Strategic Framework for

ESTIMATING THE ECONOMIC VALUE OF AN URBAN ECOSYSTEM

Global EbA Fund

IUCN

Supported by:

Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

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FOREWORD

It is now well established that water is the primary medium through which the impacts of climate change are manifested. Already, cities across the globe are facing the brunt of these impacts, in both developed and developing countries. In India while the cities are being brought to a stand still with an alarming frequency of flooding events on one hand, in summers there are increasing instances of water shortages and scarcity on the other. Enhancing water security is, therefore, central to any climate change adaptation strategy for a city.

The National Institute of Urban Affairs (NIUA) with support of the International Union for Conservation of Nature (IUCN), is working on a project under the Global EbA (Ecosystem based Adaptation) Fund entitled "Proliferating Ecosystem-based Adaptation (EbA) Practices in Indian Cities (EPIC)". The overall vision of this project is to create an enabling environment for mainstreaming ecosystem-based adaption (EbA) in the water management strategy of a city and make a case for adopting this approach in other cities. The project seeks to address two core challenges that are faced by most cities in the face of climate change – water scarcity and flooding. The city of Bhubaneswar in Odisha, India, has been taken as the test bed for this initiative.

One of the key components under this project is to conduct an economic valuation of three important ecosystems (e.g. , wetland, forest, floodplain, riparian buffer, etc.), especially those that are facing threats because of anthropogenic activities. This is to attach an 'economic' value to the ecosystem, which will help build the case for the protection of various ecosystems in Bhubaneswar.

The *Strategic Framework for 'Estimating the Economic Value of an Urban Ecosystem'* aims to simplify and demystify the process of valuing ecosystem services. It provides a clear, step-by-step methodology designed to help decision-makers understand and apply these concepts in practice.

It is intended for use by administrators, urban planners, policymakers, and practitioners to support evidence-based decision-making, strengthen ecosystem-based planning, and advocate for the integration of nature into urban development.

This document has been developed as part of the ongoing initiative by NIUA and IUCN.

ACRONYMS

CBA
Cost-Benefit Analysis

CVM
Contingent Valuation Method

EbA
Ecosystem-Based Adaptation

EIA
Environmental Impact Assessment

EPIC
Proliferating Ecosystem-Based Adaptation Practices in Indian Cities

ES
Ecosystem Services

EV
Economic Valuation

FGD
Focus Group Discussion

GIS
Geographic Information System

IUCN
International Union for Conservation of Nature

MEA
Millenium Ecosystem Assessment

MOHUA
Ministry of Housing and Urban Affairs

NIUA
National Institute of Urban Affairs

PES
Payment for Ecosystem Services

SDG
Sustainable Development Goals

TEEB
The Economics of Ecosystems and Biodiversity

ULB
Urban Local Body

UNEP
United Nations Environment Programme

WTP
Willingness to Pay

GLOSSARY

Benefit Transfer Method
A valuation method that uses existing economic values estimated in one context (study site) and applies them to a similar ecosystem or context (policy site), to save time and resources.

Biodiversity
The variety and variability of life forms within a given ecosystem, biome, or the entire planet. It includes species diversity, genetic diversity, and ecosystem diversity.

Carbon sequestration
The process by which carbon dioxide is captured from the atmosphere and stored in vegetation, soils, or aquatic systems, helping to mitigate climate change.

Contingent Valuation Method (CVM)
A survey-based method of economic valuation that estimates the value people place on non-market resources by asking how much they would be willing to pay for them.

Climate change
In the modern day context this usually refers to human-induced change in the earth's climate, caused mostly by the production of greenhouse gases such as carbon dioxide from engines (factories, cars, etc.).

Direct Use Value
Economic value derived from direct utilisation of ecosystem goods and services such as food, water, timber, and recreational opportunities.

Ecosystem
Ecosystem is a way of describing nature's functioning and it consists of components (plants, animals, microorganisms, water, air etc.) as well as the interactions between these components.

Ecosystem Services
The benefits that humans derive from nature are known as ecosystem services. They can be divided into four categories: Provisioning services, Regulating services, Habitat or Supporting services, and Cultural services.

Ecosystem Valuation
A method to estimate the monetary value of ecosystem services to highlight their importance in planning, policy, and investment decisions.

Flood Regulation
A regulating service of ecosystems that involves absorbing and storing rainwater to reduce the risk of flooding.

Focus Group Discussion (FGD)
A qualitative research method involving guided discussions with a group of stakeholders to obtain insights on perceptions, behaviours, and benefits related to an ecosystem.

Hedonic Pricing Method
A valuation approach that uses market data (e.g., housing prices) to estimate the value of ecosystem attributes, such as proximity to green spaces or water bodies.

Indirect Use Value
Value derived from ecosystem functions that benefit humans indirectly, such as air purification, pollination, and climate regulation.

Market Price Method
A valuation method that estimates the value of ecosystem goods and services based on their actual market prices.

Non-Use Value
The value people place on knowing that an ecosystem exists, even if they never use or benefit from it directly (e.g., existence or bequest value).

Payment for Ecosystem Services
A financial incentive mechanism where beneficiaries of ecosystem services pay those who manage or protect the ecosystems that provide them.

Provisioning Services
Ecosystem services that provide material benefits such as food, fresh water, timber, and medicinal resources.

Regulating Services
Ecosystem functions that regulate natural processes, such as air quality, climate, water purification, and disease control.

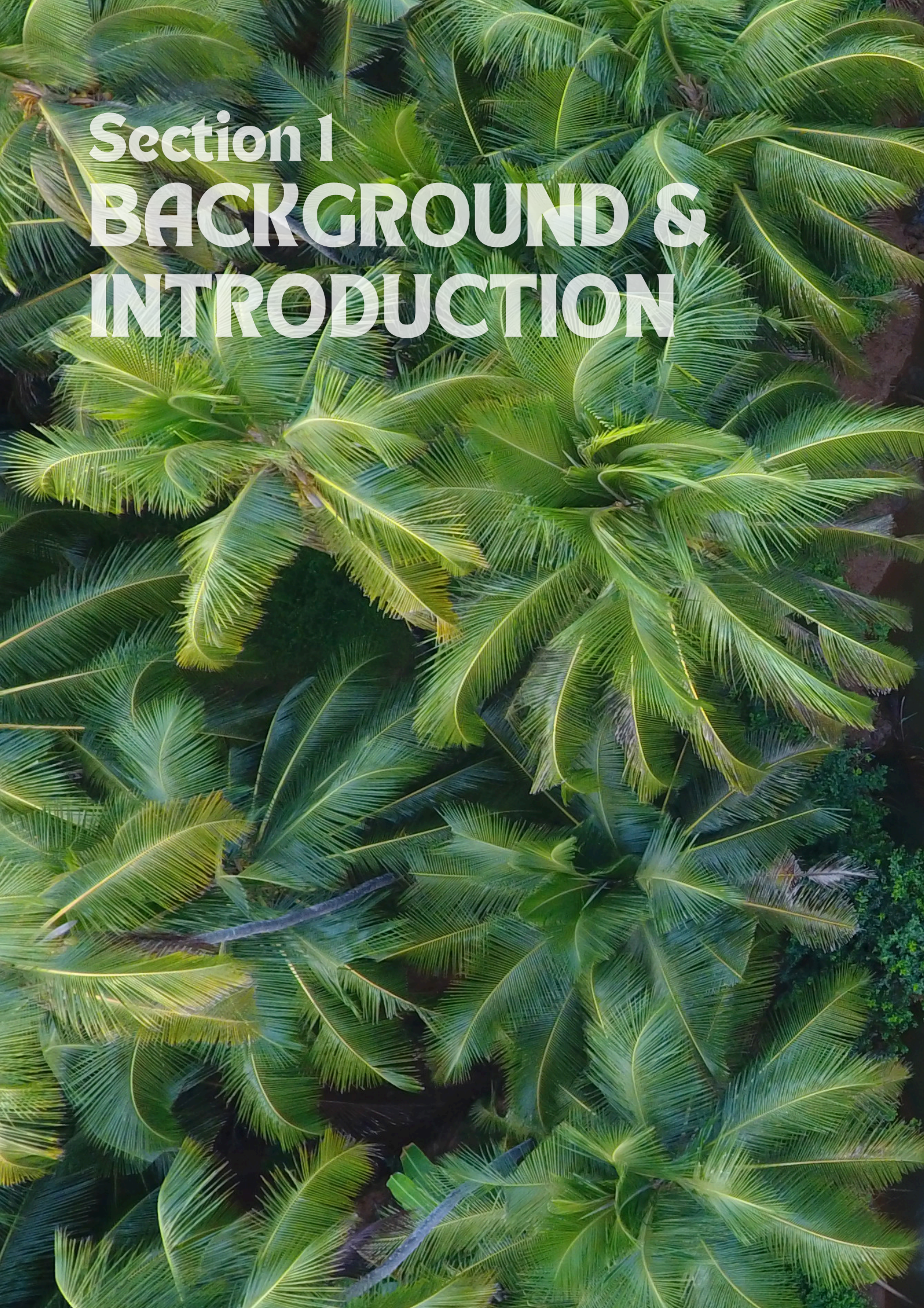
Supporting Services
Ecosystem services that are necessary for the production of all other ecosystem services, such as soil formation, photosynthesis, and nutrient cycling.

The Economics of Ecosystems and Biodiversity (TEEB)
An international initiative to draw attention to the global economic benefits of ecosystems and biodiversity, to highlight the growing costs of biodiversity loss and ecosystem degradation, and to draw together expertise from the fields of science, economics and policy to enable practical actions moving forward.

Travel Cost Method
A valuation technique that estimates the value of ecosystems based on how much people are willing to pay to travel to access them, indicating recreational or cultural importance.

Urban Ecosystem
A dynamic system formed by the interaction between urban areas and natural elements like water bodies, green spaces, trees, and biodiversity within a city.

Willingness to Pay (WTP)
The maximum amount an individual is willing to pay to secure a benefit or avoid a negative outcome related to ecosystem services.



Section 1
BACKGROUND & INTRODUCTION

ESTIMATING THE ECONOMIC VALUE OF AN URBAN ECOSYSTEM

Section 1
BACKGROUND & INTRODUCTION

Rapid urbanisation, driven by population growth and economic development, has led to the conversion of natural landscapes into built environments at an unprecedented scale. This transformation often results in the degradation and destruction of vital urban ecosystems such as wetlands, forests, rivers, and lakes, which play a crucial role in maintaining ecological balance, supporting biodiversity, and providing essential ecosystem services.

Urban wetlands, for instance, have been particularly affected. Cities like Bengaluru, Chennai, and Hyderabad, once renowned for their numerous lakes and water bodies, have witnessed the systematic encroachment and pollution of these vital ecosystems. Wetlands are often filled in for real estate development, reducing their capacity to recharge groundwater, control floods, and purify water. This loss not only disrupts the natural hydrological cycle but also exacerbates water scarcity, a growing concern in many Indian cities. Moreover, the destruction of wetlands leads to the loss of habitats for numerous aquatic species, birds, and other wildlife, reducing urban biodiversity.

Urban green spaces, such as parks, forests, and gardens, are also under threat due to infrastructure development and land-use changes. Cities like Delhi and Mumbai have seen significant reductions in their green cover, contributing to a rise in air pollution, urban heat islands, and a decline in the overall quality of life for residents. Green spaces are vital for urban health as they provide clean air, reduce noise pollution, and offer recreational opportunities that improve mental and physical well-being. The loss of these areas diminishes the resilience of cities to adapt to climate change, as trees and vegetation help mitigate the effects of extreme temperatures and absorb carbon dioxide.

The degradation of urban rivers and waterways further exemplifies the loss of urban ecosystems in India. Many rivers that once flowed through cities have been turned into open sewers, choked with industrial effluents, sewage, and plastic waste. The Yamuna in Delhi, the Mithi in Mumbai, and the Cooum in Chennai are stark examples of rivers that have been severely impacted by urbanisation and industrialisation. The contamination of these water bodies poses serious health risks to urban populations and reduces their ability to support aquatic life, leading to ecological collapse.

All in all, the loss of urban ecosystems in India is an emerging crisis that poses significant environmental, social, and economic challenges, and requires urgent attention and action. It is imperative to adopt sustainable urban planning practices that integrate the preservation and restoration of natural ecosystems within the urban fabric. By prioritising the conservation of urban ecosystems, Indian cities can not only improve their environmental health and resilience but also enhance the quality of life for their residents.

In order to do so, it is essential to understand the direct and indirect benefits provided by an urban ecosystem.

1.1. What is an Urban Ecosystem?

An urban ecosystem refers to the complex network of natural and human-made environments found within a city or metropolitan area. It includes all living organisms (plants, animals, humans) and non-living components (buildings, streets, water bodies, and air) that interact within an urban environment. Unlike natural ecosystems, urban ecosystems are heavily influenced by human activities, which shape their structure, function, and dynamics.

Urban ecosystems are characterised by a unique combination of natural elements, such as parks, green spaces, urban forests, wetlands, rivers, and lakes, along with built environments, including residential, commercial, and industrial areas. These ecosystems provide a range of ecosystem services that are crucial for the well-being of urban residents, such as air and water purification, climate regulation, flood control, recreational opportunities, and aesthetic value.

In addition to these ecological services, urban ecosystems support biodiversity by providing habitats for various plant and animal species. However, they are often under significant pressure due to factors like pollution, land-use change, habitat fragmentation, and climate change. Managing urban ecosystems effectively requires a balance between urban development and the conservation of natural resources to ensure sustainable and livable cities.

1.2. Services Provided by an Urban Ecosystem

Urban ecosystems provide a variety of ecosystem services that are vital for the well-being of urban populations and the sustainability of cities. These services can be broadly categorised into four main types: provisioning, regulating, cultural, and supporting services.

1. Provisioning Services

These services include the tangible products that urban ecosystems can provide:

- Food Production: Urban agriculture, community gardens, and rooftop gardens can

- contribute to local food production, providing fruits, vegetables, and herbs directly to urban residents.
- Water Supply: Urban green spaces and wetlands can help in groundwater recharge, maintaining the water table and providing clean water through natural filtration processes.
- Raw Materials: Urban forests and parks can provide raw materials like timber, firewood, and other plant materials, although this is less common in densely populated cities.

2. Regulating Services

Regulating services help control environmental conditions and maintain ecological balance:

- Air Quality Regulation: Urban trees and green spaces can filter pollutants and particulates from the air, improving air quality and reducing respiratory illnesses among residents.
- Climate Regulation: Urban green spaces help mitigate the urban heat island effect by cooling the air through shade and evapotranspiration, thereby reducing the need for energy-intensive cooling systems.
- Water Regulation and Flood Control: Urban wetlands, green roofs, and permeable surfaces can absorb and manage stormwater, reducing the risk of flooding and preventing sewer overflow.
- Pollination: Urban gardens and green spaces can support pollinators such as bees and butterflies, which are essential for the pollination of plants, including those in urban agriculture.
- Noise Reduction: Vegetation such as trees and shrubs can act as natural sound barriers, reducing noise pollution from traffic and industrial activities.

3. Cultural Services

Cultural services provide non-material benefits that contribute to the cultural, spiritual, and psychological well-being of urban residents:

- Recreational Opportunities: Parks, gardens, and urban forests offer spaces for recreation and physical activities like walking, jogging, cycling, and playing sports, which are crucial for mental and physical health.
- Aesthetic Value: Green spaces enhance the visual appeal of urban areas, contributing to the aesthetic value and quality of life in cities.
- Educational Opportunities: Urban ecosystems provide educational opportunities for learning about nature, ecology, and environmental stewardship. This can include school programs, community gardens, and conservation initiatives.
- Spiritual and Cultural Benefits: Urban green spaces often have cultural and spiritual significance for local communities, serving as places for social gatherings, cultural events, and spiritual reflection.

4. Supporting Services

Supporting services are necessary for the production of all other ecosystem services:

- Soil Formation and Fertility: Urban green spaces, especially community gardens and parks, contribute to soil formation and maintain soil fertility, which is essential for vegetation and food production.
- Nutrient Cycling: Urban ecosystems, such as green roofs and community gardens, contribute to nutrient cycling, which supports plant growth and maintains soil health.
- Biodiversity Support: Urban ecosystems provide habitats for various species, supporting biodiversity even within highly developed environments. Biodiversity contributes to ecosystem resilience and stability.

Effective urban planning and management are crucial to maximising these benefits and ensuring that urban ecosystems can continue to provide these services in the face of ongoing urbanisation and climate change.

Protecting urban ecosystems is essential for creating sustainable, resilient, and liveable cities. By prioritising the protection and restoration of urban ecosystems, cities can enhance their sustainability, adapt to the challenges of climate change, and improve the quality of life for all their residents.

Key References

THE MILLENNIUM ECOSYSTEM ASSESSMENT (MEA)

The Millennium Ecosystem Assessment strives to foster a deeper understanding of the true economic value of ecosystem services and provide economic instruments that accurately account this value.

Initiated in 2001, the objective of the Millennium Ecosystem Assessment was to evaluate the repercussions of ecosystem alterations on human well-being and establish the scientific basis for actions to enhance the conservation and sustainable utilisation of these systems, along with their contribution to human well-being.

The Millennium Ecosystem Assessment defines four classes of ecosystem services that enhance human well-being, all grounded in biodiversity. These services are classified into 'Provisioning,' 'Regulating,' 'Cultural,' and 'Regulatory.'

Source: The Millennium Ecosystem Assessment Framework, 2005

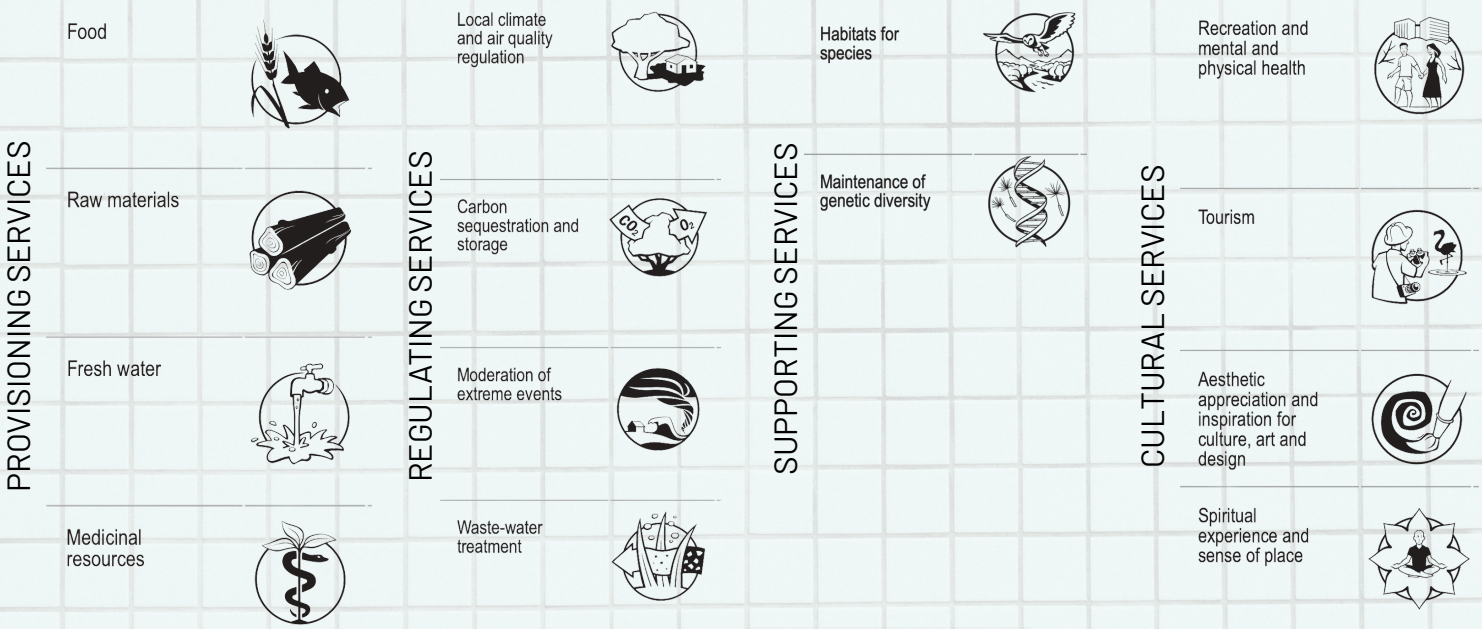
Key References

THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY

TEEB builds on the MEA classification but places a stronger focus on the link between ecosystem services and human well-being. This initiative seeks to draw attention to the invisibility of nature in the economic choices we make across the domains of international, national, and local policy-making, public administration, and business. TEEB sees this invisibility as a key driver of the ongoing depletion of ecosystems and biodiversity. TEEB advocates a three-step approach to analysing and structuring valuation of biodiversity and ecosystem services, guided by three principles:

1. ***Recognizing value*** in ecosystems, landscapes, species and other aspects of biodiversity is a feature of all human societies and communities and is sometimes sufficient to ensure conservation and sustainable use.
2. ***Demonstrating value*** in economic terms is often useful for decision-makers to consider the full costs and benefits of nature rather than just those that enter the markets in the form of private goods.
3. ***Capturing value*** involves the introduction of mechanisms that incorporate the values of biodiversity and ecosystems into decision-making through incentives and price signals. This can include payments for ecosystem services, reforming environmentally harmful subsidies or introducing tax breaks for conservation.

Following this approach, the ecosystem services can be divided into:
Provisioning - Ecosystem services that describe the material or energy outputs from ecosystems.
Regulating - The services that ecosystems provide by regulating the quality of air and soil or providing flood and disease control, etc.
Habitat or Supporting - These services underpin almost all other services.
Cultural - These include the non-material benefits people obtain from contact with ecosystems. They include aesthetic, spiritual and psychological benefits.



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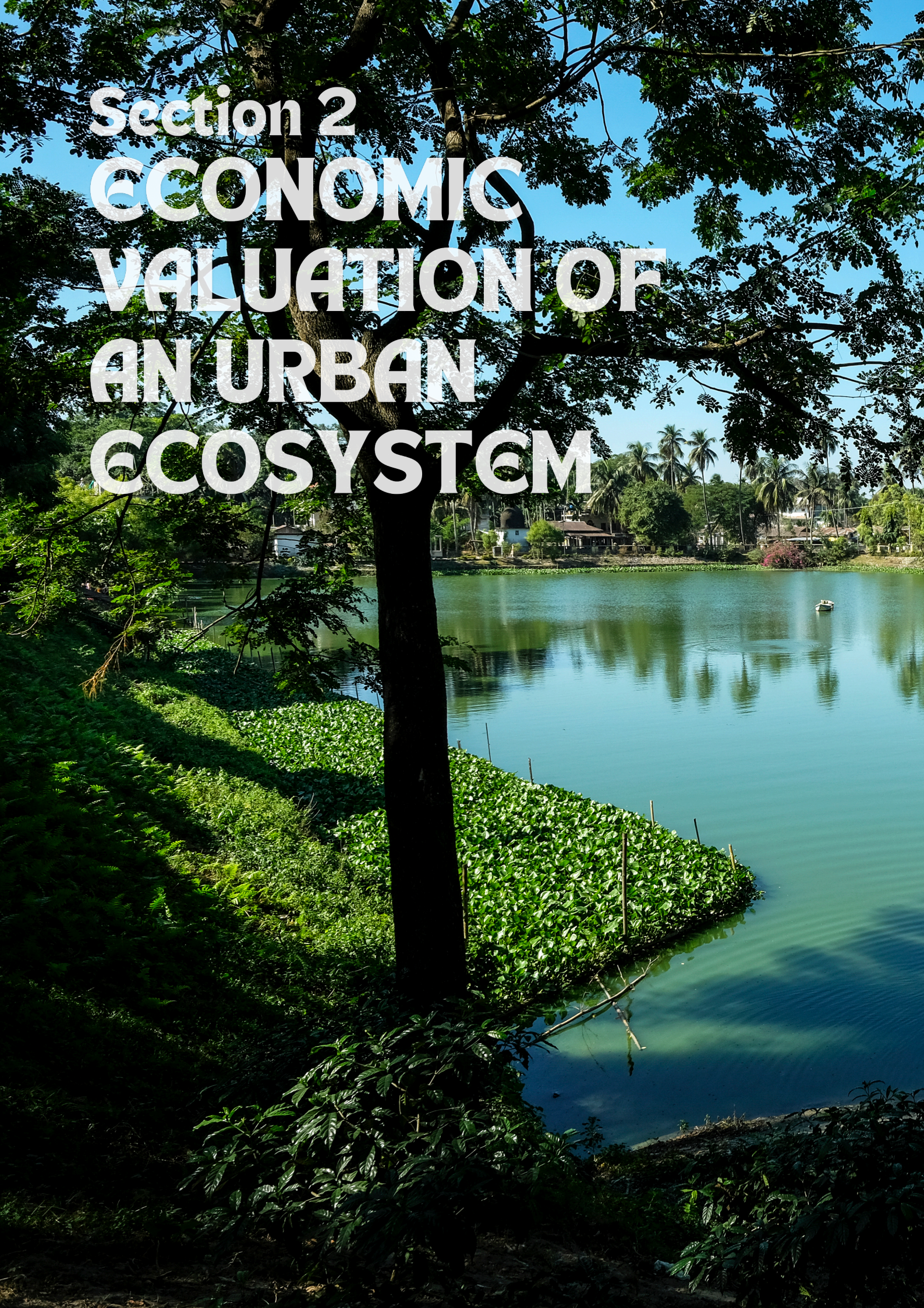

Section 2
ECONOMIC VALUATION OF AN URBAN ECOSYSTEM

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ECONOMIC VALUATION OF AN URBAN ECOSYSTEM

'The Economic valuation of ecosystem services is the process of quantifying the economic value of ecosystems and the services they provide'.

Conducting an economic valuation of an urban ecosystem involves assessing the monetary value of the goods and services provided by the ecosystem. It aims to translate the ecological and social benefits provided by urban ecosystems into economic terms, thereby facilitating more informed, transparent, and accountable decision-making processes that support urban sustainability and resilience.

This process helps decision-makers understand the economic importance of urban ecosystems, justify investments in their conservation and restoration, and make informed policy and planning decisions.

To estimate the true economic value of ecosystems, we begin by enumerating the diverse services provided by the ecosystem.

2.1. Aim and Objectives of Conducting Economic Valuation

The primary aim of conducting an economic valuation of an urban ecosystem is to quantify the benefits provided by the ecosystem services, and make a case for protection of these environmental assets.

This valuation seeks to highlight the economic value of ecosystem services—such as air purification, climate regulation, water management, and recreational opportunities—so that these benefits can be explicitly considered in urban planning, development, and policy-making.

Following are some of the common objectives behind this assessment:

- To assign a monetary value to the various ecosystem services provided by urban ecosystems and recognise the hidden economic value of natural capital in urban areas (such as air quality improvement, temperature regulation, stormwater management, biodiversity, and recreational opportunities)
- To provide data-driven insights that support the development of urban policies and planning strategies that prioritise sustainable development and ecosystem preservation
- To encourage the integration of ecosystem services into urban planning and development decisions to foster sustainable, resilient, and liveable cities
- To illustrate the cost savings and economic benefits associated with ecosystem services (such as reduced healthcare costs from improved air quality, lower energy consumption due to temperature regulation, and decreased infrastructure costs from natural stormwater management)

- To raise awareness among stakeholders— including government officials, urban planners, businesses, and residents— about the economic value of urban ecosystems and the importance of their conservation
- To attract funding and investments for urban ecosystem conservation and restoration by demonstrating the economic benefits of these activities
- To inform climate change mitigation and adaptation strategies by valuing the role of urban ecosystems in carbon sequestration, temperature regulation, and flood management
- To assess the trade-offs and opportunity costs associated with different land-use decisions, such as converting green spaces into built environments versus conserving them

2.2. Methods for Calculating the Economic Values of Ecosystem Services

Several methods are used to calculate the Economic Value of Ecosystem Services. These approaches fall into two broad categories: direct market valuation and non-market valuation methods, reflecting the variety of services ecosystems provide.

Market-based valuation methods rely on actual market transactions to estimate the value of ecosystem goods and services. For example, the value of provisioning services such as fish, timber or water.

Non-market valuation methods estimate the value of ecosystem services not bought or sold directly in markets. For example, the value of ecosystem services such as aesthetics, recreation, or biodiversity.

Since urban ecosystems provide a bundle of services, a mix of market and non-market valuation methods often gives the most holistic economic assessment.

Following table describes the types and examples of the different methods that can be used to estimate the economic values of ecosystem services.

Method	Application	Example
Direct Market Valuation Methods		
Market Price Method	Uses actual market prices of goods and services to determine value.	Value of urban farming produce.
Cost-Based Methods	Replacement Cost Method - Estimates the cost of replacing an ecosystem service with human-made infrastructure. Avoided Cost Method - Calculates the costs that are avoided due to the ecosystem service.	Wetlands reducing stormwater infrastructure costs.
Non-Market Valuation Methods		
Travel Cost Method	Infers value from how much people spend to visit green spaces.	Valuing an urban park based on visitor travel costs.
Hedonic Pricing Method	Analyzes how ecosystem features affect property prices.	Higher real estate prices near parks or waterfronts.
Contingent Valuation (CVM)	Surveys to find out how much people are willing to pay for conservation or restoration.	Willingness to pay for maintaining a city wetland.
Choice Modelling	Respondents choose between sets of alternatives with varying attributes to determine preferences.	Preferences for urban parks with different features.
Benefit Transfer	Applies valuation data from similar studies elsewhere.	Using wetland value estimates from another city.

2.3. Steps of Conducting the Economic Valuation of an Urban Ecosystem

Conducting economic valuation of an urban ecosystem is a multi-step process that involves understanding the ecosystem services provided, selecting appropriate valuation methods, and integrating the results into policy and decision-making.

Following are the key steps involved in the process:

STEP 1 - Define the Scope and Objectives of the Study

The first step in conducting an economic valuation of an urban ecosystem is to clearly define the scope and objectives of the study. This involves identifying the primary purpose of the valuation—whether it is to inform urban planning and land-use decisions, support policy formulation, raise public awareness, or justify investments in ecosystem conservation and restoration. A well-defined objective helps in tailoring the valuation process to the specific needs of the stakeholders involved.

A few examples of the objectives of this study are shown below:

- Informing policy and planning decisions
- Supporting urban development frameworks
- Raising public awareness about ecosystem benefits
- Securing funding or making a business case for conservation
- Prioritizing investment in green infrastructure

STEP 2 - Identify and Classify Ecosystem Services

This step involves systematically recognizing and categorizing the full range of benefits that urban ecosystems provide to people and the environment. It begins with a detailed assessment of the urban ecosystem to identify the specific ecosystem services it offers.

These services are typically grouped into four broad categories: provisioning services (which include tangible benefits like food, freshwater, and raw materials), regulating services (which refer to nature's role in moderating climate, improving air quality, managing stormwater, and sequestering carbon), cultural services (which encompass recreational opportunities, aesthetic enjoyment, spiritual enrichment, and educational value), and supporting services (such as nutrient cycling, soil formation, and habitat provision, that underpin all other services).

Classification of these services should be guided by established global frameworks like the Millennium Ecosystem Assessment (MEA) or The Economics of Ecosystems and Biodiversity (TEEB), both of which provide structured approaches for identifying and linking ecosystem functions to human well-being. Employing such frameworks ensures consistency and facilitates the integration of ecological, social, and economic dimensions in the valuation process.

This step ultimately helps build a comprehensive inventory of ecosystem services, serving as the foundation for selecting appropriate valuation techniques in subsequent phases.

STEP 3 - Determine the Spatial and Temporal Boundaries

This involves clearly defining the scope of the economic valuation by establishing both the geographical extent and the time horizon over which ecosystem services will be assessed.

Spatial boundaries refer to the physical area of the urban ecosystem under consideration, which could range from a single green space, park, or wetland to an entire neighbourhood, city, or urban watershed. This delineation should be informed by ecological relevance, administrative jurisdictions, data availability, and the scale at which ecosystem services are delivered and experienced.

In parallel, determining the temporal boundaries involves selecting an appropriate timeframe for analysis, taking into account the nature of different ecosystem services and the objectives of the valuation. Some services, such as flood regulation or carbon sequestration, accrue benefits over the long term, while others, like recreational use or air purification, may offer more immediate returns. A well-defined timeframe should balance short-term benefits and costs with long-term ecological and socio-economic impacts, enabling a comprehensive understanding of the ecosystem.

Establishing clear spatial and temporal boundaries ensures that the valuation is context-specific, avoids double counting, and aligns with policy or planning needs, thereby enhancing its relevance and utility for decision-making.

STEP 4 - Collect and Analyse Data

This is a critical phase that involves assembling both quantitative and qualitative information to assess the extent, condition, and value of ecosystem services provided by the urban ecosystem.

Data collection begins with gathering bio-physical information through methods such as field surveys, remote sensing, satellite imagery, ecological assessments, and the use of existing geospatial and environmental databases. These sources help capture key indicators like vegetation cover, water quality, biodiversity, air pollution levels, and land use patterns, which form the basis for estimating the supply and functionality of ecosystem services.

Complementing this, stakeholder engagement plays a vital role in capturing local knowledge, perceptions, and patterns of use. Interactions with community members, government officials, urban planners, and subject matter experts provide insights into how different services are accessed, valued, and prioritized by various user groups. This participatory approach

also helps identify social and cultural dimensions that may not be evident through scientific data alone.

Once collected, the data is analysed to quantify the availability, distribution, and quality of ecosystem services, often using various GIS mapping and statistical analysis tools. This integrated analysis provides a robust foundation for linking ecological functions to human benefits.

STEP 5 - Select Appropriate Valuation Methods

This step involves choosing the most suitable economic valuation techniques for each identified ecosystem service, based on their characteristics, the availability and quality of data, and the overall objectives of the valuation exercise.

Different ecosystem services require different approaches to accurately capture their value, particularly because some have direct market prices while others do not. For services that are traded or have a direct economic use—such as timber, freshwater, or urban agriculture—the Market Price Method can be applied using existing price data. For services that influence property values, such as proximity to parks or waterfronts, the Hedonic Pricing Method is appropriate, as it estimates the value of ecosystem based on its influence on property prices. When assessing recreational or cultural services, the Travel Cost Method can be used by analyzing the expenses people incur to visit a site, reflecting their willingness to pay for the experience. For non-market services such as biodiversity conservation, air purification, or aesthetic value, stated preference methods like Contingent Valuation or Choice Modelling are often employed, using surveys to elicit people's willingness to pay for maintaining or improving these services. In cases where primary data collection is constrained by time or budget, the Benefit Transfer Method can be used to adapt existing valuation estimates from similar contexts.

Selecting appropriate methods ensures that the diverse values of urban ecosystem services—both tangible and intangible—are captured effectively and credibly, forming the basis for evidence-based planning and policy decisions.

STEP 6 - Conduct Economic Valuation

This involves applying the selected valuation methods to estimate the economic worth of each identified ecosystem service, capturing the full spectrum of benefits the urban ecosystem provides.

This step includes calculating direct use values (e.g., income from urban agriculture or recreational fees), indirect use values (e.g., flood mitigation, air quality improvement, or temperature regulation), and non-use values, such as the existence or bequest value associated with biodiversity or natural heritage. Each valuation method—be it market-based, revealed preference, stated

preference, or benefit transfer—is applied systematically based on the nature of the service and the available data.

Once individual services are valued, the results are aggregated to derive the Total Economic Value (TEV) of the urban ecosystem, representing the cumulative benefit it offers to society.

This comprehensive valuation not only highlights the tangible and intangible contributions of nature in urban settings but also enables comparisons with conventional infrastructure investments, helping to mainstream ecosystem services into urban planning, budgeting, and policy formulation.

STEP 7 - Integrate Valuation into Decision-Making

This is the pivotal stage where the results of economic valuation are translated into actionable insights that shape urban development and environmental governance. While often overlooked or treated as optional, this step is crucial to ensuring that the values assigned to ecosystem services actually influence planning, policy, and investment decisions.

Following are some opportunities to mainstream valuation into decision-making.

- Inform Urban Land-Use Planning: Economic valuation of ecosystem services can be a powerful tool for shaping spatial planning and land-use decisions. By identifying areas that deliver high ecological and socio-economic benefits—such as floodplains, green corridors, wetlands, and urban forests—urban planners can ensure these are preserved or enhanced in master plans, development plans, and zoning regulations. Integrating valuation into planning helps prioritize ecologically sustainable development and avoid ecologically harmful land conversions.

- Support Cost-Benefit Analysis: Urban development projects often overlook the indirect or long-term benefits of nature. Incorporating ecosystem service values into cost-benefit analysis allows for a more comprehensive assessment of development alternatives. For instance, when comparing a traditional stormwater drainage system with a wetland restoration project, the valuation can highlight additional benefits such as biodiversity support, recreation, and groundwater recharge—helping justify investments in nature-based solutions.

- Influence Budgeting and Public Investment: Valuation findings can guide more informed and accountable allocation of municipal budgets and public investments. Quantifying the economic contributions of natural ecosystems (e.g., health

- savings from improved air quality, reduced disaster recovery costs due to natural buffers) strengthens the case for funding ecosystem restoration projects.

- Develop Incentive-Based Mechanisms: Economic valuation provides a baseline for designing incentives and market-based instruments to promote conservation and responsible land stewardship. For example, tools like green tax rebates and Payments for Ecosystem Services (PES) can reward landowners or communities for maintaining urban ecosystems.

- Guide Environmental Regulations and Standards: Ecosystem valuation can strengthen the enforcement and formulation of urban environmental regulations. For example, setting compensation rates for ecosystem degradation (like tree felling or wetland filling) can be grounded in real economic values. Valuation can also inform environmentally sensitive policies and regulations, ensuring that the development is ecologically sound as well as economically viable.

- Encourage Private Sector Engagement: Private developers, businesses, and industries play a significant role in shaping urban environments. Valuation makes the economic case for integrating ecosystem services into business practices, especially in sectors like real estate, insurance, infrastructure, and tourism. Developers can use valuation to promote green-certified buildings, while insurers can factor ecosystem-based disaster risk reduction into policies.

- Enhance Climate and Resilience Planning: Urban ecosystems are crucial for climate mitigation and adaptation. Valuation can quantify benefits such as carbon sequestration, urban cooling, and stormwater regulation, helping embed nature-based solutions in climate action plans and disaster risk reduction strategies.

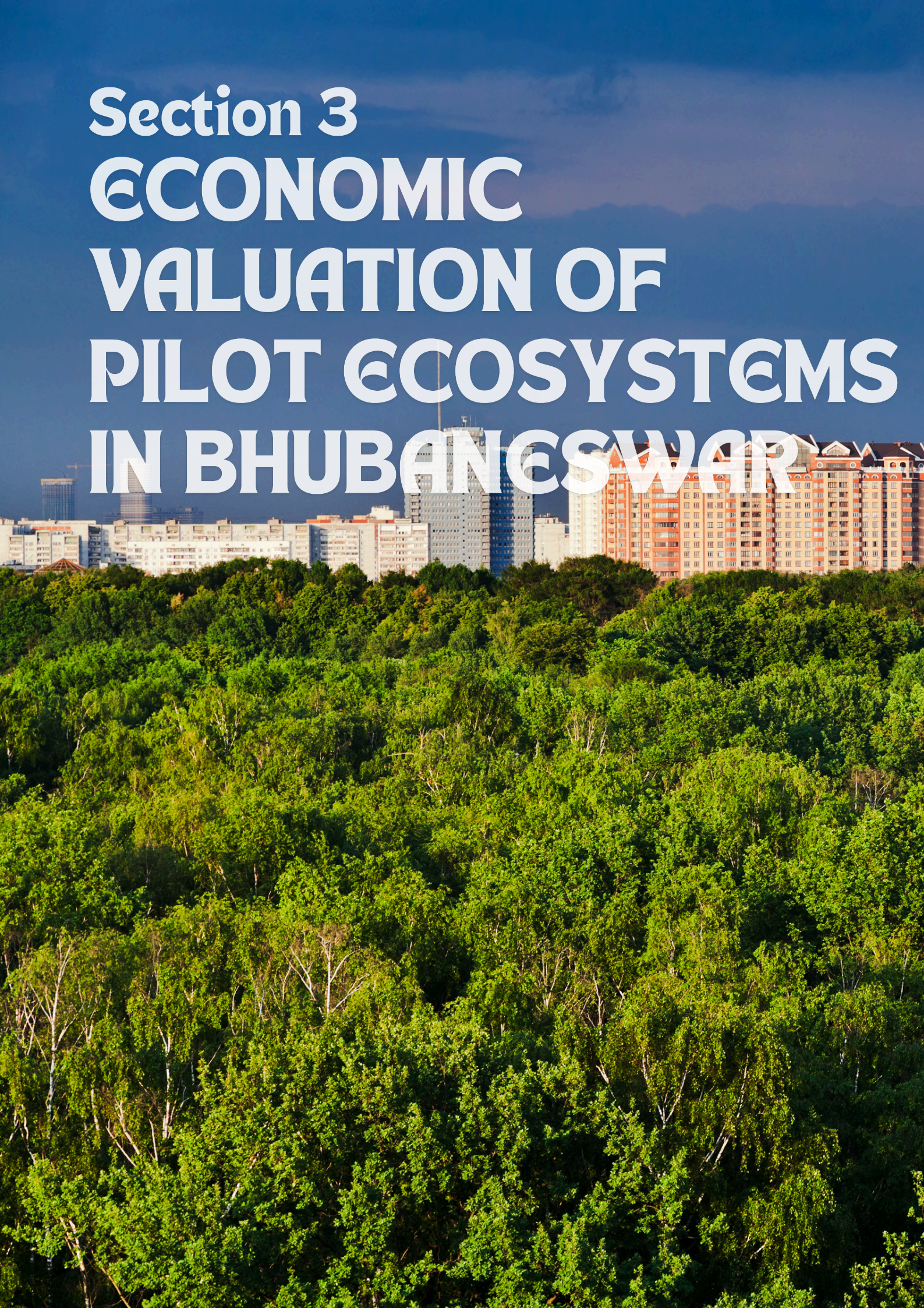
- Foster Participatory and Inclusive Governance: Engaging communities in the valuation process and using these results for participatory decision-making fosters inclusive urban governance. Valuation can reveal how different demographic groups value and depend on urban ecosystems—whether for livelihoods, cultural practices, or daily recreation. This helps ensure that planning processes are equitable and reflect the needs and values of marginalized or underrepresented groups, including women, children, and indigenous communities.

- Build Capacity and Institutional Integration: Mainstreaming ecosystem valuation into urban governance requires building institutional and technical

- capacity. Municipal departments, planning authorities, and environmental regulators need to be trained to understand, interpret, and apply valuation data. Institutionalizing valuation processes through policies, mandates, or governance will ensure long-term uptake and consistency.

- Communicate Value for Advocacy and Awareness: Valuation results should be effectively communicated through public campaigns, public information display boards (using visual tools like maps and infographics), and targeted messaging for different stakeholders. Highlighting the monetary and non-monetary value of ecosystems can boost public support for conservation and influence political will. When citizens understand the benefits of a nearby ecosystem in economic terms—such as reduced health expenses or increased property values—they are more likely to advocate for its protection.


1
Define the Scope and Objectives of the Study
2
Identify and Classify Ecosystem Services
3
Determine the Spatial and Temporal Boundaries
4
Collect and Analyse Data on the Ecosystem Services
5
Select Appropriate Valuation Methods
6
Conduct Economic Valuation
7
Integrate Valuation into Decision-Making



Section 3
ECONOMIC VALUATION OF PILOT ECOSYSTEMS IN BHUBANESWAR

Section 3
ECONOMIC VALUATION OF PILOT ECOSYSTEMS IN BHUBANESWAR

3.1. Ecosystems in Bhubaneswar

Bhubaneswar is home to a diverse range of urban ecosystems, including urban forests, water bodies, wetlands, marshlands, swamps, rivers, drainage channels, and green spaces. These ecosystems play a vital role in providing direct benefits such as freshwater, fish, and medicinal plants for local use, as well as spaces for recreation and tourism. In addition, they offer numerous indirect co-benefits, including temperature regulation, flood mitigation, carbon sequestration, and rich habitats that support biodiversity.

However, many of these ecosystems are increasingly under threat due to rapid urbanisation. Some have been degraded by pollution, while others face encroachment or have been completely lost.

For the purpose of economic valuation, three representative urban ecosystems in Bhubaneswar have been selected based on their ecological importance, distinct characteristics, and potential for replication or upscaling in similar contexts:

- Bindu Sagar Water Body
- Wetland near Gautam Nagar
- Jayadev Vatika Urban Green

These sites were chosen after careful consideration of their ecological functions, cultural significance, and their relevance as proxies for other typical urban ecosystems in other cities.

Bindu Sagar Water Body

The Bindu Sagar Lake, also known as Bindu Sarovar, is a sacred and historic water body located near the renowned Lingaraja Temple and Ananta Vasudeva Temple in Bhubaneswar, Odisha. It is one of the city's largest and most culturally significant lakes, attracting both tourists and devotees.

Surrounded by numerous temples and shrines, Bindu Sagar holds deep religious importance. Local tradition holds that a dip in its waters is spiritually purifying, and many rituals associated with the city's temples are performed here.

According to documented sources, the lake spans approximately 1,300 feet in length and 700 feet in width. At its center lies a small island with shrines, and the lake is bordered by embankments on all sides, contributing to both its aesthetic appeal and structural integrity.

Wetland near Gautam Nagar

Located in the heart of Bhubaneswar, the wetland near Gautam Nagar is a critical urban ecosystem that plays a vital role in the city's environmental and ecological health. Serving as a natural water retention basin, it helps regulate stormwater runoff, recharge groundwater, and reduce the risk of urban flooding—especially during the monsoon season.

The wetland supports a rich diversity of aquatic vegetation and provides a seasonal habitat for various bird species, including both resident and migratory birds. It also sustains a range of other flora and fauna, making it a biodiversity hotspot amidst the city's dense built-up areas. The surrounding communities informally use the wetland for livestock grazing, reflecting its livelihood and subsistence value.

Despite its ecological significance, the wetland faces increasing threats from encroachment, solid waste dumping, and untreated wastewater inflow, which compromise its health and resilience.

However, due to its potential for rejuvenation, the Gautam Nagar wetland represents an excellent candidate for ecosystem restoration and sustainable management.

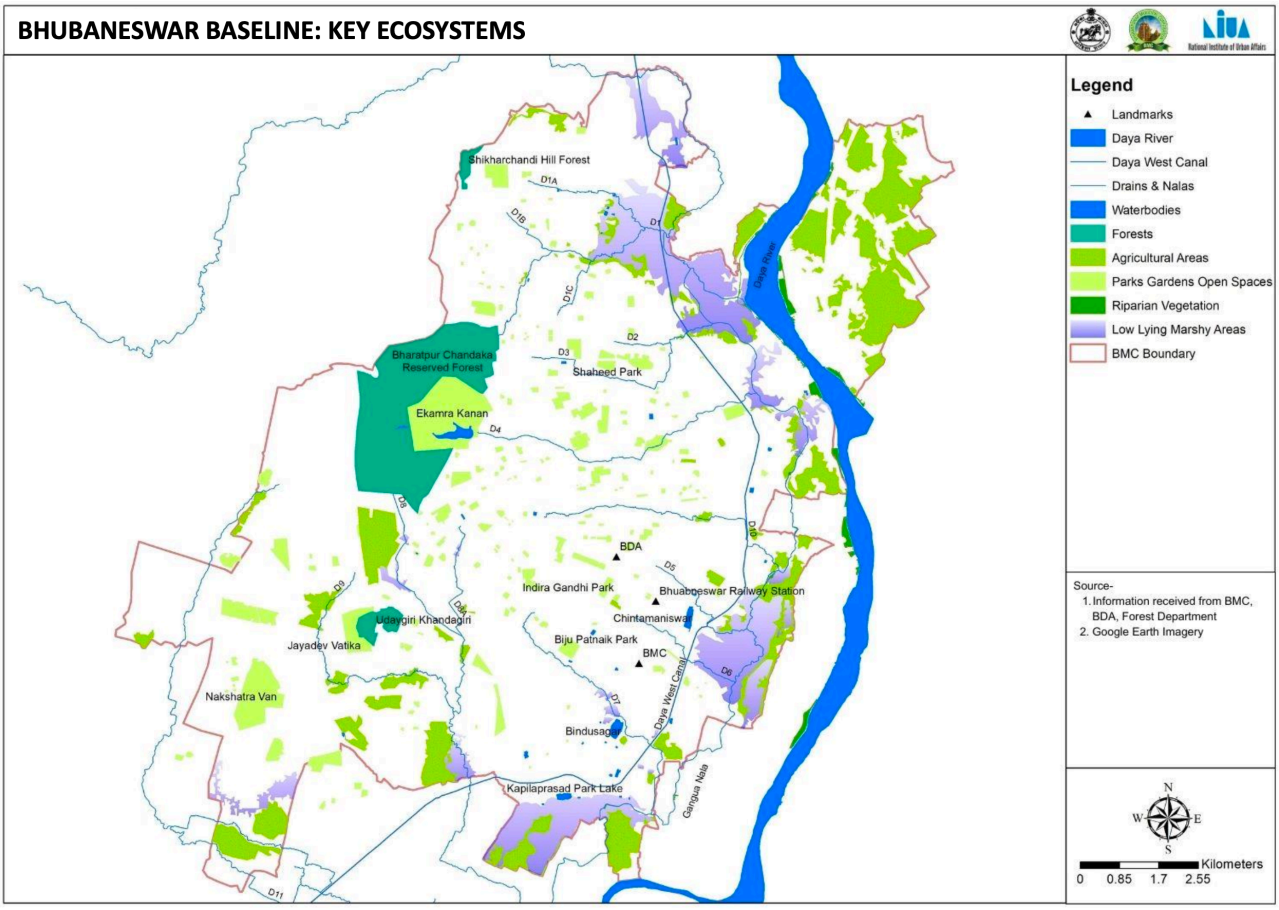
Recognizing its multifunctional value and representativeness of other peri-urban wetlands in Bhubaneswar, this site has been selected for economic valuation to inform future conservation and urban planning efforts.

Jayadev Vatika Urban Green

Named after the 12th-century saint-poet Jayadev, Jayadev Vatika is a serene urban green space—often described as a "jungle within the city." Spanning 39 hectares, it hosts over 300 species of native and exotic plants, including medicinal herbs, shrubs, climbers, grasses, and bamboo. Located at 20°14′ North latitude and 85°50′ East longitude, the park lies at the foothills of the Khandagiri caves, a site of great archaeological, historical, and religious significance dating back to the 2nd century B.C. It also shares its western boundary with this ancient heritage site.

The park's natural topography, complemented by thoughtful landscaping, features rolling hillocks, expansive lawns, and meadows, along with ponds blooming with lilies and lotuses. A variety of water elements—including a cascading stream, waterfall, and decorative fountains—enhance the scenic beauty of the park, creating a peaceful and rejuvenating atmosphere for visitors.

Jayadev Vatika is well-equipped with visitor-friendly amenities such as creeper huts, tiled-roof shelters, water and toilet facilities, and designated picnic areas. These features make it one of Bhubaneswar's popular outdoor recreational spaces, frequented by nature lovers, families, picnickers, morning and evening walkers, students of art, and tourists alike.



Forest

Drain

Waterbody

Wetland

Riparian

Swamp & Grassland

Key Ecosystems in Bhubaneswar City

Global EbA Fund
IUCN
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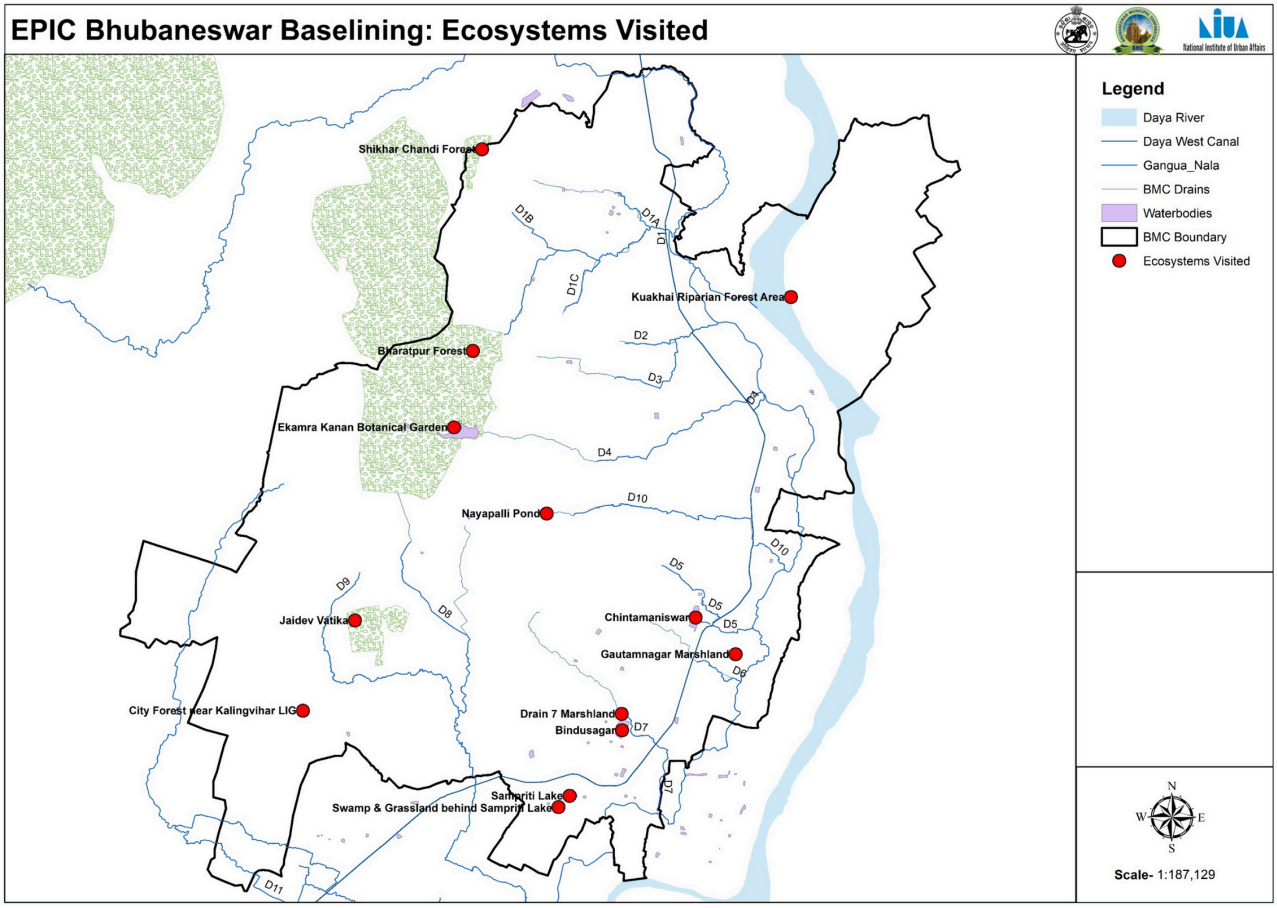
IKI INTERNATIONAL CLIMATE INITIATIVE
National Institute of Urban Affairs
WATER & ENVIRONMENT VERTICAL



Key Ecosystems in Bhubaneswar City

Source: Photographs of the Bindu Sagar water body from site survey

Source: Photographs of the Bindu Sagar water body from site survey

3.2. Methodology and approach to estimate Economic Value of each Ecosystem Service

A reconnaissance survey was initially conducted across various ecosystems in Bhubaneswar to identify and list the range of services provided by each one.

To assess the benefits derived from these urban ecosystems, both secondary data and primary field surveys were used. Primary surveys were conducted over a continuous period of 3–4 weeks around each identified ecosystem, aiming to capture a comprehensive understanding of the ecosystem services offered.

Detailed questionnaires were designed to gather relevant information from stakeholders who directly benefit from these ecosystems. These included questionnaires for local residents, tourists, staff workers, fishermen, government department officials, and other stakeholder groups. Data was collected at various times of day —from early morning to late evening— to account for temporal variations in ecosystem use.

In addition to the surveys, Focused Group Discussions (FGDs) and individual interviews were held with specific stakeholder groups to gain deeper insights into the range of co-benefits associated with each ecosystem.

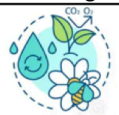
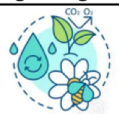
The information gathered was then used to estimate the economic value of each ecosystem service, applying appropriate valuation methods based on the nature of each service and the type of data collected.

The primary ecosystem services offered by the Bindu Sagar water body are listed below.

- Food (Fish) — The lake supports local fishing activities. While some of the fish catch is sold in local markets, a large portion is used for household consumption by the local communities. The quantum of fish catch is small as fishing is not formally permitted in this water body.
- Fresh Water - Communities residing near the lake extract water for household use. Additionally, water from the lake is pumped to the adjacent herbal garden for horticultural purposes.
- Cooler Temperature - Satellite imagery indicates that the area around Bindu Sagar experiences relatively cooler temperatures compared to its surroundings, highlighting its role in microclimate regulation.
- Flood Control - The lake plays a crucial role in mitigating urban flooding by capturing excess stormwater during heavy rainfall events.
- Carbon Storage - The water body, along with the trees surrounding it, functions as a significant carbon sink, contributing to climate regulation.
- Recreation - The area is a popular recreational space for the local community. Activities

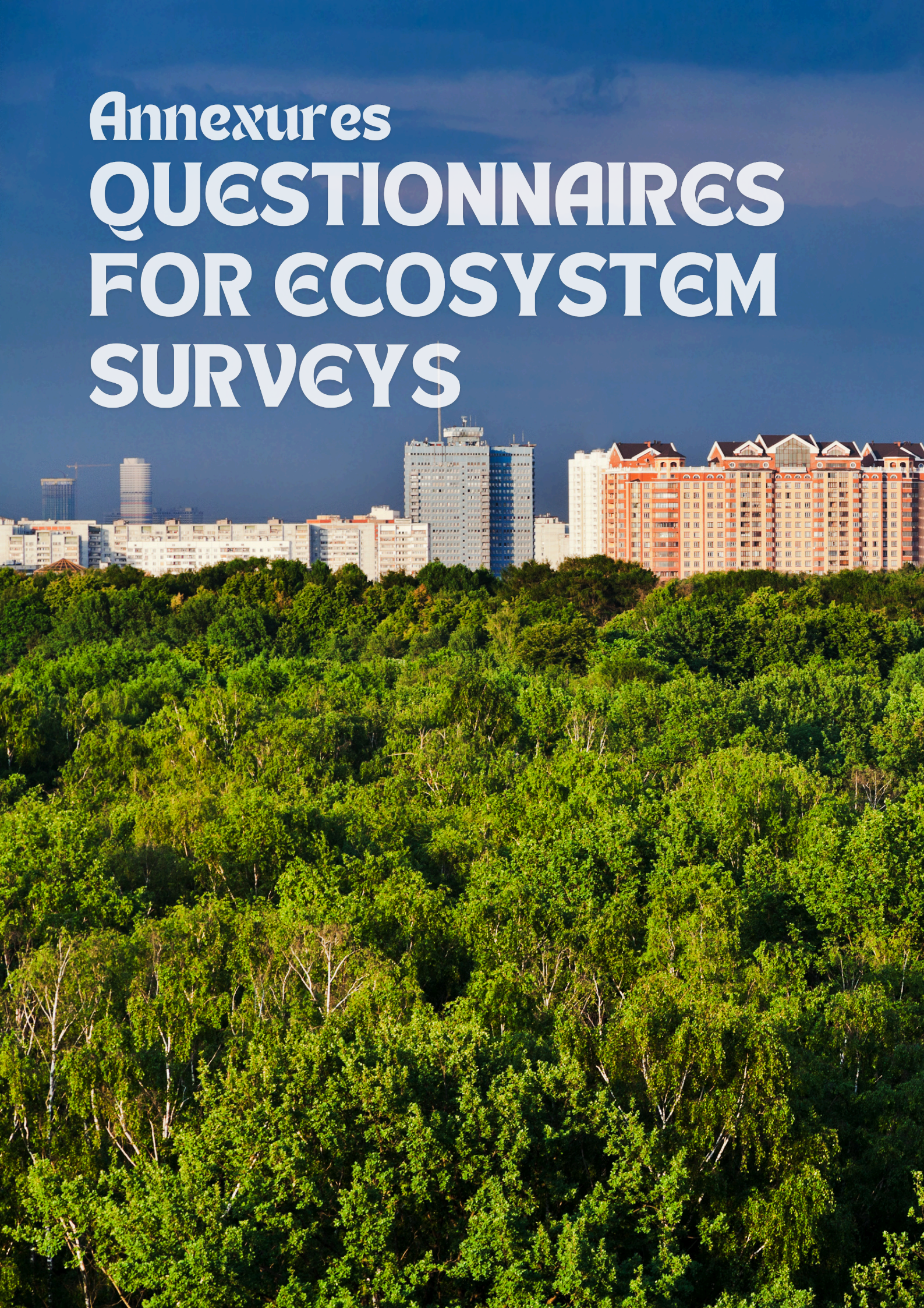
- such as evening light and sound shows, fishing, and casual visits attract numerous visitors. This footfall supports a number of local vendors and kiosks in the vicinity.
- Spiritual & Cultural - Bindu Sagar holds immense religious and cultural importance, attracting pilgrims and tourists throughout the year. The livelihoods of several priests, brahmans, pandits and shopkeepers selling religious items are directly tied to this ecosystem.
- Biodiversity - The lake hosts a diverse range of species, including fish, turtles, ducks, duckweed, and other aquatic flora. It also supports various terrestrial and avian fauna, including occasional sightings of migratory birds, making it a rich habitat for biodiversity.

Following table shows the methods used to calculate the economic value of different ecosystem services, using the Bindu Sagar water body in Bhubaneswar as a case example.

S. No.	Ecosystem Service	Observations from the Bindu Sagar Water Body	Type of Service (MEA)	Type of Value	Data Collection Method	Valuation Method
1	 Fish	Fishing for sale Fishing for self-consumption	 Provisioning Service	 Direct Use (consumptive)	 Primary – Survey, FGD	 Market-Based (Prices)
2	 Clean Water	Water consumption by the neighbouring informal settlements Higher ground water level in this area	 Provisioning Service	 Indirect Use	 Primary – Survey, FGD Secondary - GIS	 Avoided Cost Method
3	 Cool Temperatures	Cooler temperature in this area	 Regulating Service	 Indirect Use	 Primary – Survey, FGD Secondary - GIS	 Avoided Cost Method
4	 Control Flooding	Excess storm water captured	 Regulating Service	 Indirect Use	 Primary – Survey, FGD	 Avoided Cost Method
5	 Store Carbon	Green buffer with trees and shrubs	 Regulating Service	 Indirect Use	 Secondary– GIS,Research	 Benefit Transfer Method
6	 Recreation	Tourists visit this water body Light and sound show organised at the lake Passive recreational space for the neighbourhood Fishing for recreation Small shops, kiosks, snack/ tea stalls running in the vicinity	 Cultural Service	 Direct Use	 Primary – Survey, FGD	 Travel Cost Method
7	 Spirituality	Tourists visit for religious ceremonies conducted by pandits/ brahmans Small shops and kiosks selling religious products are running in the vicinity	 Cultural Service	 Direct Use (non-consump)	 Primary – Survey, FGD	 Market-Based (Services)
8	 Biodiversity	Unique biodiversity habitat, with a variety of flora, fauna and avifauna Aquatic species like ducks, duckweed, fishes and turtles are present	 Supporting Service	 Indirect Use Value	 Primary – Survey, FGD Secondary - Research	 Willingness to Pay

Annexures

QUESTIONNAIRES FOR ECOSYSTEM SURVEYS



Questionnaires for Surveying an

URBAN WATER BODY

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WATER & ENVIRONMENT VERTICAL

Checklist for Ecosystem Services of an URBAN WATER BODY

PROVISIONING SERVICES

- [ ] Food
- [ ] Fresh Water
- [ ] Fuelwood
- [ ] Fiber
- [ ] Biochemicals
- [ ] Genetic Resources
- [ ] Medicinal Resources
- [ ]
- [ ]

REGULATING SERVICES

- [ ] Climate Regulation
- [ ] Water Regulation
- [ ] Water Purification
- [ ] Disease Regulation
- [ ] Pollination
- [ ] Erosion Control
- [ ] Biological Control
- [ ] Pest Regulation
- [ ] Natural Hazard Regulation

CULTURAL SERVICES

- [ ] Spiritual & Religious
- [ ] Recreation & Eco-tourism
- [ ] Aesthetic
- [ ] Inspirational
- [ ] Educational
- [ ] Sense of Place
- [ ] Cultural Heritage
- [ ]
- [ ]

SUPPORTING SERVICES

- [ ] Soil Formation
- [ ] Nutrient Cycling
- [ ] Primary Production
- [ ] Habitats for Species
- [ ] Maintenance of Genetic Diversity
- [ ]
- [ ]
- [ ]
- [ ]

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Checklist for Ecosystem Services of an URBAN WATER BODY

PROVISIONING SERVICES

REGULATING SERVICES

CULTURAL SERVICES

SUPPORTING SERVICES

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IKI INTERNATIONAL CLIMATE INITIATIVE
National Institute of Urban Affairs
WATER & ENVIRONMENT VERTICAL

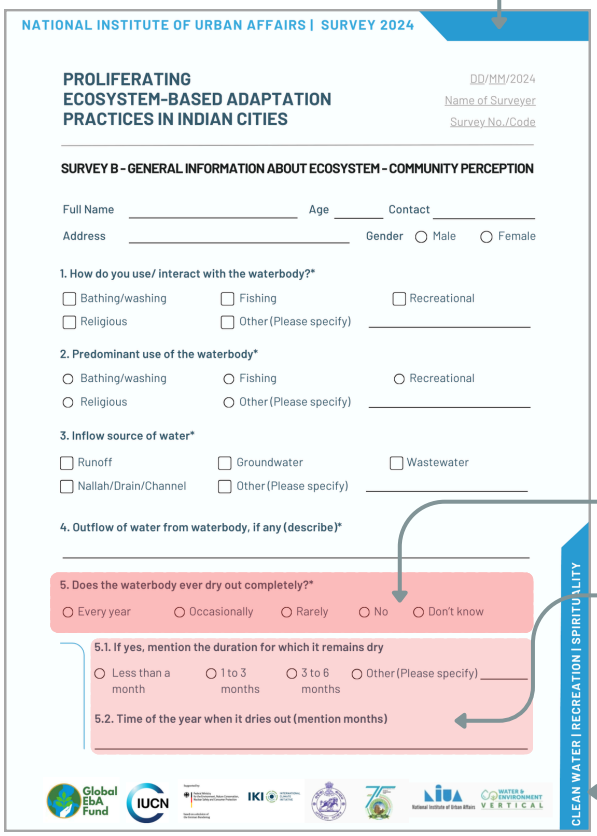
PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

GENERAL INSTRUCTIONS FOR THE SURVEYORS

- Ensure that your name, the date, and the survey number/code are clearly filled out on all forms before beginning the survey.
- All questions marked with an asterisk (*) are mandatory and must be completed.
- Fill out all sub-questions accurately, following the detailed descriptions and instructions provided for each.
- Capture geo-tagged photographs of the ecosystem and stakeholders wherever possible. Always obtain permission before taking photos within private premises or of individuals. Avoid photographing children.
- Record any additional or relevant information shared by respondents directly on the survey formats for context.
- Conduct surveys at different times of the day to capture temporal variations in responses.
- If necessary, rephrase questions for clarity or to make them more understandable for respondents, ensuring the original intent is preserved.
- Inform respondents that the data collected will be used solely for research purposes under an ongoing project and will not be shared publicly or with unauthorised parties.
- Familiarise yourself with the survey format, objectives, and questions in advance to ensure a smooth and professional interaction with respondents.
- Approach respondents respectfully and adapt your communication style to suit the local culture and context.
- Be mindful of the respondent's time. Conduct the survey efficiently without compromising on the quality of data collected.
- If you encounter any challenges or issues during the survey, document them and report them promptly to the project coordinator.
- Follow all other instructions given by the project/ survey coordinator.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

UNDERSTAND THE QUESTIONNAIRES


NATIONAL INSTITUTE OF URBAN AFFAIRS | SURVEY 2024

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2024
Name of Surveyer
Survey No./Code

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - COMMUNITY PERCEPTION

Full Name _____ Age _____ Contact _____
Address _____ Gender ○ Male ○ Female

1. How do you use/ interact with the waterbody?*
☐ Bathing/washing ☐ Fishing ☐ Recreational
☐ Religious ☐ Other (Please specify) _____

2. Predominant use of the waterbody*
○ Bathing/washing ○ Fishing ○ Recreational
○ Religious ○ Other (Please specify) _____

3. Inflow source of water*
☐ Runoff ☐ Groundwater ☐ Wastewater
☐ Nallah/Drain/Channel ☐ Other (Please specify) _____

4. Outflow of water from waterbody, if any (describe)*
_____

5. Does the waterbody ever dry out completely?*
○ Every year ○ Occasionally ○ Rarely ○ No ○ Don't know

5.1. If yes, mention the duration for which it remains dry
○ Less than a month ○ 1 to 3 months ○ 3 to 6 months ○ Other (Please specify) _____

5.2. Time of the year when it dries out (mention months)
_____

CLEAN WATER | RECREATION | SPIRITUALITY

LEGEND FOR SURVEY RESPONDENTS

- Survey instructions
- To be filled by the surveyor seperately
- To be filled by surveyor from self-observation
- Survey for anyone around the ecosystem
- Survey for specific beneficiaries
- Survey for agencies/ authorities

MAIN QUESTIONS

SUB-QUESTIONS TO BE FILLED, BASED ON RESPONSE OF THE MAIN QUESTION

TYPE OF ECOSYSTEM SERVICE

QUESTION TYPES:

☐ Multiple selection allowed

◯ Single selection only

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

BRIEF DESCRIPTION OF THE ASSIGNMENT

BACKGROUND & CONTEXT

The National Institute of Urban Affairs (NIUA), under the Ministry of Housing and Urban Affairs (MoHUA), Government of India, is implementing a research project titled "Proliferating Ecosystem-based Adaptation in Indian Cities" (EPIC). The primary objective of this project is to promote Ecosystem-based Adaptation (EbA) in urban areas across India, which are increasingly vulnerable to climate-induced risks such as water insecurity, heatwaves, urban heat island effects, and urban flooding. These challenges significantly impact public health and the urban economy. Adopting EbA practices offers a sustainable approach to mitigate these risks.

One of the key deliverables of the EPIC project is to demonstrate the valuation of three ecosystems in Bhubaneswar, highlighting their diverse ecosystem services. Attaching economic value to these ecosystems will help strengthen the case for their protection and sustainable management.

The project team at NIUA has conducted reconnaissance surveys and identified the following three urban ecosystems in Bhubaneswar for detailed evaluation:

1. Urban Water Body: Bindu Sagar
2. Urban Green Space: Jayadev Vatika
3. Urban Marsh

PURPOSE OF THIS ASSIGNMENT

The primary purpose of this assignment is to conduct comprehensive primary surveys to identify the direct and indirect ecosystem services provided by the three selected urban ecosystems in Bhubaneswar. The goal is to quantify these services and estimate their economic values, thereby emphasising the importance of these ecosystems in the city's sustainability and resilience planning.

The project team has already developed a detailed methodology and survey questionnaires to guide the data collection process. Before the assignment begins, the team will provide the necessary orientation and detailed survey tools to ensure accurate and efficient data collection.

This assignment plays a crucial role in building a strong evidence base for the protection and conservation of urban ecosystems through ecosystem-based adaptation practices.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

BRIEF DESCRIPTION OF THE ASSIGNMENT

The surveying team is expected to -

a) Undertake physical surveys of three ecosystems in Bhubaneswar - The surveys will cover a tentative sample size of 20-30 respondents for the 6 to 8 ecosystem services at three ecosystems. The data collection will be for a period of 3 weeks approx (including weekends) at each ecosystem. Approximately 700-800 survey questionnaires (30 respondents x 8 services forms x 3 ecosystems) are required to be filled based on primary surveys at three ecosystems.

The expected deliverables under this activity are cleaned excel files of data collected from the primary surveys, and a preliminary analysis of the data as per the methodology shared by NIUA.

b) Organise Structured Focused Group Discussions (FGDs) – Total 5 FGDs with distinct stakeholder groups, who are depended on these ecosystems for their subsistence, livelihood, recreation, etc. Each FGD, involving at least 10 local people from a particular stakeholder group, and with representation from all genders, and age will be conducted in consultation with the NIUA officials.

The expected deliverables under this activity will include a complete documentation of all the FGDs in the form of a brief report, video recordings/ pictures of the sessions, and key findings/highlights based on the FGDs.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

SURVEY DETAILS

Name of Surveyor _____

Gender ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

Details of surveys conducted

S. No.	Survey Respondents	Number of surveys conducted
Ecosystem: Urban water body (Bindu Sagar)		
1	Fishermen	
2	Visitors	
3	Hawkers	
4	Shop Owners	
5	Residents	
6	Water users	
7	Authorities	
8	Any user	
Ecosystem: Urban green (Jayadev Vatika)		
1	Visitors	
2	Kiosks	
3	Residents	
4	Authorities	
5	Any user	
Ecosystem: Urban marsh		
1	Residents	
2	Authorities	
3	Any user	
	TOTAL SURVEYS CONDUCTED	

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

SURVEY DETAILS

BACKGROUND OF THE SURVEYOR

About yourself

Your experience

Your educational background

Alternatively you can attach your latest CV

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Click a geo-tagged photos of the water body*

2. Name of the ecosystem*

◯ Bindu Sagar water body ◯ Udaygiri-Khandagiri forest ◯ Marsh along Drain 7

◯ Other (Please specify) _____

3. Location (you may use any mobile application to find these values)

◯ Latitude _____ ◯ Longitude _____

4. Ward number _____

5. Type of waterbody*

☐ Lake ☐ Pond ☐ Kund

☐ Wetland ☐ Other (Please specify) _____

6. Character of waterbody periphery*

☐ Natural (soft edge with plantation / shrubbery)

☐ Natural (soft edge with barren soil)

☐ Concretised completely ☐ Concretised partially

7. Accessibility to the waterbody

☐ Accessible from all sides, with no entry gates or boundaries

☐ Accessible from a few points, with a boundary wall/ barricading/ entry gates

☐ Accessible only to a particular group, like members of an institution or government authorities

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

8. Major land uses adjacent to the water body and its buffer*

- ☐ Residential
- ☐ Commercial
- ☐ Recreational
- ☐ Mixed use
- ☐ Industrial
- ☐ Public-Semi Public (Religious)
- ☐ Other (Please specify) _____

9. Major land uses of the surrounding neighbourhood*

- ☐ Residential
- ☐ Commercial
- ☐ Recreational
- ☐ Mixed use
- ☐ Industrial
- ☐ Public-Semi Public (Religious)
- ☐ Other (Please specify) _____

10. Is there any waste disposal in and around the waterbody?*

- ○ Yes
- ○ No

If yes

10.1. What type of waste is disposed?

- ☐ Plastic waste
- ☐ Industrial
- ☐ Religious offerings
- ☐ Domestic waste dumping
- ☐ Other (Please specify) _____

11. Visual/ observation-based condition of the water body (choose everything applicable)*

- ☐ Odourless
- ☐ Foul odour
- ☐ Pleasant odour
- ☐ Algal growth present
- ☐ Algal growth absent

12. How are people seen using this water body?*

- ☐ Religious
- ☐ Recreational
- ☐ Tourists/ visitors
- ☐ Educational purposes
- ☐ Work/ business
- ☐ Picnic
- ☐ Walk/ running/ jogging
- ☐ Staff/ employees
- ☐ Other (Please specify) _____

13. Specify the activities ongoing in and around this water body

_____

_____

_____

14. On an average, how many people are seen visiting this water body in a day?*

On a weekday _____ On a weekend _____

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

15. Is this water body seen being used for fishing?*

○ Yes ○ No ○ Don't know

If yes

15.1. How many people are seen fishing in the water body everyday? _____

15.2. On an average, what is the duration of such fishing activity? _____

16. Is water from this waterbody being used?*

○ Yes ○ No

If yes

16.1. For what purpose is the water being used?

☐ Drinking water supply ☐ Horticulture ☐ Bathing

☐ Washing ☐ Other (Please specify) _____

17. Is any treatment being done to the water in the waterbody?

☐ Primary ☐ Secondary ☐ Tertiary

☐ Periodic cleaning for algae and solid waste ☐ Other (Please specify) _____

18. Are there any kiosks in the area?

○ Yes ○ No ○ Don't know

If yes

18.1. How many and what type of products do they sell? _____

_____

_____

19. Are there any other well known water bodies around this area?

○ Yes ○ No ○ Don't know

If yes

19.1. Mention the number, name, type and location of the facility

_____

_____

_____

_____

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

20. Are there any well known parks/gardens/recreational/community spaces around the waterbody?

◯ Yes ◯ No ◯ Don't know

If yes

20.1. Mention the number, name, type and location of the facility

_____

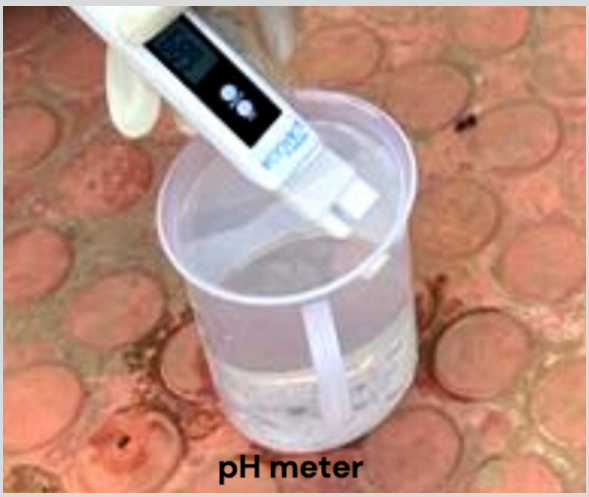
_____

_____

21. Quality of water in the waterbody (you may test water quality using hand-held meters)

◯ DO _____ ◯ pH _____

DO testing in process using DO meter


pH meter

22. What type of biodiversity species are seen in and around this water body (flora, avifauna, terrestrial fauna, aquatic fauna)?

_____

_____

_____

23. Have you noticed any unique species in and around this water body?

_____

_____

24. Specific observations, if any

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - INDIVIDUAL PERCEPTION

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Where do you live? _____

2. How do you use/ interact with this waterbody?*

☐ Bathing/ washing ☐ Fishing ☐ Recreational

☐ Religious ☐ Other (Please specify) _____

3. How many times have you visited this water body?*

◯ Once ◯ 2-5 ◯ 5-10

◯ 10-20 ◯ More than 20

4. Since how many years have you been associated with the waterbody? _____

If more than 3 years

4.1. How has the waterbody changed in your perception (both physically and in terms of its use)?

_____

_____

_____

5. As per you, how many people visit this waterbody daily?*

◯ Less than 100 ◯ 100 to 500 ◯ 500-1000

◯ More than 1000 ◯ Don't Know

6. As per you, what is the predominant use of this waterbody?*

☐ Bathing/washing ☐ Fishing ☐ Recreational

☐ Religious ☐ Other (Please specify) _____

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - INDIVIDUAL PERCEPTION

7. What is the source of water inflow in this water body?

☐ Rainfall/ Runoff ☐ Groundwater ☐ Wastewater
☐ Nallah/Drain/Channel ☐ Other (Please specify) _____

8. Is there any outflow/ use of water from this waterbody? If yes, please describe

_____

9. Does the waterbody ever dry out completely?*

○ Every year ○ Occasionally ○ Rarely ○ No ○ Don't know

If yes

9.1. What is the duration for which it remains dry?

○ Less than a month ○ 1 to 3 months ○ 3 to 6 months ○ Other (Please specify) _____

9.2. Which time of the year does it dry out (mention months)?

_____

10. Which agency manages this waterbody (Municipal Corporation/ private agencies/ any other)?

_____

11. In your knowledge, are there any well known parks/gardens/recreational/community spaces around the waterbody?

○ Yes ○ No ○ Don't know

12. How did you travel to this waterbody?*

☐ Walk ☐ Cycle ☐ E-rickshaw
☐ Bus ☐ 2 wheeler ☐ 4 wheeler
☐ Auto ☐ Others (Please specify) _____

13. Why do you think this place gathers so much crowd?*

_____

_____

14. Describe any prominent/ special features associated with this water body (like habitat)

_____

_____

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - INDIVIDUAL PERCEPTION

15. Are there any periodic festivals/ events associated with the waterbody?*

○ Yes ○ No ○ Don't know

If yes

15.1. What is the name of the event / festival? _____

_____

15.2. What type of event/ festival is it?

☐ Religious ☐ Recreational ☐ Cultural

☐ Fair ☐ Other (Please specify) _____

15.3. What is the frequency of the event/ festival?

○ Monthly ○ Quaterly ○ Half-yearly

○ Yearly ○ Other (Please specify) _____

15.4. What is the duration of the event/ festival?

○ One day ○ One week ○ 15 days

○ One month ○ Other (Please specify) _____

14.4. Which months does the event/ festival happen?

_____

15.5. How many people visit this waterbody daily during the event/ festival?

○ Less than 100 ○ 100 to 500 ○ 500-1000

○ More than 1000 ○ Don't know

15.6. Where do the visitors come from, during this event/ festival?

☐ Local / neighbourhood ☐ Within the city ☐ Within the state

☐ Within the country ☐ International ☐ Don't know

16. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY C - FOR BENEFICIARIES - FISHERMEN

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Usually how often do you come for fishing in this waterbody across the year?*

◯ Daily ◯ Weekly ◯ Fortnightly
◯ Monthly ◯ Quartly ◯ Yearly
◯ Other (Please specify) _____

2. For how long have you been coming here for fishing?

◯ 0 to 5 years ◯ 5 to 10 years ◯ 10+ years
◯ Second generation ◯ Other (Please specify) _____

3. How many hours do you spend fishing, every time you come here? _____

4. What time of the day do you come here for fishing (mention specific timings)?

_____

5. Which are the best months to catch fish from this water body?*

_____

6. How many other fishermen come to this waterbody for fishing?*

◯ 0-10 ◯ 11-50 ◯ 51-100
◯ 100+ ◯ Other (Please specify) _____

7. Is there any name of your fishing community? If yes, what is the name?

_____

8. Which fishes are found in this waterbody?* (fill in the table on next page)

☐ Tilapia / Kou ☐ Kerandi ☐ Mohurali
☐ Prawns ☐ Other (Please specify) _____

SURVEY C - FOR BENEFICIARIES - FISHERMEN

9. How many fish do you catch here per day? Approx. what percentage of it do you sell or consume youself? At what price do you sell it?*

Fish Name	Fish Catch		Fish Consumption		Average Market Price (per unit)
	Nos.	Kg.	Self %	Sale%	
Tilapia / Kou					
Kerandi					
Mohurali					
Prawns					

10. Where do you sell the fish?* _____

11. Do you catch fish from any other water sources?

◯ Yes ◯ No

If yes

11.1. From where else do you catch fish? _____

11.2. What % of your fish catch comes from this waterbody? _____

12. How much do you earn from selling the fishes? (monthly)

_____

13. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY D - FOR BENEFICIARIES - VISITORS

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Where are you coming from?*

◯ Local/ neighborhood ◯ Within the city ◯ Within the state (regional)

◯ Within the country ◯ Outside the country

If not local

1.1. How did you come to know about this water body?

◯ Found it online ◯ Was in the vicinity

◯ Recommended by someone ◯ Other (Please specify) _____

2. Why have you come to this water body?*

☐ Leisure/ relax ☐ Walk ☐ Cycle

☐ Fishing ☐ Historic/ cultural purpose ☐ Photoshoot

☐ Light and sound show ☐ Religious purpose ☐ Work

☐ Others (Please specify) _____

3. How many people have you brought along with you? _____

4. Did you visit any other place before coming here?

◯ Yes ◯ No

If yes

4.1. Which other place did you visit? _____

5. How much time did it take you to reach here?*

◯ Less than 15 mins ◯ 15 - 30 mins ◯ 30 - 45 mins

◯ 45 min - 1 hour ◯ More than 1 hour

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY D - FOR BENEFICIARIES - VISITORS

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. What is your educational background?

◯ Upto 5th Grade ◯ Primary school ◯ Secondary school

◯ Higher secondary school ◯ Graduate ◯ Post graduate & above

2. How much do you earn annually (INR)?

◯ N/A ◯ upto 1 Lakh ◯ 1 Lakh to 5 Lakh

◯ 5 to 10 Lakh ◯ 10 Lakh to 25 Lakh ◯ More than 25 Lakh

3. Where are you coming from?*

◯ Local/ neighborhood ◯ Within the city ◯ Within the state (regional)

◯ Within the country ◯ Outside the country

If not local

3.1. How did you come to know about this water body?

◯ Found it online ◯ Was in the vicinity

◯ Recommended by someone ◯ Other (Please specify) _____

4. Why have you come to this water body?*

☐ Leisure/ relax ☐ Walk ☐ Cycle

☐ Fishing ☐ Historic/ cultural purpose ☐ Photoshoot

☐ Light and sound show ☐ Religious purpose ☐ Work

☐ Others (Please specify) _____

5. How many people have you brought along with you? _____

6. Did you visit any other place before coming here?

◯ Yes ◯ No

RECREATION | SPIRITUALITY

SURVEY D - FOR BENEFICIARIES - VISITORS

If yes

6.1. Which other place did you visit? _____

7. How much time did it take you to reach here?*

- ○ Less than 15 mins
- ○ 15 - 30 mins
- ○ 30 - 45 mins
- ○ 45 min - 1 hour
- ○ More than 1 hour

8. How did you travel here?*

- ☐ Walk
- ☐ Cycle
- ☐ E-rickshaw
- ☐ Bus
- ☐ 2 wheeler
- ☐ 4 wheeler
- ☐ Auto
- ☐ Others (Please specify) _____

9. How much money did it cost you to reach here?* _____

10. What other expenses did you incur while visiting this place?*

- ☐ Food, Amount _____
- ☐ Tickets, Amount _____
- ☐ Others (Please specify), Amount _____

11. What advantages or benefits did you experience from this waterbody?* (e.g., clean air, water, recreation, etc.)

_____

_____

_____

12. Is it your first time coming to this waterbody?*

- ○ Yes
- ○ No

If no

12.1. How many times have you visited this waterbody before? _____

12.2. How frequently do you visit the waterbody?

- ○ Daily
- ○ Weekly
- ○ Fortnightly
- ○ Monthly
- ○ Quartly
- ○ Yearly
- ○ Other (Please specify) _____

12.3. Why do you think this place gathers so much crowd?

_____

_____

_____

SURVEY D - FOR BENEFICIARIES - VISITORS

12.4. Over the years, how has the biodiversity of this water body changed and why? (example improved/ degraded)

_____

_____

_____

13. Which biodiversity species have you observed in and around this water body (flora, aquatic fauna, avifauna, terrestrial fauna)?*

_____

_____

14. Have you noticed any unique species in and around this water body?*

_____

15. In your opinion, is this water body properly maintained?

◯ Yes ◯ No ◯ Can't say

16. If the biodiversity habitat of this waterbody is lost, will it affect you?*

◯ Yes ◯ No ◯ Can't say

If yes

16.1. Explain how it will affect you?

_____

_____

_____

Introduce the conservation challenge of the water body to the responder

- Critical Ecosystem Service Threatened - Highlight the importance of the water body in providing a habitat for diverse species.
- Declining Health of the Water Body - Describe the current state of the water body, in terms of habitat degradation.
- Urgent Need for Action - Emphasize that if proactive measures are not taken now, the ecosystem services provided by the water body will be severely diminished or lost altogether, impacting both human well-being and biodiversity.
- Consequences of inaction - Explain that without intervention, the water body's ability to provide essential services will be compromised. Discuss the cascading effects of the water body's decline on surrounding ecosystems, including loss of biodiversity, disruption of food webs, and increased vulnerability to natural disasters.
- In order to address the threats to this water body there is a need to mobilise funds.

With this background, ask the following questions

SURVEY D - FOR BENEFICIARIES - VISITORS

17. Are you willing to support in protecting this waterbody?*

◯ Yes ◯ No

If yes

17.1. In what way would you be willing to contribute to the waterbody conservation efforts? (Awareness initiatives, organising cleaning drives, nature sensitisation, walks, conduct talks/ community interaction sessions etc.)

_____

_____

_____

17.2. How many hours per year are you willing to dedicate to conservation activities in this waterbody?* _____

18. Are you willing to pay to protect this waterbody and its habitat?*

◯ Yes ◯ No

If yes

18.1. Approx. how much amount are you willing to pay annually? (in INR)*

_____

19. In your opinion, what type of institution should manage the water body to conserve the biodiversity habitat?

☐ Government body ☐ Private entity ☐ Academic institute

☐ Institute of national prominence ☐ NGO

☐ Other (Please specify) _____

20. Do you have any suggestions / issues with respect to the waterbody and conservation of its biodiversity habitat?

_____

_____

_____

21. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY E - FOR BENEFICIARIES - HAWKERS / STREET VENDORS/KIOSKS

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. How often do you come here?*

◯ Everyday ◯ Only on weekdays ◯ Only on weekends
◯ Only in specific months ◯ Other (Please specify) _____

2. Since how long have you been coming to this waterbody?

◯ Less than 1 year ◯ 1 to 5 years ◯ 5+ years
◯ Second generation ◯ Other (Please specify) _____

3. What time do you reach here everyday? _____

4. What time do you leave from here everyday? _____

5. What products/services do you sell here?*

_____

_____

6. How many other persons sell the same products/services here?* _____

7. Which months of the year do you have maximum customers? _____

8. What time of the day do you have maximum customers? _____

9. How many people visit this waterbody everyday?* _____

10. Do you think this waterbody benefits your business?*

◯ Yes ◯ No ◯ Can't say

11. Do people visiting the waterbody come to buy your products / services?

◯ Yes ◯ No

12. How many customers do you get everyday?* _____

SURVEY E - FOR BENEFICIARIES - HAWKERS / STREET VENDORS/KIOSKS

13. On an average, how much does each customer spend for your goods / services?

_____

14. How much is your average daily sale?* _____

15. Do you pay any rent for this space?*

◯ Yes ◯ No

If yes

15.1. Whom do you pay?* _____

15.2. How much is the monthly rent?* _____

16. Do you pay for this kiosk, in any other form?* (lease, purchase, etc.)

◯ Yes ◯ No

If yes

16.1. Whom do you pay? _____

16.2. How much do you pay?* _____

17. Do you have any employees in this kiosk?

◯ Yes ◯ No

If yes

17.1. How many employees do you have? (specify type and number)

☐ Full time, specify number _____ ☐ Part time, specify number _____

☐ Others, specify number and type of employment _____

17.2. What type of remuneration do your employees receive?

☐ Monthly salary ☐ On commission ☐ On contract

☐ Daily wagers ☐ Other (Please specify) _____

17.3. What is the average monthly earning of an employee in your shop? _____

18. How much are your other average monthly expenses?* (expense and amount)

_____

_____

_____

19. What is your average monthly profit?* _____

SURVEY E - FOR BENEFICIARIES - HAWKERS / STREET VENDORS/KIOSKS

20. Why do you think this place gathers so much crowd?

_____

_____

_____

21. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY F - FOR BENEFICIARIES - SHOP OWNERS

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Full name of your shop* _____

2. Address of your shop* _____

3. What type of shop is it?*

◯ Service ◯ Retail ◯ Wholesale

◯ Other (Please specify) _____

4. What products / services do you sell?*

☐ Food ☐ Entertainment/leisure ☐ Religious

☐ Souvenirs ☐ Domestic Utilities ☐ Medical

☐ Other (Please specify) _____

5. How many other shops sell the same products/services around this water body?* _____

6. For how many years have you been selling the products / services in the area?

◯ 0 to 5 years ◯ 5 to 10 years ◯ 10 to 15 years

◯ 15 to 20 years ◯ If 20+ years, please specify _____

7. How often do you open your shop?*

◯ Everyday ◯ Only on weekdays ◯ Only on weekends

◯ Other (Please specify) _____

8. Which months of the year do you have maximum customers? _____

9. What time of the day do you have maximum customers? _____ to _____

10. How many people visit this waterbody everyday?* _____

11. Do people visiting the waterbody come to buy your products / services?*

◯ Yes ◯ No

SURVEY F - FOR BENEFICIARIES - SHOP OWNERS

12. On an average, how many customers do you have daily?* _____

13. On an average, how much does each customer spend for your goods / services?

_____

14. How much is your average daily sale?* _____

15. Do you pay any rent for this space?*

◯ Yes ◯ No

If yes

15.1. Whom do you pay?* _____

15.2. How much is the monthly rent?* _____

16. Do you pay for this shop, in any other form?* (lease, purchase, etc.)

◯ Yes ◯ No

If yes

16.1. Whom do you pay? _____

16.2. How much do you pay?* _____

17. How much are your other average monthly expenses?* (expense and amount)

_____

_____

_____

18. What is your average monthly profit?* _____

19. Do you think this waterbody benefits your business?*

◯ Yes ◯ No ◯ Can't say

If yes

19.1. How does it benefit ? _____

_____

20. Will your business be affected if your shop is shifted elsewhere?*

◯ Yes ◯ No ◯ Can't say

If yes

20.1. How will it get affected? _____

_____

20.2. How much loss/ profit in sales is expected? _____

_____

SURVEY F - FOR BENEFICIARIES - SHOP OWNERS

21. Do you have any employees in this shop?

○ Yes ○ No

If yes

21.1. How many employees do you have? (specify type and number)

☐ Full time, specify number _____ ☐ Part time, specify number _____

☐ Others, specify number and type of employment _____

21.2. What type of remuneration do your employees receive?

☐ Monthly salary ☐ On commission ☐ On contract

☐ Daily wagers ☐ Other (Please specify) _____

21.3. What is the average monthly earning of an employee in your shop?*

_____

22. Why do you think this place gathers so much crowd?

_____

_____

_____

23. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY G - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE WATERBODY

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. What type of establishment is it?*

◯ Residential ◯ Commercial ◯ Institutional

◯ Mixed ◯ Other (Please specify) _____

If residential

1.1. How many people are there in your household? _____

1.2. What is the type of residential establishment?

◯ Unauthorised/ Informal ◯ Private builder floors ◯ Apartment complex

◯ Government quarters ◯ Other (Please specify) _____

1.3. What is the size of your house?*

◯ 1 BHK ◯ 2 BHK ◯ 3 BHK

◯ Other (Please specify) _____

1.4. How long have you been living here? _____

1.5. Is this property ◯ Owned ◯ Rented

2. Where do you get your water supply from?

☐ Municipal piped connection ☐ Municipal tankers ☐ Private tankers

☐ Community borewell/ handpump ☐ Private borewell/ handpump

☐ Other (Please specify) _____

If municipal piped connection

2.1. How long is the water supply?

◯ 24 hours

◯ Intermittent (specify interval and frequency, eg twice a day for 2 hours)

_____

2.2. Is the municipal supply sourced from this waterbody?

◯ Yes ◯ No ◯ Don't know

CLEAN WATER

SURVEY G - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE WATERBODY

3. What is the water storage capacity of your household?

◯ Less then 100 L ◯ 100 - 500 L ◯ More than 500 L

4. How many times do you refill your water tank daily? _____

5. Do you pay any water bill?

◯ No ◯ Yes, specify annual bill _____

6. Is the water treated at the household level, before use?

◯ Yes ◯ No

7. Do you use water from this waterbody?*

◯ Yes ◯ No

If yes

7.1. For what purpose do you use the water from this water body?*

☐ Drinking/cooking ☐ Washing/ bathing ☐ Toilet

☐ Other (Please specify) _____

7.2. Do you treat the water from this water body before use?*

◯ Yes ◯ No

7.3. How do you extract water for use?*

☐ Using a motor/pump ☐ Containers/ buckets ☐ Directly use in the water body

☐ Other (Please specify) _____

7.4. How much water do you extract from the waterbody for your use daily?*

◯ 1 bucket ◯ 2 to 5 buckets ◯ 5 to 10 buckets

◯ More than 10 buckets ◯ Other (Please specify) _____

8. In your knowledge, do any other households use water from the waterbody?*

◯ Yes ◯ No ◯ Don't know

If yes

8.1. Approx. how many other households use water from this waterbody?*

_____

9. Do you have a borewell/ dugwell/ handpump in your house?*

◯ Yes ◯ No

If yes

9.1. For what purpose do you use water from the borewell/ dugwell/ handpump?

☐ Drinking/cooking ☐ Washing/ bathing ☐ Toilet

☐ Other (Please specify) _____

9.2. How deep is the water level? (in feet)* _____

SURVEY G - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE WATERBODY

9.3. How deep did you have to dig for water? (in feet)* _____

9.4. When did you construct the borewell/ dugwell/ handpump?

- ○ Past one year
- ○ 1 - 5 years
- ○ 5 - 10 years
- ○ 10+ years (Please specify) _____

9.5. How much did it cost you for digging? _____

9.6. Why did you construct the borewell/ dugwell/ handpump?

- ☐ Intermittent municipal supply
- ☐ Poor quality of municipal supply
- ☐ Unaffordable water bills
- ☐ Other (Please specify) _____

10. Do you think the groundwater in this area is affected by this waterbody?*

- ○ Yes
- ○ No
- ○ Don't know

If yes

10.1. Explain how _____

11. How does the groundwater level in this area vary from other areas?

- ○ Equal to other areas
- ○ Lower
- ○ Higher
- ○ Don't know

12. Do you use air conditioning in your home?*

- ○ Yes
- ○ No

If yes

12.1. How many ACs do you have?*

- ○ 1
- ○ 2
- ○ 3
- ○ Other (Please specify) _____

12.2. How many months in a year do you use the AC?* _____

12.3. How many hours in a day do you use each AC in peak summer?*

- ○ Less than 2 hours
- ○ 2-4 hours
- ○ 4-6 hours
- ○ 6-8 hours
- ○ 8-10 hours
- ○ more than 10 hours

13. Do you use air coolers in your home?*

- ○ Yes
- ○ No

If yes

13.1. How many coolers do you have?*

- ○ 1
- ○ 2
- ○ 3
- ○ Other (Please specify) _____

SURVEY G - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE WATERBODY

13.2. How many months in a year do you use the coolers?* _____

13.3. How many hours in a day do you use each cooler in peak summer?*

- ◯ Less than 2 hours
- ◯ 2-4 hours
- ◯ 4-6 hours
- ◯ 6-8 hours
- ◯ 8-10 hours
- ◯ more than 10 hours

14. How much is your approx. monthly electricity bill in peak summer?

- ◯ upto Rs. 1000
- ◯ Rs. 1000 - 2000
- ◯ Rs. 2000 - 3000
- ◯ Other (Please specify) _____

15. Do you think the area around this waterbody is cooler than other areas in this neighborhood?*

- ◯ Yes
- ◯ No

16. What advantages or benefits did you experience from this waterbody?* (e.g., clean air, water, recreation, etc.)

_____

_____

_____

17. Why do you think this place gathers so much crowd?

_____

_____

_____

18. Over the years, how has the biodiversity of this water body changed and why? (example improved/ degraded)

_____

_____

19. Which biodiversity species have you observed in and around this water body (flora, aquatic fauna, avifauna, terrestrial fauna)?*

_____

_____

SURVEY D - FOR BENEFICIARIES - VISITORS

20. Have you noticed any unique species in and around this water body?*

_____

21. In your opinion, is this water body properly maintained?

◯ Yes ◯ No ◯ Can't say

22. If the biodiversity habitat of this waterbody is lost, will it affect you?*

◯ Yes ◯ No ◯ Can't say

If yes

22.1. Explain how it will affect you?

_____

_____

_____

Introduce the conservation challenge of the water body to the responder

- Critical Ecosystem Service Threatened - Highlight the importance of the water body in providing a habitat for diverse species.
- Declining Health of the Water Body - Describe the current state of the water body, in terms of habitat degradation.
- Urgent Need for Action - Emphasize that if proactive measures are not taken now, the ecosystem services provided by the water body will be severely diminished or lost altogether, impacting both human well-being and biodiversity.
- Consequences of inaction - Explain that without intervention, the water body's ability to provide essential services will be compromised. Discuss the cascading effects of the water body's decline on surrounding ecosystems, including loss of biodiversity, disruption of food webs, and increased vulnerability to natural disasters.
- In order to address the threats to this water body there is a need to mobilise funds.

With this background, ask the following questions

23. Are you willing to support in protecting this waterbody?*

◯ Yes ◯ No

If yes

23.1. In what way would you be willing to contribute to the waterbody conservation efforts? (Awareness initiatives, organising cleaning drives, nature sensitisation, walks, conduct talks/ community interaction sessions etc.)

_____

_____

_____

SURVEY G - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE WATERBODY

23.2. How many hours per year are you willing to dedicate to conservation activities in this waterbody?* _____

24. Are you willing to pay to protect this waterbody and its habitat?*

○ Yes ○ No

If yes

24.1. Approx. how much amount are you willing to pay annually? (in INR)* _____

25. In your opinion, what type of institution should manage the water body to conserve the biodiversity habitat?

☐ Government body ☐ Private entity ☐ Academic institute

☐ Institute of national prominence ☐ NGO

☐ Other (Please specify) _____

26. Do you have any suggestions / issues with respect to the waterbody and conservation of its biodiversity habitat?

_____

_____

_____

27. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY H - FOR BENEFICIARIES - SURROUNDING FACILITIES USING WATER FROM THE WATER BODY

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. What type of a public facility is this?

◯ Public park/ garden ◯ Public open ground ◯ Community hall

◯ Religious hall ◯ Other (Please specify) _____

2. What is your role in this facility?

◯ Owner ◯ Maintenance staff

◯ Visitor ◯ Other (Please specify) _____

3. Where do you get your water supply from?

☐ Municipal connection ☐ Private groundwater pump ☐ Community/municipal bore

☐ Private handpump ☐ Community handpump ☐ Private tankers

☐ Other (Please specify) _____

4. Do you use water from this waterbody?*

◯ Yes ◯ No

If yes

4.1. For what purpose do you use the water from this water body?*

☐ Drinking/cooking ☐ Washing/ bathing ☐ Toilet

☐ Other (Please specify) _____

4.2. Do you treat the water from this water body before use?*

◯ Yes ◯ No

4.3. How do you extract water for use?*

☐ Using a motor/pump ☐ Containers/ buckets ☐ Directly use in water body

☐ Other (Please specify) _____

4.4. How much water do you extract from the waterbody daily? (in litres)*

_____

SURVEY G - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE WATERBODY

4.5. Is there a storage tank inside the facility for water storage?

○ No ○ Yes, specify capacity _____

How many times is it filled daily, using the water body? _____

5. Why do you think this water body gathers so much crowd?

_____

_____

_____

6. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY I- QUESTIONNAIRE FOR ANY OFFICIALS/ STAFF AROUND THE ECOSYSTEM

Full Name _____

Department/ Organisation _____

Designation _____ Contact _____

1. What type of department/ agency/ authority/ organisation are you from?*

◯ Government organisation ◯ Private organisation ◯ Non-profit or NGO

◯ Other (Please specify) _____

2. What is your role in the department/ agency/ authority/ organisation?

_____

3. What is the role of your department/ agency/ authority/ organisation in managing the waterbody?*

☐ Water quality monitoring ☐ Cleaning/ maintenance ☐ Security

☐ Crowd control ☐ Landscaping/ horticulture ☐ Infrastructure operations

☐ Other (Please specify) _____

4. Do you also work in other areas?*

◯ Yes ◯ No

If yes

4.1. Where else do you work?

_____

_____

_____

5. Do you think this waterbody supports or benefits your work in any way?

◯ Yes ◯ No

CLEAN WATER | RECREATION

SURVEY I- QUESTIONNAIRE FOR ANY OFFICIALS/ STAFF AROUND THE ECOSYSTEM

6. How many people has your department/ agency/ authority/ organisation employed for waterbody related works?* (specify role of the employee, number of employees, engagement modality, working days in a week, working months in an year, average monthly salary/ earning)

Type of employee	Number	Working days	Working months	Engagement modality*	Average monthly salary/ earning

*Coding for **'Engagement modality'**

A. Salaried B. On commission C. On contract D. Daily wagers

Other (Please specify) _____

7. In your knowledge, is there any other department/ agency/ authority/ organisation involved in managing this waterbody?

◯ Yes ◯ No

If yes

7.1. Which other department/ agency/ authority/ organisation is involved?

Department/ agency	Role of employee	Number of employees working on water body

SURVEY I- QUESTIONNAIRE FOR ANY OFFICIALS/ STAFF AROUND THE ECOSYSTEM

8. Why do you think this place gathers so much crowd?

_____

_____

_____

9. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY J- QUESTIONNAIRE FOR MANAGING AGENCIES/ MUNICIPAL AUTHORITY/ PLANNING DEPARTMENT / GROUNDWATER DEPARTMENT/ OTHERS

WATER SUPPLY DEPARTMENT

Full Name _____

Department/ Organisation _____

Designation _____ Contact _____

1. What type of department/ agency/ authority/ organisation are you from?*

◯ Government organisation ◯ Private organisation ◯ Non-profit or NGO

◯ Other (Please specify) _____

2. What is your role in the department/ agency/ authority/ organisation?

_____

3. What is the role of your department/ agency/ authority/ organisation in managing the waterbody, if any?

☐ Water quality monitoring ☐ Cleaning/ maintenance ☐ Security

☐ Crowd control ☐ Landscaping/ horticulture ☐ Infrastructure operations

☐ Other (Please specify) _____

4. Is water from this water body being used for municipal supply?

◯ Yes ◯ No

If yes

4.1. How much water is extracted from this water body for supply? _____

4.2. Which areas is the water supplied to? _____

_____

5. Is the water quality of this waterbody measured?

◯ Yes ◯ No

If yes

5.1. What is the quality of water? (as per CPCB drinking quality standards)

◯ Acceptable ◯ Unacceptable

SURVEY J- QUESTIONNAIRE FOR MANAGING AGENCIES/ MUNICIPAL AUTHORITY/ PLANNING DEPARTMENT / GROUNDWATER DEPARTMENT/ OTHERS

6. What is the cost incurred by the municipal authority for supply of water from the Water Treatment Plants in the city?* (specify approx. cost per KL of water supply)

_____

7. Why do you think this water body gathers so much crowd?

_____

_____

_____

8. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY J- QUESTIONNAIRE FOR MANAGING AGENCIES/ MUNICIPAL AUTHORITY/ PLANNING DEPARTMENT / GROUNDWATER DEPARTMENT/ OTHERS

GROUND WATER DEPARTMENT

Full Name _____

Department/ Organisation _____

Designation _____ Contact _____

1. What type of department/ agency/ authority/ organisation are you from?*

◯ Government organisation ◯ Private organisation ◯ Non-profit or NGO

◯ Other (Please specify) _____

2. What is your role in the department/ agency/ authority/ organisation?

_____

3. What is the role of your department/ agency/ authority/ organisation in managing the waterbody, if any?

☐ Water quality monitoring ☐ Cleaning/ maintenance ☐ Security

☐ Crowd control ☐ Landscaping/ horticulture ☐ Infrastructure operations

☐ Other (Please specify) _____

4. How deep is the average groundwater level in the city? (in feet)*

◯ Maximum _____ ◯ Minimum _____ ◯ Average _____

5. Is groundwater extracted in the city?

◯ Yes ◯ No

If yes

5.1. How is the groundwater extracted?

◯ Formally ◯ Informally ◯ Both

5.2. How many borewells are operational in the city?

☐ Municipal borewell _____ ☐ Private borewell _____

☐ Other (Please specify) _____

SURVEY J- QUESTIONNAIRE FOR MANAGING AGENCIES/ MUNICIPAL AUTHORITY/ PLANNING DEPARTMENT / GROUNDWATER DEPARTMENT/ OTHERS

5.3. For what purposes is groundwater primarily used in the city?

_____

_____

6. How deep is the groundwater level around the waterbody?* _____

7. What is the fluctuation in the groundwater level around this waterbody?

◯ Pre-monsoon level _____ (in feet / metre)

◯ Post-monsoon level _____ (in feet / metre)

8. Do you think the groundwater in this area is affected by this waterbody?*

◯ No ◯ Yes (Please explain how) _____

_____

9. What is the approximate cost of digging 1m for groundwater?* _____

10. Why do you think this water body gathers so much crowd?

_____

_____

_____

11. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY J- QUESTIONNAIRE FOR MANAGING AGENCIES/ MUNICIPAL AUTHORITY/ PLANNING DEPARTMENT / GROUNDWATER DEPARTMENT/ OTHERS

FLOOD MANAGEMENT/ STORM WATER MANAGEMENT DEPARTMENT

Full Name _____

Department/ Organisation _____

Designation _____ Contact _____

1. What type of department/ agency/ authority/ organisation are you from?*

◯ Government organisation ◯ Private organisation ◯ Non-profit or NGO

◯ Other (Please specify) _____

2. What is your role in the department/ agency/ authority/ organisation?

_____

3. What is the role of your department/ agency/ authority/ organisation in managing the area around waterbody, if any?

☐ Water quality monitoring ☐ Cleaning/ maintenance ☐ Security

☐ Flood control ☐ Landscaping/ horticulture ☐ Infrastructure operations

☐ Other (Please specify) _____

3. Which months is the city affected by floods/ water logging?

_____

4. Which department is responsible for flood management in the city?

_____

5. Does the area around the water body flood?*

◯ Yes ◯ No

If yes

5.1. How often does this area flood?

◯ Twice or more every year ◯ Once a year

◯ Other (Please specify) _____

SURVEY J- QUESTIONNAIRE FOR MANAGING AGENCIES/ MUNICIPAL AUTHORITY/ PLANNING DEPARTMENT / GROUNDWATER DEPARTMENT/ OTHERS

5.2. Which months does this area usually flood? _____

_____

5.3. When was the last time this area flooded?

◯ This year (2025) ◯ Last year ◯ 2 years back

◯ Other (Please specify) _____

5.4. Flooding in the area happens after how many hours of rainfall? _____

5.5. How long does the water logging last? (in hrs) _____

5.6. What is the level of water logging in this area? (in mm) _____

5.7. What are the impacts of the flooding in this area?

☐ Complete shut down of activities for a few hours ☐ Complete shut down for days

☐ Activities hampered partially for a few hours ☐ Activities hampered partially for days

5.8. Which activities are usually disrupted due to flooding in the area?

☐ General movement ☐ Livelihood

☐ Services (water supply/ sanitation/etc.) ☐ Others (Please specify)

_____

5.9. List the flood management measures taken in this area and its expenditure?*
(eg: pumping, dewatering, flood relief camps, cleaning of drains etc.)

Flood management measures	No. of units	Annual cost incurred

6. How much budget is allotted for flood management in the city? _____

7. How much total expenditure is incurred annually for managing floods? _____

SURVEY J- QUESTIONNAIRE FOR MANAGING AGENCIES/ MUNICIPAL AUTHORITY/ PLANNING DEPARTMENT / GROUNDWATER DEPARTMENT/ OTHERS

8. Why do you think this water body gathers so much crowd?

_____

_____

_____

9. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY K- QUESTIONNAIRE FOR ELECTRICITY SERVICE PROVIDER/ DISCOM

Full Name _____

Department/ Organisation _____

Designation _____ Contact _____

1. What type of department/ agency/ authority/ organisation are you from?*

◯ Government organisation ◯ Private organisation ◯ Non-profit or NGO

◯ Other (Please specify) _____

2. What is your role in the department/ agency/ authority/ organisation?

_____

3. What is the role of your department/ agency/ authority/ organisation in managing the area around waterbody, if any?

☐ Electricity priovision ☐ Cleaning/ maintenance ☐ Security

☐ Flood control ☐ Landscaping/ horticulture ☐ Infrastructure operations

☐ Other (Please specify) _____

4. What is the extent of your service area? _____

5. How many electricity connections are there in this area?* (please mention the number of electricity connections in the area of influence)

☐ Residential connections _____

☐ Commercial connections _____

☐ Other (Please specify) _____

6. How many units of electricity are consumed monthly per household in this area?

_____

7. What are the electricity charges per unit?

_____

SURVEY K- QUESTIONNAIRE FOR ELECTRICITY SERVICE PROVIDER/ DISCOM

8. How much is the average monthly electricity bill in peak summer, for a residential household in this area?*

_____

9. How much is the average monthly electricity bill in peak summer, for a residential household in the city?*

_____

10. Why do you think this water body gathers so much crowd?

_____

_____

_____

11. Would you like to share any additional information about this water body? (like challenges, aspirations, etc.)

_____

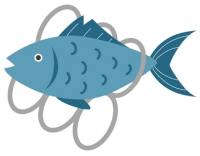
_____

_____

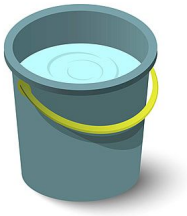
End of Survey

Co-Benefits of
BINDU SAGAR WATER BODY

PROVISIONING



FISH PRODUCTION FROM BINDU SAGAR
XXX kgs annually



WATER CONSUMPTION FROM BINDU SAGAR
XXX ML annually

DISSOLVED OXYGEN FOR BINDU SAGAR
XXX

REGULATING

TEMPERATURE REDUCTION AROUND BINDU SAGAR
XXX degrees

HIGHER GROUND WATER LEVEL AROUND BINDU SAGAR
XXX m

CARBON CAPTURE FROM BINDU SAGAR
XX tonnes annually

CULTURAL

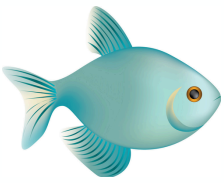
TOURISTS VISITING BINDU SAGAR
XXX annually

EMPLOYMENT GENERATION FROM BINDU SAGAR
XXX people
approx.

HOUSEHOLDS AROUND BINDU SAGAR
XXX number

SUPPORTING

TOTAL TREES AROUND BINDU SAGAR
XXX number



SPECIES OF FISHES IN BINDU SAGAR
XXX number

SPECIES OF BIRDS AROUND BINDU SAGAR
XXX number

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IUCN
Supported by: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, based on a decision of the German Bundestag
IKI International Climate Initiative
National Institute of Urban Affairs
Water & Environment Vertical

Questionnaires for Surveying an URBAN WETLAND

Global EbA Fund
IUCN
Supported by: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, based on a decision of the German Bundestag
IKI INTERNATIONAL CLIMATE INITIATIVE
National Institute of Urban Affairs
WATER & ENVIRONMENT VERTICAL

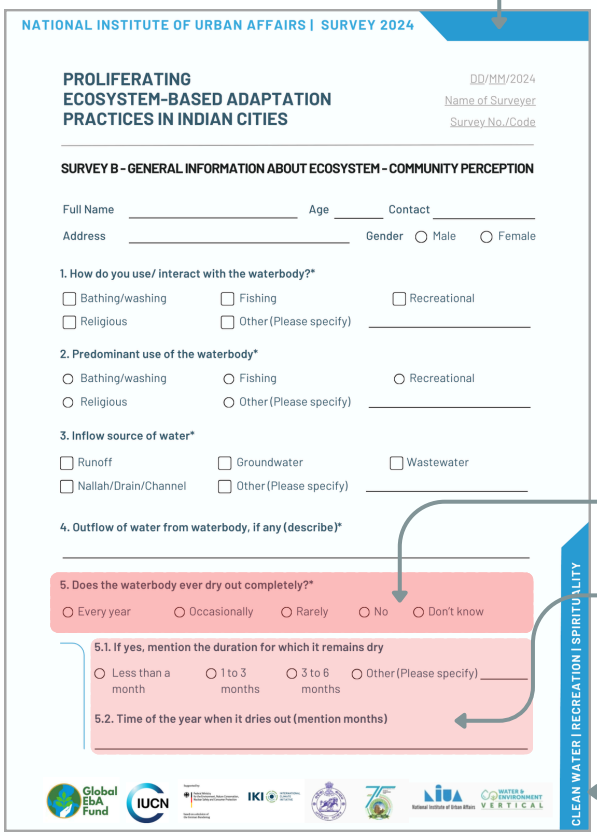
PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

GENERAL INSTRUCTIONS FOR THE SURVEYORS

- Ensure that your name, the date, and the survey number/code are clearly filled out on all forms before beginning the survey.
- All questions marked with an asterisk (*) are mandatory and must be completed.
- Fill out all sub-questions accurately, following the detailed descriptions and instructions provided for each.
- Capture geo-tagged photographs of the ecosystem and stakeholders wherever possible. Always obtain permission before taking photos within private premises or of individuals. Avoid photographing children.
- Record any additional or relevant information shared by respondents directly on the survey formats for context.
- Conduct surveys at different times of the day to capture temporal variations in responses.
- If necessary, rephrase questions for clarity or to make them more understandable for respondents, ensuring the original intent is preserved.
- Inform respondents that the data collected will be used solely for research purposes under an ongoing project and will not be shared publicly or with unauthorised parties.
- Familiarise yourself with the survey format, objectives, and questions in advance to ensure a smooth and professional interaction with respondents.
- Approach respondents respectfully and adapt your communication style to suit the local culture and context.
- Be mindful of the respondent's time. Conduct the survey efficiently without compromising on the quality of data collected.
- If you encounter any challenges or issues during the survey, document them and report them promptly to the project coordinator.
- Follow all other instructions given by the project/ survey coordinator.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

UNDERSTAND THE QUESTIONNAIRES


NATIONAL INSTITUTE OF URBAN AFFAIRS | SURVEY 2024

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2024
Name of Surveyer
Survey No./Code

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - COMMUNITY PERCEPTION

Full Name _____ Age _____ Contact _____
Address _____ Gender ○ Male ○ Female

1. How do you use/ interact with the waterbody?*
☐ Bathing/washing ☐ Fishing ☐ Recreational
☐ Religious ☐ Other (Please specify) _____

2. Predominant use of the waterbody*
○ Bathing/washing ○ Fishing ○ Recreational
○ Religious ○ Other (Please specify) _____

3. Inflow source of water*
☐ Runoff ☐ Groundwater ☐ Wastewater
☐ Nallah/Drain/Channel ☐ Other (Please specify) _____

4. Outflow of water from waterbody, if any (describe)*
_____

5. Does the waterbody ever dry out completely?*
○ Every year ○ Occasionally ○ Rarely ○ No ○ Don't know

5.1. If yes, mention the duration for which it remains dry
○ Less than a month ○ 1 to 3 months ○ 3 to 6 months ○ Other (Please specify) _____

5.2. Time of the year when it dries out (mention months)
_____

CLEAN WATER | RECREATION | SPIRITUALITY

LEGEND FOR SURVEY RESPONDENTS

- Survey instructions
- To be filled by the surveyor seperately
- To be filled by surveyor from self-observation
- Survey for anyone around the ecosystem
- Survey for specific beneficiaries
- Survey for agencies/ authorities

MAIN QUESTIONS

SUB-QUESTIONS TO BE FILLED, BASED ON RESPONSE OF THE MAIN QUESTION

TYPE OF ECOSYSTEM SERVICE

QUESTION TYPES:

☐ Multiple selection allowed

○ Single selection only

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

BRIEF DESCRIPTION OF THE ASSIGNMENT

BACKGROUND & CONTEXT

The National Institute of Urban Affairs (NIUA), under the Ministry of Housing and Urban Affairs (MoHUA), Government of India, is implementing a research project titled "Proliferating Ecosystem-based Adaptation in Indian Cities" (EPIC). The primary objective of this project is to promote Ecosystem-based Adaptation (EbA) in urban areas across India, which are increasingly vulnerable to climate-induced risks such as water insecurity, heatwaves, urban heat island effects, and urban flooding. These challenges significantly impact public health and the urban economy. Adopting EbA practices offers a sustainable approach to mitigate these risks.

One of the key deliverables of the EPIC project is to demonstrate the valuation of three ecosystems in Bhubaneswar, highlighting their diverse ecosystem services. Attaching economic value to these ecosystems will help strengthen the case for their protection and sustainable management.

The project team at NIUA has conducted reconnaissance surveys and identified the following three urban ecosystems in Bhubaneswar for detailed evaluation:

1. Urban Water Body: Bindu Sagar
2. Urban Green Space: Jayadev Vatika
3. Urban Wetland: along Gangua Nala

PURPOSE OF THIS ASSIGNMENT

The primary purpose of this assignment is to conduct comprehensive primary surveys to identify the direct and indirect ecosystem services provided by the three selected urban ecosystems in Bhubaneswar. The goal is to quantify these services and estimate their economic values, thereby emphasising the importance of these ecosystems in the city's sustainability and resilience planning.

The project team has already developed a detailed methodology and survey questionnaires to guide the data collection process. Before the assignment begins, the team will provide the necessary orientation and detailed survey tools to ensure accurate and efficient data collection.

This assignment plays a crucial role in building a strong evidence base for the protection and conservation of urban ecosystems through ecosystem-based adaptation practices.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

BRIEF DESCRIPTION OF THE ASSIGNMENT

The surveying team is expected to -

a) Undertake physical surveys of three ecosystems in Bhubaneswar - The surveys will cover a tentative sample size of 20-30 respondents for the 6 to 8 ecosystem services at three ecosystems. The data collection will be for a period of 3 weeks approx (including weekends) at each ecosystem. Approximately 700-800 survey questionnaires (30 respondents x 8 services forms x 3 ecosystems) are required to be filled based on primary surveys at three ecosystems.

The expected deliverables under this activity are cleaned excel files of data collected from the primary surveys, and a preliminary analysis of the data as per the methodology shared by NIUA.

b) Organise Structured Focused Group Discussions (FGDs) – Total 5 FGDs with distinct stakeholder groups, who are depended on these ecosystems for their subsistence, livelihood, recreation, etc. Each FGD, involving at least 10 local people from a particular stakeholder group, and with representation from all genders, and age will be conducted in consultation with the NIUA officials.

The expected deliverables under this activity will include a complete documentation of all the FGDs in the form of a brief report, video recordings/ pictures of the sessions, and key findings/highlights based on the FGDs.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

SURVEY DETAILS

Name of Surveyor _____

Gender ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

Details of surveys conducted

S. No.	Survey Respondents	Number of surveys conducted
Ecosystem: Urban water body (Bindu Sagar)		
1	Fishermen	
2	Visitors	
3	Hawkers	
4	Shop Owners	
5	Residents	
6	Water users	
7	Authorities	
8	Any user	
Ecosystem: Urban green (Jayadev Vatika)		
1	Visitors	
2	Kiosks	
3	Residents	
4	Authorities	
5	Any user	
Ecosystem: Urban wetland (along Gangua Nala)		
1	Residents	
2	Authorities	
3	Any user	
	TOTAL SURVEYS CONDUCTED	

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

SURVEY DETAILS

BACKGROUND OF THE SURVEYOR

About yourself

Your experience

Your educational background

Alternatively you can attach your latest CV

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Click geo-tagged photos of the wetland*

2. Name of the ecosystem*

◯ Bindu Sagar water body ◯ Udaygiri-Khandagiri forest ◯ Wetland (along Gangua)

◯ Other (Please specify) _____

3. Location (you may use any mobile application to find these values)

◯ Latitude _____ ◯ Longitude _____

4. Ward number _____

5. Character of the wetland*

◯ Shallow depression ◯ Deep depression

6. Character of wetland periphery*

☐ Natural (soft edge with plantation / shrubbery) ☐ Natural (soft edge with barren soil)

☐ Concretised ☐ Natural embankments

7. Visual/ observation-based condition of the wetland (choose everything applicable)*

☐ Vegetation cover ☐ Water logging ☐ Encroachment

☐ Other observations, if any

_____

_____

_____

_____

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SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

8. Accessibility to the wetland

- ☐ Accessible from all sides, with no entry gates or boundaries
- ☐ Accessible from a few points, with a boundary wall/ barricading/ entry gates
- ☐ Accessible only to a particular group, like members of an institution or government authorities

9. How are people seen using this wetland?*

- ☐ Recreational
- ☐ Parking
- ☐ Waste dumping
- ☐ Tourists/ visitors
- ☐ Educational purposes
- ☐ Walk/ running/ jogging
- ☐ Grazing/ waddling
- ☐ Open/ vacant
- ☐ Other (Please specify)

_____

_____

10. Designated use of this wetland* (if any information board/ display board is shown)

- ○ Private property
- ○ Institutional land
- ○ Recreational land
- ○ Other (Please specify) _____

11. Predominant land use of the immediate surrounding (adjacent land) of the wetland*

- ☐ Residential
- ☐ Commercial
- ☐ Industrial
- ☐ Mixed use
- ☐ Other (Please specify) _____

12. Predominant land use of the surrounding neighbourhood*

- ☐ Residential
- ☐ Commercial
- ☐ Industrial
- ☐ Mixed use
- ☐ Other (Please specify) _____

13. Is there any waste disposal in and around the wetland?*

- ○ Yes
- ○ No

If yes

13.1. What type of waste is disposed?

- ☐ Plastic waste
- ☐ Industrial
- ☐ Religious offerings
- ☐ Domestic waste
- ☐ Medical waste
- ☐ Other (Please specify) _____

_____

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

14. Are there any other open/ vacant spaces around the wetland?

◯ Yes ◯ No

If yes

14.1. Mention the number, name, type and location of the area

_____

_____

_____

_____

15. Specify the activities ongoing in and around this wetland

_____

_____

_____

_____

16. Is water from the surrounding areas being discharged into this wetland?*

◯ Yes ◯ No

If yes

16.1. Where is the water coming from?

☐ Surface run-off ☐ Industries ☐ Residential

☐ sewage ☐ Other (Please specify) _____

16.2. Location of inlet points and type of water inflow (industrial, domestic, sewage, etc)

Latitude, Longitude _____ Inflow type _____

Latitude, Longitude _____ Inflow type _____

Latitude, Longitude _____ Inflow type _____

17. Is any treatment being done to the water in the wetland?

☐ Primary ☐ Secondary ☐ Tertiary

☐ Periodic cleaning for algae and solid waste ☐ Other (Please specify) _____

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

18. Are there any well known parks/gardens/recreational/community spaces around the wetland?

○ Yes ○ No ○ Don't know

If yes

18.1. Mention the number, name, type and location of the facility

_____

_____

_____

19. What type of biodiversity species are seen in and around this wetland (flora, avifauna, terrestrial fauna, aquatic fauna)**?**

_____

_____

_____

20. Have you noticed any unique species in and around this wetland?

_____

_____

_____

21. Specific observations, if any

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - COMMUNITY PERCEPTION

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Where do you stay?

◯ Around the wetland ◯ Nearby (up 5 km) ◯ Far away (more than 5 km)

2. What are you doing at this wetland?

◯ Walk/ Run ◯ Business/ Work ◯ Other (Please specify)

_____

3. Who owns this wetland?

◯ Government ◯ Private agency ◯ Private individual

◯ Other (Please specify) _____

If govt

3.1. Name the government department/ agency which owns this land?

_____

4. What is the designated use of this wetland?

◯ Don't know ◯ Residential ◯ Institutional

◯ Recreational ◯ Other (Please specify) _____

5. What is the predominant (actual) use of this wetland?

☐ Sitting/ Play area ☐ Parking ☐ Waste dumping

☐ Grazing/ waddling ☐ Horticulture ☐ Other (Please specify)

_____

6. In your knowledge, from how far does the water get collected in this wetland?

◯ Upto 100m around ◯ 100m - 1 km around ◯ 1km - 5 km around

◯ Further than 5km around ◯ Don't know

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - COMMUNITY PERCEPTION

7. How often does is this wetland filled with water?*

○ Always ○ Occasionally ○ Rarely ○ Don't know

8. Which months of the year is this wetland usually filled with water?*

☐ January ☐ February ☐ March ☐ April
☐ May ☐ June ☐ July ☐ August
☐ September ☐ October ☐ November ☐ December

9. What is the duration for which this wetland is filled with water?*

○ Upto 1 week ○ More than a week ○ More than a month ○ Other (Please specify) _____

10. What is the approx. depth of water in this area?*

○ Less than 1 inch ○ 1-2 inches ○ 2-4 inches ○ More than 4 inches

11. When was the last time this wetland filled with water?

○ This year ○ Last year ○ 2-5 years ago
○ More than 5 years ago ○ Currently ○ Don't know

12. Does the area around this wetland get flooded?

○ Yes ○ No ○ Don't know

If yes

12.1. How often does it flood?

○ Always flooded ○ Occasionally ○ Rarely

12.2. How does it impact the nearby services?

○ All services impacted ○ Minor closures ○ No impact

12.3. List out what services are impacted and how?

_____

13. Which biodiversity species have you observed in and around this wetland (flora, aquatic fauna, avifauna, terrestrial fauna)**?***

_____

_____

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - COMMUNITY PERCEPTION

14. Have you noticed any unique species in and around this wetland?*

_____

_____

15. Are there any other open/ vacant areas around this wetland?

◯ Yes ◯ No ◯ Don't know

16. In your opinion, how has this wetland changed over the past 5 years?

◯ Reduced in size ◯ Increased in size ◯ Don't know

17. In your opinion, has this wetland reduced the flooding in the surrounding areas?

◯ Yes ◯ No ◯ Don't know

18. Would you like to share any additional information about this wetland? (challenges like cleanliness or mosquito breeding, aspirations like public spaces or recreational needs)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY C - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE WETLAND

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. What type of establishment is it?*

◯ Residential ◯ Commercial ◯ Institutional

◯ Mixed ◯ Other (Please specify) _____

If residential

1.1. How many people are there in your household? _____

◯ 1 ◯ 2 ◯ 3 ◯ Other (Please specify) _____

1.2. What is the type of residential establishment?

◯ Unauthorised/ Informal ◯ Private builder floors ◯ Apartment complex

◯ Government quarters ◯ Other (Please specify) _____

1.3. What is the size of your house?*

◯ 1 BHK ◯ 2 BHK ◯ 3 BHK

◯ Other (Please specify) _____

1.4. How long have you been living here?

◯ <5yrs ◯ 5-10yrs ◯ >10yrs

1.5. Is this property ◯ Owned ◯ Rented

1.6. How many floors does this building have ?

☐ Single storey ☐ 2-4 floors ☐ More than 4 floors

1.7. How old is this building ?

☐ 0-5 years old ☐ 5-10 years old ☐ More than 10 years old

2. Who owns this wetland?

◯ Government ◯ Private agency ◯ Private individual

◯ Other (Please specify) _____

SURVEY C - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE MARSH LAND

If govt

2.1. Name the government department/ agency which owns this wetland?

_____

3. What is the designated use of this wetland?

◯ Residential ◯ Recreational ◯ Institutional

◯ Other (Please specify) _____

4. What is the predominant (actual) use of this wetland?

☐ Sitting/ Play area ☐ Parking ☐ Waste dumping

☐ Grazing/ waddling ☐ Horticulture ☐ Other (Please specify)

_____

5. In your knowledge, from how far does the water get collected in this wetland?

☐ Upto 100m around ☐ 100m - 1 km around ☐ 1km - 5 km around

☐ Further than 5km around ☐ Don't know

6. How often does is this wetland filled with water?*

◯ Always ◯ Occasionally ◯ Rarely ◯ Don't know

7. Which months of the year is this wetland usually filled with water?*

☐ January ☐ February ☐ March ☐ April

☐ May ☐ June ☐ July ☐ August

☐ September ☐ October ☐ November ☐ December

8. For what duration is this wetland filled with water?*

◯ Less than a week ◯ 1 week to 2 weeks ◯ 2 weeks to 1 month ◯ Other (Please specify) _____

9. What is the approx. depth of water in this wetland?*

◯ Less than 1 inch ◯ 1-2 inches ◯ 2-4 inches ◯ More than 4 inches

10. When was the last time this wetland filled with water?

◯ This year ◯ Last year ◯ 2-5 years ago

◯ More than 5 years ago ◯ Currently ◯ Don't know

SURVEY C - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE MARSH LAND

11. Does the area around this wetland flood?

○ Yes ○ No ○ Don't know

If yes

11.1. How often does the area around this wetland flood?

○ Always flooded ○ Occasionally ○ Rarely ○ Don't know

11.2. How does it impact the nearby services?

○ All services impacted ○ Minor closures ○ No impact

11.3. List the extent of damage caused by flooding, and the cost for repairs*
(eg: structural damage to the building, plastering and paint cost, deterioration in the value of affected infrastructure, interruption/ contamination of water supply, loss of public health, livestock loss, etc.)

Damage caused by flooding	Estimate cost for repairs (INR)

12. Are there any other open/ vacant areas around this wetland?

○ Yes ○ No ○ Don't know

13. In your opinion, has this wetland reduced the flooding in the surrounding areas?*

○ Yes ○ No ○ Don't know

14. Where do you get your water supply from?

☐ Municipal piped connection ☐ Municipal tankers ☐ Private tankers
☐ Community borewell/ handpump ☐ Private borewell/ handpump
☐ Other (Please specify) _____

If municipal piped connection

14.1. How long is the water supply?

○ 24 hours
○ Intermittent (specify interval and frequency, eg twice a day for 2 hours)

_____

SURVEY C - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE MARSH LAND

15. What is the water storage capacity of your household?

◯ Less then 100 L ◯ 100 - 500 L ◯ More than 500 L

16. How many times do you refill your water tank daily?

◯ 1 ◯ 2 ◯ 3 ◯ Other (Please specify) _____

17. Do you pay any water bill?

◯ No ◯ Yes, specify annual bill _____

18. Do you have a borewell/ dugwell/ handpump in your house?

◯ Yes ◯ No

If yes

18.1. For what purpose do you use water from the borewell/ dugwell/ handpump?

☐ Drinking/cooking ☐ Washing/ bathing ☐ Toilet

☐ Other (Please specify) _____

18.2. How deep is the water level? (in feet) _____

18.3. How deep did you have to dig for water? (in feet)* _____

18.4. When did you construct the borewell/ dugwell/ handpump?

◯ Past one year ◯ 1 - 5 years ◯ 5 - 10 years

◯ 10+ years (Please specify) _____

18.5. How much did it cost you for digging? _____

18.6. Why did you construct the borewell/ dugwell/ handpump?

☐ Intermittent municipal supply ☐ Poor quality of municipal supply ☐ Unaffordable water bills

☐ Other (Please specify) _____

19. Do you think the groundwater in this area is affected by this wetland?*

◯ Yes ◯ No ◯ Don't know

If yes

19.1. Explain how _____

20. How does the groundwater level in this area vary from other areas? *

◯ Equal to other areas ◯ Lower ◯ Higher ◯ Don't know

SURVEY C - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE MARSH LAND

21. Do you use air conditioning in your home?*

◯ Yes ◯ No

If yes

21.1. How many ACs do you have?*

◯ 1 ◯ 2 ◯ 3

◯ Other (Please specify) _____

21.2. How many months in a year do you use the AC?* _____

21.3. How many hours in a day do you use each AC in peak summer?*

◯ Less than 2 hours ◯ 2-4 hours ◯ 4-6 hours

◯ 6-8 hours ◯ 8-10 hours ◯ more than 10 hours

22. Do you use air coolers in your home?*

◯ Yes ◯ No

If yes

22.1. How many coolers do you have?*

◯ 1 ◯ 2 ◯ 3

◯ Other (Please specify) _____

22.2. How many months in a year do you use the coolers?* _____

22.3. How many hours in a day do you use each cooler in peak summer?*

◯ Less than 2 hours ◯ 2-4 hours ◯ 4-6 hours

◯ 6-8 hours ◯ 8-10 hours ◯ more than 10 hours

23. How much is your approx. monthly electricity bill in peak summer?

◯ upto Rs. 1000 ◯ Rs. 1000 - 2000 ◯ Rs. 2000 - 3000

◯ Other (Please specify) _____

24. Do you think the area around this wetland is cooler than other areas in this neighborhood?*

◯ Yes ◯ No

25. What advantages or benefits do you experience from this wetland?* (e.g., clean air, flood control, etc.)

_____

_____

_____

SURVEY C - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE MARSH LAND

26. Over the years, how has the biodiversity of this wetland changed and why? (example improved/ degraded)

_____

_____

27. Which biodiversity species have you observed in and around this wetland (flora, aquatic fauna, avifauna, terrestrial fauna)?*

_____

_____

28. Have you noticed any unique species in and around this wetland?*

_____

_____

29. In your opinion, is this wetland properly maintained?

◯ Yes ◯ No ◯ Can't say

30. If the biodiversity habitat of this wetland is lost, will it affect you?*

◯ Yes ◯ No ◯ Can't say

If yes

30.1. Explain how it will affect you?

_____

_____

_____

Introduce the conservation challenge of the wetland to the responder

- Critical Ecosystem Service Threatened - Highlight the importance of the wetland in providing a habitat for diverse species.
- Declining Health of the wetland - Describe the current state of the wetland, in terms of habitat degradation.
- Urgent Need for Action - Emphasise that if proactive measures are not taken now, the ecosystem services provided by the wetland will be severely diminished or lost altogether, impacting both human well-being and biodiversity.
- Consequences of inaction - Explain that without intervention, the wetland's ability to provide essential services will be compromised. Discuss the cascading effects of the wetland's decline on surrounding ecosystems, including loss of biodiversity, disruption of food webs, and increased vulnerability to natural disasters.
- In order to address the threats to this wetland there is a need to mobilise funds.

With this background, ask the following questions

SURVEY C - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE MARSH LAND

31. Are you willing to support in protecting this wetland?*

○ Yes ○ No

If yes

31.1. In what way would you be willing to contribute to the wetland conservation efforts? (Awareness initiatives, organising cleaning drives, nature sensitisation, walks, conduct talks/ community interaction sessions etc.)

_____

_____

_____

31.2. How many hours per year are you willing to dedicate to conservation activities in and around this wetland?* _____

32. Are you willing to pay to protect this wetland and its habitat?*

○ Yes ○ No

If yes

32.1. Approx. how much amount are you willing to pay annually? (in INR)*

_____

33. In your opinion, what type of institution should manage the wetland to conserve the biodiversity habitat?

☐ Government body ☐ Private entity ☐ Academic institute

☐ Institute of national prominence ☐ NGO

☐ Other (Please specify) _____

34. Do you have any suggestions / issues with respect to the wetland and conservation of its biodiversity habitat?

_____

_____

_____

35. Would you like to share any additional information about this wetland? (like challenges, aspirations, etc.)

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY D - FOR BENEFICIARIES - CATTLE GRAZERS

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Is this your land?

◯ Yes ◯ No

If no

1.1. Whose land is it? _____

2. How often do you come here?*

◯ Everyday ◯ Weekly ◯ Monthly

◯ Other (Please specify) _____

3. Since how long have you been coming here for grazing?

◯ Less than 1 year ◯ 1 to 5 years ◯ 5+ years

◯ Second generation ◯ Other (Please specify) _____

4. How many cows/ buffaloes do you have? _____

5. How many cows/ buffaloes do you get here for grazing? _____

6. Do you take your cattle to any other area for grazing? If yes, where?

_____

_____

7. In your knowledge, how many other people come here for grazing in a day?* _____

8. How many hours does your cattle spend grazing here in a day? _____

9. What time of the day do you usually come here for cattle grazing?

From _____ **To** _____

10. Where are you coming from? (locality name) _____

SURVEY D - FOR BENEFICIARIES - CATTLE GRAZERS

11. Do you use these cattle for milking?

○ Yes ○ No

If yes

11.1. What do you use the milk for? _____

☐ Self consumption ☐ Sale

11.2. Approx. how much milk do you get in a month for use?

☐ Self consumption _____

☐ Sale _____

11.3. What is your average monthly profit from sale of milk?* _____

12. Do you earn from these cattle in any other form?*

○ Yes ○ No

If yes

12.1. How else do you earn? _____

12.2. Approx how much do you earn in a month?* _____

13. Do you think this wetland benefits your business?*

○ Yes ○ No

14. Apart from grazing your cattle, do you also purchase fodder?

○ Yes ○ No

If yes

14.1. How much fodder do you purchase for each cow or buffalo in a month?

_____

14.2. Approx how much does the fodder cost you?* _____

15. Would you like to share any additional information about this wetland? (like challenges, aspirations, etc.)

_____

_____

_____

_____

End of Survey

Questionnaires for Surveying an URBAN GREEN

Global EbA Fund
IUCN
Supported by: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
based on a decision of the German Bundestag
IKI INTERNATIONAL CLIMATE INITIATIVE
National Institute of Urban Affairs
WATER & ENVIRONMENT VERTICAL

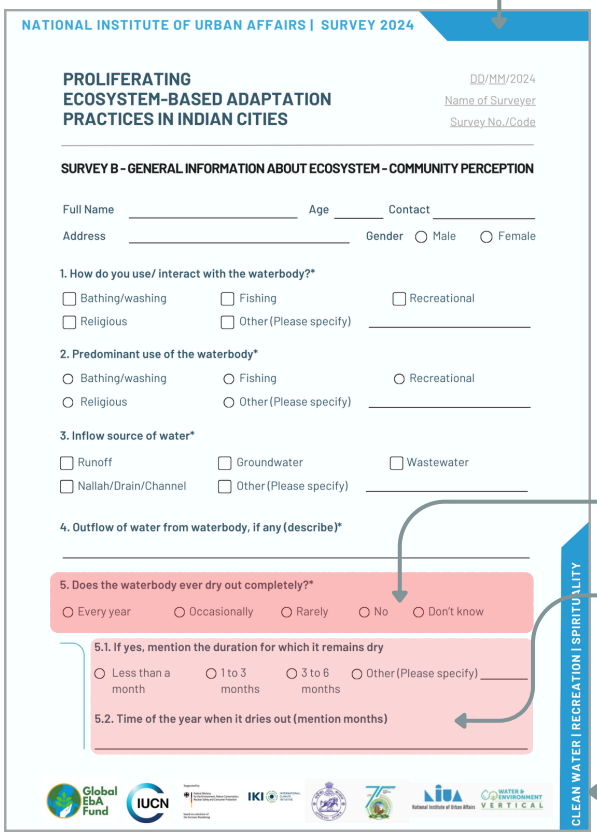
PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

GENERAL INSTRUCTIONS FOR THE SURVEYORS

- Ensure that your name, the date, and the survey number/code are clearly filled out on all forms before beginning the survey.
- All questions marked with an asterisk (*) are mandatory and must be completed.
- Fill out all sub-questions accurately, following the detailed descriptions and instructions provided for each.
- Capture geo-tagged photographs of the ecosystem and stakeholders wherever possible. Always obtain permission before taking photos within private premises or of individuals. Avoid photographing children.
- Record any additional or relevant information shared by respondents directly on the survey formats for context.
- Conduct surveys at different times of the day to capture temporal variations in responses.
- If necessary, rephrase questions for clarity or to make them more understandable for respondents, ensuring the original intent is preserved.
- Inform respondents that the data collected will be used solely for research purposes under an ongoing project and will not be shared publicly or with unauthorised parties.
- Familiarise yourself with the survey format, objectives, and questions in advance to ensure a smooth and professional interaction with respondents.
- Approach respondents respectfully and adapt your communication style to suit the local culture and context.
- Be mindful of the respondent's time. Conduct the survey efficiently without compromising on the quality of data collected.
- If you encounter any challenges or issues during the survey, document them and report them promptly to the project coordinator.
- Follow all other instructions given by the project/ survey coordinator.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

UNDERSTAND THE QUESTIONNAIRES


NATIONAL INSTITUTE OF URBAN AFFAIRS | SURVEY 2024

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2024
Name of Surveyer
Survey No./Code

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - COMMUNITY PERCEPTION

Full Name _____ Age _____ Contact _____
Address _____ Gender ○ Male ○ Female

1. How do you use/ interact with the waterbody?*
☐ Bathing/washing ☐ Fishing ☐ Recreational
☐ Religious ☐ Other (Please specify) _____

2. Predominant use of the waterbody*
○ Bathing/washing ○ Fishing ○ Recreational
○ Religious ○ Other (Please specify) _____

3. Inflow source of water*
☐ Runoff ☐ Groundwater ☐ Wastewater
☐ Nallah/Drain/Channel ☐ Other (Please specify) _____

4. Outflow of water from waterbody, if any (describe)*
_____

5. Does the waterbody ever dry out completely?*
○ Every year ○ Occasionally ○ Rarely ○ No ○ Don't know

5.1. If yes, mention the duration for which it remains dry
○ Less than a month ○ 1 to 3 months ○ 3 to 6 months ○ Other (Please specify) _____

5.2. Time of the year when it dries out (mention months)
_____

CLEAN WATER | RECREATION | SPIRITUALITY

LEGEND FOR SURVEY RESPONDENTS

- Survey instructions
- To be filled by the surveyor seperately
- To be filled by surveyor from self-observation
- Survey for anyone around the ecosystem
- Survey for specific beneficiaries
- Survey for agencies/ authorities

MAIN QUESTIONS

SUB-QUESTIONS TO BE FILLED, BASED ON RESPONSE OF THE MAIN QUESTION

TYPE OF ECOSYSTEM SERVICE

QUESTION TYPES:

☐ Multiple selection allowed

○ Single selection only

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

BRIEF DESCRIPTION OF THE ASSIGNMENT

BACKGROUND & CONTEXT

The National Institute of Urban Affairs (NIUA), under the Ministry of Housing and Urban Affairs (MoHUA), Government of India, is implementing a research project titled "Proliferating Ecosystem-based Adaptation in Indian Cities" (EPIC). The primary objective of this project is to promote Ecosystem-based Adaptation (EbA) in urban areas across India, which are increasingly vulnerable to climate-induced risks such as water insecurity, heatwaves, urban heat island effects, and urban flooding. These challenges significantly impact public health and the urban economy. Adopting EbA practices offers a sustainable approach to mitigate these risks.

One of the key deliverables of the EPIC project is to demonstrate the valuation of three ecosystems in Bhubaneswar, highlighting their diverse ecosystem services. Attaching economic value to these ecosystems will help strengthen the case for their protection and sustainable management.

The project team at NIUA has conducted reconnaissance surveys and identified the following three urban ecosystems in Bhubaneswar for detailed evaluation:

1. Urban Water Body: Bindu Sagar
2. Urban Green Space: Jayadev Vatika
3. Urban Marsh

PURPOSE OF THIS ASSIGNMENT

The primary purpose of this assignment is to conduct comprehensive primary surveys to identify the direct and indirect ecosystem services provided by the three selected urban ecosystems in Bhubaneswar. The goal is to quantify these services and estimate their economic values, thereby emphasising the importance of these ecosystems in the city's sustainability and resilience planning.

The project team has already developed a detailed methodology and survey questionnaires to guide the data collection process. Before the assignment begins, the team will provide the necessary orientation and detailed survey tools to ensure accurate and efficient data collection.

This assignment plays a crucial role in building a strong evidence base for the protection and conservation of urban ecosystems through ecosystem-based adaptation practices.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

BRIEF DESCRIPTION OF THE ASSIGNMENT

The surveying team is expected to -

a) Undertake physical surveys of three ecosystems in Bhubaneswar - The surveys will cover a tentative sample size of 20-30 respondents for the 6 to 8 ecosystem services at three ecosystems. The data collection will be for a period of 3 weeks approx (including weekends) at each ecosystem. Approximately 700-800 survey questionnaires (30 respondents x 8 services forms x 3 ecosystems) are required to be filled based on primary surveys at three ecosystems.

The expected deliverables under this activity are cleaned excel files of data collected from the primary surveys, and a preliminary analysis of the data as per the methodology shared by NIUA.

b) Organise Structured Focused Group Discussions (FGDs) – Total 5 FGDs with distinct stakeholder groups, who are depended on these ecosystems for their subsistence, livelihood, recreation, etc. Each FGD, involving at least 10 local people from a particular stakeholder group, and with representation from all genders, and age will be conducted in consultation with the NIUA officials.

The expected deliverables under this activity will include a complete documentation of all the FGDs in the form of a brief report, video recordings/ pictures of the sessions, and key findings/highlights based on the FGDs.

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

SURVEY DETAILS

Name of Surveyor _____

Gender ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

Details of surveys conducted

S. No.	Survey Respondents	Number of surveys conducted
Ecosystem: Urban water body (Bindu Sagar)		
1	Fishermen	
2	Visitors	
3	Hawkers	
4	Shop Owners	
5	Residents	
6	Water users	
7	Authorities	
8	Any user	
Ecosystem: Urban green (Jayadev Vatika)		
1	Visitors	
2	Kiosks	
3	Residents	
4	Authorities	
5	Any user	
Ecosystem: Urban marsh		
1	Residents	
2	Authorities	
3	Any user	
	TOTAL SURVEYS CONDUCTED	

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

SURVEY DETAILS

BACKGROUND OF THE SURVEYOR

About yourself

Your experience

Your educational background

Alternatively you can attach your latest CV

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. Click a geo-tagged photo of the urban green*

2. Name of the ecosystem*

◯ Bindu Sagar water body ◯ Jayadev Vatika ◯ Marsh along Drain 7

◯ Other (Please specify) _____

3. Location (you may use any mobile application to find these values)

◯ Latitude _____ ◯ Longitude _____

4. Ward number _____

5. Type of urban green*

◯ Urban Forest ◯ Urban park/ garden ◯ Playground ◯ Vacant land

◯ Other (Please specify) _____

6. Accessibility to the urban green

☐ Accessible from all sides, with no entry gates or boundaries

☐ Accessible from a few points, with a boundary wall/ barricading/ entry gates

☐ Accessible only to a particular group, like members of an institution or government authorities

7. Major land uses adjacent to the urban green and its buffer*

☐ Residential ☐ Commercial ☐ Recreational

☐ Mixed use ☐ Industrial ☐ Public-Semi Public (Religious)

☐ Other (Please specify) _____

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

8. Major land uses of the surrounding neighbourhood*

- ☐ Residential
- ☐ Commercial
- ☐ Recreational
- ☐ Mixed use
- ☐ Industrial
- ☐ Public-Semi Public (Religious)
- ☐ Other (Please specify) _____

9. Is there any waste disposal in and around this urban green?

- ○ Yes
- ○ No

If yes

9.1. What type of waste is disposed?

- ☐ Plastic waste
- ☐ Religious offerings
- ☐ Domestic waste dumping
- ☐ Industrial
- ☐ Other (Please specify) _____

10. How are people seen using this urban green?*

- ☐ Religious
- ☐ Recreational
- ☐ Tourists/ visitors
- ☐ Educational purposes
- ☐ Work/ business
- ☐ Picnic
- ☐ Walk/ running/ jogging
- ☐ Staff/ employees
- ☐ Other (Please specify) _____

11. Specify the activities ongoing in this urban green

_____

_____

_____

12. On an average, how many people are seen visiting this urban green in a day?*

On a weekday _____ On a weekend _____

13. Is this urban green seen being used for picnic?*

- ○ Yes
- ○ No
- ○ Don't know

If yes

13.1. How many groups are seen visiting this urban green for picnic everyday? _____

13.2. On an average, what is the duration of such picnics? _____

13.3. What is the average size of such groups?

- ○ 2-5 people
- ○ 5-10 people
- ○ More than 10 people

SURVEY A - INTERVIEW SCHEDULE (to be filled by the surveyor from observation)

14. Are there any kiosks in the area?

◯ Yes ◯ No ◯ Don't know

If yes

14.1. How many and what type of products do they sell? _____

_____

_____

15. Are there any other well known urban greens around this area?

◯ Yes ◯ No ◯ Don't know

If yes

15.1. Mention the number, name, type and location of the facility

_____

_____

_____

_____

16. What type of biodiversity species are seen in this urban green (flora, avifauna, terrestrial fauna, aquatic fauna)?

_____

_____

_____

17. Have you noticed any unique species in this urban green?

_____

_____

18. Is there any entry ticket for this urban green?

◯ Yes ◯ No ◯ Don't know

If yes

18.1. How much is the entry ticket for Indian nationals? Adult _____ **Child** _____

18.2. How much is the entry ticket for foreign nationals? Adult _____ **Child** _____

19. Specific observations, if any

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - INDIVIDUAL PERCEPTION

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. How do you use/ interact with this urban green?

☐ Work/ business ☐ Sitting/ Play area ☐ Grazing/ waddling

☐ Other (Please specify) _____

2. What are the major uses of this urban green?

☐ Educational ☐ Recreational ☐ Tourism

☐ Other (Please specify) _____

3. What is the major land use of the buildings adjacent to this urban green?

☐ Residential ☐ Commercial ☐ Recreational

☐ Mixed use ☐ Industrial ☐ Public-Semi Public (Religious)

☐ Other (Please specify) _____

4. What is the major land use of the surrounding neighbourhood?

☐ Residential ☐ Commercial ☐ Recreational

☐ Mixed use ☐ Industrial ☐ Public-Semi Public (Religious)

☐ Other (Please specify) _____

5. Which agency manages this urban green (Municipal Corporation/ Forest Department/ private agencies/ any other)? _____

6. In your knowledge, approx. how many people visit this urban green daily?* _____

7. Where are you coming from?

☐ Local / neighbourhood ☐ Within the city ☐ Within the state

☐ Within the country ☐ International

SURVEY B - GENERAL INFORMATION ABOUT ECOSYSTEM - INDIVIDUAL PERCEPTION

8. Is there any entry ticket for this urban green?

◯ Yes ◯ No ◯ Don't know

If yes

8.1. How much is the entry ticket for Indian nationals? Adult _____ **Child** _____

8.2. How much is the entry ticket for foreign nationals? Adult _____ **Child** _____

9. How many times have you visited this urban green?*

◯ Once ◯ 2-5 ◯ 5-10

◯ 10-20 ◯ More than 20

10. In your knowledge, are there any other well known urban greens around this green space?

◯ Yes ◯ No ◯ Don't know

11. How did you travel to this urban green?

☐ Walk ☐ Cycle ☐ E-rickshaw

☐ Bus ☐ 2 wheeler ☐ 4 wheeler

☐ Auto ☐ Others (Please specify) _____

12. Why do you think this place gathers so much crowd?

_____

_____

_____

13. Describe any prominent/ special features associated with this urban green

_____

_____

_____

14. Would you like to share any additional information about this urban green? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY C - FOR BENEFICIARIES - VISITORS

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. What is your educational background?

◯ Upto 5th Grade ◯ Primary school ◯ Secondary school

◯ Higher secondary school ◯ Graduate ◯ Post graduate & above

2. How much do you earn annually (INR)?

◯ N/A ◯ upto 1 Lakh ◯ 1 Lakh to 5 Lakh

◯ 5 to 10 Lakh ◯ 10 Lakh to 25 Lakh ◯ More than 25 Lakh

3. Where are you coming from?*

◯ Local/ neighborhood ◯ Within the city ◯ Within the state (regional)

◯ Within the country ◯ Outside the country

If not local

3.1. How did you come to know about this urban green?

◯ Found it online ◯ Was in the vicinity

◯ Recommended by someone ◯ Other (Please specify) _____

4. Why have you come to this urban green?*

☐ Leisure/ relax ☐ Walk/ cycle ☐ Religious purpose

☐ Work ☐ Historic/ cultural purpose ☐ Picnic

☐ Others (Please specify) _____

5. How many people have come along with you to this urban green?* _____

6. Did you buy a ticket to enter this urban green?*

◯ Yes ◯ No

RECREATION

SURVEY C - FOR BENEFICIARIES - VISITORS

If yes

6.1. How many tickets did you buy? (category wise, if applicable)

_____

6.2. How much amount did you spend on tickets? _____

7. Did you spend on anything else in this area?*

◯ Yes ◯ No

If yes

7.1. What all did you spend on?

☐ Food ☐ Play/ Games ☐ Buying something

☐ Others (Please specify) _____

7.2. How much amount did you spend on each?

What did you spend on	Amount

8. Did you use this urban green for picnic?*

◯ Yes ◯ No

If yes

8.1. How much amount did you pay for booking the picnic spot? _____

8.2. For how long did you use the picnic spot? _____

8.3. How many other groups did you see coming for a picnic here? _____

9. Is it your first time to this urban green?*

◯ Yes ◯ No

If no

9.1. How many times have you visited this urban green before? _____

9.2. How frequently do you visit this urban green?

◯ Daily ◯ Weekly ◯ Fortnightly

◯ Monthly ◯ Quartly ◯ Yearly

◯ Other (Please specify) _____

SURVEY C - FOR BENEFICIARIES - VISITORS

9.3. Why do you think this place gathers so much crowd?

_____

_____

9.4. Over the years, how has the biodiversity of this urban green changed and why? (example improved/ degraded)

_____

_____

10. What advantages or benefits did you experience from this urban green?* (eg: clean air, recreation etc.)

_____

_____

11. What type of biodiversity species are present in and around this urban green?* (flora, avifauna, terrestrial fauna, aquatic fauna)

_____

_____

12. Have you noticed any unique species in and around this urban green?*

_____

13. In your opinion, is this urban green properly maintained?

◯ Yes ◯ No ◯ Can't say

14. If the biodiversity habitat of this urban green is lost, will it affect you?*

◯ Yes ◯ No ◯ Can't say

If yes

14.1. Explain how it will affect you?

_____

_____

Introduce the conservation challenge of the urban green to the responder

- Critical Ecosystem Service Threatened - Highlight the importance of the urban green in providing a habitat for diverse species.
- Declining Health of the urban green - Describe the current state of the urban green, in terms of habitat degradation.
- Urgent Need for Action - Emphasise that if proactive measures are not taken now, the ecosystem services provided by the urban green will be severely diminished or lost altogether, impacting both human well-being and biodiversity.

SURVEY C - FOR BENEFICIARIES - VISITORS

- Consequences of inaction - Explain that without intervention, the urban green's ability to provide essential services will be compromised. Discuss the cascading effects of the urban green's decline on surrounding ecosystems, including loss of biodiversity, disruption of food webs, and increased vulnerability to natural disasters.
- In order to address the threats to this urban green there is a need to mobilise funds.

With this background, ask the following questions

15. Are you willing to support in protecting this urban green?*

◯ Yes ◯ No

If yes

15.1. In what way would you be willing to contribute to the conservation efforts? (Awareness initiatives, organising cleaning drives, nature sensitisation, walks, conduct talks/ community interaction sessions etc.)

_____

_____

_____

15.2. How many hours per year are you willing to dedicate to conservation activities in this urban green?* _____

16. Are you willing to pay to protect this urban green and its habitat?*

◯ Yes ◯ No

If yes

16.1. How much are you willing to pay annually?* _____

17. In your opinion, what type of institution should manage this urban green to conserve the biodiversity habitat?

☐ Government body ☐ Private entity ☐ Academic institute

☐ Institute of national prominence ☐ NGO

☐ Other (Please specify) _____

18. Do you have any suggestions / issues with respect to this urban green and conservation of its biodiversity habitat?

_____

_____

19. Would you like to share any additional information about this urban green? (like challenges, aspirations, etc.)

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY D - FOR BENEFICIARIES - HAWKERS / STREET VENDORS/KIOSKS

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. How often do you come here?*

◯ Everyday ◯ Only on weekdays ◯ Only on weekends

◯ Only in specific months ◯ Other (Please specify) _____

2. Since how long have you been coming to this urban green?

◯ Less than 1 year ◯ 1 to 5 years ◯ 5+ years

◯ Second generation ◯ Other (Please specify) _____

3. What time do you reach here everyday? _____

4. What time do you leave from here everyday? _____

5. What products/services do you sell here?*

_____

_____

6. How many other persons sell the same products/services here?* _____

7. Which months of the year do you have maximum customers? _____

8. What time of the day do you have maximum customers? _____

9. How many people visit this urban green everyday?* _____

10. Do you think this urban green benefits your business?*

◯ Yes ◯ No

11. Do people visiting the urban green come to buy your products / services?

◯ Yes ◯ No

12. How many customers do you get everyday?* _____

SURVEY D - FOR BENEFICIARIES - HAWKERS / STREET VENDORS/KIOSKS

13. On an average, how much does each customer spend for your goods / services?

_____

14. How much is your average daily sale?* _____

15. Do you pay any rent for this space?*

◯ Yes ◯ No

If yes

15.1. Whom do you pay?* _____

15.2. How much is the monthly rent?* _____

16. Do you pay for this kiosk, in any other form?* (lease, purchase, etc.)

◯ Yes ◯ No

If yes

16.1. Whom do you pay? _____

16.2. How much do you pay?* _____

17. Do you have any employees in this kiosk?

◯ Yes ◯ No

If yes

17.1. How many employees do you have? (specify type and number)

☐ Full time, specify number _____ ☐ Part time, specify number _____

☐ Others, specify number and type of employment _____

17.2. What type of remuneration do your employees receive?

☐ Monthly salary ☐ On commission ☐ On contract

☐ Daily wagers ☐ Other (Please specify) _____

17.3. What is the average monthly earning of an employee in your kiosk? _____

18. How much are your other average monthly expenses?* (expense and amount)

_____

_____

_____

19. What is your average monthly profit?* _____

SURVEY D – FOR BENEFICIARIES – HAWKERS / STREET VENDORS/KIOSKS

20. Why do you think this place gathers so much crowd?

_____

_____

_____

21. Would you like to share any additional information about this urban green? (like challenges, aspirations, etc.)

_____

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY E - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE URBAN GREEN

Full Name _____

Gender* ◯ Male ◯ Female ◯ Other (please specify) _____

Age ◯ 18-30 ◯ 30-50 ◯ 50 and over Contact _____

1. What type of establishment is it?*

◯ Residential ◯ Commercial ◯ Institutional
◯ Mixed ◯ Other (Please specify) _____

If residential

1.1. How many people are there in your household? _____

1.2. What is the type of residential establishment?

◯ Unauthorised/ Informal ◯ Private builder floors ◯ Apartment complex
◯ Government quarters ◯ Other (Please specify) _____

1.3. What is the size of your house?*

◯ 1 BHK ◯ 2 BHK ◯ 3 BHK
◯ Other (Please specify) _____

1.4. How long have you been living here? _____

1.5. Is this property ◯ Owned ◯ Rented

2. Do you use air conditioning in your home?*

◯ Yes ◯ No

If yes

2.1. How many ACs do you have?*

◯ 1 ◯ 2 ◯ 3
◯ Other (Please specify) _____

2.2. How many months in a year do you use the AC?* _____

2.3. How many hours in a day do you use each AC in peak summer?*

◯ Less than 2 hours ◯ 2-4 hours ◯ 4-6 hours
◯ 6-8 hours ◯ 8-10 hours ◯ more than 10 hours

SURVEY E - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE URBAN GREEN

3. Do you use air coolers in your home?*

○ Yes ○ No

If yes

3.1. How many coolers do you have?*

○ 1 ○ 2 ○ 3

○ Other (Please specify) _____

3.2. How many months in a year do you use the coolers?* _____

3.3. How many hours in a day do you use each cooler in peak summer?*

○ Less than 2 hours ○ 2-4 hours ○ 4-6 hours

○ 6-8 hours ○ 8-10 hours ○ more than 10 hours

4. How much is your approx. monthly electricity bill in peak summer?

○ upto Rs. 1000 ○ Rs. 1000 - 2000 ○ Rs. 2000 - 3000

○ Other (Please specify) _____

5. Do you think the area around this urban green is cooler than other areas in this neighborhood?*?*

○ Yes ○ No

6. Have you visited this urban green?*

○ Yes ○ No

If yes

6.1. How many times have you visited this urban green? _____

6.2. How frequently do you visit this urban green?

○ Daily ○ Weekly ○ Fortnightly

○ Monthly ○ Quartly ○ Yearly

○ Other (Please specify) _____

6.3. For what purposes did you visit this urban green?*

☐ Leisure/ relax ☐ Walk/ cycle ☐ Religious purpose

☐ Work ☐ Historic/ cultural purpose ☐ Picnic

☐ Others (Please specify) _____

_____

SURVEY E - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE URBAN GREEN

6.4. What advantages or benefits did you experience from this urban green?* (e.g., clean air, recreation, etc.)

_____

_____

_____

7. Why do you think this place gathers so much crowd?

_____

_____

_____

8. Over the years, how has the biodiversity of this urban green changed and why? (example improved/ degraded)

_____

_____

_____

9. Which biodiversity species have you observed in and around this urban green (flora, aquatic fauna, avifauna, terrestrial fauna)?*

_____

_____

_____

10. Have you noticed any unique species in and around this urban green?*

_____

_____

_____

11. In your opinion, is this urban green properly maintained?

◯ Yes ◯ No ◯ Can't say

SURVEY E - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE URBAN GREEN

12. If the biodiversity habitat of this urban green is lost, will it affect you?*

◯ Yes ◯ No ◯ Can't say

If yes

12.1. Explain how it will affect you?

_____

_____

_____

Introduce the conservation challenge of the urban green to the responder

- Critical Ecosystem Service Threatened - Highlight the importance of the urban green in providing a habitat for diverse species.
- Declining Health of the urban green - Describe the current state of the urban green , in terms of habitat degradation.
- Urgent Need for Action - Emphasize that if proactive measures are not taken now, the ecosystem services provided by the urban green will be severely diminished or lost altogether, impacting both human well-being and biodiversity.
- Consequences of inaction - Explain that without intervention, the urban green 's ability to provide essential services will be compromised. Discuss the cascading effects of the urban green 's decline on surrounding ecosystems, including loss of biodiversity, disruption of food webs, and increased vulnerability to natural disasters.
- In order to address the threats to this urban green there is a need to mobilise funds.

With this background, ask the following questions

13. Are you willing to support in protecting this urban green?*

◯ Yes ◯ No

If yes

13.1. In what way would you be willing to contribute to the conservation efforts for this urban green? (Awareness initiatives, organising cleaning drives, nature sensitisation, walks, conduct talks/ community interaction sessions etc.)

_____

_____

_____

13.2. How many hours per year are you willing to dedicate to conservation activities in this urban green?*

_____

SURVEY E - FOR BENEFICIARIES - LOCAL RESIDENTS AROUND THE URBAN GREEN

14. Are you willing to pay to protect this urban green and its habitat?*

○ Yes ○ No

If yes

14.1. Approx. how much amount are you willing to pay annually? (in INR)*

_____

15. In your opinion, what type of institution should manage the urban green to conserve the biodiversity habitat?

☐ Government body ☐ Private entity ☐ Academic institute

☐ Institute of national prominence ☐ NGO

☐ Other (Please specify) _____

16. Do you have any suggestions / issues with respect to the urban green and conservation of its biodiversity habitat?

_____

_____

_____

17. Would you like to share any additional information about this urban green? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025
hrs:mins
Name of Surveyor
Survey No./Code

SURVEY F- QUESTIONNAIRE FOR ANY OFFICIALS/ STAFF AROUND THE ECOSYSTEM

Full Name _____

Department/ Organisation _____

Designation _____ Contact _____

1. What type of department/ agency/ authority/ organisation are you from?*

◯ Government organisation ◯ Private organisation ◯ Non-profit or NGO

◯ Other (Please specify) _____

2. What is your role in the department/ agency/ authority/ organisation?

_____

3. What is the role of your department/ agency/ authority/ organisation in managing the urban green?*

☐ Irrigation ☐ Cleaning/ maintenance ☐ Security

☐ Ticketing ☐ Landscaping/ horticulture ☐ Infrastructure operations

☐ Other (Please specify) _____

4. Do you also work in other areas?*

◯ Yes ◯ No

If yes

4.1. Where else do you work?

_____

_____

_____

5. Do you think this urban green supports or benefits your work in any way?

◯ Yes ◯ No

SURVEY F- QUESTIONNAIRE FOR ANY OFFICIALS/ STAFF AROUND THE ECOSYSTEM

6. How many people has your department/ agency/ authority/ organisation employed for work in this urban green?* (specify role of the employee, number of employees, engagement modality, working days in a week, working months in an year, average monthly salary/ earning)

Type of employee	Number	Working days	Working months	Engagement modality*	Average monthly salary/ earning

*Coding for **'Engagement modality'**

A. Salaried B. On commission C. On contract D. Daily wagers

Other (Please specify) _____

7. In your knowledge, is there any other department/ agency/ authority/ organisation involved in managing this urban green?

◯ Yes ◯ No

If yes

7.1. Which other department/ agency/ authority/ organisation is involved?

Department/ agency	Role of employee	Number of employees working on the green

SURVEY F- QUESTIONNAIRE FOR ANY OFFICIALS/ STAFF AROUND THE ECOSYSTEM

8. Why do you think this place gathers so much crowd?

_____

_____

_____

9. Would you like to share any additional information about this urban green? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY F- QUESTIONNAIRE FOR SITE OFFICE AT THE URBAN GREEN

Full Name _____

Department/ Organisation _____

Designation _____ Contact _____

1. What type of department/ agency/ authority/ organisation are you from?*

◯ Government organisation ◯ Private organisation ◯ Non-profit or NGO

◯ Other (Please specify) _____

2. What is your role in the department/ agency/ authority/ organisation?

_____

3. What is the role of your department/ agency/ authority/ organisation in managing the urban green?*

☐ Irrigation ☐ Cleaning/ maintenance ☐ Security

☐ Ticketing ☐ Landscaping/ horticulture ☐ Infrastructure operations

☐ Other (Please specify) _____

4. Do you also work in other areas?*

◯ Yes ◯ No

If yes

4.1. Where else do you work?

_____

_____

_____

5. Do you think this urban green supports or benefits your work in any way?

◯ Yes ◯ No

6. Is there any entry ticket for this urban green?*

◯ Yes ◯ No ◯ Don't know

SURVEY F- QUESTIONNAIRE FOR SITE OFFICE AT THE URBAN GREEN

If yes

6.1. How much is the entry ticket for Indian nationals?* Adult _____ Child _____

6.2. How much is the entry ticket for foreign nationals?* Adult _____ Child _____

6.3. How much is the average daily earning on weekdays from selling the ticket?* _____

6.4. How much is the average daily earning on weekends from selling the ticket?* _____

6.5. Which agency/ department is receiving the ticket charges?*

_____

7. Are there any kiosks in and around this urban green?*

◯ Yes ◯ No ◯ Don't know

If yes

7.1. How many kiosks are there?* _____

7.2. What type of products do they sell? _____

_____

8. Are you/ any other department charging the kiosks in and around this area?*

◯ Yes ◯ No ◯ Don't know

If yes

8.1. What are the charges for?*

☐ Rent ☐ Lease

☐ Purchase ☐ Maintenance

☐ Other (Please specify) _____

_____

8.2. How many kiosks are paying?* _____

8.3. How much amount is paid per kiosk?* _____

8.4. Which agency/ department is receiving the charges?*

_____

9. Is this urban green being used for picnic?*

◯ Yes ◯ No ◯ Don't know

If yes

9.1. How many groups visit this urban green for picnic?* (daily/ weekly)

_____

SURVEY F- QUESTIONNAIRE FOR SITE OFFICE AT THE URBAN GREEN

9.2. On an average, what is the duration of such picnics?* _____

9.3. How much is the average rent for booking a picnic spot in this urban green?*

_____

9.4. Which agency/ department is charging the booking rental?* _____

10. Why do you think this place gathers so much crowd?

_____

_____

_____

11. Would you like to share any additional information about this urban green? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY G - QUESTIONNAIRE FOR ELECTRICITY SERVICE PROVIDER/ DISCOM

Full Name _____

Department/ Organisation _____

Designation _____ Contact _____

1. What type of department/ agency/ authority/ organisation are you from?*

◯ Government organisation ◯ Private organisation ◯ Non-profit or NGO

◯ Other (Please specify) _____

2. What is your role in the department/ agency/ authority/ organisation?

_____

3. What is the extent of your service area? _____

4. How many electricity connections are there in this neighborhood?* (please mention the number of electricity connections in the area of influence)

☐ Residential connections _____

☐ Commercial connections _____

☐ Other (Please specify) _____

5. How many units of electricity are consumed monthly per household in this neighborhood?

_____

6. What are the electricity charges per unit?

_____

7. How much is the average monthly electricity bill in peak summer, for a residential household in this neighborhood?*

_____

PROLIFERATING ECOSYSTEM-BASED ADAPTATION PRACTICES IN INDIAN CITIES

DD/MM/2025

hrs:mins

Name of Surveyor

Survey No./Code

SURVEY G - QUESTIONNAIRE FOR ELECTRICITY SERVICE PROVIDER/ DISCOM

8. Why do you think this area gathers so much crowd?

_____

_____

_____

9. Would you like to share any additional information about this urban green? (like challenges, aspirations, etc.)

_____

_____

_____

End of Survey

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WATER & ENVIRONMENT VERTICAL

Strategic Framework for

ESTIMATING THE ECONOMIC VALUE OF AN URBAN ECOSYSTEM