifolia	Narrow-leaf Cattail	Yes	Least Concern (LC)	Herb/Aquatic

Site 25:

Kujang	
Lat	Long
20.312	86.52624

SPECIES SCIENTIFIC NAME	SPECIES COMMON	POPULATION SIZE	IUCN CATEGORY NAME	CATEGORY
Azadirachta indica	Neem	Yes	Least Concern (LC)	Tree
Cynodon Dactylon	Doab Grass	Yes	Least Concern (LC)	Grass
Desmostachya bipinnata	Kush Grass	Yes	Least Concern (LC)	Grass
Paddy Clove Plant		Yes	Data Deficient (DD)	Tree/Shrub
Chloris Virgata	Feather Finger Grass	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Grass
Vigna Mungo	Black Gram (Urad Dal)	Yes	Least Concern (LC)	Herb
Hygrophila auriculata	Kolikhiya (Local Name)	Yes	Least Concern (LC)	Herb

Site 26:

Srima School	
Lat	Long
20.35412	86.57872

SPECIES SCIENTIFIC NAME	SPECIES COMMON	POPULATION SIZE	IUCN CATEGORY NAME	CATEGORY
Cynodon Dactylon	Doab Grass	Yes	Least Concern (LC)	Grass
Desmostachya bipinnata	Kush Grass	Yes	Least Concern (LC)	Grass
Paddy Clove Plant		Yes	Data Deficient (DD)	Tree/Shrub
Chloris Virgata	Feather Finger Grass	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass

Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Grass
Vigna Mungo	Black Gram (Urad Dal)	Yes	Least Concern (LC)	Herb
Hygrophila auriculata	Kolikhiya (Local Name)	Yes	Least Concern (LC)	Herb

Site 27:

Narendrapur	
Lat	Long
20.30791	86.57681

SPECIES SCIENTIFIC NAME	**SPECIES COMMON NAME**	**POPULATION SIZE**	**IUCN CATEGORY**	**CATEGORY**
Cynodon Dactylon	Doab Grass	Yes	Least Concern (LC)	Grass
Desmostachya bipinnata	Kush Grass	Yes	Least Concern (LC)	Grass
Ludwigia grandiflora	Paddy Clove Plant	Yes	Data Deficient (DD)	Tree/Shrub
Chloris Virgata	Feather Finger Grass	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Grass
Vigna Mungo	Black Gram (Urad Dal)	Yes	Least Concern (LC)	Herb
Hygrophila auriculata	Kolikhiya (Local Name)	Yes	Least Concern (LC)	Herb

Site 28:

Nalidia	
Lat	Long
20.33799	86.69598

SPECIES SCIENTIFIC NAME	**SPECIES COMMON**	**SIZE**	**POPULATION CATEGORY NAME**	**IUCN**	**CATEGORY**
Ludwigia grandiflora	Paddy Clove Plant	Yes	Least Concern (LC)		Shrub
Chloris Virgata	Feather Finger Grass	Yes	Least Concern (LC)		Grass

Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Grass
Hygrophila auriculata	Kolikhiya (Local Name)	Yes	Least Concern (LC)	Herb

Site 29:

Para leep	
Lat	Long
20.31628691	86.62003213

SPECIES SCIENTIFIC NAME	SPECIES COMMON	POPULATION SIZE	IUCN CATEGORY NAME	CATEGORY
Cenchrus purpureus	*Elephant grass*	*Yes*	*Least concern (lc)*	*Grass*
Chloris Virgata	*Feather finger grass*	*Yes*	*Least concern (lc)*	*Grass*
Cynodon dactylon	*Bermuda grass*	*Yes*	*Least concern (lc)*	*Grass*
Agrostis stolonifera	*Spreading bent grass*	*Yes*	*Least concern (lc)*	*Grass*
Hordeum brachyantherum	*Meadow barley*	*Yes*	*Least concern (lc)*	*Grass*
Bouteloua dactyloides	*Buffalo grass*	*Yes*	*Least concern (lc)*	*Grass*

Site 30

Gara omita	
Lat	Long
20.35434957	86.58727051

SPECIES SCIENTIFIC NAME	SPECIES COMMON	POPULATION SIZE	IUCN CATEGORY NAME	CATEGORY
Lantana montevidensis	Purple Lantana	Yes	Least Concern (LC)	Shrub
Cynodon dactylon	Doab Grass	Yes	Least Concern (LC)	Grass
Desmostachya bipinnata	Kush Grass	Yes	Least Concern (LC)	Grass
Ludwigia grandiflora	Paddy Clove Plant	Yes	Least Concern (LC)	Herb
Chloris virgata	Feather Finger Grass	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Grass

Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Grass
Hygrophila auriculata	Kolikhiya (Local Name)	Yes	Least Concern (LC)	Herb

Site 31:

Bal a	
Lat	Long
20.29068188	86.51112714

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	POPULATION SIZE	IUCN CATEGORY	CATEGORY
Cynodon Dactylon	Doab Grass	Yes	Least Concern (LC)	Grass
Desmostachya bipinnata	Kush Grass	Yes	Least Concern (LC)	Grass
Ludwigia grandiflora	Paddy Clove Plant	Yes	Least Concern (LC)	Herb
Cephalanthera Longifolia	Sword-leaved Helleborine	Yes	Data Deficient (DD)	Herb
Chloris Virgata	Feather Finger Grass	Yes	Least Concern (LC)	Grass
Cynodon dactylon	Bermuda Grass	Yes	Least Concern (LC)	Grass
Agrostis stolonifera	Spreading Bent Grass	Yes	Least Concern (LC)	Grass
Hordeum brachyantherum	Meadow Barley	Yes	Least Concern (LC)	Grass
Bouteloua dactyloides	Buffalo Grass	Yes	Least Concern (LC)	Grass
Hygrophila auriculata	Kolikhiya (Local Name)	Yes	Least Concern (LC)	Herb
Sicyos angulatus	Star Cucumber	Yes	Not Evaluated (NE)	Herb

Site 32:

Balia 2 (Updated)	
Lat	Long
20.29388	86.51228

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	CATEGORY	POPULATION SIZE
Eucalyptus tereticornis	Eucalyptus	Tree	Yes
Lantana montevidensis	Purple Lantana	Shrub	Yes
Cephalanthera Longifolia	Sword-leaved Helleborine	Herb	Yes

Chloris Virgata	Feather Finger Grass	Grass	Yes
Saccharum spontaneum	Wild Sugarcane	Grass	Yes
Cynodon dactylon	Bermuda Grass	Grass	Yes
Agrostis stolonifera	Spreading Bent Grass	Grass	Yes
Hordeum brachyantherum	Meadow Barley	Grass	Yes
Bouteloua dactyloides	Buffalo Grass	Grass	Yes

Site 34:

Ram nagar	
Lat	Long
20.36568	86.67688

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	CATEGORY	IUCN CATEGORY	POPULATION SIZE
Cocos nucifera	Cononut	Tree	Least Concern (LC)	Yes
	Acacia	Tree	Least Concern (LC)	Yes
Borassus flabellifer	Palm	Tree	Least Concern (LC)	Yes
Mangifera indica	Mango	Tree	Least Concern (LC)	Yes
Commelina communis	asiatic dayflower	Herb	Least Concern (LC)	Yes
Cynodon dactylon	Bermuda Grass	Grass	Least Concern (LC)	Yes
Bouteloua dactyloides	Buffalo Grass	Grass	Least Concern (LC)	Yes
Sporobolus indicus	Smut Grass	Grass	Least Concern (LC)	Yes

Site 35:

Baratubi (hanged)	
Lat	Long
20.34961	86.68779

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME	CATEGORY	IUCN CATEGORY	AVAILABILITY
Avicennia marina	Grey Mangrove	Tree	Least Concern (LC)	Yes
Conocarpus erectus	Button Mangrove	Tree	Least Concern (LC)	Yes

Excoecaria agallocha	Mangrove	Tree	Least Concern (LC)	Yes
	Elephant Grass	Gass	Least Concern (LC)	Yes
Nymphaeaceae	Water lilly	Herb	Least Concern (LC)	Yes
Eichhornia crassipes	Water hyacinth	Shrub	Data not available	Yes
Mimosa pudica	Touch-me-not	Herb	Least Concern (LC)	Yes
Typha angustifolia	Narrow-leaf cattail	Grass	Least Concern (LC)	Yes

Site 36:

Govindpur	
Lat	Long
20.21305	86.56514

SPECIES COMMON NAME	SPECIES CATEGORY	CATEGORY	IUCN	AVAILABILITY SCIENTIFIC NAME
Casuarina equisetifolia	Casuarina (Australian pine)	Tree	Least Concern (LC)	Yes
Anacardium occidentale	Cashew	Tree	Least Concern (LC)	Yes
Ipomoea Carnea	Bush Morning Glory	Shrub	Least Concern (LC)	Yes
	Elephant Grass	Grass	Least Concern (LC)	Yes
Nymphaeaceae	Water lily	Herb	Least Concern (LC)	Yes
Calotropis gigantea	Crown Flower	Shrub	Least Concern (LC)	Yes
Eichhornia crassipes	Water hyacinth	Shrub	Least Concern (LC)	Yes
Mimosa pudica	Touch-me-not	Herb	Least Concern (LC)	Yes
Typha angustifolia	Narrow-leaf cattail	Grass	Least Concern (LC)	Yes
Sporobolus Indicus	Smut Grass	Grass		

Site 37:

Kansaripadia	
Lat	Long
20.24418	86.61791533

SPECIES SPECIES CATEGORY IUCN AVAILABILITY SCIENTIFIC NAME COMMON NAME CATEGORY				
Vachellia nilotica	Babul	Tree	Least Concern (LC)	Yes
Cocos nucifera	Cononut	Tree	Least Concern (LC)	Yes
Ficus Benghalensis	Banyan	Tree	Least Concern (LC)	Yes
Ziziphus Mauritiana	Indian Bair (Jujube)	Shrub	Least Concern (LC)	Yes
Sida acuta	Common Wireweed	Herb	Least Concern (LC)	Yes
Bonplad's Croton	Ban tulsi	Herb	Least Concern (LC)	Yes
Cynodon Dactylon	Doab Grass	Grass	Least Concern (LC)	Yes
Desmostachya bipinnata	Kush Grass	Grass	Least Concern (LC)	Yes
	Paddy Clove Plant		Least Concern (LC)	Yes
Nymphaeaceae	Water lilly	Herb	Least Concern (LC)	Yes
Eichhornia crassipes	Water hyacinth	Shrub	Least Concern (LC)	Yes
Mimosa pudica	Touch-me-not	Herb	Least Concern (LC)	Yes
Typha angustifolia	Narrow-leaf cattail	Grass	Least Concern (LC)	Yes
Ipomoea aquatica	Chinese water Spinach	Herb	Least Concern (LC)	Yes
Sporobolus Indicus	Smut Grass	Herb	Least Concern (LC)	Yes

Annexure-VI Format for Evaluation of Flora and Fauna.

Schedule I – Community Questionnaire

Community Questionnaire- Biodiversity Assessment

Paradeep Phosphates Limited, Paradeep

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1. **Name of the Respondent:**

S. No	Respondent	Village/Panchayat	Age	Sex

2. **GPS Coordinates:**
3. **Number and Types of Trees in this Area:**
    - a. Can you identify the diverse types of trees in your surroundings? (Y/N)
    - b. Are there any endangered or rare tree species in this area? (Y/N)
4. **Table for Tree Species:**

Serial No.	Tree Species
1.	
2.	
3.	
...	

5. **Factors Contributing to the Reduction of Trees:**
    - a. What are the main factors causing a reduction in the number of trees in this area?
    - b. Have you observed any illegal logging or deforestation activities?
6. **Available Natural Products in this Area:**
    - a. List the natural products available in your community, such as fruits, nuts, or other resources.

- b. Are these natural products used for local consumption or sold commercially?

7. **Table for Natural Products:**

Serial No.	Natural Product	Use (Local/Commercial)
1.		
2.		
3.		

8. **Common Plants in this Area:**
   - a. Can you name some common plants that thrive in your locality?
   - b. Do these plants have any cultural or traditional significance?
9. **Table for Common Plants:**

Serial No.	Common Plant Name	Significance
1.		
2.		
3.		
...		

10. **Medicinal Plants in this Area:**
    - a. Identify any plants known for their medicinal properties in this area.
    - b. How does the community use these medicinal plants?
11. **Table for Medicinal Plants:**

Serial No.	Medicinal Plant Name	Use
1.		
2.		
3.		
...		

12. **Introduction of New Trees in this Area:**
    - a. Have any efforts been made to introduce new tree species in this region?
    - b. What challenges or benefits have been observed with the introduction of new trees?
13. **Number of Families Dependent on the Forest for Livelihood:**
    - a. Estimate the number of families relying on the forest for their livelihood.
    - b. In what ways do these families depend on the forest resources for their sustenance?
14. **Types of Natural Products Available:**
    - a. Specify the types of natural products found, including non-timber forest products.
    - b. How are these products used within the community?
15. **Types of Animals Found in this Area:**
    - a. Identify the various animal species present in your locality.
    - b. Are there any endangered or rare animal species observed?
16. **Changes in the Forest Over the Last 5 Years:**
    - a. Describe any noticeable changes in the forest ecosystem over the past five years.
    - b. Have there been any positive or negative impacts on biodiversity during this period?
17. **Community Awareness and Identification of Useful Plants:**
    - a. How aware is the community about the importance of preserving biodiversity?
    - b. Can the community quickly identify and differentiate between beneficial and harmful plants?
18. Vegetation Cover Assessment:

- How was the area about vegetation cover about 5-10 years ago?

Period	Description of Vegetation Cover
5-10 years ago,	

19. Useful Plants and Animals (5-10 Years Ago):

Sl No.	Name of the Plant	Uses	Animals
1.			
2.			
3.			
4.			
5.			
6.			

20. **Causes of Degradation:**
    - What, in your opinion, are the causes of the degradation of the natural vegetation?

Cause No.	Causes of Degradation
a)	
b)	
c)	
d)	

21. **Conservation Efforts:**
    - Do you believe such conservation efforts can improve the situation? Yes/No
    - If yes:
        1. What are your suggestions for future courses of action?

22. **Timber Trees Assessment:**
    - Available trees in this area for timber purposes (Y/N) • Reducing trees in this area for timber purposes. (Y/N)
    - Tell the names of timber trees that are extinct.

Sl No.	Tree Species for Timber	Current Status
1.		
2.		
3.		

23. **Fungi in the Area:**
    - Type of fungi available in your area.

Type No.	Types of Fungi	Status (Abundant/Scarce/Reducing)
1.		
2.		
3.		

24. **Birds in the Area:**

- Specify the names of birds that have reduced their number in the last 5-10 years.

Bird No.	Bird Species	Status (Increasing/Decreasing/Stable)
1.		
2.		
3.		

Name of Evaluator:	**Checked By**
Signature of Evaluator:	**Signature:**
Date of Enumeration:	

SCHEDULE II - Biodiversity Assessment Questionnaire

Biodiversity Assessment Questionnaire

Paradeep Phosphates Limited, Paradeep

1. **Plot Details:**

Plot Number	
GP	
Village	
Name of the Site (reference)	
Date	
Arial Distance	
Any other information	

2. **GPS Details (Each Site)**

Latitude	Longitude

3. To study Tree Population by Quadrat Method (30m×30m): (1 quadrat/Site)

Plantations	1. Lay sample plots (30 Mx30 M or 0.1 ha) using GPS, cross-staff and measuring equipment. 2. Record survival and growth data species-wise and the quality and impact of interventions

Division	Range	Plantation / Site Name	Plantation / Site Code	Sample Plot No	Latitude of Central Point	Longitude of central point	Altitude (msl)
				X of Y			
Quadrant NE / SE / SW / NW	Species	Regeneration Status	Height	Collar girth	Planted/Natural		Remark (General Health etc.
NE							
SE							
SW							
NW							

4. To study Shrub Regeneration Population by Quadrat Method (5m×5m): (4-5 quadrats/Sites)

Plantations	1. Lay sample plots (5Mx5M) using GPS, cross-staff and measuring equipment.

S/No	Plant Species	Local Name	No quadrates were employed in the study (Q)					No of Quadrants in which species is present (N)	Percentage of Frequency F=N/Qx100
			I	II	III	IV	V		

5. To study Herb Population by Quadrat Method (1m×1m): (4-5 quadrats/ Site)

Plantations	1. Lay sample plots (1Mx1M) using GPS, cross-staff and measuring equipment.

S/No	Plant Species	Local Name	No quadrates were employed in the study (Q)					No of Quadrants in which species is present (N)	Percentage of Frequency F=N/Qx100
			I	II	III	IV	V		

6. To study Fauna by Line, Transect Method (10m): (2 Line Transect/ Site)

Transect No	Start Point (GPS)	End Point (GPS)	Species Observed	Abundance	Behaviour
1	X	Y	A, B, C	10,2,3	Grazing, Nesting, Forging

7. To study Birds by Line, Transect and point count method (10m): (2 Line Transect/ Site)

Point No.	Observation Time (hh: mm)	Observed Through	Weather Conditions	Habitat Type	Distance from Point (m)	Method Used	Species Identified
1				Forest/ wetland/ barren /river			
2							

8. To study Mangrove by Line, Transect and quadrat method (10m): (2 Line Transect or one quadrat/ Site)

Mangrove Species Planted	Tree Density (Trees/ha)	Tree Height (m)	DBH (m)	Presence of Seedlings	Bird Species Observed	Invertebrates Detected

Name of Evaluator:	**Checked By**
Signature of Evaluator:	**Signature:**
Date of Enumeration:	