Gokul Jalashay Wetland Complex

Integrated Management Plan

2023-2027

Wetlands International South Asia

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GOKUL JALASHAY

An Integrated Management Plan for Conservation and Wise Use

बिहार सरकार
पर्यावरण वन एवं जलवायु परिवर्तन विभाग

Wetlands INTERNATIONAL

Wetlands International South Asia

The Integrated Management Plan for Gokul Jalashay Wetland Complex has been developed by **Wetlands International South Asia** under the aegis of GEF-UNEP-MoEFCC funded "**Integrated Management of Wetland Biodiversity and Ecosystem Services**" project with guidance and support from **Environment, Forest and Climate Change Department, Government of Bihar**

Project supervisor

Dr Ritesh Kumar, Director, Wetlands International South Asia

Mr Rajkumar M. IFS, Divisional Forest Officer, Forest Division Bhojpur

Project Team

Ravi Prakash (Project Lead)
Wetlands Specialist

Animesh Kar
Wetlands Specialist- IMWBES

Kamal Dalakoti
Technical Officer-GIS and Remote Sensing

Preethi Vasudevan
Junior Technical Officer- Water management

Harsh Ganapathi
Senior Technical Officer-Ecohydrology

Suchita Awasthi
National Project Coordinator- IMWBES

Consultant- Biodiversity assessment

Arvind Mishra, Founder, Mandar Nature Club, Bhagalpur

Dr Tapan Kumar Pan, Plant taxonomist, Tilkamanjhi Bhagalpur University

Rishi Verma, Nature photographer

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Animesh Kar
Ravi Prakash
Arvind Mishra

Cover- A fisher at Gokul Jalashay wetland (Photo credit- Ravi Prakash)
Back Cover- Flock of lesser whistling duck at Gokul Jalashay wetland (Photo credit- Arvind Mishra)

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Acronyms

ACYD	Art Culture and Youth Department
AD	Agriculture Department
APHA	American Public Health Association
BAU	Welcome To Bihar Agriculture University
BNHS	The Bombay Natural History Society
BOD	Biochemical oxygen demand
BSDMA	Bihar State Disaster Management Authority
CBO	Community Based Organization
CC	Climate Change
CG	Community Groups
CGWB	Central Ground Water Board
CIFRI	Central Inland Fisheries Research Institute
CR	Critically Endangered
CSO	Civil Society Organization
CWC	Central Water Commission
DAHD	Department of Animal Husbandry and Dairying
DD	Data Deficient
DDMA	District Disaster Management Authority
DEM	Digital Elevation Model
DO	Dissolved oxygen
DWD	District Welfare Department
EIA	Environmental Impact assessment
EN	Endangered
EPA	Environmental Protection Agency
FC	Fecal Coliform
FC	Fisheries Cooperative
FCD	Flood Control Department
FD	Fisheries Department
FDB	Forest Division Bhojpur
FDC	Forest Development Committee
GIS	Geographic Information System
HD	Horticulture Department
ICAR	Indian Council of Agricultural Research
IFPRI	International Food Policy Research Institute
IMD	India Meteorological Department
IMWBES	Integrated Management of Wetland Biodiversity and Ecosystems Services
ISRO	Indian Space Research Organization
IUCN	International Union for Conservation of Nature
KVK	Krishi Vigyan Kendra
LC	Least concern
LD	Line departments
LULC	Land Use Land Cover
MCM	Minimum Control Measures

METT	Management Effectiveness Tracking Tool
MNC	Multinational Corporation
MNC	Mandar Nature Club
MoEFCC	Ministry of Environment, Forest and Climate Change
MSME	Ministry of Micro, Small and Medium Enterprises
MSME	Ministry of Micro, Small and Medium Enterprises
NA	Not Applicable
NABL	National Accreditation Board for Testing and Calibration Laboratories
NASA	National Aeronautics and Space Administration
NDMA	National Disaster Management Authority
NDWI	Normalized Difference Water Index
NE	Not Evaluated
NGO	Non-Governmental Organization
NM	Namami Gange
NMCG	National Mission for Clean Ganga
NPCA	National Plan for Conservation of Aquatic Ecosystems
NT	Near threatened
NWIA	National Wetland Inventory and Assessment
PHED	Public Health Engineering Department
PKP	Potential Knowledge Partners
PRI	Panchayati Raj Institution members
RDD	Rural Development Department
RLRD	Revenue and Land Reforms Department
RS	Remote Sensing
RWD	Rural Works Department
SAC	Space Application Centre
SD	Statistics Department
SPMG	State Program Management Group
SRTM	Shuttle Radar Topography Mission
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TC	Total coliforms
TD	Tourism Department
TDS	Total Dissolved Solids
ToR	Terms of Reference
VU	Vulnerable
WIAMS	Wetlands Inventory, Assessment and Monitoring System
WISA	Wetlands International South Asia
WM	Wetland Mitra
WRD	Water Resources Department
WRIS	India-Water Resources Information System

Executive Summary

Gokul Jalashay wetland complex, spanning between the districts of Buxar and Bhojpur of Bihar, is an ox-bow wetland system linked with River Ganga. Comprises Gokul Jalashay (448 ha) and Sunki Suhiya (1320 ha), connected by the flows of seasonal River Dharmawati and flood pulses of River Ganga, the wetland complex is an important source of freshwater and flood buffer for the 56 villages surrounding the complex. The mosaic of habitats within the wetland complex sustains at least 186 plant and 134 animal species. In the past 20 years, the land use land cover of the wetland complex has changed significantly with an increase in inundation area from 273 ha in 2000 to 289 ha in 2021 for Gokul Jalashay and from 404 ha in 2000 to 1093 ha in 2021. The changes can be attributed to inundation due to flood pulses of the river Ganga.

The wetland complex plays an important role in maintaining the hydrological regimes of the region. Besides being a prominent water source for the people living around, it provides flood buffer to adjoining settlements by accommodating a significant proportion of flood water of river Ganga. Communities of 56 villages living in and around the wetland harvest fish and aquatic plants for use as food, fodder, and thatch.

Despite having high social and ecohydrological significance, Gokul Jalashay lacks a proper management regime. The wetland has been subjected to extensive hydrological fragmentation. The evaluation of wetland features was done through field surveys, collation of existing published and unpublished literature, interpretation of remote sensing imageries, consultation with state government departments, and participatory appraisals with communities living around the wetland complex. The evaluation of wetland features indicates the following trends:

Habitat fragmentation- The natural connection between the river Ganga and the wetland complex has been restricted by the construction of embankments along the river. Construction of Nainijor road between Gokul Jalashay and Sunki Suhiya has led to disconnectivity between the wetland complex. Moreover, the construction of a series of earthen and permanent bridges within the wetland has also led to the fragmentation of habitats.

Presence of invasive aquatic species: *Eichhornia sp., Ceratophyllum sp., Hydrilla sp.,* and *Parthenium sp.* are major invasive species that have been found in Gokul Jalashay and Sunki Suhiya. The presence of these invasive species has a direct implication on the population of native species compromising the ecosystem components, processes, and services of the wetland complex.

Deteriorating water quality: The water quality of the wetland complex has deteriorated over time due to increasing anthropogenic stresses such as the discharge of untreated sewage, solid waste dumping, etc. The wetland water has been found to be contaminated with fecal coliforms as well as total coliforms indicating a lack of a sewage disposal system around the wetland complex.

Siltation
Siltation due to flood pulses from river Ganga has led to an increase in the bare land area within the wetland complex, especially in a few patches of Sunki Suhiya. The deposition

Management Framework
The overarching goal of managing the Gokul Jalashay wetland complex is "conservation and wise use of wetland ecosystems to sustain their full range of ecosystem services and biodiversity values.

The purpose is to: a) enhance ecosystem health, b) enhance water security, c) reduce water-related disaster risks to communities living in and around the wetlands, d) provide livelihood opportunities to local communities based on sustainable use of wetland resources, and e) sustain habitats and migration corridors of wetland-dependent species.

To achieve the goal and purpose, the management framework is built around the following eight management objectives:

Objectives	**Performance indicators**	**Desired outcomes**
Maintain hydrological connectivity with the wetland catchment	Duration of flood pulse and connectivity of river channels with wetlands.	Inundation regimes (minimum and maximum) achieved in the past 30 years are maintained
Maintain water quality to support ecosystem processes and services	DO levels	4mg/l or more
Promote good agricultural practices aligned with the wise use of wetlands	Cropping practices that do not modify water regimes or deteriorate water quality or introduce exotic species	No structural modification of the wetland No introduction of chemicals, fertilizers, and pesticides No introduction of exotic species. No intensive water abstraction
Maintain the naturalness of shorelines	The extent of the wetland shoreline, devoid of any built-up area	No concretization of the shoreline Maintenance of at least 50 m buffer around the wetlands
Maintain and improve habitat quality to support the diversity of wetland-dependent species	Habitat diversity	No species extirpation Migration corridors for fish and large mammals (Nilgai) are maintained Sighting of key species is maintained in the range of 20% deviation from the average of the last five years Counts of migratory waterbirds are maintained in the range of 20% deviation from the average of the last five years
Enhance awareness of wetlands biodiversity and	The number of affirmative actions by	Increase in affirmative actions

Objectives	Performance indicators	Desired outcomes
ecosystem services among stakeholders	stakeholders for wetlands conservation and wise use	
Promote local stakeholder participation in wetlands management	Representation of local stakeholders in wetland management structures	Communities' views rights and capacities are reflected in wetland management decisions. Pro-active engagement of women, youth, and children in wetland management
Livelihood vulnerability of wetland-dependent communities is reduced	Resource productivity (fish catch, vegetable harvest) Diversification of income sources	Non-declining harvest of fish and vegetables Wetland communities having income in the lower quintiles gain additional sources of income

Recommendations
The following actions are recommended under four management components namely 1) Institutions and Governance 2) Land and water management 3) Species and habitat conservation 4) Livelihood:

Institutions and Governance
The recommended action components under institutions and governance include:
- Notification of Wetland complex under wetlands (Conservation and Management) Rules, 2017
- Establishment of proper Institutions for an effective management regime
- Management zoning/Regulatory regimes
- Wetlands Inventory, Assessment, and Monitoring System
- Research
- Capacity development
- Communication and outreach

Land and water management
The recommended action components under land and water management include:
- Maintaining the environmental flows
- Pollution control
- Water quality parameter testing

Species and Habitat conservation
The recommended action components under species and habitat conservation include:
- Asian water birds census
- People's biodiversity registers
- Habitat mapping and surveillance
- Maintain habitat of migratory birds
- Invasive species management

- Maintain fish diversity and check invasives fish
- Protect breeding sites of wetland dependent birds
- Check macrophyte growth in the wetland
- Establishing centres for veterinary care, shelter and preparedness for wildlife during and after extreme events
- Disease control
- Communication and education facilities

Livelihood
The recommended action components under livelihood includes:

- Sustainable fishing
- Post harvesting and marketing
- Diversification of cropping pattern
- Crop intensification
- Organic manure and pest control
- Eco-tourism
- Infrastructure for education
- Community infrastructure

Budget:
Implementation of the integrated management plan will entail a budget of Rs. 61.53 crores of this, the component on Livelihood is allocated 31.08 %. This is followed by an allocation of 30.23 % for implementing actions under the component for the conservation of species and habitat. The components of Institution and Governance and land and water management have been allocated 21.61 % and 17.08 % of the budget respectively. Being aligned with the objectives of the National Mission of Clean Ganga (of the Ministry of the Jal Shakti) and the National Plan for Conservation of Aquatic Ecosystems (of the Ministry of Environment, Forest and Climate Change), the concerned authority can consider seeking funding from these sources, along with allocations from the state budget.

1. Introduction

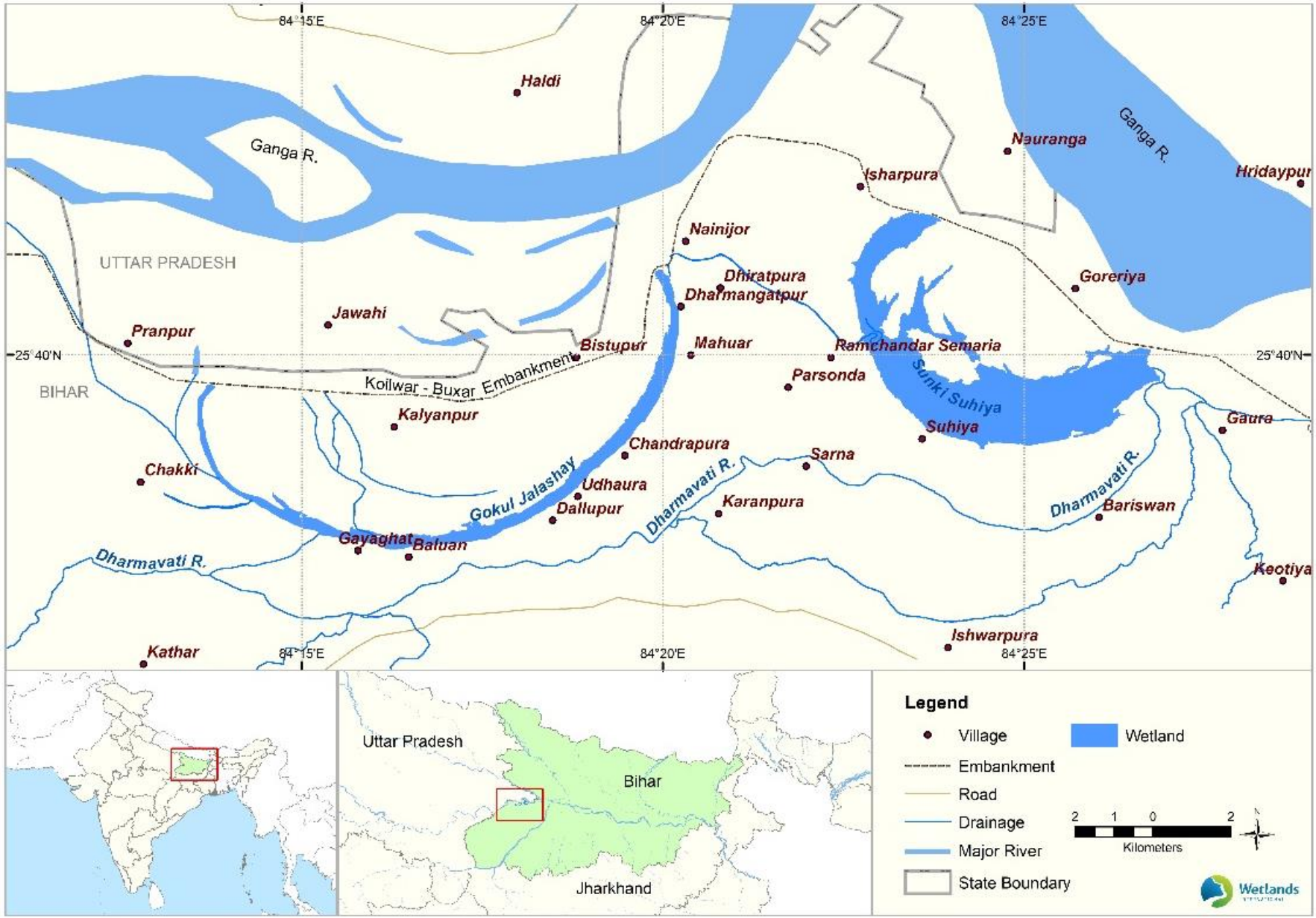
Background

Gokul Jalashay wetland complex, spanning between the districts of Buxar and Bhojpur of Bihar, is an ox-bow wetland system linked with River Ganga. Comprises Gokul Jalashay (448 ha) and Sunki Suhiya (1320 ha), connected by the flows of seasonal River Dharmawati and flood pulses of River Ganga, the wetland complex is an important source of freshwater and flood buffer for the 56 villages surrounding the complex. The mosaic of habitats within the wetland complex sustains at least 186 plant and 134 animal species. Communities living around the wetland ascribe high cultural and recreational significance to these wetlands (Map 1).

Despite having high socio-ecological significance, the wetland complex is facing various natural and human-induced threats. These include fragmentation of natural connectivity between the wetlands and river Ganga, pollution, and proliferation of invasive species. The absence of well-defined management arrangements has also limited the capacity to systematically address threats of adverse change and address the prevailing resource use conflicts.

Recognising the need for securing the ecosystem services and biodiversity values of Gokul Jalashay, the Honorable Union Minister of State for the Ministry of Environment, Forest and Climate Change (MoEFCC), Mr. Ashwini Kumar Choubey, called upon the Government of Bihar (GoB) and MoEFCC to take up integrated management of the wetland complex on a priority. Subsequently, the Gokul Jalashay wetland complex was included in the implementation plan of the Global Environment Facility-funded Integrated Management of Wetland Biodiversity and Ecosystem Services Project. This management plan has been prepared under the IMWBES project and reflects the commitment of GoB and MoEFCC to conserve the Gokul Jalashay wetland complex and put in place effective management arrangements for these ecosystems.

Gokul Jalashay wetland near Gaighat village



Map 1: Gokul Jalashay wetland complex located between Buxar and Bhojpur districts of Bihar

Management planning purpose and objectives

As a signatory to the Ramsar Convention, India is committed to the wise use of all wetlands in her territory. Wise use of wetlands is defined in the text of the Ramsar Convention as 'the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.' Ecological character is 'the combination of ecosystem components, processes, and services that characterise a wetland.' Ecosystem management of wetlands thus seeks to achieve the goal of 'maintenance of ecological character' or 'wetland wise use.

Wise use is the longest-established example among inter-governmental processes, the implementation of which has become known as ecosystem approaches for the conservation and sustainable development of natural resources, including wetlands (Finlayson et al., 2011). The approach recognises the human interdependency with wetland functioning. It accommodates sustainable utilisation of these ecosystems for the benefit of humankind in a way compatible with the maintenance of natural properties of the ecosystem. Wise use encourages stakeholder engagement and transparency in negotiating trade-offs and determining equitable outcomes for wetland conservation while promoting the maintenance of environmental, economic, and social sustainability (Finlayson, 2012). Management planning aims to outline how wetland-wise use can be achieved (Ramsar, 2010).

The term 'wise use' is often misinterpreted to indicate that the Ramsar Convention promotes the human use of all wetlands. However, wise use as a wetland management approach is much broader than the use of a wetland. The phrase 'in the context of sustainable development recognises that development, which may be inevitable in some cases, is not an objective for every wetland. Whenever development is to take place, it has to be facilitated sustainably by approaches elaborated in the Ramsar Convention. 'Ecosystem approaches include the elements elaborated by the Convention on Biological Diversity – integrated management, stakeholder's participation in the decision-making process, transparency about trade-offs, and equitability of the outcomes. In totality, wise use is about 'maintaining the capability of the wetland' to support human well-being at present and in the future, rather than 'use' or 'development' at present.

The wetland management plan aims to put in place effective management arrangements that enable the integration of biological diversity and ecosystem service values of these wetlands in developmental planning. The following are its specific objectives:

- Describe the wetlands in terms of their ecological character and their governing factors.
- Assess the risk of adverse change in wetlands and their underpinning reasons.
- Define monitoring requirements for detecting changes in ecological character.
- Define management objectives and strategies for achieving these objectives.
- Support resource mobilisation.
- Enable communication within and between sites, organisations, and stakeholders.
- Ensuring compliance with local, national, and international policies and regulatory frameworks.

Management planning approach and method

Gokul Jalashay Wetlands complex evolves and functions within physical templates, characteristics determined primarily by the interaction between water, sediments and nutrients. The wetland complex's ecological components, processes, and services are influenced by land and water management practices within the immediate as well as indirect catchments of the wetland complex. Management planning, therefore, calls for an approach that recognises the interconnectedness of wetland biological diversity and ecosystem services with land and water management in the river basin, taking into account the external, natural, and induced factors.

The approach also needs to address climate change, which has direct and indirect implications for wetland features and factors governing these features. The wise use principle encourages stakeholder engagement and transparency in negotiating trade-offs and determining equitable outcomes for wetland conservation while promoting the maintenance of environmental, economic, and social sustainability.

The National Environment Policy (2006), Government of India, recommends the integration of conservation and wise use of wetlands into river basin management involving all relevant stakeholders, particularly local communities, to ensure the maintenance of hydrological regimes and conservation of biodiversity. It further recommends the integration of wetland conservation into sectoral development plans for poverty alleviation and livelihood improvement and links efforts for conservation and sustainable use of wetlands with all ongoing rural infrastructure development and employment generation programs. If considered as a natural infrastructure capable of providing water and food security, buffering extreme events, and supporting adaptation to climate change, the ecosystem services of the Gokul Jalashay wetland complex can help achieve outcomes for several sectoral development plans, particularly for water resources, agriculture, rural development, and disaster risk reduction. The Wetlands (Conservation and Management) Rules, 2017; The River Ganga (Rejuvenation, Protection, and Management) Authorities Order, 2016 (amended 2019); and the minimum environmental flows notification of 2018 provide the regulatory framework to prevent any fragmentation of hydrological regimes through hydraulic structures, diversions, encroachments, or impeding flow pathways.

The methodology for management planning is based on the New Guidelines for Management Planning for Ramsar Sites and Other Wetlands as adopted by the Contracting Parties to the Ramsar Convention on Wetlands in 2002. These guidelines also form the basis of the wetlands management planning guidelines of the MoEFCC's National Plan for Conservation of Aquatic Ecosystems (NPCA). In 2022, the Ministry also notified the Sahbhagita Guidelines – wherein a participatory and inclusive framework for wetland management has been outlined, clarifying roles and responsibilities at various levels of administration.

The NPCA guidelines recommend following diagnostic approach – wherein the selection of management interventions is guided by knowledge of wetlands features and factors governing these features and their relationship with broader societal conservation and development goals that wetland-wise use is contributing to (Figure 1). The management plan follows the NPCA guidelines as well as the Sahbhagita guidelines.

Figure 1: Framework for integrated management planning

The management plan was prepared by a multidisciplinary team having expertise in wetland ecology, hydrology, socio-economics, and wetland management planning. Field missions to Gokul Jalashay were held in February and June 2022 wherein field data on various wetland features were collected and stakeholder consultations held. Species and habitat assessments were undertaken by experts from Mandar Nature Club, Bhagalpur who have a history of working in the landscape. The draft management plan was sent to all concerned government departments and stakeholders for review and feedback.

Management Plan Structure

The management plan follows the format prescribed under NPCA and is organised into three sections with eight chapters. Following the introduction, section one of the plan (comprising Chapters 2, 3, and 4) contains a description and evaluation of the wetland features, governing factors, and an analysis of current institutional arrangements in terms of the capability of addressing the risk of adverse change and ensuring wetlands wise use. Section 2 of the plan (containing chapters 5 and 6) discusses the management framework (management goal, purpose, strategy and objectives, and monitoring arrangements thereof. Section 3 (comprising chapters 7 and 8) includes the detailed action plan, five-year budget, and possible financing arrangements.

2. Description of wetland features

Wetland location and extent

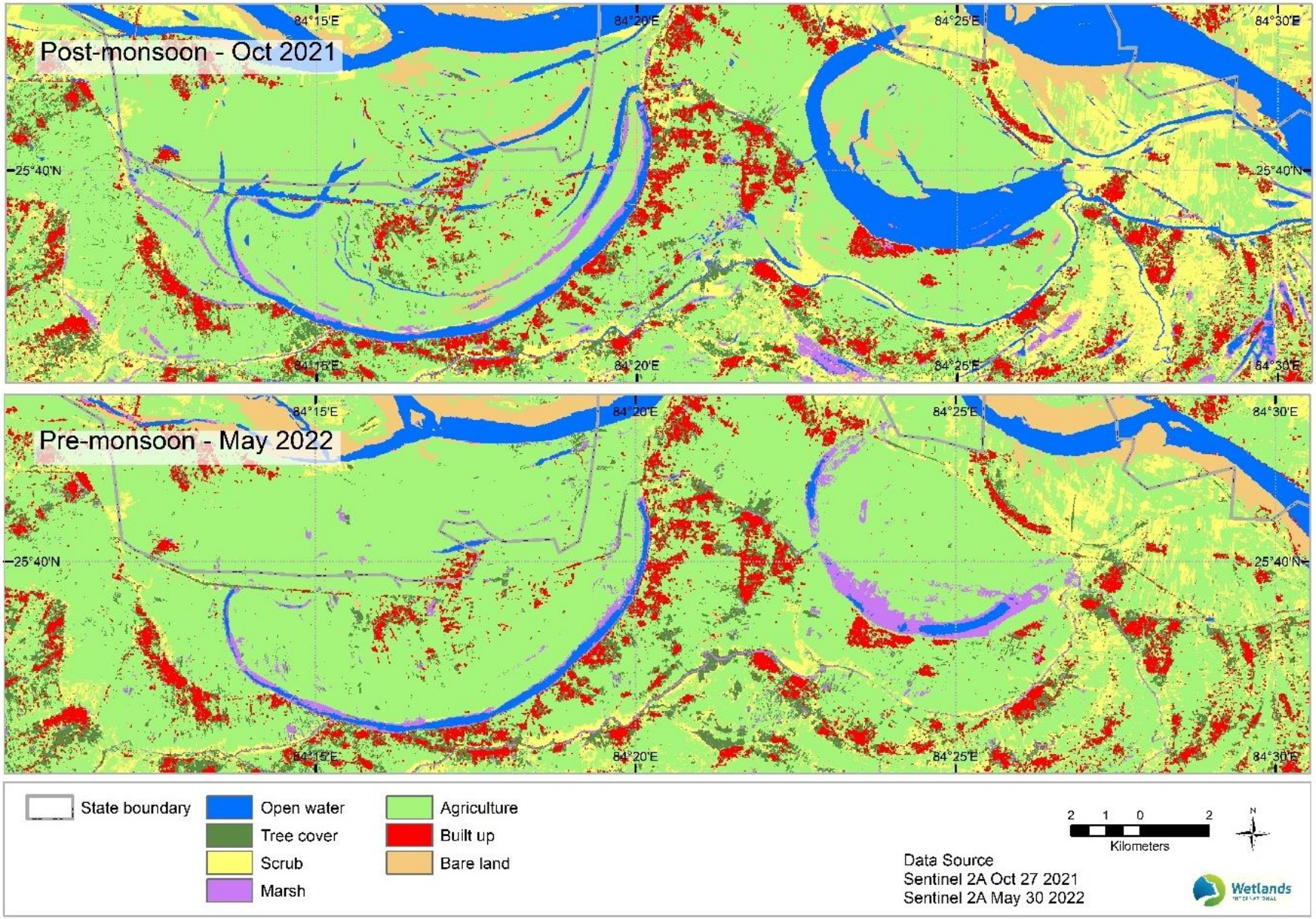
Gokul Jalashay wetland complex is situated between 84.22° E and 84.44° E longitudes and between 25.69° N and 25.62°N latitudes. Formed due to the meandering river Ganga, the wetland complex consists of two oxbows, Gokul Jalashay, lying in the Buxar district, and Sunki Suhiya in the Bhojpur district of Bihar.

Delineation of the wetland complex was done using Sentinel 2A images of 10m resolution through supervised image classification of pre (May 30, 2022) and post-monsoon (October 27, 2021). The Global Surface Water Data has been used to assess inundation patterns. The dataset provides water occurrence and extent for 1984-2020 at 30 m resolution.

The total area of the Gokul Jalashay wetland complex was assessed to be 1768 ha. Of this Gokul Jalashay spans 448 ha and Sunki Suhiya spans 1320 ha. Interannual variability assessed from images of May 30, 2022 (pre-monsoon) and October 10, 2022 (post-monsoon) indicated that the open water area within the wetland complex increases post-monsoon (Table 1 and Map 2). Subsequently, as inundation recedes, marshes develop all along the fringes and the exposed land is used for seasonal agriculture. Crops such as mustard and paddy are grown during the winter months.

Table 1: Area under land use land cover categories in Gokul Jalashay wetland complex (in ha)

	Gokul Jalashay		**Sunki Suhiya**	
	Pre-monsoon (May 30, 2022)	**Post-monsoon (Oct 10, 2021)**	**Pre-monsoon (May 30, 2022)**	**Post-monsoon (Oct 10, 2021)**
Open Water	234	289	105	1093
Marsh	138	101	402	17
Agriculture	68	31	806	65
Built up	2	2	1	1
Tree and Scrubs	5	6	3	4
Bare land	1	19	3	140
Total	448	448	1320	1320



Map 2: Seasonal variation in land use land cover of Gokul Jalashay wetland complex (October 2021 and May 2022)

Table 2 Changes in land use land cover of Gokul Jalashay wetland complex (in ha) (2000-2021)

	Gokul Jalashay		Sunki Suhiya	
	2000	**2021**	**2000**	**2021**
Open Water	273	289	404	1093
Marsh	114	101	235	17
Agriculture	59	31	630	65
Built up	0	2	0.18	1
Tree and Scrubs	2	6	35	4
Bare land	0	19	15	140
Total	448	448	1320	1320

In the last 20 years, the open water area and bare lands have increased, whereas the agricultural area has decreased (Table 2 and Map 3). The increased inundation has led to decreased marshes and agricultural areas in both the wetlands. These changes are more prominent in Sunki Suhiya. The increase in bare land area, especially in Sunki Suhiya, can be attributed to sand deposition due to flood pulses from river Ganga.

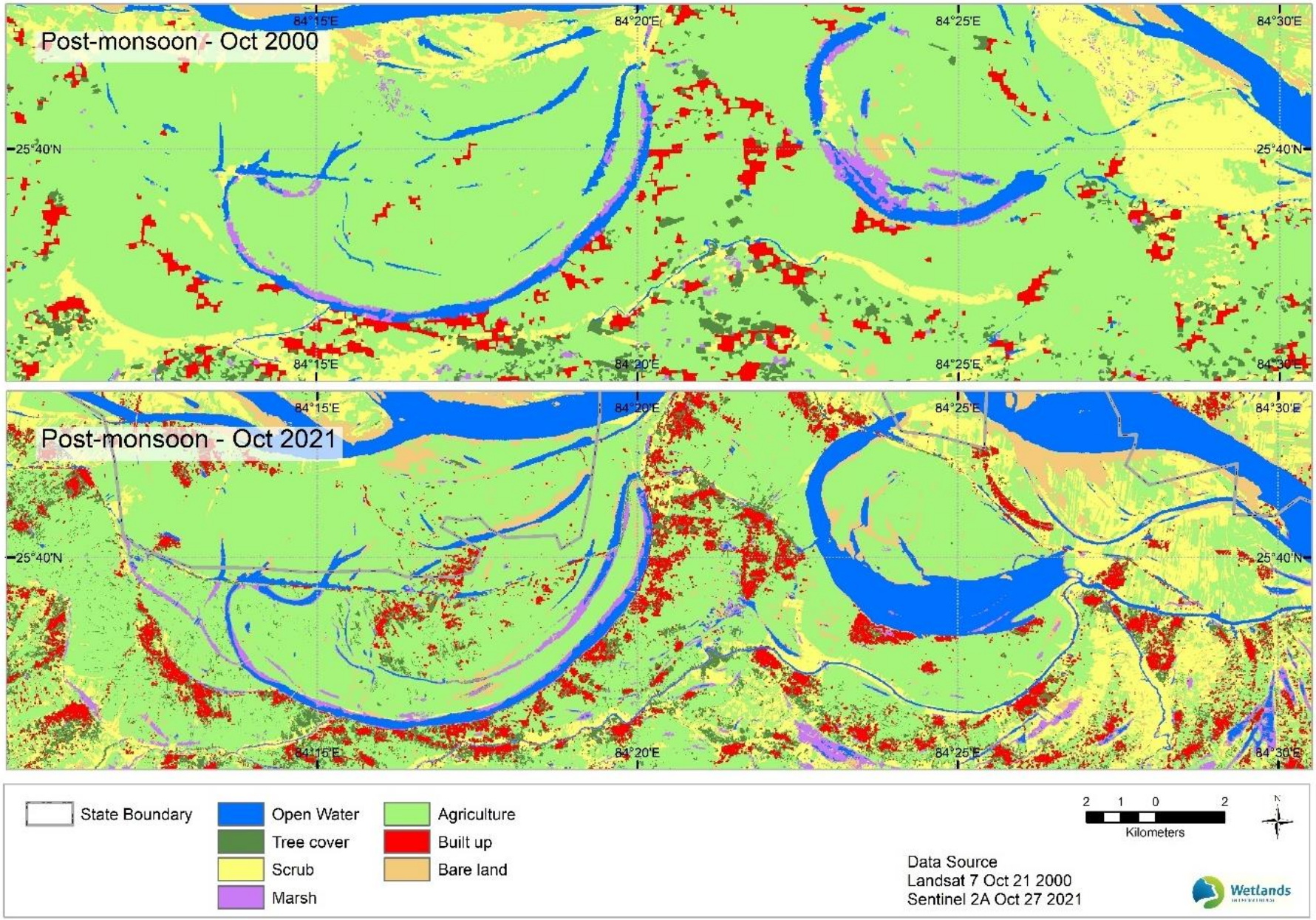
Wetland Catchment

The Gokul Jalashay and Sunki Suhiya wetlands fall within the drainage system of the Dharmawati river, which forms its catchment. The river Bainsahi and Kao meets near Salempur to form river Dharmawati. The then-formed Dharmawati passes through villages like Paschim Tola, Yogia, Nimej, Parasia, and Gahuana and ultimately discharges into River Ganga near Salempur. The river meets Gokul Jalashay and Sunki Suhiya at Gaighat and Chamarpur, respectively.

The wetland catchment was delineated using SRTM DEM data of 30-meter resolution. For decadal change analysis, LULC for 2000 was derived through supervised image classification of post-monsoon (October 21, 2000) Landsat 7 satellite image of 30m resolution.

The catchment of the Gokul Jalayshay complex spans an area of 1,003 square kilometers and is bounded by the city of Buxar in the west, Shahpur in the east, Jawahi in the north, and Nawanagar in the south. As the large portion of the catchment lies within the floodplains of Ganga, it has homogenous terrain leading to a gentle slope. Analysis of LULC for the year 2021 revealed that the land use within the catchment is dominated by agriculture contributing around 67% of the total area. Wetlands and other water bodies, such as small rivers and streams, account for around 5% of the total catchment area. Tree cover and bare land correspond to 8% and 3% of the total catchment area respectively.

Analysis of post-monsoon land use and the land cover data for 2000 and 2021 indicates an increase in area under wetlands and streams. There is a decrease in agricultural land which can be attributed to an increase in tree cover related to orchard farming within a few patches of the catchment. The built area has also increased remarkably by 4498 ha in the catchment from 2000 to 2021(Table 3 and Map 4).



Map 3: Land use land cover of Gokul Jalashay wetland complex (October 2000 and October 2021)

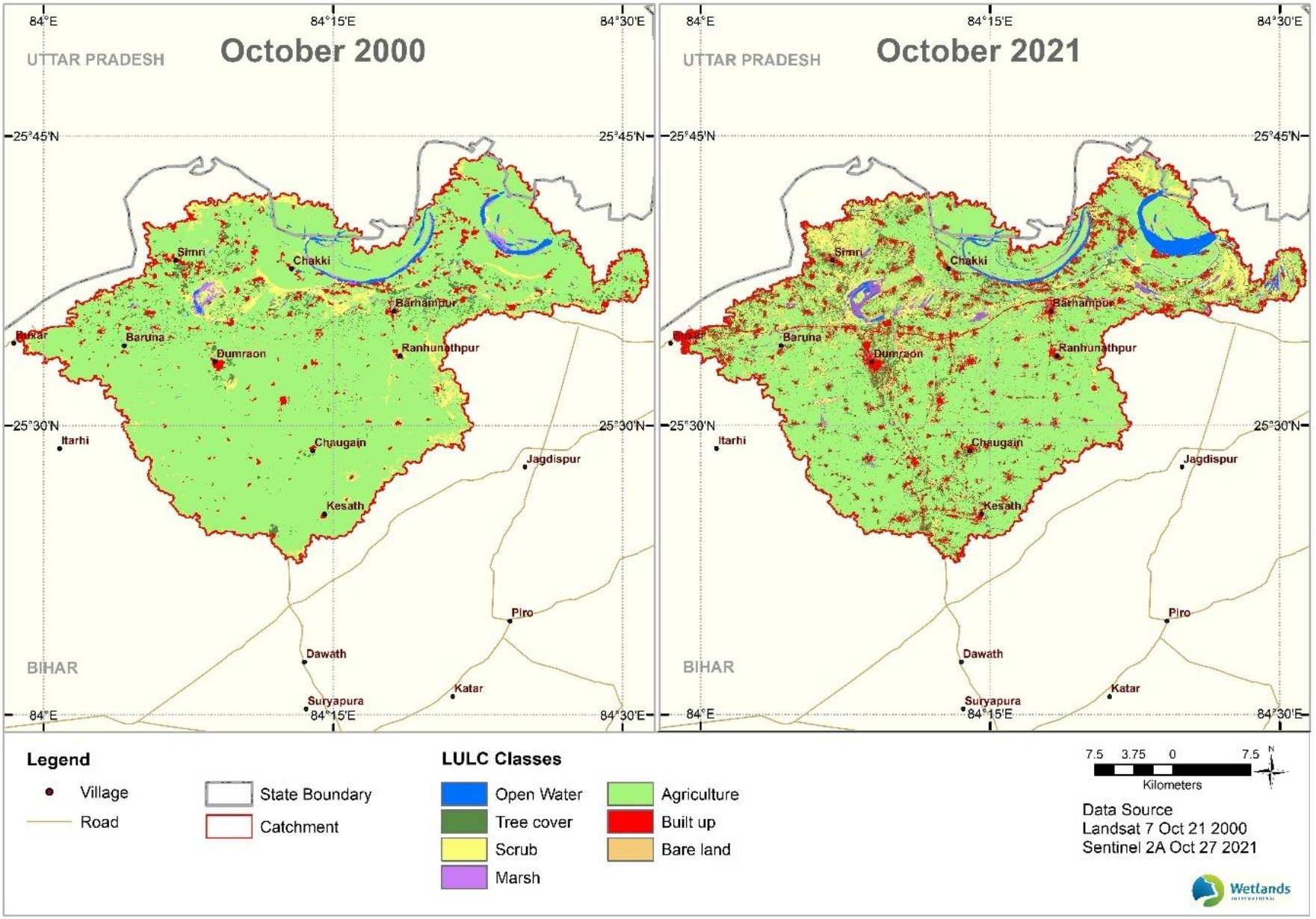
Table 3 Long-term changes in land use land cover of the catchment of Gokul Jalashay wetland complex (in ha)

	2000	**2021**
Wetlands (including streams)	1129	2287
Tree cover	2801	8106
Scrub	5382	9631
Marsh	991	2649
Agriculture	86347	66965
Built up	3448	7946
Bare land	348	2749
Total		

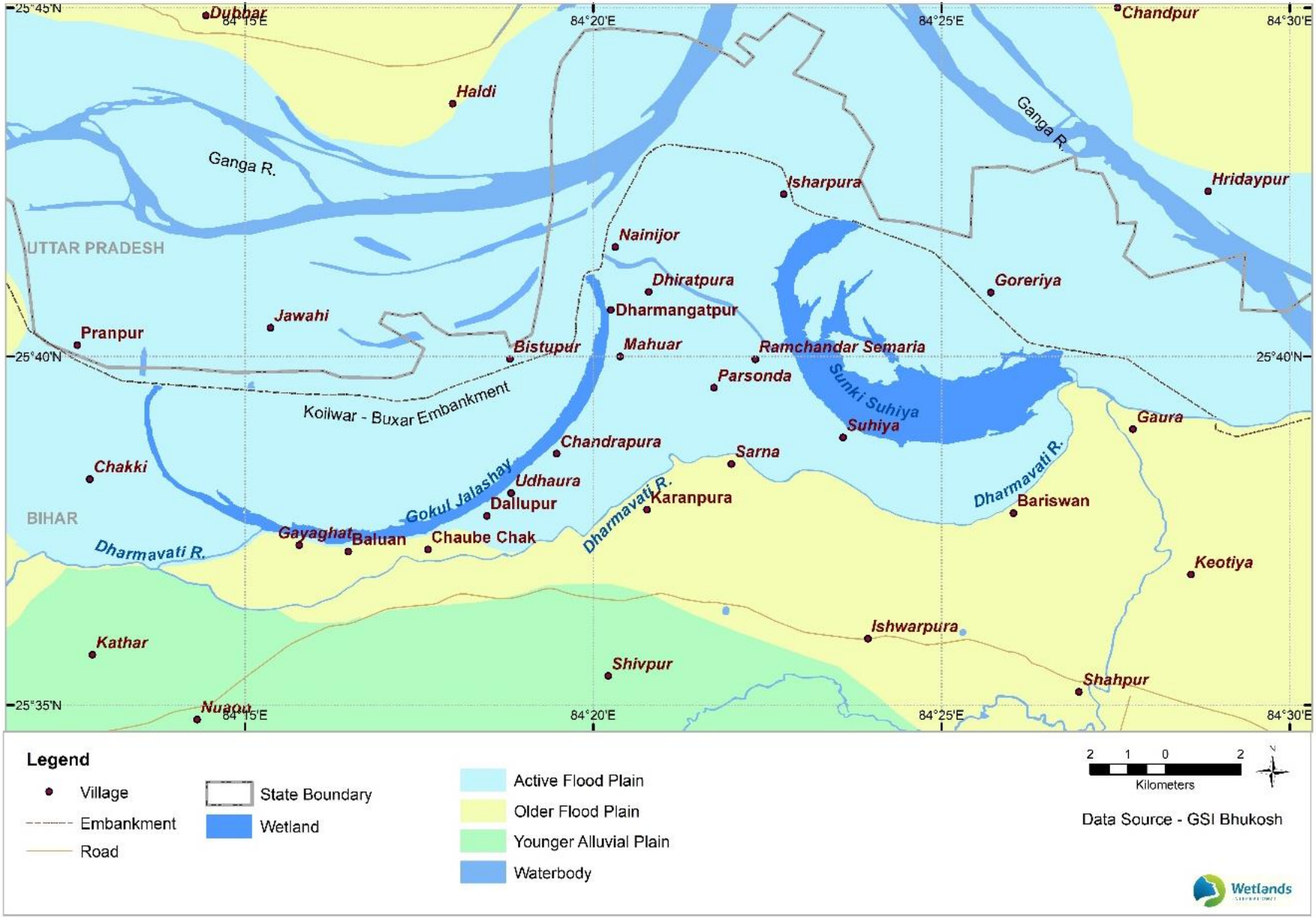
Geology and geomorphology

Wetland formation processes in the Ganga floodplain region are linked with river meandering and aggradation. The sediment accumulation rates generally exceed the subsidence rates, leading to the aggradation of river beds. River aggradation is intermittently interrupted by fluvial impulses creating meanders, leading to oxbow wetland formations. Channel movement through avulsion and cut-offs are characteristic features of most rivers of the Ganga system, although with a difference in scale and frequency. Extending for about 200 km from the hills of Peninsular India in the south to the foothills of the Himalayas in the north, Gangetic plains are one of the largest areas of quaternary sedimentation in the world. The Ganga River is one of the world's largest sediment dispersal systems transporting an extremely high suspended sediment load of 356×10^6 t year^{-1}. The predominant geological formations within the wetland complex are quaternary alluvium consisting mainly of sand of various grades, silt, and clay (Map 5).

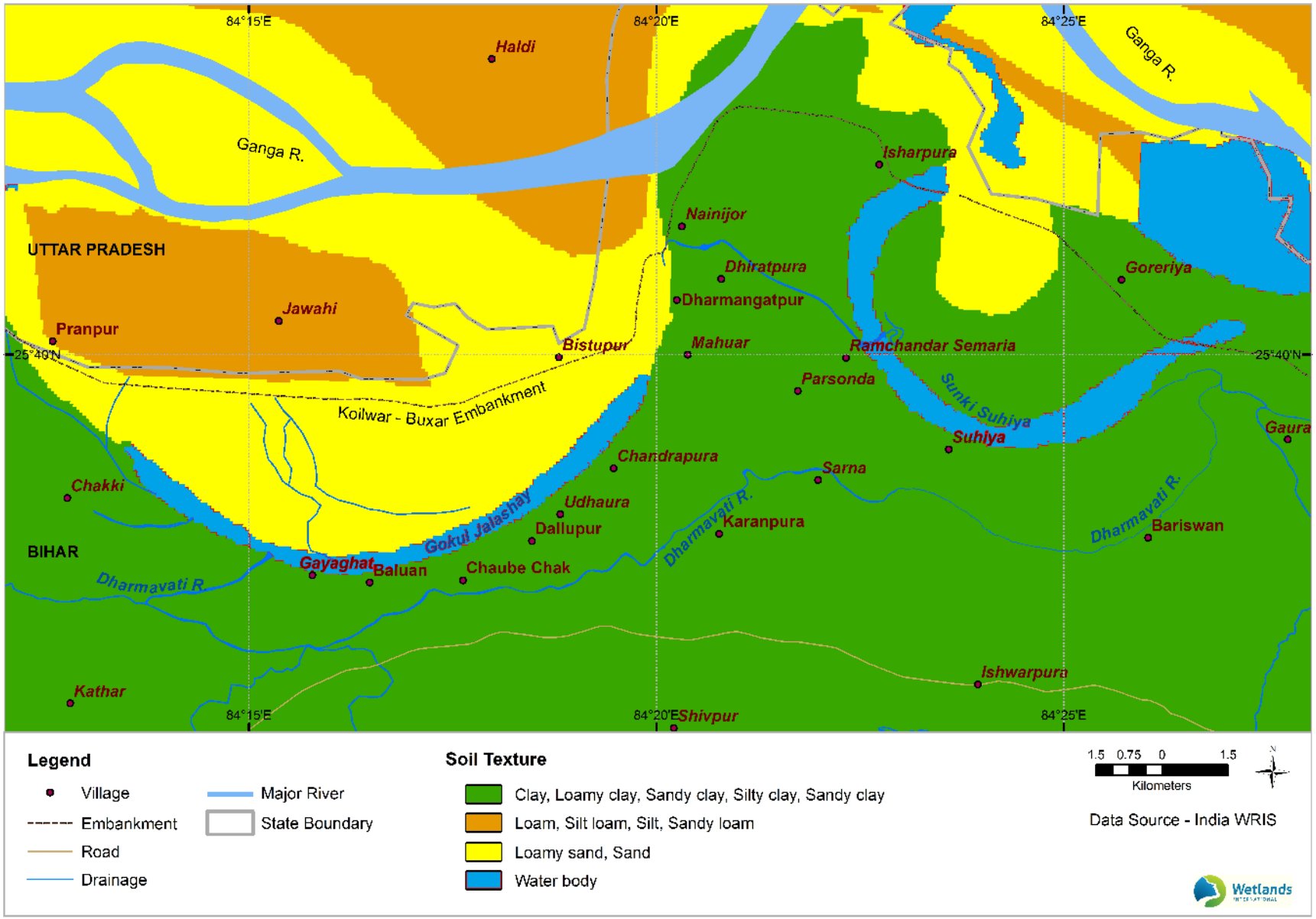
The major fraction of the soil type within the wetland complex consists of loamy sand brought through the flood pulses of river Ganga. The southern periphery of the wetland complex mostly has clay deposition with various characteristics such as loamy clay, sandy clay, and silty clay (Map 6).



Map 4: Long-term changes in land use land cover within the catchment of the Gokul Jalashay wetland complex



Map 5: Geomorphology of the Gokul Jalashay wetland complex and its surrounding areas



Map 6: Soil characteristics of Gokul Jalashay wetland complex and its surrounding areas

Climatic set-up

Gokul Jalashay wetland complex experiences a monsoon-influenced humid subtropical climate characterised by hot summers and cold winters. Summers last from early April to late June and are extremely hot. The monsoon arrives in late June and continues till the middle of September. Temperatures drop slightly, with plenty of cloud cover but with higher humidity. May is the warmest month of the year. The temperature in May averages 32.8°C. In January, the average temperature is 15.9°C. It is the lowest average temperature of the whole year. The average annual temperature is 25.6°C. The rainfall averages 1172 mm. The driest month is November, with 5 mm of rain. The highest precipitation falls in July, with an average of 344 mm (Figure 2)

Hydrological set-up

Gokul Jalashay complex is yet to be subjected to systematic hydrological monitoring. The Water Resources Department, Government of Bihar maintains two monitoring stations in the Ganga basin in the Bhojpur district. Central Water Commission (CWC) manages three monitoring stations in the Ganga basin in the Bhojpur district and two monitoring stations in the Buxar district. However, the monitoring system for the overbank flows from river Ganga to the wetland complex is still lacking.

Field assessment was done by the team of Wetlands International South Asia to understand the hydrological regime of the wetland complex. Inlets and outlets of both Gokul Jalashay and Sunki Suhiya were identified, and a flow rate assessment was done for February and June 2022. The depth and extent of water level at different locations were identified to understand the water storage capacity of the wetland complex. A water quality assessment was carried out by the PHED department of Buxar at relevant sampling points within the wetland.

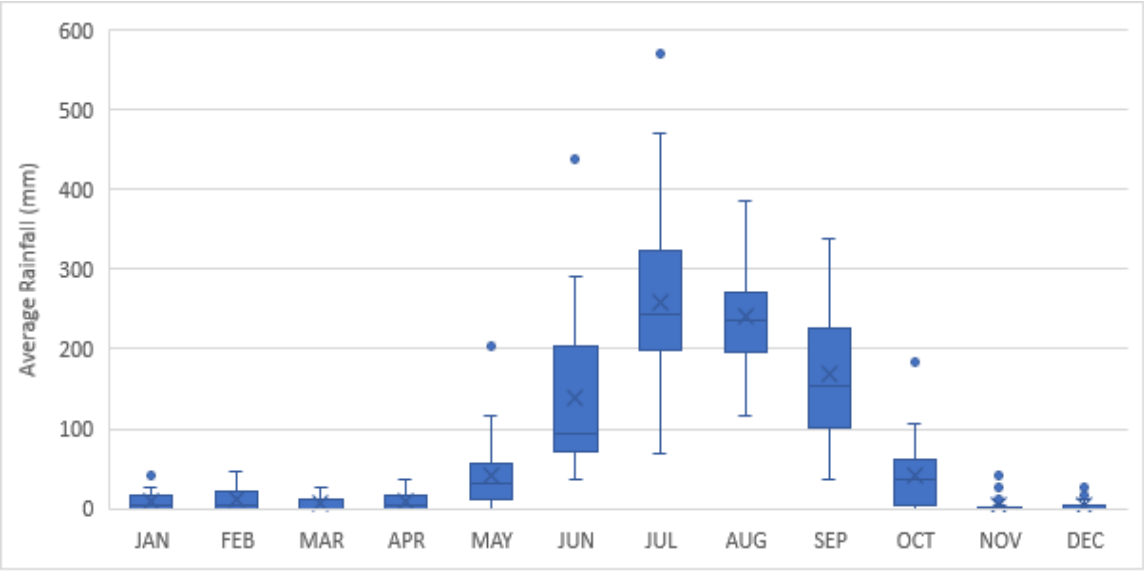


Figure 2: 30-year average monthly rainfall of Buxar district (1991-2021)

Connectivity of River Dharmawati with Gokul Jalashay at Gaighat (25°37'32.4"N 84°15'14.2"E)

Inflows and Outflows

Inflow sources of the Gokul Jalashay include discharge from the Dharmawati river, direct precipitation, groundwater flow, and bank inundation of River Ganga. Field assessments of major inflows and outflows were conducted in June 2022. The dry period inflow from the Dharmawati river to Gokul Jalashay has been observed to be 3.4 m3/s. The total catchment area of the wetland complex is about 1003 square kilometers. The average annual rainfall of the Buxar district for the period of 1981-2021 is 898.3 mm. About 89% of the annual rainfall in the district is received during the monsoon period. The total peak inflow from the catchment of the wetland complex has been calculated by Dicken's formula:

*Qp = C*A^(3/4)*

For the Northern Indian plains, the value of C is 6
Therefore, peak discharge from the catchment is estimated to be around 1069 m3/s.

Gokul Jalashay lacks physical drainage or outlet, limiting the outflow to evapotranspiration and groundwater recharge and abstraction. However, during the peak flood events, the occasional backflow from the wetland to the Dharmawati river and discharge from small culverts constructed on the Koilwar-Buxar embankment acts as an outflow.

The inflow of Sunki Suhiya comes from the catchment runoff of the Dharmawati river, direct rainfall, groundwater, and bank inundation of River Ganga. The outflow of Sunki Suhiya is mainly through discharge to the Dharmawati river, groundwater recharge, and evapotranspiration.

The average annual discharge of River Ganga is about 16,650 m^3/s. Overbank flows from River Ganga during the flood events recharge the wetland leading to water availability all year round. The last such event was observed during the flooding event of August 2021. However, this is not the perennial source of water to the wetland and occurs only during extreme events. Bankful inundation occurs through a broken embankment at Nainijor which acts as a source of surface water to the wetland.

Connectivity

The historical connectivity between Gokul Jalashay and Sunki Suhiya at Nainijor village (25°41'14.7"N 84°20'04.2"E) has been completely lost due to the construction of the Nainijor Brahampur road. The present connectivity between these wetlands is through the Dharmawati River which passes through the southern periphery of both wetlands. The river also acts as a source of water for both the wetlands and meets Gokul Jalashay at Gaighat village and Sunki Suhiya at Chamarpur village.

Similarly, the surface connectivity of the wetland complex with the River Ganga has been obstructed by the establishment of a Buxar-Koilwar embankment which is an earthen bund. Flood-prone villages lying between the wetland and river Ganga are Jawahi, Jawahi Diyar, Pranpur, Mainpur, Manipur, Kalyanpur, Bishupur, Bairia, Chakhani, Ekdar, Sapahi. Although the embankment has multiple culverts to allow water movement, the flow through these passages is minimal as the spans are very small.

The major overbank flow has been observed through a broken stretch of the embankment at Nainijor village. The embankment breach is almost 250 meters long from where the flood water enters the Sunki Suhiya wetland and inundates the nearby villages. After inundating villages, flood water enters the Gokul Jalashay wetland at Mahuar village. The inundation leads to the hydrological connectivity between River Ganga, Sunki Suhiya, Dharmawati river, and Gokul Jalashay, making it a single hydrological system.

Embankment breach of approx. 250 m at Isharpura village (Flood water enters from River Ganga to Sunki Suhiya-25°41'57.8"N 84°23'37.9"E)

Moreover, there are four earthen roads and three concrete over-bridges within the Gokul Jalashay wetland, which restricts the water flow within the wetlands.

Water holding capacity

The peak inundation in the wetland complex is 1768 ha (448 hectares for Gokul Jalashay and 1320 hectares for Sunki Suhiya (Source: Global Surface Water Explorer and SAC, ISRO). The elevation profile of the wetland was derived from Google Earth. The average depth of the Gokul Jalashay and Sunki Suhiya was calculated to be approx. 1.5 meters and 1.2 meters, respectively (Figure 3 and Figure 4).

Figure 3: Elevation profile of the center of the open water area within Gokul Jalashay wetland (Source: Google Earth Pro)

Figure 4: Elevation profile of the center of the open water area within Sunki Suhiya wetland (Source: Google Earth Pro)

The water holding capacity of the Gokul Jalashay and Sunki Suhiya wetlands was calculated to be around 6.72 MCM and 15.84 MCM, respectively.

During flooding events, the higher wetland region also stores the inundated water creating a flood buffer for nearby villages. As flooding is a major issue in Bihar, the capacity of the wetland complex to buffer floods and act as a sponge is crucial for building flood resilience. During interviews, communities indicated that the flood level can reach up to several meters depending on the rainfall intensity.

Water quality

The water quality of the wetland complex is mainly affected by the inflow water quality of domestic wastewater, Dharmawati river, and bank inundation, including sediments from the River Ganga. During the field visit, it was observed that untreated domestic wastewater is being discharged to the wetland through small drains. Nutrient enrichment through agricultural runoff is also one of the potential threats to the water quality of the wetland complex. Excess nutrients usually lead to eutrophication leading to algal bloom in the wetland complex. A few patches of wetlands face the problem of excessive growth of invasive species, hydrilla, and water hyacinth. Moreover, solid waste dumping, which was sighted at various stretches of the wetland, is also a water quality threat.

Water samples were collected and tested by the PHED department during the month of February and July 2022. A summary of the analysis has been attached in annex 1. pH was observed to be within the permissible limit of 6.5 to 8.5. Similarly, total dissolved solids were in the range of 164 mg/l (at Gaighat) to a maximum of 254 mg/l (at the outlet of the stormwater drain). The availability of nutrients was observed to be adequate to support overall productivity in the wetland. Nitrate and Sulphate also were found to be within permissible limits.

The concentration of Total Coliform, an indicator of faecal contamination, was found to exceed the permissible limit at all the sampling points making the water unfit for drinking and domestic purposes. Numerous studies have reported arsenic contamination of groundwater in the Buxar district (Kumar et al., 2016; Kumar et al., 2021; CGWB, 2013). However, the assessments by PHED indicated that arsenic concentrations in the surface waters of Gokul Jalashay were within the permissible limits of 0.01 mg/l.

(Left) Water hyacinth in Dharmawati river (Right) Untreated wastewater discharge in Gokul Jalashay at Gaighat

Species and Habitat

In February and June 2022, surveys were conducted to assess the floral and faunal species richness in the wetland complex. A total of 185 and 123 floral species were recorded in Gokul Jalashay and Sunki Suhiya respectively (Annex 2). A total of 146 and 63 faunal species were also recorded in Gokul Jalashay and Sunki Suhiya respectively (Table 4).

Table 4: Record of species at Gokul Jalashay and Sunki Suhiya and their conservation status

Gokul Jalashay			**IUCN Conservation Status**						
		No of Species	**CR**	**EN**	**VU**	**NT**	**DD**	**LC**	**NE**
Flora	Phytoplankton	NA							
	Macrophytes	35						35	
	Plant types								
	Herb	24						24	
	Shrub	31						31	
	Tree	53						53	
	Climbers	NA							

Gokul Jalashay			IUCN Conservation Status						
		No of Species	CR	EN	VU	NT	DD	LC	NE
	Creepers	NA							
	Agricultural crops	43					12	31	
Fauna	Zooplankton	NA							
	Mollusc	3						3	
	Insect	3						3	
	Pisces	44							
	Amphibia	1							1
	Reptilia	24	2	1	4	4	2	11	
	Aves	59	1		1			57	
	Mammalia	14		1	1			12	
Sunki Suhiya									
Flora	Phytoplankton	NA							
	Macrophytes	23						23	
	Plant types								
	Herb	19						19	
	Shrub	17						17	
	Tree	25						25	
	Climbers	NA							
	Creepers	NA							
	Agriculture crops	39					11	28	
Fauna	Zooplankton	NA							
	Mollusc	NA							
	Insect	NA							
	Pisces	15						15	
	Amphibia	1							
	Reptilia	8						6	
	Aves	27						27	
	Mammalia	12						12	

CR-Critically Endangered; EN-Endangered; VU-Vulnerable; NT-Near Threatened; DD-Data Deficient; LC-Least Concern; NE-Not Evaluated (as per IUCN Red List ver 15.1); NA- Not Assessed

Floral species

The floral composition of the Gokul Jalashay wetland complex includes 35 aquatic species. Emergent macrophytes form 35% of the total aquatic species in the wetland complex. Free-floating macrophytes constitute 24% of the species recorded. *Eichhornia crassipes, Hydrilla verticillata, Nelumbo nucifera, Phragmities sp*. and *Sagittaria sagittifolia* are the dominant macrophytes. *Saccharum spontaneum*, *Imperata cylindrica*, and *Cyperus rotundus* were observed on the wetland margins, these act as good soil binders (Table 5).

Table 5 Macrophyte composition of Gokul Jalashay wetland complex

Wetland	Floating macrophytes		Submerged macrophytes		Emergent macrophytes
	Rooted macrophytes	Free-floating macrophytes	Rooted Submerged	Free submerged	Emergent macrophytes
Gokul Jalashay	8	8	5	1	12
Sunki Suhiya	2	8	5	0	8

Terrestrial tree species such as *Butea monosperma*, *Tamarindus indicus*, *Madhuca longifolia*, and *Borassus* flabellifer show the old formation of land representing plateau character growing on the periphery of the wetland. Species such as *Anthocephalus indicus*, *Bombax ciba Gmelina arborea*, *Terminalia arjuna*, and *Leucaena leucocephala* are suitable for the breeding of birds and harbour diverse animal life on them. Bamboos especially are important plants supporting small birds like flycatchers, and warblers and providing habitat to snakes, monitor lizards, mongooses, porcupines, and others. Eichhornia, Ceratophyllum, Hydrilla and Parthenium are the major plant invasives recorded within the wetland complex.

Faunal species

The occurrence of faunal species was documented based on direct sightings during field visits (conducted during February and June 2022) by the team of Wetlands International South Asia and Mandar Nature Club. The assessment indicates the presence of at least 146faunal species, which include 44 fish, 59 birds, and 24 reptiles. Of these, 4 species (*Varanus bengalensis*, *Gongylophis conicus* , *Eryx johnii* , *Python molurus*) are classed as near threatened, 2 (*Platanista gangetica, Nilssonia gangetica*) as endangered, and 36 (*Lutrogale perspicillata* , *Crocodylus palustris* , *Oligodon arnensis* , *lissemys punctate, Pangshura tecta*) vulnerable and 2 critically endangered (*Gavialis gangeticus, Batagur dhongoka*) as per the IUCN Red list (Figure 5)

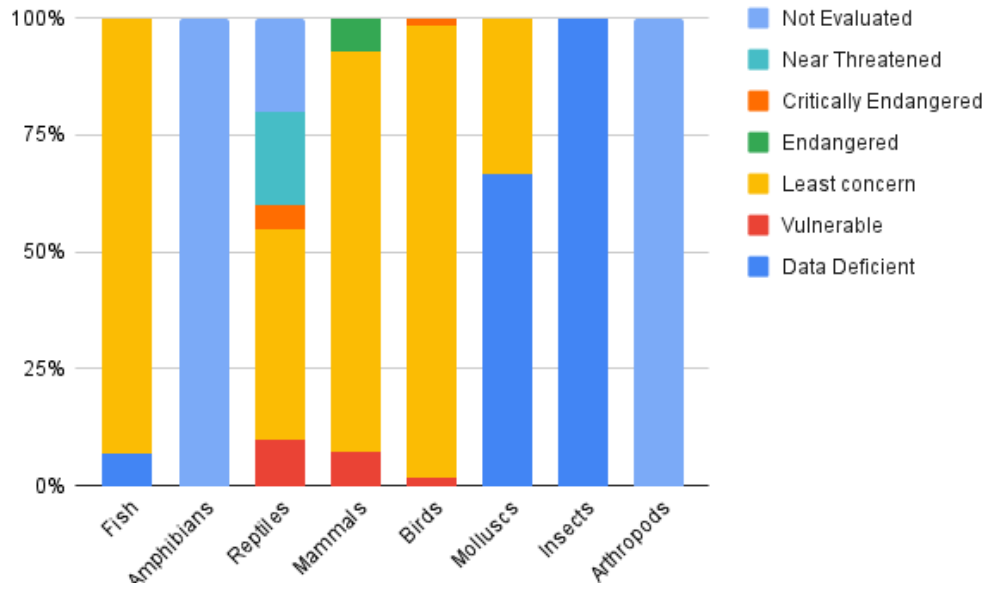
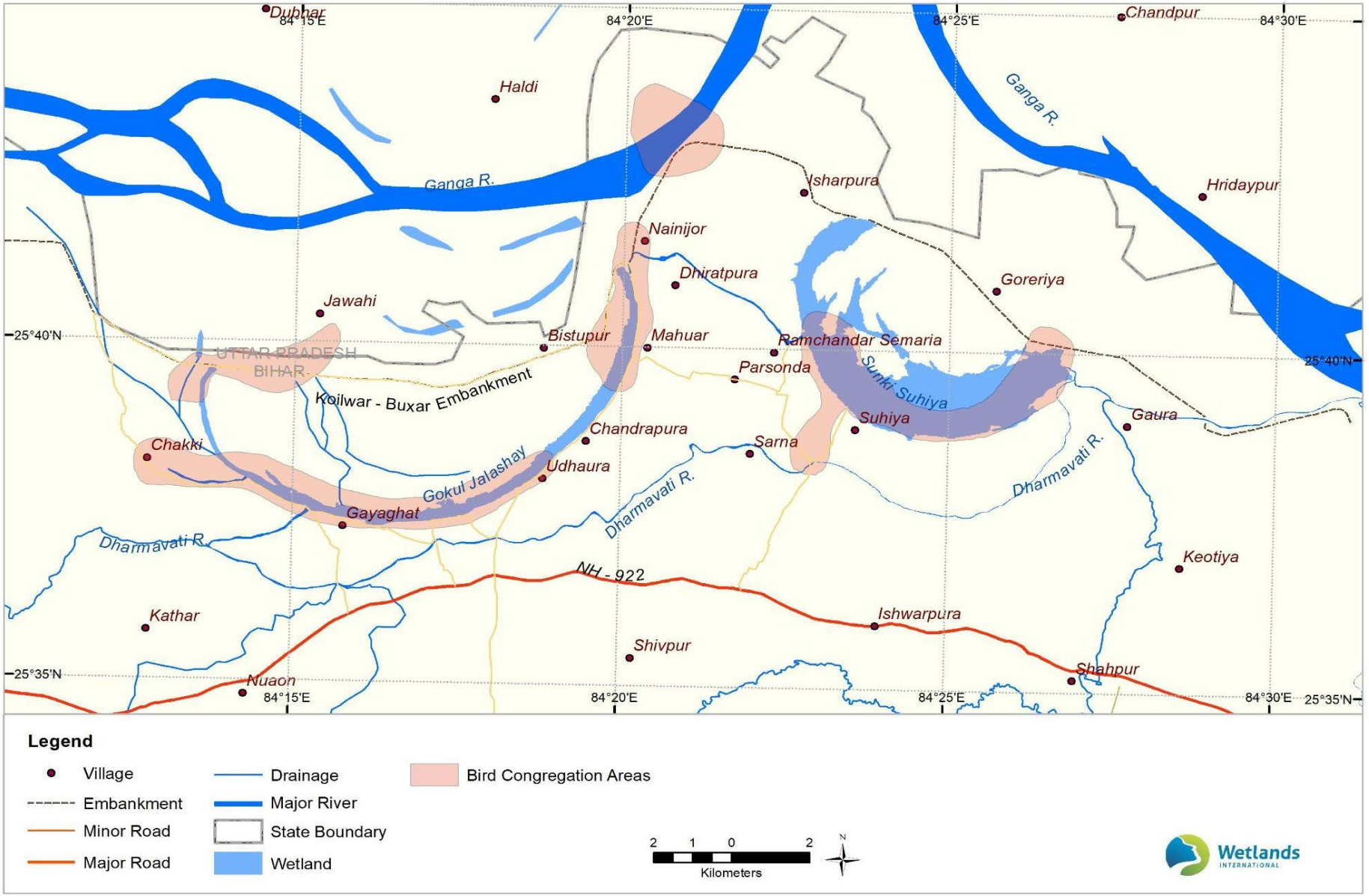


Figure 5: Faunal Distribution of Gokul Jalashay

Black headed Ibis at Gokul Jalashay wetland

The Gokul Jalashay wetland complex is a habitat for at least 44 species of 30 genera and 16 families. These include 31 ornamental species, and 3 of recorded medicinal value (*Clarias batrachus, Heteropneustes fossilis, Anabas testudineus*) species (Suday Prasad et al., 2020). The major fish species include *Labeo rohita*, *Catla catla,Wallago attu, Tengara mystus*, *Telapia Sp.,Puntius sp., Cololabis adocetus, Cirrhinus mrigala, Anabas testudinus and Amblypharyngodon mierolepis*. The Gokul Jalashay wetland gradually slopes towards the north to a shallow zone, marshy land, and mudflats consisting of the growth of small plants and shrubs surrounded by cultivable land. The diverse habitat sufficiently provides food and hide to the foraging and roosting birds and the breeding habitat to the resident birds. This habitat is most suitable for swimming and diving birds like anatids (ducks), rails like coot and moorhens, jacanas, grebes, and the waders like sandpipers and species from similar groups. About 48 bird species from 31 families were sighted in Gokul Jalashay in February 2022. The total count remained at 850. During June 2022, 2406 birds of 59 species were spotted. The bird congregation area of Gokul Jalashay stretches from Chakki to Udhaura and Mahuar to Nainijor. For Sunki Suhiya the bird congregation area was identified to be from Chamarpur to near Shonvarsha (Map 7)

There are records of at least 14 mammal species. Seven of these were sighted during field surveys in June 2022. *Antilope cervicapra, Boselaphus tragocamelus* are frequently encountered around Gokul Jalashay. This species is categorised as threatened in the IUCN Red List. There is, however, no official record of the actual number of blackbucks and no survey has been done to count their population in Buxar. The presence of *Hystrix indica*, *Paradoxurus hermaphroditus, Lutrogale perspicillata, Calotes versicolor* and *Varanus bengalensis* have been reported in Gokul Jalashay wetland and nearby areas. Farmers of the region adjoining the wetlands reported frequent crop raiding by wild boar and langur.



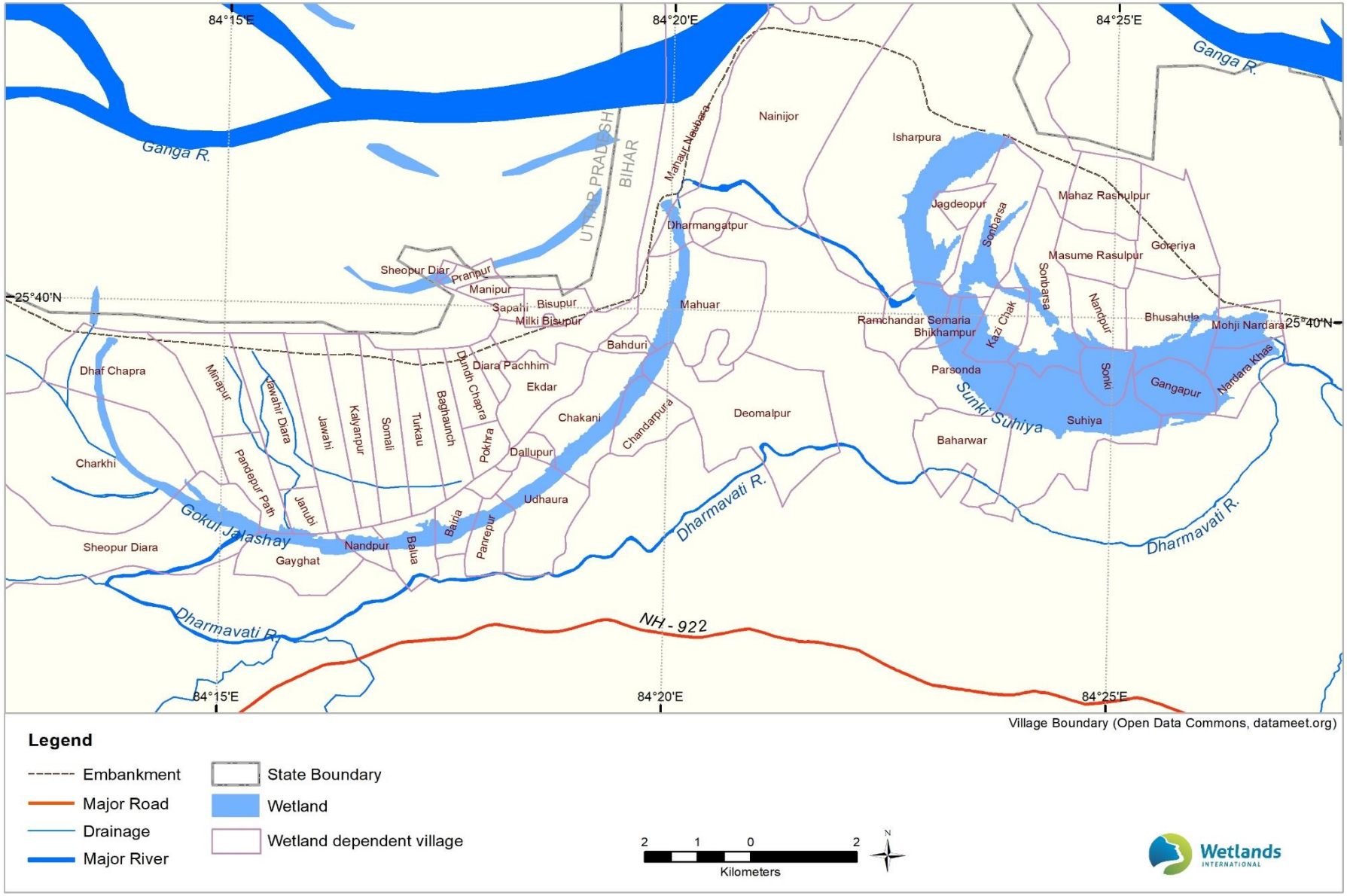
Map 7: Bird congregation areas of Gokul Jalashay wetland complex

The region has a high density of snakes, and nearly 300 people are reported to die of snakebites in Buxar every year, mostly from the bites of Common Krait (*Bungarus caeruleus*) and Cobra (*Ophiophagus sp.*). A total of 14 species of snakes were reported from the region surrounding the wetland complex. Out of which 11 of them are non-venomous species.

Wetlands Ecosystem services and Livelihoods

Focus group discussions were held in February and June 2022 to understand the resource linkages and livelihood connections with Gokul Jalashay and Sunki Suhiya wetlands. Communities place a high value on water regulation, providing water during droughts, and erosion regulation by the wetland complex. A total of 56 villages are situated on the margins of Gokul Jalashay and Sunki Suhiya under the Barhampur and Chakki blocks of Buxar District and Sahpur block of Bhojpur district (Map 8 and Annex 3). The total population of Brahmpur and Chakki blocks associated with Gokul Jalashay wetlands is around 238,325 comprising 114,519 females and 123,807 males. Similarly, the Shahpur block associated with the Sunki Suhiya wetland has a population of around 212,253 out of which 111,884 are male and 100,369 are female.

Focus group discussion with Brahampur Prakhand Matasyajivi Sahyog Samiti Limited at Mahuar



Map 8: Wetland dependent villages

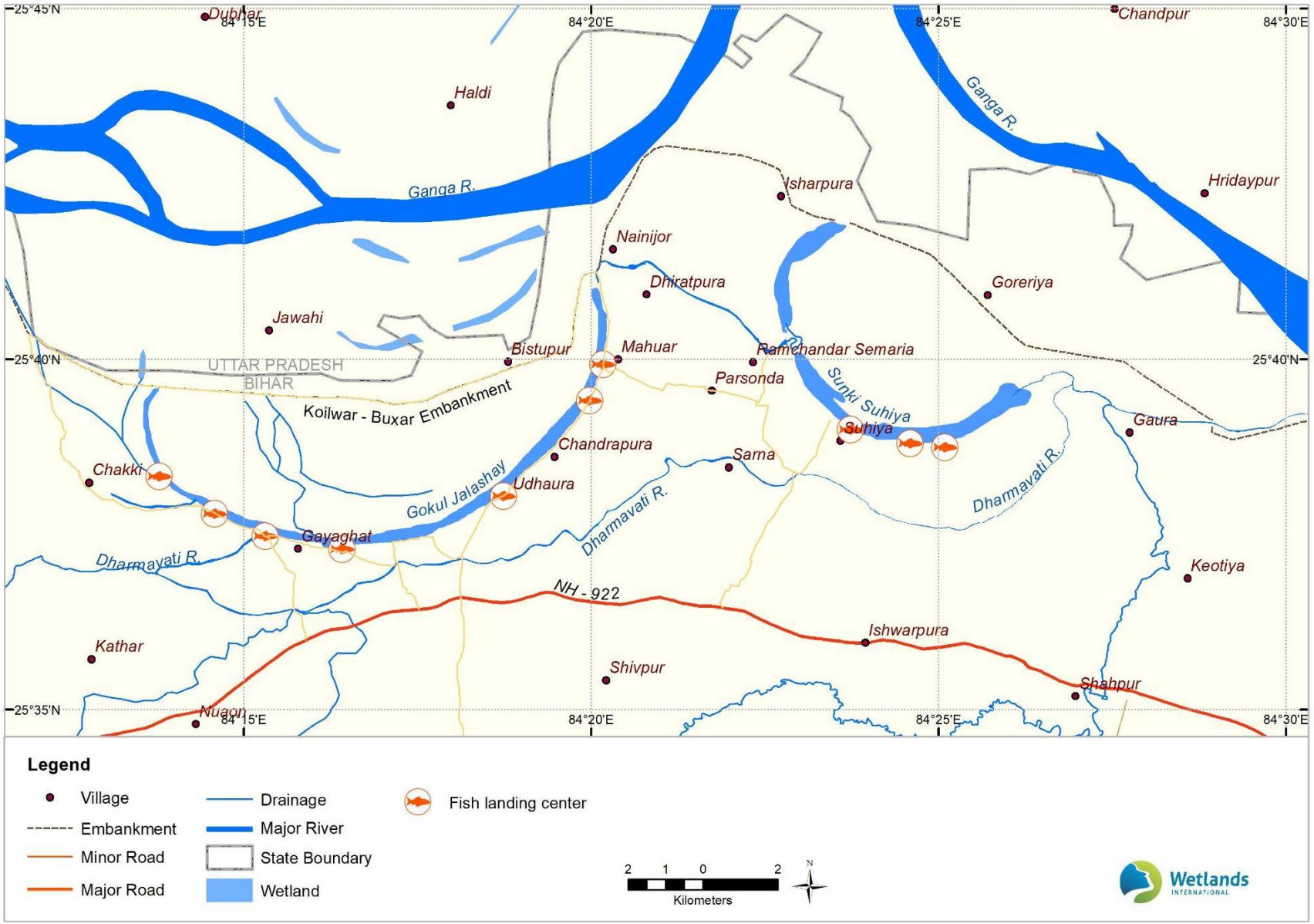
About 60–70 % of people secure their employment in agriculture and fishing around Gokul Jalashay wetland complex. In the Barhampur block, 60.4% of people rely on work or services for more than six months to support their families, and for the remaining time, they are engaged in daily labor. There are 13,877 agricultural laborers and 13,767 cultivators in Barhampur block. Similarly, In Chakki, 70.3% of workers have jobs or earnings for 6 months or more whereas 29.7% of workers are engaged in marginal activity which provides them a living for less than 6 months. In Chakki, 3,098 people worked as cultivators and 1,876 as farm labourers. In Shahpur 65.4% of workers have stable earnings for over 6 months and the rest are involved in a marginal activity that provides them livelihood for less than 6 months. In Shahpur there are around 591 cultivators and 1,320 agricultural labourers.

Fisheries

The fishery is one of the major livelihoods in the Gokul Jalashay wetland complex. The annual fish production of Gokul Jalashay and Sunki Suhiya is around 56 tonnes (Annex 4) and 40-45 tonnes respectively. Around 800 families depend on fisheries within the wetland complex. According to members of the fisher co-operative revenue generated by fisheries from Gokul Jalashay is about 60-80 lakhs per year and from Sunki Suhiya is about 40-60 lakhs per year. Fishing is done with two types of conventional gear, i.e., drag net and cast net. 2 fisher cooperatives are working under a lease of the fisheries department for catching fish from the Gokul Jalashay and Sunki Suhiya wetlands. Brahampur Prakhand Matasyajivi Sahyog Samiti Limited formed in 1976 has 451 registered members and is currently operating 143 fishing boats to catch fish in Gokul Jalashay. Another cooperative named Sahpur Prakhand Matasyajivi Sahayoug Samiti Limited has around 350 registered members who are involved in fisheries in Sunki Suhiya.

Major fish landing sites of the wetland complex are Chakki, Gaighat, Udaura, and Suhiya (Map 9). Communities rely on wetland water for irrigation purposes. Boating is also one of the livelihood alternatives in Gokul Jalashay used to transport vegetables grown in the wetland complex. 10 families derive their livelihoods from this.

Fish market at Brahmpur



Map 9: Important fish landing sites at Gokul Jalashay and Sunki Suhiya wetland

Agriculture

Apart from fisheries, the wetland complex is also used for agriculture. A total of 43 crops have been identified to be grown in Gokul Jalashay in a single season including paddy, maize, wheat, barley, etc (Annex 5). Similarly, around 39 types of crops have been observed to be grown in Sunki Suhiya. A list of all the species grown in the wetland complex has been attached in. Moreover, the local communities use shrubs and grasses of wetland as fodder and fuelwood. Species like Garar *Leersia hexandra*, Ghass *Sacciolepis myosuroides*, and Mootha *C. iria* are used as fodder. Moreover, dried Kans ghass (*Saccharum spontaneum*), Narkat *Phragmites karka*, and *Mootha C. iria* are extensively used as thatch roofs.

Cultural significance

The wetland is revered because of its historic connections with the river Ganges. Owing to its cultural importance, the wetland is central to socio-cultural practices such as cremation, tonsure, marriages, Chahath puja, and other spiritual and cultural events. Lord Rama temple located in Udhaura village is considered a sacred place and is visited by thousands of devotees from different parts of India (Map 10).

Mustard cultivation at the fringes of the Gokul Jalashay wetland

Map 10: Sites with high cultural and tourism importance near Gokul Jalashay wetland complex

3. Ecological character description

Wise use of wetlands requires “maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development”. This entails defining ecological character through the assessment of ecological, hydrological, socio-economic, and institutional features related to wetlands and the identification of those essential ecological and hydrological functions which ultimately secure the provision of ecosystem services.

The definition of ecological character is the description of components, processes, and ecosystem services at a given time. Ecological character definition allows the identification of components, processes, and services, and identifies required management intervention.

Changes in the ecological character of the wetlands exceeding the natural variation indicate unsustainable use of the site that can lead to disruption in its hydrological, ecological, and biological functioning (Ramsar Convention 1996, Resolution VI.1).

The following definitions have been used to describe the ecological character components, processes, and services:

Ecosystem components- The living (biotic) and non-living (abiotic) constitute a wetland ecosystem.

- Geomorphic setting (landscape, catchment, river basin)
- Climate (precipitation, wind, temperature, evaporation, humidity)
- Physical setting (areas, boundaries, topography, shape, bathymetry, habitat type, and connectivity)
- Water regime (inflow, outflow, balance, surface-groundwater interactions, inundation regime, tidal regime, quality)
- Wetland Soil (texture, chemical, and biological properties)
- Biota (plant and animal communities)

Ecosystem processes -

- Processes that occur between organisms and within and between populations and communities, including interactions with the non-living environment, result in an existing ecosystem state and bring about changes in ecosystems over time.
- Physical processes (water stratification, mixing, sedimentation, erosion)
- Energy – nutrient dynamics (primary production, nutrient cycling, carbon cycling, decomposition, oxidation-reduction)
- Processes that maintain animal and plant population (recruitment, migration)
- Species interaction (Competition, predation, succession, herbivory)

Ecosystem services-

Benefits obtained by humans from ecosystems

- Provisioning (fisheries, use of aquatic vegetation for economic purposes, wetland agriculture, biochemical products)
- Regulating (maintenance of hydrological regimes)
- Cultural (recreation and tourism, spiritual, scientific, and educational value)

Gokul Jalashay wetland complex is a riverine wetland, the functioning of which is governed by flood pulses of River Ganga, as well as the catchment inputs derived from the seasonal Dharmawati River. Like other riverine wetland ecosystems, the Gokul Jalashay wetland complex has its character driven by the hydrology of its associated river as well as by the changes in the land use and land cover within its catchment. The variation in the land use land cover of the wetland complex is mainly driven by the water extent of the wetland complex. The seasonal variation in the ecosystem of the wetland complex includes an increase in marshes and agricultural areas during the pre-monsoon period and increased inundation during the post-monsoon period. Apart from the water collected from its catchment, the hydrological regime of the wetland complex is also governed by the characteristics of the upstream Gangetic catchment. Therefore, regular flow monitoring of the river Ganga becomes imperative in terms of managing the hydrology of the wetland complex. Ecosystem components and processes taking place within the wetland complex that plays a major role in the maintenance of ecological character and in providing services to the community are fish migration from river Ganga, flood buffering capacity, and wetland vegetation.

The key values of the Gokul Jalashay wetland complex are:

- As a flood buffer for the community living around it
- As a major source of fish
- As a mosaic of habitats
- As a source of groundwater recharge
- As a cultural destination

The following key ecosystem components and processes are critical to sustaining its diverse values:

- Connectivity with river Ganga and Dharmawati
- Maintenance of storage capacity
- Regulation of sedimentation from river Ganga
- Maintenance of water quality
- Conservation of wetland plants and animals
- Maintenance of migration of fishes from river Ganga

Status and trends in components, processes, and services

Table 6: Ecological character description of Gokul Jalashay wetland

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
Ecosystem components					
1. Physical form					
1.1 Area	Hectare (Ha)	Gokul Jalashay- 390 ha Sunki Suhiya -1110 ha	Gokul Jalashay- 387 ha Sunki Suhiya- 239 ha	Area under open water and marsh (Global surface water explorer 2000 and 2021, National Wetland Atlas,2007)	The wetland area has remained largely stable in the last 20 years. The area under inundation has increased, while marshy areas have declined.
1.2 Bathymetry	MCM	The storage capacity of Gokul Jalashay and Sunki Suhiya is approximately 6.72 MCM and 15.84 MCM with an average depth of 1.5 meters and 1.2 meters respectively	Not Available	Global surface water explorer,2020	While no previous bathymetric surveys are available, there is a considerable reduction in depth in select patches.
1.3 Shape		Crescent-shaped (Ox-bow)	Crescent-shaped (Ox-bow)	Physical observations and remote sensing imagery 2022	Has remained unchanged in the last 20 years
2. Wetland Soils					
2.1 Texture		Clay, Loamy clay, sandy clay, and silty clay near the	Not Available	WRIS, 2022	Not assessed in absence of data

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
		southern part of the wetland while loamy sand and sand texture are found near the southern part of the wetland			
2.2 Chemical properties		Assessment yet to be carried out	Not Available		Not assessed in absence of data
2.3 Biological properties		Assessment yet to be carried out	Not Available		Not assessed in absence of data
3. Physico-chemical water					
3.1 Nutrients	mg/liters	Nitrate- 15-25 mg/l	Not Available	PHED Buxar, June 2022	While there are no quantitative assessments, there has been a considerable increase in the use of chemical fertilizers within the catchments, thus increased nutrient levels are highly likely.
3.2 Conductivity	Microsiemens per centimeter (uS/cm)	Gaighat- 390.8 Baluan- 323.1 Sapahi- 304.6	Not Available	PHED Buxar, June 2022	Same as above
3.3 Cations and anions	mg/liters	Calcium Gaighat- 16 Baluan- 16 Sapahi- 48 Suhiya- NA Magnesium	Not Available	PHED Buxar, June 2022	Same as above

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
		Gaighat- 25 Baluan- 24.96 Sapahi- 17.28 Suhiya- NA Sulfate Gaighat- 20 Baluan- 20 Sapahi- 30 Suhiya- NA Chloride Gaighat- 20 Baluan- 30 Saphi- 40			
3.4 pH		Gaighat- 7.5 Baluan- 7.4 Sapahi- 7.4	Not Available	PHED Buxar, June 2022	Not likely to change
3.5 Biological Oxygen demand		Assessment yet to be carried	Not Available	Data Deficient	
3.6 Total and fecal coliform	Presence (+ ve and - ve)	Gaighat Present Baluan - Present Sapahi - Present	Not Available	PHED Buxar, June 2022	Coliform presence is likely to have increased due to an increase in human and animal population and lack of appropriate sewage disposal facility
4. Biota					

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
4.1 Wetland plants	Count	Gokul Jalashay has nearly 179 floral species of which 44 are aquatic. In Sunki Suhiya 36 aquatic species have been recorded.	Not Available	Field assessment, June 2022	While there are no past trends regarding floral composition, threats such as habitat fragmentation, sedimentation, and agricultural practices within the wetland complex likely have implications on plant diversity.
4.2 Vertebrate fauna	Count	44 species	Not Available	June 2022	While there are no past trends regarding faunal composition, threats such as habitat fragmentation, sedimentation, and agricultural practices within the wetland complex likely have implications on faunal diversity.
4.2.1 Fish	Count	44 species	Not Available	June 2022	Same as above
4.2.2 Amphibians	Count	Information not available	Not Available	June 2022	Same as above
4.2.3 Reptiles	Count	12 snake species have been found in Gokul Jalashay	Not Available	June 2022	Same as above
4.2.4 Water birds	Count	45 Species	Not Available	June 2022	Same as above
4.2.5 Mammals	Count	9 Species	Not Available	June 2022	Same as above
5. Climate					

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
5.1 Precipitation	mm	The average annual rainfall in the district is 898.3 mm from 1981-2021	In the fifty years from 1951 to 2000, the highest annual rainfall amounting to 152% of the annual normal occurred in 1993	NASA Power, 2022	Monsoon rainfall is becoming concentrated over shorter periods, and non-monsoon rainfall is declining
5.2 Air temperature	Celsius (C)	The air temperature for the year 2021 was 25.59 C.	In 1981 the air temperature was observed to be 25.55 C with the highest wind temperature of 27.18 C recorded in the year 2010	NASA Power, 2022	No discernible trend.
5.3 Evaporation		Assessment yet to be carried out			
5.4 Wind	m/sec	The average wind speed for the Buxar district during 2021 was 1.97 m/sec	The average wind speed during 1981 was 1.99 m/sec with a maximum wind speed observed in the year 1989	NASA Power, 2022	No discernible trend
5.5 Humidity	Percentage (%)	The average relative humidity for the year 20201 was 61.62%.	Relative humidity for the year 1981 was 58.5% with a maximum observed relative humidity of 64.44 in the year 2008.	NASA Power, 2022	Relative humidity for the Buxar district shows an increasing trend for the period of 1981-2020.
6. Geomorphology					

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
6.1 Topography	Meters	The topographic map indicates elevation varies from 37m to 92m amsl within the catchment. As the wetland complex lies within the flood plain of the river Ganga, elevation changes within the complex are minimal.	Not Available	SRTM DEM data of Gokul Jalashay, June 2022	No discernible trend
6.2 Connectivity to surface waters		During the peak flow, flood pulses from River Ganga connect Sunki Suhiya with Gokul Jalashay. The flood water enters Sunki Suhiya through an embankment breach The permanent connectivity of the two wetlands is through the Dharmawati river.	Before the development of the Buxar-Koilwar embankment and Nainijor road, there was a clear connection between the wetland complex with the river Ganga.	Global Surface Water Explorer 1984-2020 and Field assessment,2022	There is a clear disconnectivity between the river Ganga and the Gokul Jalashay wetland due to the construction of the Buxar-Koilwar embankment. Nainijor road disconnects Gokul Jalashay from Sukhi Suhiya
6.3 Water sources		Major water sources are rainfall, flow from the Dharmawati river, and bank flows during extreme events	Before the construction of the Buxar-Koilwar embankment, the peak flow from river Ganga used to drain both Gokul Jalashay and Sukhi Suhiya	Field assessment and Survey, 2022	Water sources to Gokul Jalashay have been reduced as the connection of the wetland with the river Ganga has been lost. During extreme events, flood water from Sunki Suhiya enters Gokul Jalsahy

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
6.4 Soils		Soil type mostly comprises alluvium. Soil texture varies from clay, loamy clay, sandy clay, and silty clay in the northern periphery of the wetland complex. Within the Diara region situated between the river Ganges and the wetland, the soil texture varies from loam, silt loam, sandy loam, loamy sand, and sand.	Assessment by CGWB indicates majorly three types of soil within the wetland complex i.e., recent alluvium (levee soil), Tal soil, and old alluvium soil.	WRIS,2022 CGWB, 2013	While there is no past data to assess the trend, soil type within the wetland complex is mainly driven by the sediment flow from the river Ganga.
7. Hydrology					
7.1 Water balance	MCM	The water storage capacity of Gokul Jalashay and Sunki Suhiya wetlands has been calculated to be about 6.72 MCM and 15.84 MCM respectively.	Not available	Field assessment, Google Earth, 2022	While there is no past data to assess the trend, the water-holding capacity of the wetland complex has been likely to be affected by the sedimentation and fragmentation of the wetland complex.
7.2 Groundwater infiltration and seepage		Assessment yet to be carried out			

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
7.3 Surface-groundwater interactions		Assessment yet to be carried out			
7.4 Inundation regime	Hectare (Ha)	The maximum water extent of Gokul Jalashay and Sunki Suhiya is about 448 ha and 1320 ha respectively.	The area under water for the past duration of 1984-2020 indicates that the inundation regime be 546 ha for Gokul Jalshay and 1320 ha for Sunki Suhiya	Global Surface Water Explorer 1984-2020	Increasing ephemerality
8. Energy-nutrient dynamics					
8.1 Primary productions		Assessment yet to be carried out			
8.2 Nutrient cycling		Assessment yet to be carried out			
8.3 Carbon Cycling		Assessment yet to be carried out			
8.4 Decomposition		Assessment yet to be carried out			
8.5 Oxidation-reduction		Assessment yet to be carried out			
Ecological process					
9. Process that maintains animal and plant population					
9.1 Fish recruitment		The wetlands act as breeding and spawning grounds for major Indian carp, and several	Not available		No discernible trend

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
		ornamental species. Bank inundations are a major source of fish recruitment.			
9.2 Fish migration		Seasonal migration of fish takes place between river Ganga, Gokul Jalashay, and Sunki Suhiya through the Dharmawati river. The current fish migration from river Ganga to Sunki Suhiya also takes place through an embankment breach at Nainijor.	Not available	Survey, 2022	Although quantitative trends cannot be established. However, the construction of the Buxar-Koilwar embankment and its breach at Nainijor has significant implications for fish migration from the river Ganga to the wetland complex.
10. Species interaction					
10.1 Competition		Assessment yet to be carried out			
10.2 Predation		Assessment yet to be carried out			
10.3 Succession		Assessment yet to be carried out			
10.4 Herbivory		Assessment yet to be carried out			
11. Physical processes					
11.1. Stratification		Assessment yet to be carried out			
11.2. Mixing		Assessment yet to be carried out			

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
11.3. Sedimentation		A quantitative assessment is yet to be carried out. However, sedimentation from flood pluses of Ganga to Sunki Suhiya has been observed. The embankment breach at Nainijor has aggravated the direct sediment transportation from river Ganga to Sunki Suhiya	Not available	Field assessment, 2022	Although no past quantitative data is available, sedimentation has been significant in Sunki Suhiya due to an embankment breach at Nainijor. Satellite imagery shows a significant increase in bare land which is likely due to an increase in sand deposition from the river Ganga.
11.4. Erosion		Both wetlands are prone to erosion. However, Sunki Suhiya has been observed to be more affected by erosion. Quantitative assessment is needed to understand the extent and changes in erosion patterns.	Not available	Field assessment, 2022	The quantitative trend cannot be established due to a lack of historic data. However, erosion has been observed, especially in Sunki Suhiya.
Ecosystem Services					
12 Provisioning services					
12.1 Fisheries	Million Tonnes (MT)	Nearly 100 MT of fish has been collected annually	Not available	Field survey, 2022	Although quantitative assessments have not been

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
		from Gokul Jalashay and Sunki Suhiya wetlands.			done, as per community interviews, there has been no significant change in fish catch in the last 20 years
12.2 Wetland agriculture	Count	45 Villages depend on Gokul Jalashay and Sunki Suhiya for agriculture.	Not available	Field survey, 2022	The trend cannot be assessed due to a lack of historic data. Remotely sensed data reveals that agricultural area has decreased within the wetland extent due to an increase in inundation.
12.3 Use of aquatic vegetation for economic purposes	Count	Out of 44 aquatic species identified in Gokul Jalashay 3 species are used as food, 4 species are used for making thatched roofs or as fuel.7 species can be used as fodder, 3 ornamental, 13 species can be used as compost,16 species have medicinal values.	Not available	Field survey, 2022	There has been no major change in the availability of economically important plant species in the last 20 years
12.4 Biochemical products	Count	16 aquatic plant species have medicinal value.	Not available	Field survey, 2022	The trend cannot be assessed due to a lack of historic data.
13. Regulating services					

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
13.1 Maintenance of hydrological regimes	MCM	The water holding capacity of Gokul Jalashay and Sunki Suhiya combined is about 22.56 MCM which buffers flood pulses from river Ganges and river Dharmawati.	Not available	Field assessment and Google Earth Pro, 2022	The trend cannot be assessed due to a lack of historic data.
14. Cultural services					
14.1 Recreation and tourism		Ram Temple in Udaura, a village on the periphery of Gokul Jalashay has spiritual values that attract thousands of devotees.	Not available	No trend	The number of religious tourists visiting the area has significantly increased in the last 20 years
14.2 Spiritual		Spiritual activities such as mundan, marriage, cremation, idol immersion, Chhath puja, etc are performed within the wetland periphery.	Not available		The number of people visiting the wetland for spiritual activities has grown considerably in the last 20 years
14.3 Scientific and educational		World Wetland Day 2022 was celebrated at Gokul Jalashay by the Forest department Buxar along with Namami Gange Project Office, Buxar. Several school kids took part in the event and raised	Not available		Scientific and educational activities around the wetland have increased

Ecological Character Descriptor	Unit	Current Status (2020-22)	Historical records	Data assessment Source and Year	Trend
		awareness regarding wetland conservation using rallies, banners, and posters.			

Threats to ecological character

Based on the analysis of status and trends, the following factors of adverse change in ecological character have been identified. The management needs to address these risks through specific interventions.

Disconnectivity between Gokul Jalashay and Sunki Suhiya has affected the water availability of the wetland. The embankment breach at Nainijor provides water to the wetland, but also leads to flooding in nearby villages. Fragmentation due to the construction of roads within the Gokul Jalashay wetland has obstructed the natural flow of water. Discharge of untreated domestic wastewater from nearby villages has led to eutrophication in a few stretches of the wetland, especially near the outlet of the stormwater drains. The growth of invasive species such as hydrilla and water hyacinth directly affects the water quality as well as the overall health of the wetland. The trend of increasing agriculture within the wetland also raises concerns about water availability and quality. The lack of data due to the unavailability of a monitoring system limits the hydrological understanding of the catchment. Over-extraction of water has led to sustainability concerns related to water use and management in the wetland.

Key Threats	**Likely impact on ecological character (C=components, P-Processes, and S=Services)**	**Likelihood of change in the near future (H=High, M= Medium, L=Low)**
Habitat fragmentation- The natural connection between the river Ganga and the wetland complex has been restricted by the construction of embankments along the river. Construction of Nainijor road between Gokul Jalashay and Sunki Suhiya has led to disconnectivity between the wetland complex. Moreover, the construction of a series of earthen and permanent bridges within the wetland has also led to the fragmentation of habitats.	Reduced species exchange within the wetland (P), water regime (C), and productivity of fisheries (S)	High
Use of small-size fishing gear- “Fasa jal”, used to catch very small-sized fish can actually damage the larger fish population.	Impact species recruitment (P), maintenance of biota (C), and fish productivity (S)	High

Key Threats	Likely impact on ecological character (C=components, P-Processes, and S=Services)	Likelihood of change in the near future (H=High, M= Medium, L=Low)
Resource use conflict There have been conflicts related to land ownership between farmers and revenue and the land reforms department, Bihar.	Reduced effectiveness of management indirectly affecting all the components, processes, and services	High
No closing season for fishing- According to the survey of the fisheries co-operative group, Brahmapur, fishing in Gokul Jalashay take place throughout the year. However, the Fisheries Department has announced monsoon as no fishing season.	Impact productivity of fisheries and other aquatic species (S)	Medium
Invasion of aquatic and terrestrial plants and animal species Eichhornia, Ceratophyllum, Hydrilla and Parthenium are major invasive species that have been found in Gokul Jalashay and Sunki Suhiya.	Impact the growth of native species (C) ultimately affecting the ecosystem processes such as primary production nutrient cycling and sediment cycling (P). The productivity of native fish species also gets affected (S)	High
Siltation Siltation due to flood pulses from river Ganga has led to an increase in the bare land area within the wetland complex, especially in Sunki Suhiya.	Excessive siltation of river sand in the wetland complex can lead to a decrease in biological productivity and sediment cycling (P) of the wetland complex which in turn can affect the biotic and abiotic components of the wetland (C) leading to decreased benefits (S)	Medium

4. Institutional Arrangements

Institutions play an important role in governing and coordinating relationships between various wetland stakeholders, and thereby their fit with ecological character has an important influence on wise use outcomes. Institutional requirements for conservation and sustainable management of the wetland complex are defined by the ability to ensure integration of site management within broad-scale environmental management and development programming and enabling participatory management, particularly ensuring the involvement of local communities whose livelihoods are linked to the wetland ecosystem.

This section of the management plan presents an analysis of existing institutions and governance settings with the intent of arriving at recommendations for the management of the Gokul Jalashay wetland complex. The chapter includes an overview of existing settings and emerging lessons and gaps and recommendations for enhancing the effectiveness of the regimes to secure wise use of floodplain wetlands.

Existing institutional and governance arrangements

Policy and regulatory frameworks
The National Environment Policy of 2006 has articulated the core policy elements of conserving wetlands: recommending the adoption of a catchment approach, their inclusion in poverty alleviation and rural development strategies, and taking into account the explicit impact of developmental projects on wetlands. The National Action Plan for Climate Change includes wetland conservation and sustainable management in the National Water Mission and the Green India Mission. The National Disaster Management Plan considers several non-structural measures for flood and cyclone risk reduction measures and makes direct reference to wetlands.

The Gokul Jalashay wetland complex is located outside the formally designated protected area network. The Environment (Protection) Rules, 1986, empowers the Central government to prohibit or restrict the location of industries and carrying on of processes and operations in different areas including wetlands. The Indian Fisheries Act, 1897, The Water (Prevention and Control of Pollution) Act, 1974, and The Biological Diversity Act, 2002 provide instruments for regulating various development threats on wetlands. Further, under the Biological Diversity Act, 2002, the Central Government can issue directives to State Governments to take immediate ameliorative measures to conserve any area rich in biological diversity, biological resources, and their habitats, especially when the area is being threatened by overuse, abuse, or neglect. The said Act also gives state governments the power to notify areas of biodiversity importance as biodiversity heritage sites.

In 2017, the Ministry notified the Wetlands (Conservation and Management) Rules under The Environment (Protection) Act, 1986. The MoEFCC issued an Office Memorandum on March 8, 2022, reiterating that the 2, 01,503 wetlands (>2.25 ha) as per the National Wetland Inventory and Assessment (NWIA), 2011 should be protected as per Rule 4 of the Wetlands (Conservation and Management) Rules, 2017 (and thus applies to the Gokul Jalashay Wetland complex as well). This regulation thus protects wetlands from development threats

by prohibiting a range of activities such as the discharge of untreated sewage, and construction within 50 meters of high flood lines.

The Ministry of Water Resources, River Development, and Ganga Rejuvenation Notification of October 7, 2016, namely the River Ganga (Rejuvenation, Protection, and Management) Authorities Order, 2016 sets the overarching regulation and management framework for the Ganga River System, including tributaries, floodplains, and connected surface and groundwater regimes. Rule 4 (ix) provides that the entire floodplain zone be a construction-free zone to reduce pollution sources, and pressures and to maintain its natural groundwater recharge functions. Gokul Jalashay Wetlands complex falls within the connected surface and groundwater regimes, and thereby the aforementioned order is relevant for wetland management. An overview of the formal regulatory regime relevant to the management of the Gokul Jalashay wetland complex is presented in Table 7.

Table 7: Key regulatory frameworks relevant to the Gokul Jalashay wetland complex

Regulation	**Purpose**	**Scope**	**Key implications for management of Gokul Jalashay wetland complex**
Wetlands (Conservation and Management) Rules, 2017 under Environment (Protection) Act, 1986	Provides the regulatory framework for the conservation and management of wetlands in the country	All wetlands >2.25 ha except those covered under the Indian Forest Act, 1927, the Wild life (Protection) Act, 1972, the Forest (Conservation) Act, 1980	Prohibits: Conversion for non-wetland uses solid waste dumping discharge of untreated waste and effluents from cities and towns poaching
Environment Protection Act, 1986	Umbrella law to provide for the protection and improvement of the environment, and for matters connected therewith	Covers all forms of pollution and empowers the central government to take any all measures for improving environment quality and lay down standards for emissions and discharges throughout the country	The EPA, 1986 and related Acts as the Water Act, 1974, the Water Cess Act 1977, the Wetland (Conservation and Management) Rules 2017 lay the framework of regulatory tools to deal with pollution from industries, towns and settlements located along the Ganges and wetland management. The provision of the Act can be invoked to make new statutes.
The Water (Prevention and Control of Pollution) Act of 1974	Aims to prevent and control water pollution and to maintain/restore wholesomeness of water by establishing central and state pollution control board	National (Rules pertain to the State of Bihar)	Lays down effluent discharge standards of sewage and sullage Provides for the constitution of State Level Boards for enforcement of various provisions of the Act.

Regulation	Purpose	Scope	Key implications for management of Gokul Jalashay wetland complex
	to monitor and enforce the regulations		
The Biological Diversity Act, 2002	Conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected in addition to that or incidental thereto	National	Prohibits, without approval of the National Biodiversity Authority Obtaining any biological resource or knowledge associated thereto for research or for commercial utilisation or for bio-survey and bio-utilisation Transferring results for monetary consideration Application for intellectual property rights
The Bihar Fish Jalkar Management Act 2006	Prohibition of fishing	State	(i) Fishing in rivers shall be prohibited from 15th June to 15th August. (ii) Fishing net or Gill net with less than 4 cm. Mesh size shall be prohibited in rivers. (iii) Fishing of fingerlings of culturable fishes of any species shall be prohibited. (iv) Putting offence or any obstruction restricting the movement of fish shall be prohibited in rivers and reservoir. (v) Use of dynamite or explosives, poison and poisonous chemicals for fishing shall be prohibited.

Major organisations and programmes relevant to wetlands conservation

Programmes of the Government Departments

State Mission for Clean Ganga-Bihar (SPMG-Bihar is an extended arm of the National Mission for Clean Ganga (NMCG) for the state of Bihar and Jharkhand and implements the Namami Gange and other programmes through various executing agencies. The SPMG-Bihar also oversees the functioning of the State Ganga Committee and District Ganga Committees. Several capacity-building and awareness-raising workshops on water and wetlands conservation have been organised, involving the youth and school children of the Gokul Jalashay and nearby villages with support from Namami Ganga Project and the Forest Department of Buxar.

The Revenue and Land Reforms Department deals with land management, land survey, and settlement, land consolidation, land acquisition for different Central and State Government schemes, and Agriculture Census of national importance. The land rights for the three blocks of Gokul Jalashay (Chakki, Nainjor, Simri) has been initiated recently. The Public Health Engineering Department is responsible for maintaining the embankments along Gokul Jalashay wetland complex.

According to the guidelines laid down by the National Disaster Management Authority (NDMA), the Bihar State Disaster Management Authority (BSDMA) was set up in the year 2005. Following this, District Disaster Management Authority (DDMA) was instituted. The BSDMA is accountable for various actions as envisaged in the National Disaster Management Act, as per Section 18 (2). It lays down guidelines to be followed by the different state and district departments for the purposes of integration of measures for the prevention of disasters and mitigation in their development plans and projects and provides necessary technical assistance therein. The BSDMA is working with PHED and another line department to maintain the embankment to mitigate direct flood hazards arising from river Ganga.

The Bihar Fisheries Department issues lease for Gokul Jalashay wetland fisheries. There are two fisher cooperatives (Brahmpur Prakhand Matsyajeebi Sahyogi Samiti Limited and Shahpur Prakhand Matsyajeebi Sahyogi Samiti Limited) are the two cooperatives which lease out the fisheries in the wetland complex. The Department of Agriculture is implementing schemes related to promoting micro-irrigation systems in the region.

Research & Academia
Limited research on fisheries aspects has been conducted by Bihar Agricultural University, Bhagalpur. Recently, Mandar Nature Club has also included the wetland complex within its water bird monitoring programmes.

Civil Society Organisations
There are over 30 registered NGOs in Buxar that work on the issues of agriculture, horticulture, animal husbandry, education and renewable energy. Conservation of Gokul Jalashay is yet to figure within the programmes of civil society.

Rights and privileges

During interviews with the District Administration, it was discussed that:

The ownership aspect of the Gokul Jalashay wetland complex needs to be evaluated further. So far, the ownership is largely under the control of the Forest Department although there are community lands that fall under the Gokul Jalashay wetland complex that needs to be clearly demarcated with the basis of revenue records.

Communities exercise certain traditional and customary privileges and rights associated with the wetlands. These range from right to access, harvesting of resources, and transit to the practice of rituals and religious ceremonies. Wetlands are traditionally used for harvesting

plant material used as fodder, fuel, fiber, food, medicine, or decorative item. This was mostly an unregulated activity with little restrictions in terms of the quality or quantity of resource harvested.

Fishing is done in 100% of wetlands, mostly by inhabitants of dependent 56 villages. Customary religious and cultural rights are enjoyed by communities in 100 % of the wetlands. They are used for conducting religious ceremonies including immersion of idols. Many annual fairs are also organized around wetlands.
Although harvesting of plant material for fodder, fuel, fiber, and medicines are largely an unregulated activity, with exception of fodder collection, it has witnessed a sharp decline, majorly due to changes in choices, degraded condition, and a decline in the availability of wetland resources.

Evaluation of existing institutional arrangements

Table 8: Identifying key gaps in the status of the different components of existing institutional arrangements

Enabling institutional conditions and implications for wetland management	**Status of current institutional arrangements**	**Key gaps**
Defined user and resource boundaries		
Presence of well-defined boundaries around Gokul Jalashay wetland complex is required to ensure that management zones and actions are defined in spatial terms and linked with user access rights, adverse land and water use change is prevented, and communities have incentives for protecting the wetland.	A survey of land rights is being undertaken by the Buxar District Administration. Lack of clarity of land rights (private ownership versus state ownership) in several parts of the wetland complex	The wetland boundary has not been delineated. The zone of influence has not been delineated. User access rights have not been defined.
Congruence		
Rules for management of Gokul Jalashay Wetlands complex conform to the functioning of biophysical and social systems. The rules also balance the cost of enforcement of management with the benefit derived from wetland ecosystem services and biodiversity.	The River Ganga (Rejuvenation, Protection, and Management) Authorities Order, 2016 sets the overarching regulation and management framework for the Ganga River System, including tributaries, floodplains and connected surface and groundwater regimes. The order defines floodplains as 'areas of River Ganga or its tributaries which	Lack of proper notification following the due process as recommended in Wetlands (Conservation and Management) Rules, 2017, and not meeting the requirement for putting in place a management plan for wise use has made the Gokul Jalashay wetland complex a virtually open resource.

	comes under water on either side of it due to floods corresponding to its greatest flow or with a flood of frequency once in hundred years', Rule 4 (ix) provide that the entire floodplain zone to be construction free zone to reduce pollution sources, pressures and to maintain its natural ground water recharge functions. Rule 4 of wetland conservation and management rules apply to all wetlands above 2.5 ha.	There is limited clarity on activities that are prohibited, regulated and permitted within the wetland and its zone of influence.
Conflict resolution mechanism		
Low cost and effective conflict resolution mechanism are available for supporting the implementation of wetland management.	Conflict resolution mechanism are specified under Wetlands (Conservation and Management) Rules, 2017 but are yet to be implemented. Presently, all cases of conflicts are referred to the District Administration.	The current conflict resolution mechanism is not efficient.
Minimal recognition of rights to organize		
Rights of communities to define management objectives for Gokul Jalashay wetland complex are not counter to existing government rules and regulations.	Communities enjoy traditional rights and privileges to access wetland resources. However, there is no mechanism in place for communities to contribute to the process of wetland management.	In absence of any defined wetland management arrangements, there is no formal system in place for engaging communities in wetlands management.

Proposed institutional arrangements

Mission Sahbhagita launched in 2022 to commemorate 75 years of independence, is a Government of India initiative for the conservation and wise use of wetlands of national and international importance. The Mission prescribes a multitier institutional arrangement for the management of wetlands that is relevant and can be suitably adopted in the given context. The following institutional arrangement is proposed for management for management of the Ganga floodplain wetlands.

- At Site level: The Wetland Prabhari is assisted by a network of Wetland Mitra/Ganga Praharis coordinating site management, line government departments and agencies, knowledge partners, civil society organisations, and corporate sectors.
- At District level: District Wetland Committees ensure that convergence is built with district-level conservation and development plans and programmes.
- At State level: The Bihar State Wetland Authority reviews and approves site management plans and provides access to funds for implementing management from central and state-level public sector schemes, as well as corporate sector partnerships.

Roles and Responsibilities

Wetland Prabharis
The Wetland Prabharis may be responsible for the following activities:

- Install signages displaying information on the wetland site's uniqueness, conservation significance, cultural significance, and management arrangements
- Nurture a network of 'Wetland Mitra' for stakeholder engagement in wetland management actions
- Coordinate the development of an action plan for conservation and sustainable management
- Identify 'cultural icon(s)' and run community campaigns relating the icon to wetlands conservation and sustainable management
- Organize events linked to local legends/cultural values of the wetland.
- Design and implement citizen science programme - such as the Asian Water bird Census' to engage citizens in wetlands monitoring and management
- Coordinate targeted stakeholder education, awareness, and behaviour change campaign to incentive affirmative actions for wetlands conservation and sustainable management through the establishment of a wetland interpretation centre
- Commission baseline wetland inventories through the support of knowledge partners, corporate and civil society partners
- Connect with Panchayats and Municipalities in the vicinity; connect with local schools and teachers for awareness-raising among children and youth
- Coordinate implementation of the wetland action plan through funds from ongoing development plans and programmes, including through engagement with corporates
- Coordinate periodic wetlands monitoring and management effectiveness review to assess whether mid-course correction in wetland management implementation is required

District Wetland Committees
The primary responsibilities of the District Wetland Committee include:

- Review wetland management plans, in consultation with all relevant departments and sectors
- Integrate wetland management actions in district level environment plans, disaster risk reduction plans, district development plans, and others
- Build convergence of wetland management plan with district level development plans
- Periodic review of management plan implementation and monitoring outcomes

The Bihar State Wetland Authority

The Bihar State Wetland Authorities will have the following key roles:

- Mapping of each wetland site with District Wetland Committees, Knowledge Partners, Corporate Sector and CSO Partners
- Designate a Wetland Prabhari for each wetland with a mandate to deliver roles and responsibilities as prescribed
- Review and approve management plans
- Ensure access to funds for implementing management plan actions by building convergence with conservation and development sector schemes
- Provide a platform for business engagement in wetlands management
- Review wetlands monitoring information, and undertake mid-term course correction as may be required
- Notify wetland sites under Wetlands (Conservation and Management) Rules, 2017 and other extant regulation

5. Management Framework

Management of the Gokul Jalashay wetland complex needs to be based on the recognition of their full range of ecosystem services and biodiversity values, their relationships with ecosystem health, and mainstreaming into conservation development plans and programmes at all levels. The effectiveness of management will be reflected in the ability to sustain the multiple values of wetlands based on the traditional knowledge of communities that have evolved, without undermining the key ecological and social processes that underpin the functioning of these wetlands as socio-ecological systems. Wise use of floodplain wetlands of River Ganga will be realized when the capability of the wetland complex to provide diverse ecosystem services and sustain rich diversity is maintained now as well as in the future, on pathways that are aligned with ecosystem principles and guided by sustainable development. The sustainable development framework, as adopted in 2015 calls for addressing five elements – People, Planet, Partnerships, Peace, and Prosperity.

The current chapter sets out the management planning framework including the management goal and purpose, management strategy, objectives, targets and indicators, and likely risks and risk-mitigation options pertaining to the implementation of the management.

Management Goal and Purpose

The overarching goal of managing the Gokul Jalashay wetland complex is “conservation and wise use of wetland ecosystems to sustain their full range of ecosystem services and biodiversity values.

The purpose is to: a) enhance ecosystem health, b) enhance water security, c) reduce water-related disaster risks to communities living in and around the wetlands, d) provide livelihood opportunities to local communities based on sustainable use of wetland resources, and e) sustain habitats and migration corridors of wetland-dependent species.

Management Strategy

The ecological and hydrological connectivity of the Gokul Jalashay wetland complex with River Ganga provides the physical template in which these wetlands evolve and function. At the same time, the wetlands are also conditioned by the land use in the surrounding areas, traditional uses of the wetland, the cultural and relational linkages that communities have with wetland ecosystems, and the overarching regional developmental planning for different development sectors. Management of the Gokul Jalashay wetland complex is thereby proposed at site-level interventions which address the direct drivers of adverse change.

Located near Gangetic floodplains, the Gokul Jalashay wetland complex and adjacent areas are extensively used for agricultural practices. Promotion of sustainable agricultural practices which economizes water use and enhances productivity should form the core strategy. This should also include regulating the cropping pattern within the core inundation area in line with fluctuating hydrological regimes, by reducing the cropping cycle, allowing for

lands to be left fallow during monsoons for natural soil enrichment, and reducing area under water-intensive perennial crops. There is over-dependence on the use of groundwater for irrigation. This has a deleterious impact on the river ecosystem's health and needs to be reduced.

The management strategy involves:

Putting in place clear and effective management arrangements

The management arrangements of the Gokul Jalashay wetland complex are not yet well established. The Mission Sahbhagita prescribes a multitier institutional arrangement for the management of wetlands. The management arrangements have been proposed for the Ganga floodplains, wherein the site-level arrangement includes the appointment of Wetland Prabhari who will be responsible for coordinating site management, line government departments and agencies, knowledge partners, civil society organizations, and corporate sectors with assistance from Wetland Mitra/Ganga Praharis. The mission also prescribes district-level arrangements including the establishment of District Wetland Committees, which will ensure convergence with district-level conservation and development plans and programmes. The mission provides leveraging mechanism at the state level through the establishment of the State Wetland Authority which has the responsibility of reviewing and approving site management plans and providing access to funds for implementing management from central and state-level public sector schemes, as well as corporate sector partnerships.

Restoration of the hydrological regime

The hydrological regime of the Gokul Jalashay wetland complex is governed by the inflow from river Dharmawati, flood pulses from river Ganga, and their connectivity. The dis-connectivity between Gokul Jalashay and Sukhi Suhiya has led to hydrological fragmentation. Moreover, the unregulated inflow from the embankment breach needs to be regulated. The overall maintenance of the hydrological regime of the wetland complex can be ensured by: a) regulating outflows; b) restoring the connectivity within the wetland complex; c) enhancing the water holding capacity of the wetland complex; d) enhancing riverine inflows into the wetland complex, and e) allocating water for wetland functioning at the catchment level.

Rejuvenation of the natural channel between the Gokul Jalashay and Sunki Suhiya at Nainijor is crucial to maintaining the eco-hydrology of the wetland complex. Moreover, selective dredging and removal of water hyacinths from the Dharmawati river will allow catchment water to enter Gokul Jalashay.

Two hydrometric monitoring stations, one at Buxar and one at Bhojpur need to be established to address hydrological data required for management purposes.

The silt deposition in the wetlands due to flood pulses from river Ganga needs to be selectively removed after a scientific assessment of its consequences to the wetland ecology. In the medium and longer term, the structure of the culverts can be revisited to accommodate the hydrological regime requirement of the wetland complex.

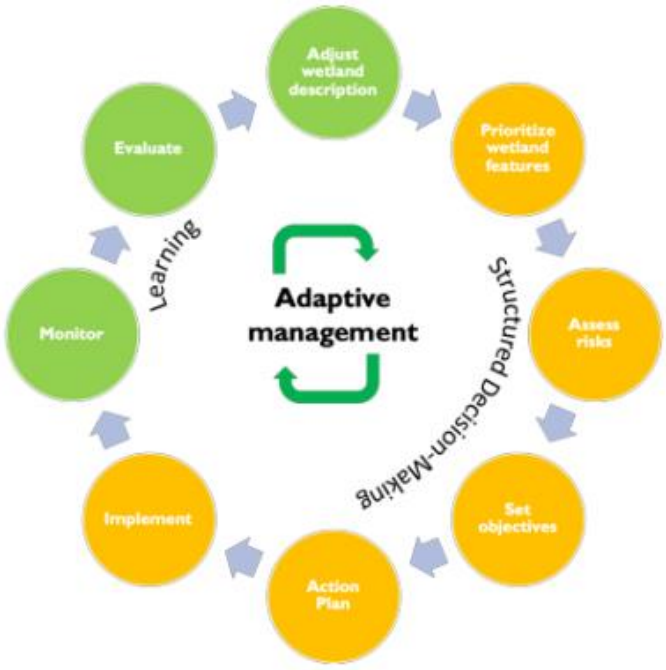
Adaptive management

Gokul Jalashay wetland complex, like several other wetland ecosystems, have an inherent uncertainty and unpredictability in its behaviour owing to complex and multi-scalar ecological, social and institutional interactions that shape their features and governing factors. There are several reasons, including:

- The environmental variation that is uncontrollable (such as increasing intensity of precipitation)
- Partial observability (as not all wetland features and factors can be monitored)
- Partial controllability of actions (as management interventions are implemented through several agencies)
- Structural uncertainty arising out of a lack of complete understanding of how the ecosystem functions

Given that the knowledge of the ecosystem is always likely to be incomplete, adaptive management is based on iterative learning, and using that learning to improve management using a goal-oriented and structured process shall be applied. Adaptive management will be enabled in the management of the Gokul Jalashay wetland complex by a combination of processes (Figure 6), such as:

- Structured decision-making to clarify management goals, objectives and actions, involving stakeholders
- Investing into monitoring and learning for management. Each management intervention in reality is an experiment based on a working hypothesis of ecosystem functioning. Monitoring enables the assessment of whether the hypothesis works in reality.
- Investing into cross-scale communication. Understanding change at multiple scales may help get a better understanding of ecosystem functioning and variability.
- Adaptive governance, based on collaborative and participatory management has the flexibility of sharing management responsibilities. Successful adaptive governance



has required leadership with a vision, systematic monitoring, and complementary legislation framework which allows for adaptive management, information flow amongst stakeholders, and clear opportunities for stakeholders to collaborate.

Figure 6: The Adaptive Management Cycle (After Allen et al, 2011)

Management zoning for multiple ecosystem services and biodiversity values

The multiplicity of land uses coexisting with high biological diversity and interlinkages with fluvial processes calls for adopting a management zoning approach for the floodplain wetland complex. Management zoning of the Gokul Jalashay wetland complex can be done prior to the assessment of its use and biodiversity values. The wetland complex can be divided into four zones i.e., the Fishery zone, Agriculture zone, Horticulture zone as well as Nature protection zone. The current inundation area (including open water areas and marshes) which sustains the waterbird population can be treated as a nature protection zone, wherein the emphasis should be on the maintenance of ecological character by prioritizing the maintenance of waterbird habitats. Other zones include areas under permanent agriculture, horticulture, and fisheries that can be managed as sustainable production systems, ensuring that production processes do not create a direct adverse impact on ecosystem components and processes (e.g., through the discharge of nutrient-rich flows, impeding hydrological regimes). In the entire catchment, land and water use needs to be influenced to ensure that wetlands retain hydrological connectivity with the rivers and surface -groundwater interactions are in balance.

Balancing biodiversity conservation and Livelihoods

Managing the Gokul Jalashay wetland complex requires seeking a balance between securing the biological diversity of the wetland as well as the livelihoods of the dependent communities. Management planning, therefore, envisages making investments for biodiversity conservation along with sustaining resource productivity within natural thresholds as well as improving the well-being of the wetland-dependent communities by augmenting water, sanitation, and health infrastructure, creating opportunities for livelihood diversification, especially through positive incentives for wetland stewardship.

Capacity building

The major factor limiting the integrated management of the Gokul Jalashay wetland complex is the lack of effective capacity amongst concerned state government departments, stakeholders, and local communities. The management plan, therefore, emphasizes building capacity on wetland management, particularly recognizing biodiversity and ecosystem services features and governing factors and integrating these in planning, decision-making, and implementation at all levels.

Focus on behavior change

The management plan entails a shift from a high emphasis on wetland regulation to inducing positive behavior within wetlands communities and stakeholders which is aligned with wise use. The Wetland Prabhari will use strategic communication to inform stakeholders about the role of the Gokul Jalashay wetland complex in their overall well-being, and the ways these groups can engage in ensuring that the wetland continues to deliver their wide-ranging services. Information, education, and communication tools, tailor-made to the needs of various stakeholder groups, would be proactively used to trigger behaviour change, along with building capacities and opportunities for participation in wetlands management.

Monitoring and evaluation for ecological character change

Monitoring and evaluation are critical to assess changes in ecological character of Gokul Jalashay wetland complex. Management planning would therefore strive to put in place an integrated wetland inventory, assessment, and monitoring system to support the establishment of ecological and socioeconomic information baseline, assessing the efficiency of management interventions and determining impacts of developmental projects on Kanwar and associated wetlands. An important part of the strategy would be to involve stakeholders, particularly local communities and civil society organizations in wetland monitoring. The concerned authority would also work towards creating a network of specialist organizations to support assessments and independent reviews of quality and outcomes of inventory, assessment, and monitoring efforts.

Management Objectives and Performance indicators

Table 9: Management objectives, performance indicators and desired outcomes of Gokul Jalashay wetland complex.

Objectives	Performance indicators	Desired outcomes
Maintain hydrological connectivity with the wetland catchment	Duration of flood pulse and connectivity of river channels with wetlands.	Inundation regimes (minimum and maximum) achieved in the past 30 years are maintained
Maintain water quality to support ecosystem processes and services	DO levels	4mg/l or more
Promote good agricultural practices aligned with the wise use of wetlands	Cropping practices that do not modify water regimes or deteriorate water quality or introduce exotic species	No structural modification of the wetland No introduction of chemicals, fertilizers, and pesticides No introduction of exotic species. No intensive water abstraction
Maintain the naturalness of shorelines	The extent of the wetland shoreline, devoid of any built-up area	No concretization of the shoreline Maintenance of at least 50 m buffer around the wetlands

Objectives	Performance indicators	Desired outcomes
Maintain and improve habitat quality to support the diversity of wetland-dependent species	Habitat diversity	No species extirpation Migration corridors for fish and large mammals (Nilgai) are maintained Sighting of key species is maintained in the range of 20% deviation from the average of last five years Counts of migratory waterbirds is maintained in the range of 20% deviation from the average of last five years
Enhance awareness of wetlands biodiversity and ecosystem services amongst stakeholders	The number of affirmative actions by stakeholders for wetlands conservation and wise use	Increase in affirmative actions
Promote local stakeholder participation in wetlands management	Representation of local stakeholders in wetland management structures	Communities' views rights and capacities are reflected in wetland management decisions. Pro-active engagement of women, youth, and children in wetland management
Livelihood vulnerability of wetland-dependent communities is reduced	Resource productivity (fish catch, vegetable harvest) Diversification of income sources	Non-declining harvest of fish and vegetables Wetland communities having income in the lower quintiles gain additional sources of income

Risks and risk-mitigation measures

The management plan design is based on certain assumptions. The Table 10 below identifies the risk associated with these assumptions in the management plan and possible risk-management measures.

Table 10: Proposed risk management measures at the goal and objective levels

Risk	Risk-management measures
At Goal Level	

Risk	Risk-management measures
Land ownership within the wetland complex is not clear as community and Revenue and Land Reforms departments both claim for the wetlands in certain areas.	Proper wetland boundary delineation and updation of land ownership in revenue records should be done.
Wetland monitoring systems are not established and there is no effort for monitoring the effectiveness of management.	Based on scientific guidelines, a wetlands inventory, assessment, and monitoring system are to be developed and maintained to assess and respond to changes in the wetland's components, processes, and services. Environmental Impact Assessments (EIA) for developmental projects likely to create detrimental impacts on wetlands ecosystem services and biodiversity values are to be commissioned. Collate and disseminate periodic reports on the status of wetlands in the state.
At Objective Level	
Sufficient human capacity is not allocated for implementing wetland management.	Conduct capacity and training needs assessments and identify priority training areas. Devise capacity development programmes for wetlands management.
Pollution abatement measures are energy-intensive and do not integrate the opportunity to use wetland-mediated solutions.	Promote nature-based solutions, such as wetlands management to ensure hydrological connectivity of the entire system. Restrict waste disposal activities that can alter wetland water quality. Several brick kilns have been constructed around the Gokul Jalashay wetland complex and need to be monitored and assessed for their impact on the wetland complex.
Livelihood concerns related to the adoption of good agricultural practices are not addressed.	Leverage compensatory schemes or provide alternative livelihoods such as through engagement in wetland-based tourism activities. Promote participatory management.
Investment in behaviour change communication is insufficient and does not lead to awareness generation on wetland values and functions.	Consideration of stakeholder issues and feedback in management implementation.
Financing of wetland values and conservation is episodic and in project	Identify sectoral priorities and align them with the management of wetlands.

Risk	Risk-management measures
mode and not linked with systematic budget allocations.	For different wetlands management activities, an analysis of complementarity with ongoing development or conservation sector schemes may be done to assess the extent of funding that can be generated through convergence with these schemes. Opportunities for private sector participation should be identified and encouraged.

6. Monitoring Plan

Wetland management is an exercise in decision-making— choosing actions that are expected to best achieve the management objectives. Monitoring plays a central role in wetlands management because these ecosystems are dynamic and variable, and often do not align with the desired results of intended decisions and actions. There are several sources of uncertainty that affect natural resource decisions. Primarily, environmental variation in space and time often drives natural systems in ways that may or may not be consistent with management prescriptions. Secondly, many system variables are not measured directly (i.e., partial system observability), and thirdly, outcomes of management actions often deviate in degree and spatial extent from management prescriptions. Thus, by integrating monitoring into decision-making, adaptive management explicitly addresses these sources of uncertainty and allows decision-makers to simultaneously achieve management objectives and generate new knowledge about how the system responds to management.

Management of Gokul Jalashay wetland complex are primarily focused on meeting the objectives of achieving 'wise use'. Having a system to monitor, detect and describe changes in ecological character is therefore critical to support decision-making for wise use of wetlands. Equally important is ability to assess the effectiveness of management in terms of the capacity to develop and implement integrated planning, management, and evaluation systems to secure wise use of the wetland.

This chapter describes a monitoring framework for the Gokul Jalashay wetland complex Catchment at the scale of both Catchment and individual wetland sites to support integrated management for wetlands wise use. It essentially delineates monitoring objectives, strategy and associated resource requirements.

Monitoring Objectives

Developing a monitoring plan for the Gokul Jalashay wetland complex requires addressing the inter-related requirements of wetland inventory (which is the collection and/ or collation of basic information for wetland management) and wetland assessment (identification of status of, and threats to wetlands which provides a basis for wetlands monitoring. It is imperative therefore to put in place an integrated Wetland Inventory, Assessment, and Monitoring System (WIAMS) to address the overall information needs for wetland management, and to provide a robust decision support system for the same. The following are the specific objectives for establishing WIAMS for Gokul Jalashay wetland complex catchment:

- Developing up-to-date and scientifically valid information on the status and trends of wetland features and influencing factors.
- Establishing a baseline for measuring the change in ecosystem components, processes, and services.
- Informing decision-makers and stakeholders on the status and trends in biodiversity, ecological functioning, and ecosystem services of the wetland
- Supporting compliance with national and state specific legal requirements and regulatory regimes.

- Determining the impacts of developmental projects on ecosystem components, processes, and services.
- Identifying risks to the ecological character and supporting the development of response strategies.
- Assessing the effectiveness of wetland management.

Monitoring Strategy

Monitoring is proposed to be undertaken at the following two levels:

- At specific sites that explain status and trends in wetland ecological character in response to natural and anthropogenic stresses.
- Catchment level to explain status and trends in key hydrological and ecological processes that influence wetland functioning.

The monitoring parameters have been selected based on their ability to reflect the degree to which management objectives are met. The information needed for inventory is derived from the core datasets required to establish a baseline on ecological character for the catchment and contains all essential ecosystem components, processes, and services, as well as management-related parameters that characterize the site. Within the aquatic environment, information needs pertain to inflow, quality, and ecosystem services such as provisioning, regulating, culture and supporting. At the level of wetland, information needs to pertain to land-use and land cover change, and threats such as over household effluent discharge. At the catchment level, the information required is related to geo-morphological and climatological setup, as well as basin-wide management arrangements, particularly those related to land, water resources, and urban planning. At all levels, information on institutional arrangements and management practices is included to enable the creation of a database on sectoral programmes, and the linked stakeholders, which are likely / have an impact on the wetland state. While not explicitly mentioned, strategic environmental assessments can be commissioned for any developmental project that has/is likely to have a negative impact on the wetlands.

The monitoring and assessment needs are envisaged to be addressed by a dedicated monitoring programme and specific research and assessment projects. Inventory, being based on collated information on identified wetland features and management practices, will be developed based on the monitoring and assessment information, as well as secondary sources. Inventory, assessment, and monitoring form an integral part of wetland management, and thereby the core activity of Forest Department. The management plan proposes to establish a dedicated wetland monitoring unit with adequate infrastructure support to effectively deliver this function.

Table 11 presents the monitoring strategy for the Gokul Jalashay wetland complex grouped across wetland features. Monitoring methods and frequency have been listed for each monitoring indicator. The lead monitoring institution is either responsible for the collection of data or coordinating with relevant supporting resource institutes for access and collation of monitoring data.

Table 11: Monitoring parameters, methods and suggested institutions

Wetland feature	Monitoring Parameter	High priority Moderate priority Low priority Indicators	Monitoring method	Frequency	Lead monitoring institution	Supporting Resource Institutes & Knowledge Partners
Extent	Boundary defined by law and regulation	Wetland boundary	Notification	6 years	Forest Department	MoEFCC
	Inundation regime	Water spread and water levels	NDWI	1 month	WRD, Buxar	Flood Control/ Disaster Management
	seasonal land use land cover within the wetland	Extent of different habitats exposed due to water level variation	seasonal LULC mapping	2 years	Forest Department	WRD, Buxar
		Extent of different habitats	RS and GIS based LULC mapping	3 years	Forest Department	WRD, Buxar
Catchment	Land use land cover change within the direct catchment	Open water	RS and GIS based LULC mapping	4 years	WRD, Buxar	PHED, Forest Department
		Agriculture	RS and GIS based LULC mapping	3 years	Agriculture Department	Forest Department
		Built-up	RS and GIS based LULC mapping	3 years	Revenue and Land reforms Department	Economics & Statistics Department
		Marsh	RS and GIS based LULC mapping	3 years	Forest Department	WRD, Buxar
		Scrub	RS and GIS based LULC mapping	3 years	Forest Department	Revenue and Land reforms Department, Community Groups

Wetland feature	Monitoring Parameter	High priority Moderate priority Low priority Indicators	Monitoring method	Frequency	Lead monitoring institution	Supporting Resource Institutes & Knowledge Partners
		Bare land	RS and GIS based LULC mapping	3 years	Revenue and Land reforms Department	Forest Department
		Tree Cover	RS and GIS based LULC mapping	4 years	Forest Department	Community Groups
	Infrastructure development within the direct catchment	Embankments/Bridges/ Culverts	Development plans	3 years	WRD, Buxar	PHED, Forest Department, PRI Members
		Density of roads and railways	Development plans	4 years	Transport Department	PRI Members, Revenue Department
		Location of large- and small-scale industries	Development plans, EIAs	5 years	Economics & Statistics Department	Welfare Department, MSME, PRI Members,
	Hydrological connectivity (with rivers)	Changes in drainage network	NDWI	3 years	WRD, Buxar	Revenue and Land reforms Department, PHED, PRI Members
	Runoff from rainfall	Changes in runoff from catchment precipitation	SWAT	3 years	WRD, Buxar	Flood control department
	Sediment flows	Sources of sediment and point records	SWAT and ancillary data	2 years	WRD , Buxar	Disaster Management Buxar, PHED
	Climate	Changes in precipitation	Weather stations recordings at different stations	1 month	Regional Meteorological Centre	Flood control/ Disaster Management
		Changes in minimum and maximum temperature	Weather stations recordings	1 month	Regional Meteorological Centre,	IMD

Wetland feature	Monitoring Parameter	High priority Moderate priority Low priority Indicators	Monitoring method	Frequency	Lead monitoring institution	Supporting Resource Institutes & Knowledge Partners
			at different stations		Buxar and Bhojpur	
		Changes in relative humidity	Weather stations recordings at different stations	1 month	Regional Meteorological Centre, Buxar and Bhojpur	IMD
		Number of extreme events	Regional meteorological department	1 year	Regional Meteorological Centre, Buxar and Bhojpur	IMD
Hydrology of wetland	Inundation regime	Monthly inundation	NDWI/Global Surface Water Explorer	1 month	WRD, Buxar	Forest Department,
	Inflows	Monthly volume of water flows	NDWI	2 months	WRD, Buxar	Forest Department,
	Outflows	Monthly outflow from wetland	NDWI	3 months	WRD, Buxar	Forest Department,
	Sediment deposition	Sediment deposited at various zones in the wetland and near the Near Sunki Chakki,Diara, Nainijor, Suhiya, Ishapura	Sediment gauges	6 months	WRD, Buxar	Central University Bihar, Forest Department
	Water quality	Temperature, turbidity, specific conductivity, TDS, pH, DO, BOD, Nitrate, Phosphate, heavy metals, TC, FC and chlorophyll content	APHA standard method	3 months	PHED, Buxar	WRD, Buxar
	Sediment quality	Sediment type, volume, sediment quality	APHA standard method	6 months	WRD, Buxar	PHED, Patna University
Biodiversity and Habitat	Avifauna	Count (population, species richness), habitat for key species,	Conducting annual bird and	3 months	Fisheries Department	Bihar Agriculture

Wetland feature	Monitoring Parameter	High priority Moderate priority Low priority Indicators	Monitoring method	Frequency	Lead monitoring institution	Supporting Resource Institutes & Knowledge Partners
		congregation areas), Number of birds/ species ringed	wildlife census			University, MNC
	Fish	Fish diversity and abundance	As per guidelines	1 year	Fisheries Department	Agriculture University, MNC
	Invasive species	Location, area and new invasive	Plotting	1 year	Fisheries Department	Agriculture University, MNC
	Mammals	Mammal count and diversity	Wildlife census	1 year	Fisheries Department	Agriculture University, MNC,
	Domestic cattle	Population of local, stray and nomadic cattle	census	6 months	Fisheries Department	Agriculture University, MNC
	Zoonotic diseases	Number of infected wetland species	As per guidelines	6 months	Fisheries Department, ICAR-CFRI	Agriculture University, MNC
Ecosystem Services and Livelihood	Fisheries	Fish yield and stocking	Fisheries survey	3 months	Fisheries Department	Community Groups
		Number of licensed fishermen	Socio-economic survey	1 year	Fisheries Department	Community Groups
	Grazing	Local grazers	Socio-economic survey	1 year	Animal Husbandry Department	Community Groups
		Nomadic grazers	Socio-economic survey	1 year	Animal Husbandry Department	Community Groups
	Agriculture	Crop yield	crop yield per hectare	6 months	Agriculture Department	KVK, IFPRI
		Number of agriculture practitioner in the wetland	Socio-economic survey	1 year	Agriculture Department	KVK, Community Groups

Wetland feature	Monitoring Parameter	High priority Moderate priority Low priority Indicators	Monitoring method	Frequency	Lead monitoring institution	Supporting Resource Institutes & Knowledge Partners
	Tourism	Number of tour guides	Socio-economic survey	1 year	Tourism Department	PRI members, Community Groups
		Number of tourists	Tourism records	1 year	Tourism Department	PRI members, Community Groups
		Income generated		1 year	Tourism Department	PRI members, Community Groups
	Wetland dependent population	Total number of people dependent on wetland resources	Socio-economic survey, Consultations	3 years	Economics & Statistics Department	PRI members, Community Groups
Institution and Governance	Formal meetings	Representation from various stakeholders	Meeting records /Stakeholder consultations	1 month	Forest Department	Stakeholders-Line departments, NGOs, Research/Technical Institutions
	Informal meetings	Representation from various stakeholders	Meeting records	1 month	Forest Department	CBOs, PRI members, Fisher & Agriculture Groups, Dairy Groups

Assessing Management Effectiveness

Gokul Jalashay wetland complex catchment is a dynamic ecosystem and so are its management needs. Management plans, which are developed based on assumptions known to managers, need to be periodically assessed to make sure that the set goals and objectives are being achieved.

The effectiveness of management towards achieving the overarching objective of maintenance of ecological character can be greatly enhanced if the following questions are periodically reflected upon:

- What is the current status of the wetlands in the landscape?
- Is the management achieving the goal of maintenance of ecological character?
- What are the current and future threats?
- Are adequate resources available for implementing management, and if not, how can they be accessed?
- Are management processes adequate, effective, and efficient?
- What other steps can be taken to improve management?

The Contracting Parties to the Ramsar Convention adopted R-METT (Ramsar Site Management Effectiveness Tracking Tool) to assist Ramsar site managers in assessing the effectiveness of management in achieving wetland wise use outcomes. The assessment looks into the following aspects:

- **Context** of management (wetland ecological character, threats, and risks of adverse change).
- **Management planning** defines how the management goals and objectives have been defined.
- **Inputs** including human, technical and financial resources applied to implement management actions.
- **Process** of management plan implementation.
- **Outputs** (tangible and intangible) that result from the implementation of management actions.
- **Outcomes** concerning the objectives defined by the management plan

It is proposed that management effectiveness assessments for Gokul Jalashay and adjoining Sunki Suhiya wetlands be done at least once in five years so that management action plans are revised and updated to reflect the real time condition of wetlands as well as the ability of management to prevent adverse changes in ecological character. A baseline assessment is proposed to be done at the inception of the management plan.

Infrastructure and Human Resources Requirements

Implementing the monitoring strategy as outlined in the previous sections requires the following physical and human infrastructure support:

- Remote Sensing and GIS unit with advanced capabilities of remote sensing image processing, preparation of maps and development and maintenance of spatial datasets.
- Wetland monitoring and research centre with capabilities for analysis of chemical, physical and biological properties of water and soil.
- Mobile-based citizen reporting system for recording and reporting illegal encroachments.
- Database management system for storing and retrieving monitoring and assessment data. The monitoring data would be stored along with metadata, as per the quality control procedures suggested in the following sections.
- Network of hydro-meteorological and water quality stations for real time monitoring of weather, hydrological -biological variables.

Deployment of the aforementioned resources can be done cost-effectively by applying the lessons and expertise of the existing infrastructure created by the state government for the management of floodplain wetlands. Need-based training programmes can also be conducted to upgrade the skills of the concerned state government departments and agencies.

Reporting

Reporting constitutes an important element of the wetland monitoring programme. The intended user group, format, style and peer review requirements need to be set in the initial phases of set up of the monitoring programme. Periodic reports, for example as a part of the annual report of the Forest Department should aim to provide a summary overview of the outcomes of monitoring.

Special publications, for example, wetland atlases constituting thematic maps on various parameters are intended to inform stakeholders on wetland status and trends. Outcomes of specific assessments, for example, ecological character status and trends, economic valuation, environmental flows etc. could be made available in the form of technical report series, with an extended summary for a general readership. As the monitoring programs get sophisticated over a period of time, real-time monitoring options through the use of satellite-based data communication techniques can be explored.

Quality control

Monitoring systems are required to ensure the scientific validity of sampling, laboratory analysis, data analysis and reporting. They also play a critical role in preventing the introduction of random and systematic errors in data collection, analysis and reporting. It is recommended that a Quality Management and Assurance Plan is developed for the monitoring programme. The plan should, *inter alia* specify the following:

- **Data quality objectives:** Maximum amount of uncertainty that can be tolerated to ensure that the data is fit for the intended use.

- **Sampling programme design:** Statistical robustness of sampling frame; Means to ensure that samples are representative of the environment; Sample recording; Procedures for minimizing environmental impact.
- **Documentation:** Procedures for field sample record-keeping and methods documentation.
- Sample processing validity (especially for water quality and biological components).
- **Data quality control methods:** Processes for quality control samples, duplicates and replicates; Performance audit procedures including data and systems audit.

Review and Adaptation

A periodic review of the monitoring programme is required to determine the extent to which the objectives of wise use are met, support to management is achieved, and the monitoring system remains relevant for maintaining the wetland state (particularly in the light of new and emerging threats). The review process should also aim at increasing the sophistication of the monitoring system to be able to assess complex landscape scale processes affecting the ecological character of wetland and related management. The review process should include documentation on the way wetland inventory, assessment, and monitoring information is being used to support management planning and policy goals. The review should also include the identification of appropriate mechanisms to ensure that wetland monitoring is continued in the event.

7. Action Plan

Activities to meet the eight objectives have been clustered under four components: Institutions and Governance, land and water management, species and habitats, and livelihood development (Table 12).

Table 12: Management plan components

Component	Objectives
Component 1 – Institutions and Governance	Objective-6 Enhance awareness of wetlands biodiversity and ecosystem services amongst stakeholders Objective 7- Promote local stakeholder participation in wetlands management
Component 2. Land and Water management	Objective 1- Maintain hydrological connectivity with the wetland catchment Objective- 2 Maintain water quality to support ecosystem processes and services Objective-4 Maintain the naturalness of shorelines
Component 3. Species and habitats conservation	Objective 5. Maintain and improve habitat quality to support the diversity of wetland-dependent species
Component 4. Livelihoods	Objective 3. Promote good agricultural practices aligned with wise use of wetlands Objective 8. Livelihood vulnerability of wetland dependent communities is reduced

Component-1: Institutions and Governance

1.1 Notification of Wetland complex under wetlands (Conservation and Management) Rules, 2017

It is proposed that the wetland complex should be notified under the wetlands (Conservation and Management) Rules, 2017. Regarding this, delineation and demarcation of the wetland boundary should be done. Delineation of the wetland complex will include the following activities:

- Field reconnaissance survey for boundary identification
- Delineation of wetland boundary on a geo-coded map
- Delineation of the zone of influence of the wetland complex
- Ground truthing of wetland maps
- Production of ground truth map
- Stakeholder consultation

- Map finalization and publication

Moreover, the notification process will include the following steps:

- Preparation of a brief document
- Submission of the brief document to Bihar State Wetland Authority (BSWA)
- Preparation of draft notification
- Public consultation
- Final notification

Finally, the demarcation of wetland boundary should be done on the basis of finalized delineated map, land rights survey, and stakeholder consultation. Installation of geotagged pillars is proposed along the wetland boundary (preferably at 250 meters intervals).

1.2 Establishment of proper Institutions for an effective management regime

To establish and strengthen the institutions for an effective management regime, the constitution of wetland mitra is proposed. The following are the activities involved in the constitution of wetland mitra:

- Workshop for identification of possible wetland mitras
- Vacancy announcement for the post of wetland mitra on social media and local newspapers
- Recruitment of wetland mitras

1.3 Management zoning/Regulatory regimes

For ease of management, and also to ensure compliance with the extant regulatory regimes, it is proposed to segment the wetland into four major zones-

- Fishery zone: Fisheries zones have the highest potential for fish harvesting without compromising biodiversity losses. Hence designated zones need to be identified and discussed among stakeholders for fishing activities.
- Agriculture zone: Parts of the wetland that are permanently being used for the cultivation of wheat and other crops. The zone can additionally be managed by using open spaces for storing excess flood water and allowing infiltration of storm water drains. The zone has the potential to attract wintering water birds if organically farmed. Rainwater harvesting in agricultural fields to enhance the availability of freshwater.
- Horticulture zone: Parts on the southern periphery of Gokul Jalashay and northern parts of Sunki Suhiya wetland that have been converted as a region for the seasonal cultivation of vegetables. The zone can be maintained as an area for practicing horticulture.
- Nature protection zone: A part of the wetland where biodiversity value is the highest, and habitat used by migratory species. The zone can act as a buffer for species when moving between rural and urban areas. The zone also has the potential to be used as a site for recreation and ecotourism, within the framework of existing provisions of Wetlands (Conservation and Management) Rules, 2017, and other extant regulations.

The zoning plan will guide management interventions. The following steps are proposed:

- Finalization of zoning plan in consultation with stakeholders
- Preparation of zonal management plans

1.4 Wetlands Inventory, Assessment and Monitoring System (WIAMS)

An integrated wetland inventory, assessment and monitoring system is proposed to be set up to address the overall information needs of wetland management and to provide a robust decision support system for the same. The following activities are proposed:

1.4.1 Establishment of wetland monitoring and research centre

The following activities are proposed for the establishment of a monitoring and research centre
Identification of potential site for construction of wetland monitoring and research centre near Gaighat:

- Site identification- A suitable location can be identified near Gaighat with the support from Revenue and Land Reforms Department, Water Resources Department
- Construction of center- Forest Division Bhojpur can construct one monitoring and research center
- Lab accreditation by National Accreditation Board for Testing and Calibration Laboratories (NABL)
- Procurements of laboratory equipment and reagents
- Recruiting research personnel
- Identification of sites for the hydro-meteorological station
- Procurement of instruments for hydrometeorological monitoring including sediment and water flow and depth monitoring equipment and local weather monitoring equipment
- Installation of hydrometeorological stations
- Maintenance of hydro-meteorological equipment
- Identification of suitable sites for water quality sampling stations
- Identification of suitable sites for water quality sampling stations
- Procurement of instruments for water quality monitoring
- Installation of water quality monitoring equipment
- Maintenance of water quality monitoring equipment

1.4.2 Development of database management system

A database system for storing, retrieving, and analyzing the WIAMS is proposed to be set up in a GIS environment. This will include:

- Development of data quality management and assurance plan including specification of data collection objectives, data quality objectives, sampling program design, data and metadata documentation procedure, data quality control methods, and performance audit procedures;
- Development of GIS-based database management system

1.4.3 Wetland monitoring and evaluation

For wetland monitoring, it is proposed to develop a wetland inventory, monitoring, and assessment tool. The following activities are proposed regarding this:

- Development of draft wetland inventory, monitoring, and assessment tool.
- Field testing of wetland inventory, monitoring, and assessment tool
- Stakeholder consultation
- Finalization of wetland inventory, monitoring, and assessment tool

1.4.4 Surveillance system

A mobile-based surveillance system for recording infringements to Wetlands (Conservation and Management) Rules, 2017 and is proposed to be developed. The app-based system will enable „community wardens‟ to transmit information on violations in Gokul Jalashay wetland Complex to Forest Division Bhojpur through geotagged pictures and related data. Drone mapping and other sophisticated technologies such as the installation of CCTV will also be used for surveillance of land use change.

The following activities are proposed to be undertaken-

- Development of mobile-based surveillance system/app by the Department of Information and Technology
- Field testing
- Stakeholder consultation
- Finalization of the surveillance app
- Procurement of drones and CCTV cameras
- Installation of CCTVs at appropriate locations
- Surveillance of the wetland complex using drones and CCTVs

1.4.5 Ecosystem Health Report Card

It is proposed to develop an Ecosystem Health Report Card and publish it annually to assess and communicate wetland monitoring information to decision-makers and stakeholders. The health report card summarizes indicators along major indices (water quality, catchment status, biodiversity status) which represent various ecosystem features of the lake, and are reported against respective thresholds set in line with management goals.
The following activities are to be taken:

- Convening a methodology workshop for health development
- Development of Ecosystem Health Report Card
- Report card publication
- Stakeholder dissemination workshop

1.4.6 Tracking of management effectiveness

The following activities are to be undertaken-

- Development of Management Effectiveness Tracking Tool (METT)

- Field testing
- Stakeholders consultation based on METT data collection
- Finalization of the METT

1.5 Research

Following specific research studies are proposed to be commissioned to address the knowledge gaps in assessing status and trends in ecological character.

- Climate risk assessment
- Habitat study for foraging birds, especially black-headed Ibis
- Hydrological assessment

Activities that need to be undertaken are organizing inception workshop, conducting respective studies, and sharing their results

1.6 Capacity development

To support the integrated management of the Gokul Jalashay management complex, the human capacity of concerned line departments as well as stakeholders will be enhanced by training workshops. Major activities proposed for this are:

- Development of Capacity and Training Needs Assessment (CTNA) tool and assessment of the tool
- Provide training to site managers as per CTNA (such as wetland ecology, participatory planning, health card preparation, conflict resolution, and community engagements).

1.7 Communication and outreach

Stakeholder engagement in wetland management will be promoted by creating awareness of biodiversity and ecosystem services values, management strategies adopted, and opportunities for participation. Specific activities to be undertaken include:

- Stakeholder engagement in wetland management through communication and awareness
- Signage indicating the Gokul Jalashay wetland complex, an Important Bird Area or a Biodiversity Hotspot is proposed to be placed at all major entry points of the wetlands complex.
- A dedicated webpage on the Gokul Jalashay wetland complex is proposed to be developed and periodically updated with information, datasets, and communication products. It is envisaged that the website would become an important interface of Government of Bihar on issues related to conservation of wetlands.
- Information boards showcasing significance of site
- Celebration on important public events

Public events are proposed to be organized on the eve of World Wetlands Day (Feb 2), World Environment Day (June 5) as a means of reaching out to public on the issues of wetland

conservation and wise use. Public events on specific issues, as pollution control or water management are also proposed to be organized as a means of engaging with stakeholders.

- Production of resources material
- Resource material on the following themes are proposed to be published:

Brochures, fact sheets and awareness materials on Gokul Jalashy wetland complex are proposed to be published in English and Hindi for public distribution. A coffee table book is also proposed to be published for serious nature lovers.

- Art Culture and Youth Department can organize series of nukkad nataks in wetland dependent villages to sensitize communities
- An annual newsletter highlighting progress made in management plan implementation and key emerging issues related to Gokul Jalashay wetland complex is proposed to be published annually in English and Hindi, and disseminated to all stakeholders.

Component-2: Land and water management

2.1 Maintain the environmental flows

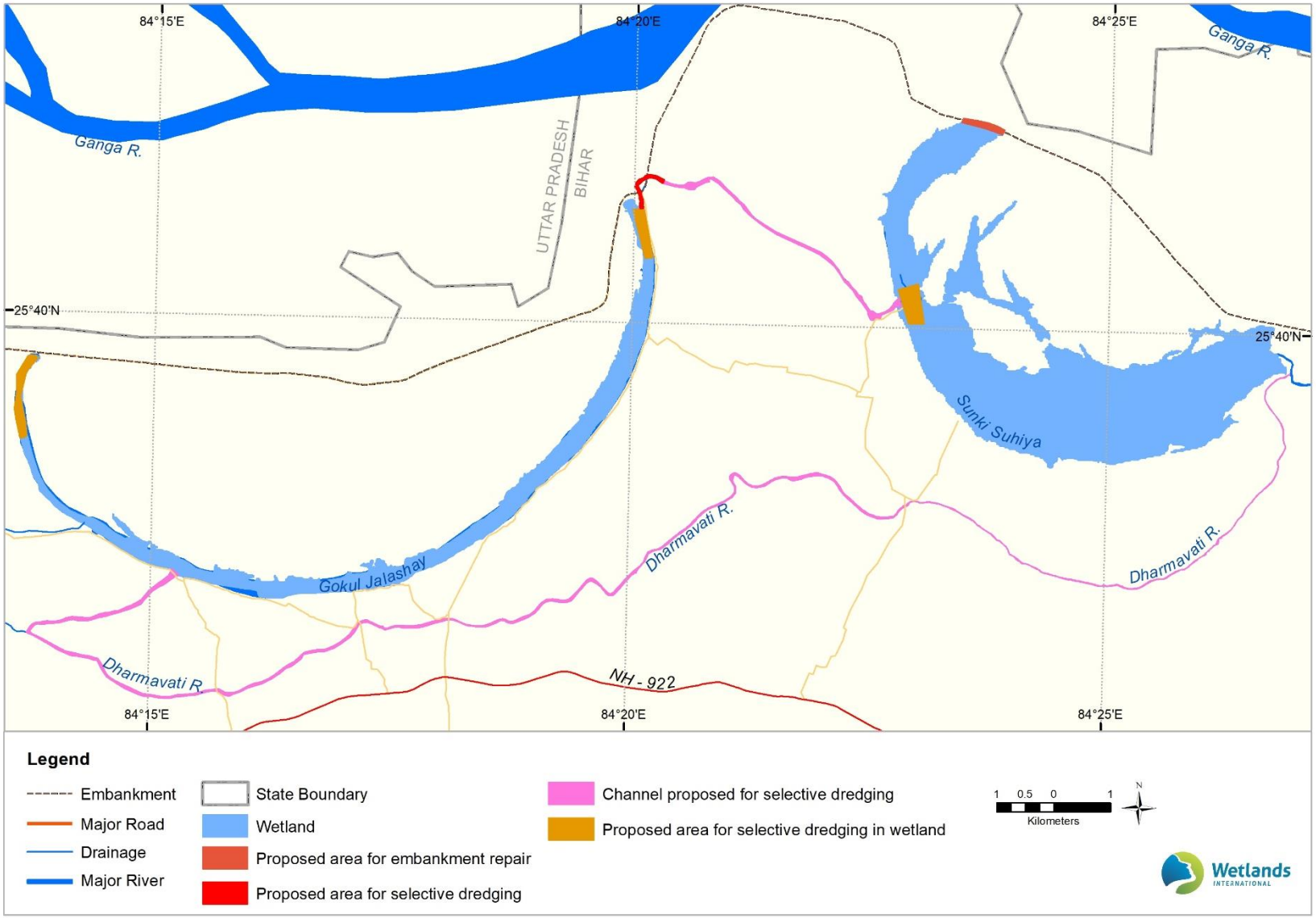
Maintain the environmental flows of the Gokul Jalashay wetland complex will involve improving the inflow by selective dredging, regulating the flood pulses of river Ganga. This will require survey of the areas that needs to be dredged. Map 11 shows the proposed area that can be considered for selective dredging also the natural drainage between the wetland complex should be dredged to enhance the water holding capacity of the wetlands as well as to maintain their inter-connectivity.

The embankment breach at Nainijor needs to be repaired and construction of at least 5 culverts should be done to maintain the connectivity of Sunki Suhiya and river Ganga. Moreover, to restore the connectivity of between the Gokul Jalashay and Sunki Suhiya, construction of 2 culverts at Nainijor is proposed to enable the natural flow between the wetlands. Map 11 shows the proposed area for repairment of embankment and construction of culverts. Construction of 2 sluice gates is proposed at Gokul Jalashay wetland to regulate the flows from river Ganga (Map 12). To maintain the environmental flow within the wetland complex, removal of the invasive macrophytes is also proposed which will enhance the drainage capacity of the inflow channels such as Dharmawati river and storage capacity of the wetland complex. Maintenance of the temporary structures such as check dams and roads has been proposed which will include cleaning of debris accumulated around these structures to increase the water holding capacity.

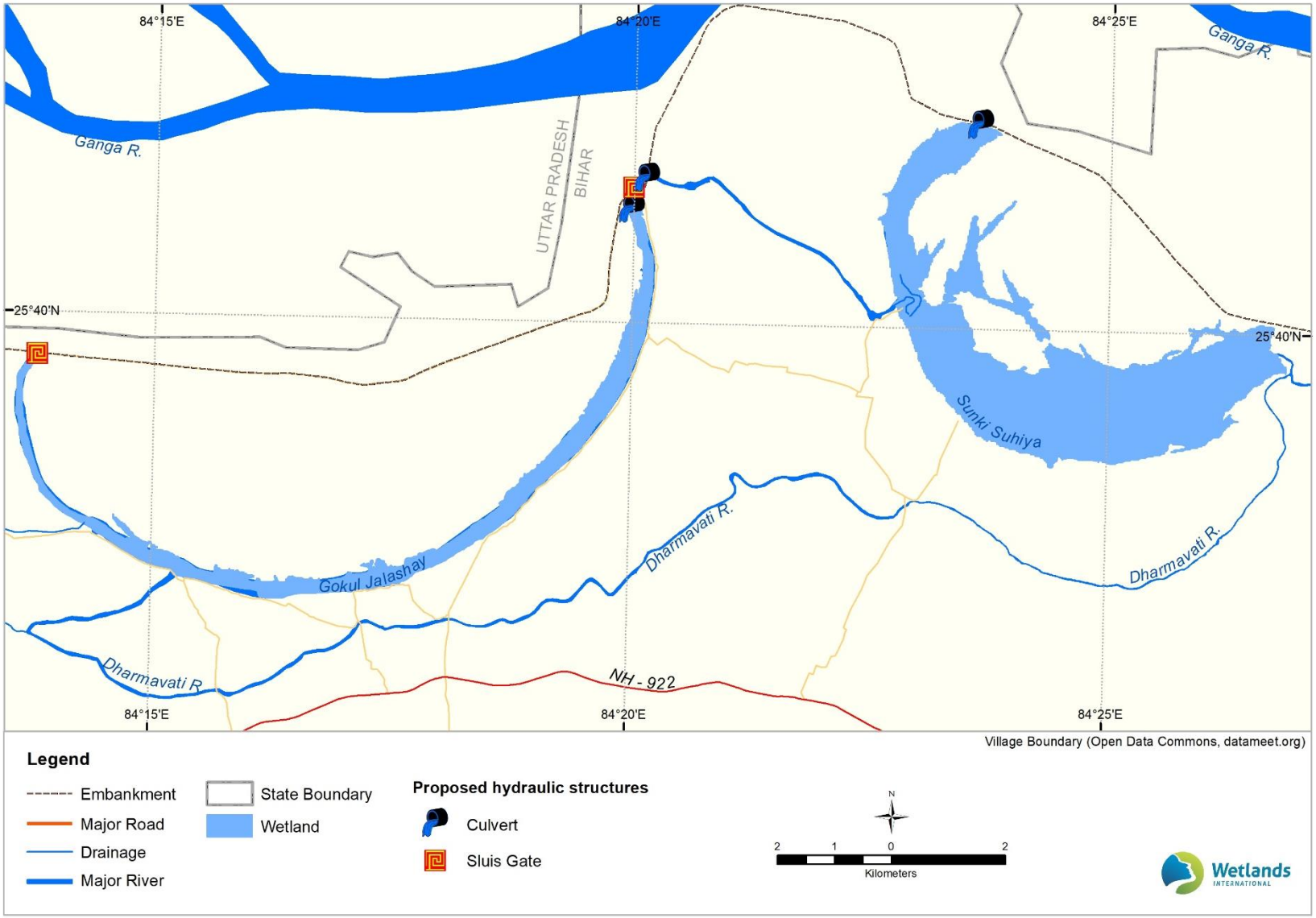
2.2 Pollution control

Activities proposed for pollution abatement for the maintenance of the ecological character of the wetland complex includes preparation of pollution abatement plans, manual scouring of scum and other waste materials, installation of mesh for screening out of waste from Dharmawati river, construction of sand-gravel bed for inflow filtration, Installation of colour coded bins for wastes at the designated waste dumping sites as well as provide trainings to

community groups, PRI members and line departments on waste management and segregations.



Map 11: Sites proposed for selective dredging and repairing of embankment in Gokul Jalashay wetland complex



Map 12: Proposed hydraulic structures in Gokul Jalashay wetland complex

2.3 Water quality parameter testing

Water quality testing should be done at the proposed water quality monitoring station (Map 13) to understand the hydro-ecological health of the wetland complex. This will aid in keeping check and regulate the untreated wastewater discharge to the wetland complex. Activities involved are:

- Conducting periodic water quality testing at sampling points within the wetland and catchment
- Recording and monitoring water quality changes
- Conducting meeting with stakeholders to discuss the result
- Documenting water quality report

Component-3: Species and habitat conservation

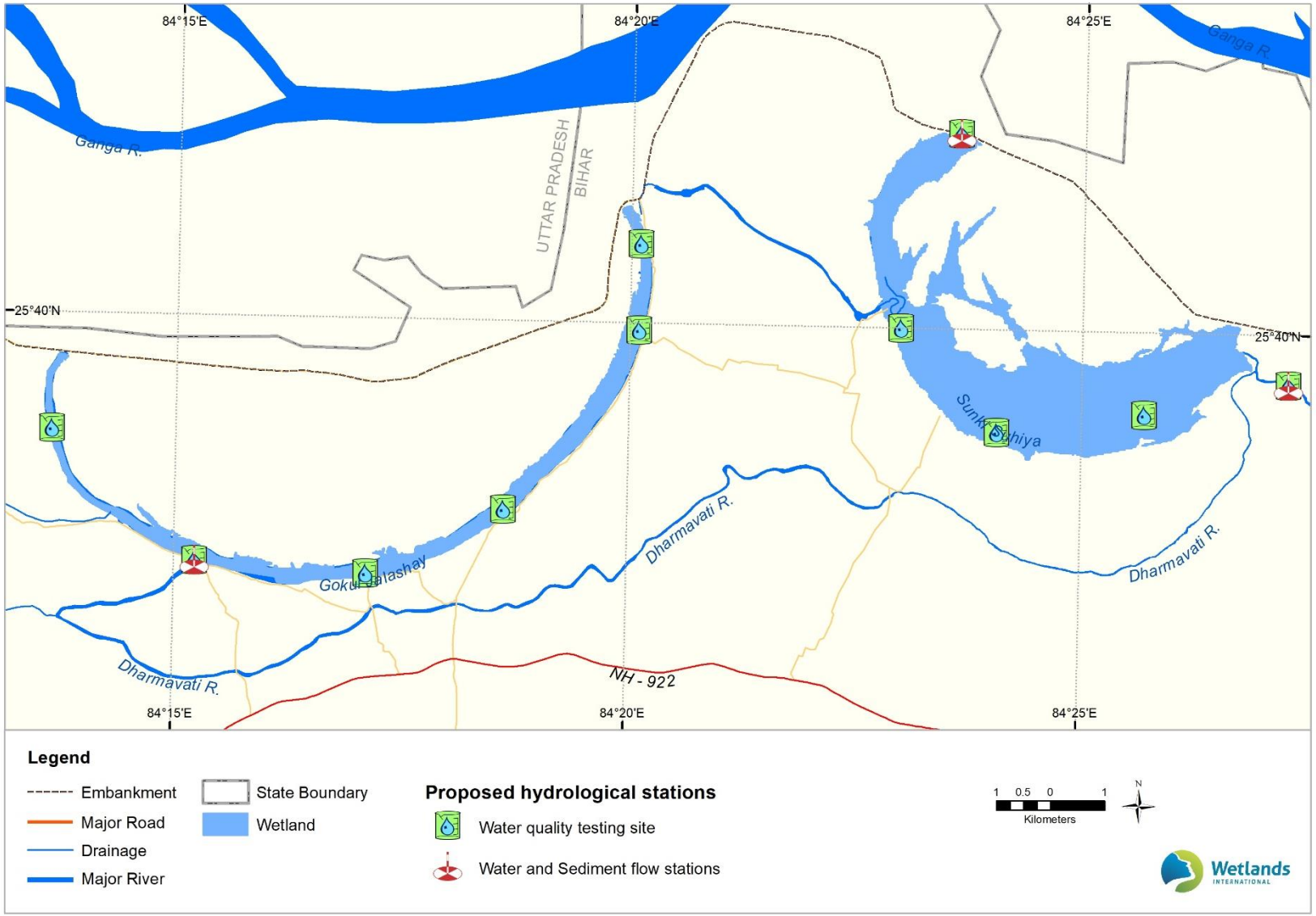
3.1 Asian Water bird Census

Regular monitoring of water bird population following standard protocols as the Asian Water bird Census at all the major congregation sites within and around Gokul Jalashay wetland complex shall be maintained in a coordinated manner so as to understand comprehensively the significance of the wetlands for water birds (both resident and migratory) and to plan and monitor habitat management strategies and actions. The management plan will support mid-winter counts of water bird as per Asian Water bird Census protocol. The census may be carried out in collaboration with NGOs such as Mandar Nature Club, Bhagalpur with prior experience in conducting such census. Census programmes will include training of prospective census participants and local water bird enthusiasts. Data collected during this monitoring work will include collection of detailed information on habitat structure and seasonal abundance and changes in different prey items (aquatic flora and fauna). Information collected should enable realistic population estimates of the different water birds and trends to be developed and provide guidance for management activities

3.2 Creation and maintenance of People’s Biodiversity Registers

The following activities are proposed to for the creation and maintenance of People’s Biodiversity Registers:

- With support from the State Biodiversity Board (SBB), People’s Biodiversity Registers are created at the local level under the guidance of the Biodiversity Management Committee (BMC).
- For creating the Peoples' Biodiversity Register, training by experts should be conducted to prepare a document that contains comprehensive information on the landscape, demography of the village, and locally available bio-resources. To prepare species inventories training by wildlife experts should be conducted on habitat mapping and identification of local flora and fauna.
- Training on Asian Waterbird Census (AWC) must be conducted annually during the winter season. This is a must for wetlands that are known to be frequented by migratory water birds of the Central Asian Flyway.



Map 13: Proposed hydrological stations in Gokul Jalashay wetland complex

3.3 Habitat mapping and surveillance

The following activities are proposed for habitat mapping and surveillance:

- Exposed to riverine flood pulses the floodplains serve as breeding and spawning grounds for fishes, migratory corridors for wildlife, and habitats for ecotone species such as Black Headed Ibis. Actions include mapping of key habitat and breeding areas followed by regular monitoring and surveillance through community groups.
- Community sensitization and formation of bird protection committees to monitor water bird habitats and to control any human disturbance. Incentives in the form of recognition and training as bird guides could be provided to the committee members.

3.4 Maintain habitat of migratory birds

Activities that need to be undertaken by Forest Division along with community participation are:

- Mapping the feeding grounds/ congregating areas of the migratory birds (zonal plan)
- Monitoring the anthropogenic disturbance of key habitats through surveillance
- Planting native fruit bearing trees in villages for terrestrial birds
- Conducting study to understand the drawdown area creation of bird habitats on wetland ecology
- Strengthening of village-based antipoaching committees by providing them ID cards and monitory incentives, and guidelines for monitoring and poaching
- Developing an SOP in cases of avian disease breakouts in the region and its institutionalization by authority
- Awareness workshops on waterbird conservation

3.5 Invasive species management:

For the management of invasive species in the Gokul Jalashay wetland complex, a site survey is proposed for the identification of areas with high presence of invasive species. These invasive macrophytes is proposed to be alternatively used in manure, and handicrafts products development. A study is proposed on the possibilities on biological control of macrophytes invasion by introducing carps.

3.6 Maintain fish diversity and check invasives fish

It is proposed to undertake further research on the invasion pathways of invasive fish species, and undertake screening at various points along the inflowing channels to prevent further spread of this fish invasive.
The activities proposed to be undertaken on the site are

- Promote native fish breeding
- Prohibit illegal fishing activities
- Sensitize local fishermen to do sustainable fishing
- Prohibit fishing and boating activities in the fish breeding areas
- Conduct periodic patrolling to ensure fishing malpractice

3.7 Protect breeding sites of wetland dependent birds

For protecting the breeding sites of the wetland dependent birds it is proposed to first identify the breeding areas within the wetland complex. Furthermore, it is proposed to distribute proper harvesting gadgets to the fisher cooperatives. Awareness on waterbird conservation has also been proposed.

3.8 Check macrophyte growth in the wetland

Growth of invasive macrophytes to be managed by either manual or mechanical removal of thick stands of emergent vegetation like *Phragmites karka, Ipomoea aquatica*, *Eichhornia crassipes, Hydrilla sp.* etc. to improve hydrological connectivity, check eutrophication and increase fish breeding areas. Control of invasive macrophytes such as Water Hyacinth can also be done through the meshing of inlets.

3.9 Establishing centres for veterinary care, shelter and preparedness for wildlife during and after extreme events

It is proposed to have one veterinary shelter in Gaighat to cater to affected/ injured wildlife during and after an extreme event of flood or heatwave.

3.10 Disease control

It is necessary to prepare a SOP for handling avian diseases for Gokul Jalashay wetland complex. Field staffs should be trained to undertake safety protocols to control spread of zoonotic diseases like isolation of affected individual and clearing debris. A community awareness workshop is suggested to observe any unusual behavior among the bird and animal species due to zoonotic diseases.

Department of Animal Husbandry and Dairying is responsible in undertaking: (i) vaccination of the livestock against contagious disease like foot and mouth disease, haemorrhagic septicaemia, etc around Gokul Jalashay. (ii) prompt disease diagnosis in the event of disease outbreaks at Gokul Jalashay wetland complex. (iii) undertake safety protocols to control spread of zoonotic diseases like isolation of affected individual and clearing debris and (iv) participate in development of SOP for the containment and control measures for wild bird species in case of contagious diseases like Avian Influenza

3.11 Communication and education facilities

Exhibitions and field excursions can be organised by Forest Division Bhojpur to the field staff to acquire more information on conservation practices and challenges.

Component-4: Livelihood

4.1 Sustainable fishing

The introduction and promotion of sustainable fishing practices is an important part of the management component. The strategy towards sustainable fishing involves the development of guidelines for sustainable fishing practices through feasibility assessments and identification of best practices. Training and educating the fishers on these sustainable best practices, the use of licensed gears for fishing, illegal fishing practices, and stocking practices to maintain fish population along with monitoring of the activities are steps to be undertaken for developing sustainable fishing in the wetland.

4.2 Post harvesting and marketing

Following activities proposed to be undertaken

- Distribution of proper harvesting gadgets to the fisher Cooperative members
- Fish holding and storage facilities for the fisher groups near Gaighat, Chakki, Nainijor and Suhiya and Chamarpur
- Support cooperatives with live fish transport mechanism for better pricing
- Market chain including E-Markets to expand demand of Gokul Jalashay wetland Complex
- Capacity building trainings to the fishers groups on post harvesting and marketing by fisheries department

4.3 Diversification of cropping pattern

Proposed activities are as follows-

- Promotion of organic agriculture following feasibility studies, trainings and monitoring
- Promotion of horticulture such as cultivation of fruit bearing trees, high value crops, crop rotation to maintain soil fertility
- Cultivation of medicinal plants.

4.4 Crop intensification

- Promotion of SRI/SWI/SCI techniques to minimize water consumptions for judicious use of wetland water

4.5 Organic manure and pest control

- Training on organic manure/vermin composing to 100 wetland dependent farmers to minimize the use of chemical fertilizers
- Training on organic pest controller to 100 wetland dependent farmers to control over use of chemical pesticides and fungicides

4.6 Eco-tourism

The development and promotion of community-led ecotourism are among the priority activities

Under this IMP. Promotion of community-led ecotourism will involve the preparation of a master plan for ecotourism, training of local community members to function as tour guides for bird watching, boat rides, etc. Infrastructure developments would include:

- Construction of two eco-huts for tourists
- Construction of four watch towers for bird watchers and visitors
- Board walk, cycling, nature trails facilities
- Construction of adequate public amenities - drinking water, toilets, resting sheds, and eateries
- Waste management - solid and wastewater - rainwater harvesting, wastewater treatment
- Purchase and maintenance of paddle boats
- Souvenir shop
- Maintenance of sites of cultural significance at Udhaura
- Provide training to eco-tourism guides and enhance their capacity by organizing exposure visits.

4.7 Infrastructure for education

An Interpretation center will be established near Gokul Jalashay wetland complex to extend education and knowledge about wetland conservation. Following are the activities proposed for establishment of Interpretation centre:

- Identify suitable location for interpretation centre near Nainijor
- Preparation of technical design and estimates
- Construction of Interpretation centre
- Purchase of binoculars, lifejackets and field identifications/guidebooks for wetland mitras
- Training for ecotourism guides
- Exposure visits to acquire knowledge of ecotourism

4.8 Community infrastructure

4.8.1 Medical Health camps

Health camps for wetlands communities is proposed to run in collaboration with the Department of Health and Family Welfare to address the health hazards. This will include

4.8.2 Safe drinking water facilities

It is proposed to provide arsenic filters to the wetland-dependent communities to reduce the risk of contracting water borne diseases.

Table 13 represents detailed activity wise action plan for integrated management of Gokul Jalashay wetland complex

Table 13: Action plan for Gokul Jalashay wetland complex

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
1. Management component: Institutions and Governance							
1.1 Notification of Wetland complex under wetlands (Conservation and Management) Rules, 2017							
	1.1.1	Delineation of wetland complex					
		1.1.1.1	Field reconnaissance survey for boundary identification	RLRD	FDB, PRI and CG	Buxar- Brahampur & Chakki block Bhojpur-Shahpur block	High
		1.1.1.2	Delineation of wetland boundary on a geo-coded map	WISA	FDB and RLRD	Buxar- Brahampur & Chakki block Bhojpur-Shahpur block	High
		1.1.1.3	Delineation of zone of influence of the wetland complex	WISA	FDB and RLRD	Buxar and Bhojpur,	High
		1.1.1.4	Ground truthing of wetland maps	RLRD	FDB, WISA, PRI and CG	Buxar- Brahampur & Chakki block Bhojpur-Shahpur block	High
		1.1.1.5	Production of ground truthed map	WISA	FDB and RLRD		High
		1.1.1.6	Stakeholder consultation	FDB	LD, WISA, PRI, Local NGOs, CBOs and CG	Buxar- Gayghat	High
		1.1.1.7	Map finalization and publication	WISA	RLRD and FDB		High
	1.1.2	Notifying wetland complex under Wetlands (Conservation and Management) Rules, 2017					
		1.1.2.1	Preparation of brief document	FDB	LD, WISA	Buxar	High
		1.1.2.2	Submission of brief dccument to Bihar State Wetland Authority (BSWA)	FDB			High
		1.1.2.3	Preparation of draft notification	BSWA			High
		1.1.2.4	Public consultation	FDB	LD, WISA, PRI, Local NGOs, CBOs and CG	Buxar-Gayghat	High
		1.1.2.5	Final notification	BSWA	FDB		High
	1.1.3	Wetland Demarcation					
		1.1.3.1	Survey of land rights	RLRD	FDB, PRI and CG	Buxar- Brahampur & Chakki block Bhojpur-Shahpur block	High
		1.1.3.2	Publication of draft land right maps	RLRD	FDB		High
		1.1.3.3	Stakeholder consultation	FDB	LD, PRI, NGOs, CBOs and CG	Buxar- Brahampur & Chakki block Bhojpur-Shahpur block	High
		1.1.3.4	Land right conflict resolution as per established procedure	RLRD	LD, PRI, NGOs, CBOs and CG	Buxar- Brahampur & Chakki block Bhojpur-Shahpur block	High
		1.1.3.5	Map finalization and publication	RLRD	FDB, WISA		High
		1.1.3.6	Registration of wetland boundaries into revenue records	RLRD	FDB		High
		1.1.3.7	Identification of geo-tagged pillar location points (Preferablly at 250 meters interval)	FDB	RLRD	Periphery of Gokul Jalashay wetland compex	High
		1.1.3.8	Installation of geo-tagged pillars along the wetland boundary including estimation and procurement	FDB	RLRD	Periphery of Gokul Jalashay wetland compex	High
		1.1.3.9	Maintainance of installed pillars	FDB	RLRD	Periphery of Gokul Jalashay wetland compex	High
1.2 Establishment of proper Institutions for effective management regime							
	1.2.1	Workshop for constitution of WM network					
		1.2.1.1	Workshop for identification of possible wetland mitras	FDB	PRI, CG	Gayghat and Suhiya	High
		1.2.1.2	Vacacny announcement for the post of WM on social media and local newspapers	FDB	PRI, CG	Gayghat and Suhiya	High
		1.2.1.3	Recruitement of WMs	FDB	PRI, CG	Gayghat and Suhiya	High

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
1.3 Management zoning/Regulatory regimes							
	1.3.1	Establishment of management zones					
		1.3.1.1	Preparation of draft zonal management plans	FDB	LD, WISA, PRI, Local NGOs, CBOs and CG	Fishery Zone- Gayghat- Saphi, Mahuar-Nainijor, Suhiya-Chamarpur Agriculture Zone- Chakki, Nainijor, Diara, Gayghat, Isharpura-Chamarpur Horticulture Zone- Gayghat, Chakki, Diara, Uhaura, Mahuar, Suhiya, Isharpura-Chamarpur Nature Protection zone- Chakki-Gayghat, Gayghat-Udhaura, Mahuar-Nainijor, Suhiya-Dhamwal, Isharpura-Sonvarsha	Medium
		1.3.1.2	Stakeholder consultation	FDB	LD, PRI, NGOs, CBOs and CG	Buxar- Brahampur & Chakki block Bhojpur-Shahpur block	Medium
		1.3.1.3	Finalization and publication	FDB	LD		Medium
1.4 Wetlands Inventory, Assessment and Monitoring System							
	1.4.1	Establishment of wetland monitoring and research centre					
		1.4.1.1	Identification of potential site for construction of wetland	FDB	RLRD, WRD	Wetland monitoring and research centre-Gayghat	High
		1.4.1.2	Construction of research centre	FDB	RWD	Wetland monitoring and research centre-Gayghat	High
		1.4.1.3	Lab accredation from Nationlal Accredation Board for Testing and Calibration Laboretories(NABL) and other regulatory agencies	FDB	NABL	Wetland monitoring and research centre-Gayghat	High
		1.4.1.4	Procurement of laboratory equipment and reagents	FDB	BAU and IIT Patna	Wetland monitoring and research centre-Gayghat	High
		1.4.1.5	Recruitement of research personnels	FDB	BAU and IIT Patna	Wetland monitoring and research centre-Gayghat	High
		1.4.1.6	Identifcation of suitable sites for installation of hydrometeorological stations	WRD	FDB, WISA	Water and Sediment flow stations- At Gayghat (25°37'32.4"N 84°15'14.2"E) At Isharpura (25°41'57.8"N 84°23'37.9"E) At Chamarpur (25°39'29.87"N 84°27'17.72"E)	High
		1.4.1.7	Procurement of instruments for hydrometeorolgical monitoring including sediment and water flow and depth monitoring	WRD	FDB, WISA	Wetland monitoring and research centre-Gayghat	High
		1.4.1.8	Installation of hydrometeorological stations	WRD	FDB	Water and Sediment flow stations- At Gayghat (25°37'32.4"N 84°15'14.2"E) At Isharpura (25°41'57.8"N 84°23'37.9"E) At Chamarpur (25°39'29.87"N 84°27'17.72"E) Weather stations At Gayghat and Suhiya	High
		1.4.1.9	Maintainance of hydrometeorological equipements	WRD	FDB	Water and Sediment flow stations- At Gayghat (25°37'32.4"N 84°15'14.2"E) At Isharpura (25°41'57.8"N 84°23'37.9"E) At Chamarpur (25°39'29.87"N 84°27'17.72"E) Weather stations At Gayghat and Suhiya	High
		1.4.1.10	Identifcation of suitable sites for water quality sampling stations	Public Health Engineering Department	FDB, WRD, WISA	Water quality station- For Gokul Jalashay- At Gayghat (25°37'32.4"N 84°15'14.2"E) At Chakki (25°38'50.38"N 84°13'38.14"E) At Baluan (25°37'26.50"N 84°17'7.88"E) At Udhuara (25°38'6.58"N 84°18'38.31"E) At Mahuar (25°39'55.95"N 84°20'6.28"E) At Nainijor (25°40'47.95"N 84°20'6.61"E) For Sunki Suhiya- At Isharpura (25°41'57.8"N 84°23'37.9"E) At Sonvarsha (25°40'0.34"N 84°23'0.10"E) At Suhiya (25°38'58.48"N 84°24'4.57"E)	High

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
		1.4.1.11	Procurement of instruments for water quality monitoring	Public Health Engineering Department	FDB, WISA	Water quality station- For Gokul Jalashay- At Gayghat (25°37'32.4"N 84°15'14.2"E) At Chakki (25°38'50.38"N 84°13'38.14"E) At Baluan (25°37'26.50"N 84°17'7.88"E) At Udhuara (25°38'6.58"N 84°18'38.31"E) At Mahuar (25°39'55.95"N 84°20'6.28"E)	High
		1.4.1.12	Installation of water quality monitoring equipments	Public Health Engineering Department	FDB	Water quality station- For Gokul Jalashay- At Gayghat (25°37'32.4"N 84°15'14.2"E) At Chakki (25°38'50.38"N 84°13'38.14"E) At Baluan (25°37'26.50"N 84°17'7.88"E) At Udhuara (25°38'6.58"N 84°18'38.31"E) At Mahuar (25°39'55.95"N 84°20'6.28"E) At Nainijor (25°40'47.95"N 84°20'6.61"E) For Sunki Suhiya- At Isharpura (25°41'57.8"N 84°23'37.9"E) At Sonvarsha (25°40'0.34"N 84°23'0.10"E) At Suhiya (25°38'58.48"N 84°24'4.57"E) At Dhamwal (25°39'10.60"N	High
		1.4.1.13	Maintainance of water quality monitoring equipments	Public Health Engineering Department	FDB	Water quality station- For Gokul Jalashay- At Gayghat (25°37'32.4"N 84°15'14.2"E) At Chakki (25°38'50.38"N 84°13'38.14"E) At Baluan (25°37'26.50"N 84°17'7.88"E) At Udhuara (25°38'6.58"N 84°18'38.31"E) At Mahuar (25°39'55.95"N 84°20'6.28"E) At Nainijor (25°40'47.95"N 84°20'6.61"E) For Sunki Suhiya- At Isharpura (25°41'57.8"N 84°23'37.9"E) At Sonvarsha (25°40'0.34"N 84°23'0.10"E) At Suhiya (25°38'58.48"N 84°24'4.57"E) At Dhamwal (25°39'10.60"N	High
	1.4.2	Development of database management system					
		1.4.2.1	Development of data quality management and assurance plan	Department of Information Technology	FDB, PKP such as BAU, IIT Patna and MNC and WISA	Wetland monitoring and research centre-Gayghat	High
		1.4.2.2	Development of GIS based database management system	Department of Information Technology	FDB, PKP such as BAU, IIT Patna and MNC and WISA	Wetland monitoring and research centre-Gayghat	High
	1.4.3	Wetland monitoring and evaluation					
		1.4.3.1	Development of draft wetland inventory, monitoring and	WISA	FDB, BAU, IIT Patna, MNC	WISA, BAU, IIT Patna, MNC	High
		1.4.3.2	Field testing of wetland inventory, monitoring and assessment tool	FDB	WISA, BAU, IIT Patna, MNC	Wetland monitoring and research centre-Gayghat	High
		1.4.3.3	Stakeholder consultation	FDB	LD, WISA, PRI, Local NGOs, CBOs and CG	Wetland monitoring and research centre-Gayghat	High
		1.4.3.4	Finalization of wetland inventory, monitoring and assessment tool	FDB	WISA, BAU, IIT Patna, MNC	Wetland monitoring and research centre-Gayghat	High
	1.4.4	Surveillance system					
		1.4.4.1	Development of mobile-based surveillance system/app	Department of Information	FDB	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwal, Chamarpur	Medium
		1.4.4.2	Field testing	Department of Information	FDB, WM, PRI and CG	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwal, Chamarpur	Medium
		1.4.4.3	Stakeholder consultation	FDB	LD, PRI, NGOs, CBOs and CG	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwal,	Medium

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
		1.4.4.4	Finalization of surveillance app	Department of Information	FDB	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwal, Chamarpur	Medium
		1.4.4.5	Procurement of drones and CCTV cameras	Department of Information	FDB	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwal, Chamarpur	Medium
		1.4.4.6	Installation of CCTVs at appropriate locations	Department of Information	FDB,WM, PRI and CG	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwal, Chamarpur	Medium
		1.4.4.7	Surveillance of the wetlannd complex using drones and CCTVs	Department of Information	FDB	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwal, Chamarpur	Medium
	1.4.5	Ecosystem Health Report Card					
		1.4.5.1	Convening a methodology workshop for healthcard development	WISA	LD, PRI, Local NGOs, CBOs and CG	Buxar & Bhojpur	High
		1.4.5.2	Development of Ecosystem Health Report Card	WISA	LD, PRI, Local NGOs, CBOs and CG	Buxar & Bhojpur	High
		1.4.5.3	Report card publication	WISA	LD	Buxar & Bhojpur	High
		1.4.5.4	Stakeholder dissemination workshop	WISA	LD, PRI, Local NGOs, CBOs and CG		High
	1.4.6	Tracking of management effectiveness					
		1.4.6.1	Development of Management Effectiveness Tracking Tool (METT)	WISA	FDB	Buxar & Bhojpur	High
		1.4.6.2	Pilot testing of METT	WISA	FDB	Buxar & Bhojpur	High
		1.4.6.3	Stakeholders consultation	FDB	LD, WISA, PRI, Local NGOs, CBOs and CG	Buxar & Bhojpur	High
		1.4.6.4	Finalisation of METT	WISA	FDB	Buxar & Bhojpur	High
		1.4.6.5	Periodic monitoring of management effectiveness using	FDB	PRI, WMs, CG	Buxar & Bhojpur	High
1.5 Research							
	1.5.1	Cliamte risk assessment					
		1.5.1.1	Inception workshop	WISA	FDB, other LD, PRI, Local	Gayghat	Medium
		1.5.1.2	Study	WISA	FDB	Gayghat, Chakki, Nainijor, Suhiya, Chamarpur	Medium
		1.5.1.3	Result sharing	WISA	LD, WISA, PRI, Local NGOs, CBOs and CG	Gayghat, Chakki, Nainijor, Suhiya, Chamarpur	Medium
		1.5.1.4	Publication	WISA	FDB	Buxar	Medium
	1.5.2	Habitat study for foraging birds especially black-headed Ibis					
		1.5.2.1	Inception workshop	WISA	FDB, LD, PRI, Local NGOs, CBOs and CG	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwar, Chmarpur	Medium
		1.5.2.2	Study	WISA	FDB, MNC and BNHS	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwar, Chmarpur	Medium
		1.5.2.3	Result sharing	WISA	FDB, LD, PRI, Local NGOs, CBOs and CG	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwar, Chmarpur	Medium
		1.5.2.4	Publication	WISA	FDB, MNC and BNHS	Buxar	Medium
	1.5.3	Hydrological assessement					
		1.5.3.1	Inception workshop	WISA	FDB,WRD, PRI, NGOs, CBOs and CG	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwar, Chmarpur	Medium
		1.5.3.2	Study -Bathymetry -Flow measurement -Hydrological Connectivity -Groundwater quality and quantity assessement	WISA	WRD, PHED, IIT Patna	Gokul Jalashay wetland complex	High
		1.5.3.3	Result sharing	WISA	FDB,WRD, other LD, PRI, NGOs, CBOs	Chakki, Gayghat, Baluaon, Udaura, Nainijor, Ishapura, Suhiya, Dhamwar, Chmarpur	Medium
		1.5.3.4	Publication	WISA	WRD and IIT Patna	Buxar	Medium

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
1.6 Capacity development							
	1.6.1	Site Manager training					
		1.6.1.1	Development of Capacity and Training Needs Assessment (CTNA) tool	WISA	FDB	Buxar and Bhojpur	High
		1.6.1.2	Training workshop for CTNA	WISA	FDB	Buxar and Bhojpur	High
		1.6.1.3	Assessment through CTNA tool	WISA	FDB	Buxar and Bhojpur	High
		1.6.1.4	Prepare training calender as per CTNA	WISA	FDB	Buxar and Bhojpur	High
		1.6.1.5	Provide trainings to site managers as per CTNA (such as wetland ecology, participatory planning, health card preparation, conflict resolution, community engagements)	WISA	FDB, other LD	Wetland monitoirng and research centre-Gayghat	High
	1.6.2	Frontline staff training					
		1.6.2.1	Training of staff on sampling and instrumentation	FDB	PKP such as BAU, IIT Patna and MNC	Wetland monitoirng and research centre-Gayghat	High
		1.6.2.2	Systematic training on wildlife disease identification	FDB	MNC	Wetland monitoirng and research centre-Gayghat	High
		1.6.2.3	Bird ringing	FDB	MNC	Wetland monitoirng and research centre-Gayghat	High
		1.6.2.4	Poaching prevention	FDB	MNC	Wetland monitoirng and research centre-Gayghat	High
	1.6.3	Resource users training					
		1.6.3.1	Identify key wetland dependent resources groups using participatory mapping	FDB	WMs, SD, PRI and CG	Buxar & Bhojpur	Medium
		1.6.3.2	Identify key training needs for identified groups such as agriculturalists, horticulturalists, fishers, fodder and forage users, dairy and cultural groups	FDB	WMs, AD, HD, PRI and CG	Buxar & Bhojpur	Medium
		1.6.3.3	Convergence workshop with LD and resource user groups	FDB	FDB,LD, PRI, NGOs, CBOs and CG	Buxar & Bhojpur	Medium
	1.6.4	LD and local community training					
		1.6.4.1	Provide trainings to CG, PRI and LD on participatory planning process	FDB	DWD, WM,PRI, CG	Gayghat, Nainijor, Suhiya, Chakki	Medium
		1.6.4.2	Gender mainstream training and ensuring participation of women in leadership and decision making roles	FDB	DWD, SD, WM,PRI, CG	Gayghat, Nainijor, Suhiya, Chakki, Chamarpur, Isharpura	Medium
		1.6.4.3	Integrate wetland management actions into development planning process during Gram	FDB	LD, WM,PRI, CG	Gayghat, Nainijor, Suhiya, Chakki, Chamarpur, Isharpura	Medium
		1.6.4.4	Extant wetland management rules and regulations awareness programme	FDB	LD, WM,PRI, CG	Gayghat, Nainijor, Suhiya, Chakki, Chamarpur, Isharpura	Medium
		1.6.4.5	Training of local communities and bodies such as Panchayati Raj Institutions and CBOs on ecosystem-based wetland	FDB	WM,PRI, CG	Gayghat, Nainijor, Suhiya, Chakki, Chamarpur, Isharpura	Medium
	1.6.5	Community mobilisation and proactive stakeholder engagement					
		1.6.5.1	Establishment of community advisory groups for liasoning workshops and meetings	FDB	WM,PRI, Existing FDC, CG	Chakki, Gayghat, Udhaura, Nainijor & Suihiya	Medium
		1.6.5.2	Establishment of community-based wetland management groups (WMC)	FDB	WM,PRI, Existing FDC, CG	Chakki, Gayghat, Udhaura, Nainijor & Suihiya	Medium
		1.6.5.3	Creation of wetland peoples Biodiversity Register-ToR, Stakeholders Consultations	Bihar State Biodiversity Board (BSBB)	WM,PRI, Existing FDC, CG	Buxar- Chakki, Brahampur & Bhojpur-Shahpur	Medium
		1.6.5.4	Distribution of portable water quality test kits	PHED	FDB, WM,PRI, CG	Chakki, Gayghat, Udhaura, Nainijor & Suihiya	Medium
		1.6.5.5	Training on water quality test kits	PHED	FDB, WM,PRI, CG	Chakki, Gayghat, Udhaura, Nainijor & Suihiya	Medium
		1.6.5.6	Participatory water quality monitoring	PHED	FDB, WM,PRI, CG	Chakki, Gayghat, Udhaura, Nainijor & Suihiya	Medium
1.7 Communication and outreach							
	1.7.1	Stakeholder engagement in wetland management through communication and awareness					
		1.7.1.1	Installation of signage in key locations-in all entrance and exits points	FDB	WM,PRI, CG	Gayghat,Chakki, Brahmpur, Chamarpur, Isharpura, Nainijor & Suhiya	Medium

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
		1.7.1.2	Creation of webpage	Department of	FDB,WM,PRI, CG	Wetland Monitoring and Research Station-Gayghat	Medium
		1.7.1.3	Information boards showcasing significance of site	FDB	WM,PRI, CG	Gayghat,Chakki, Brahmpur, Chamarpur, Isharpura, Nainijor & Suhiya	Medium
		1.7.1.4	Celebration on important public events	FDB	LD, WISA, PRI, Local NGOs, CBOs and CG	Gayghat,Chakki, Brahmpur, Chamarpur, Isharpura, Nainijor & Suhiya	Medium
		1.7.1.5	Production of resources material	FDB	LD, PKP	Wetland Monitoring and Research Station-Gayghat	Medium
		1.7.1.6	Oragnising nukkad nataks to sensitize communities on wise use of wetlands	Art Culture and Youth Department	FDB, WM,PRI, CG	Gayghat,Chakki, Diara, Saphi, Udhaura, Brahmpur, Chamarpur, Isharpura, Nainijor & Suhiya	Medium
2. Management component: Land and water management							
2.1 Maintaing the environmental flows							
	2.1.1	Improvement of inflow of inlets/channels using selective dredging					
		2.1.1.1	Identification of sites for selective dredging	WRD	RWD, FDB, WM,PRI, CG	Dharmavati river section joining Gokul Jalashay (From 25°36'57.08"N 84°13'43.95" E to 25°37'31.02"N 84°15'13.82"E) Dharmavati river section joining Sunki Suhiya (25°36'57.08"N 84°13'43.95" E to 25°39'37.45"N 84°26'55.13"E)	High
		2.1.1.2	Selective dredging of Dharmavati river channel	WRD	RWD, FDB, WM,PRI, CG	Dharmavati river section joining Gokul Jalashay (From 25°36'57.08"N 84°13'43.95" E to 25°37'31.02"N 84°15'13.82"E) Dharmavati river section joining Sunki Suhiya (25°36'57.08"N 84°13'43.95" E to 25°39'37.45"N 84°26'55.13"E)	High
		2.1.1.3	Identification of sites for selective dredging within the wetland	WRD	RWD, FDB, WM,PRI, CG	Gokul Jalashay wetland complex, preferably at Chakki, Nainijor, Sonvarsha	High
		2.1.1.4	Selective dredging of wetland complex to maintain water depth	WRD	RWD, FDB, WM,PRI, CG	Gokul Jalashay wetland complex, preferably at Chakki(25°39'2.73"N 84°13'36.42"E), Nainijor (25°40'53.27"N 84°20'4.14"E), Sonvarsha (25°40'16.78"N 84°22'54.70"E)	High
		2.1.1.5	Selective dredging of drain connecting Gokul Jalashay and Sunki Suhiya	WRD	RWD, FDB, WM,PRI, CG	Nainijor (25°41'21.03"N 84°20'18.22"E) to Sonvarsha (25°40'11.33"N 84°22'45.68"E)	High
	2.1.2	Regulation of flood pulses from river Ganga					
		2.1.2.1	Identification of zone of vulnerablity due to flood pulses	WRD	RWD, FDB, WM,PRI, CG	Ishapura (25°41'57.82"N 84°23'37.67"E)	High
		2.1.2.2	Preparation of technical design with estimations for the restoring broken sections of the	WRD	RWD	Ishapura (25°41'57.82"N 84°23'37.67"E)	High
		2.1.2.3	Procurements of raw meterials	WRD	RWD, FDB	Ishapura (25°41'57.82"N 84°23'37.67"E)	High
		2.1.2.4	Repairing of approx. 250 m embankment breach at Isharpura	WRD	RWD, FCD, FDB, WM,PRI, CG	Ishapura (25°41'57.82"N 84°23'37.67"E)	High
		2.1.2.5	Design and estimation of culverts required in the broken section of embankment at Isharpura	WRD	RWD, FCD, FDB, WM,PRI, CG	Ishapura (25°41'57.82"N 84°23'37.67"E)	High
		2.1.2.6	Construction of approx. 5 culverts to maintain the connectivity between river Ganga and the wetland complex	WRD	RWD, FCD, FDB, PRI, CG	Ishapura (25°41'57.82"N 84°23'37.67"E)	High
	2.1.3	Restoration of hydrological connectivity					
		2.1.3.1	Site survey for identification of potential sites for construction of culverts and sluice gates	WRD	RWD, FDB	Culverts- Nainijor (25°41'25.77"N 84°20'8.48"E and 25°41'13.75"N 84°19'59.40"E) Sluice gate- Pranpur (25°39'35.92"N 84°13'46.35"E), Nainijor (25°41'25.77"N 84°20'8.48"E)	High
		2.1.3.2	Preparation of technical design with estimations for construction of culverts and sluice gates	WRD	RWD		High
		2.1.3.3	Construction of 2 culverts at Nainijor	WRD	RWD,FDB	Nainijor (25°41'25.77"N 84°20'8.48"E and 25°41'13.75"N 84°19'59.40"E)	High
		2.1.3.4	Construction of 2 sluice gates	WRD	WRD	Pranpur (25°39'35.92"N84°13'46.35"E)	High
		2.1.3.5	Site survey for identification of dredging site at Nainijor to restore connectivity of Gokul Jalashay and	WRD	RWD	Nainijor (25°41'23.61"N 84°20'10.56"E) to (25°41'15.39"N84°20'1.84"E)	High

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
		2.1.3.6	Selected dredging at Nainijor to restore connectivity between Gokul Jalashay and Sunki Suhiya	WRD	RWD	Nainijor (25°41'23.61"N 84°20'10.56"E) to (25°41'15.39"N84°20'1.84"E)	High
	2.1.4	Removal of invasive macrophytes					
		2.1.4.1	Site survey for the identification of region with high invasive macrophytes	WRD	FDB, WM, CG	Dharmawati river channel, Gokul Jalashay, Sunki Suhiya and Drain connecting the wetland complex at	High
		2.1.4.2	Periodical trapping and removing of invasive macrophytes	FDB	WRD, WM, CG	Gayghat, Nainijor & Suhiya	High
		2.1.4.3	Undertake awareness campaigns in wetland dependent villages	FDB	WRD, WM, CG	Gayghat, Nainijor & Suhiya	High
		2.1.4.4	Placing of signboards to generate awareness	FDB	WRD, WM, CG	Gayghat,Chakki, Nainijor & Suhiya, Dhamwal	High
	2.1.5	Cleaning of sections with temporary structures such as check dams and temporary roads					
		2.1.5.1	Identification of temporary structures with high sedimentions	WRD	FDB,RWD,	Dharmawati river channel and Gokul Jalashay wetland complex	Medium
		2.1.5.2	Periodic removal of debris/sediment near temporary	RWD	WRD, PRI, CG	Dharmawati river channel and Gokul Jalashay wetland complex	Medium
		2.1.5.3	Maintanance of the temporary structures	RWD	WRD, PRI, CG	Dharmawati river channel and Gokul Jalashay wetland complex	Medium
2.2 Pollution control							
	2.2.1	Activities for pollution abatement are as follows:					
		2.2.1.1	Survey of storm drains with high pollution load	RWD	BSPCB and PHED	Chakki, Gayghat, Baluan, Udaura, Nainijor, Sonvarsha, Suhiya, Dhamwa and Chamarpur	Medium
		2.2.1.2	Preparation of pollution abatement plans	RWD	FDB and PHED, BSPCB	Chakki, Gayghat, Baluan, Udaura, Nainijor, Sonvarsha, Suhiya, Dhamwa and Chamarpur	Medium
		2.2.1.3	Procurements of raw meterials and equipments for waste management	RWD	FDB and PHED, BSPCB	Relocation of dumping sites from- Gayghat, Chakki, Baluan, Suhiya, Dhamwal, Sonvarsha	Medium
		2.2.1.4	Manual scouring of scum and other waste material	RWD	FDB and PHED, BSPCB	Survey of Nallas- Chakki, Gayghat, Baluan, Udaura, Nainijor, Sonvarsha, Suhiya, Dhamwa and Chamarpur Scouring or scum of waste-Chakki, Gayghat, Baluan, Udaura, Nainijor, Sonvarsha, Suhiya, Dhamwa and Chamarpur Relocation of dumping sites from- Gayghat, Chakki, Baluan, Suhiya, Dhamwal, Sonvarsha	Medium
		2.2.1.5	Relocation of dumping sites	RWD	FDB and PHED, RWD BSPCB	Survey of Nallas- Chakki, Gayghat, Baluan, Udaura, Nainijor, Sonvarsha, Suhiya, Dhamwa and Chamarpur Scouring or scum of waste-Chakki, Gayghat, Baluan, Udaura, Nainijor, Sonvarsha, Suhiya, Dhamwa and Chamarpur Relocation of dumping sites from- Gayghat, Chakki, Baluan, Suhiya, Dhamwal, Sonvarsha	Medium
		2.2.1.6	Installation of mesh for screening out of waste from Dharmawati river	RWD	FDB and PHED, RWD BSPCB	Survey of Nallas- Chakki, Gayghat, Baluan, Udaura, Nainijor, Sonvarsha, Suhiya, Dhamwa and Chamarpur Scouring or scum of waste-Chakki, Gayghat, Baluan, Udaura, Nainijor, Sonvarsha, Suhiya, Dhamwa and Chamarpur Relocation of dumping sites from- Gayghat, Chakki, Baluan, Suhiya, Dhamwal, Sonvarsha	Medium
		2.2.1.7	Construction of sand-gravel bed for inflow filtration	RWD	BSPCB, FDB and PHED	Baluan, Gayghat, Dhamwal,Suhiya	Medium
		2.2.1.8	Provide trainings to CG, PRI and LD on waste mangement and segregations	BSPCB	FDB and PHED, PRI, NGOs, CG	Baluan, Gayghat, Dhamwal,Suhiya	Medium
		2.2.1.9	Installation of colour coded bins for wastes at the designated waste dumping sites	RWD	RWD, PRI, BSPCB	Chakki, Gayghat, Uhaura, Dhamwal,Suhiya, Chmarpur	Medium

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
2.3 Water quality parameter testing							
	2.3.1	Water quality parameter testing					
		2.3.1.1	Conduct periodic water quality testing at sampling points within the wetland and catchment	PHED	FDB, BSPCB	Water quality testing point: At Gayghat (25°37'32.4"N 84°15'14.2"E) At Chakki (25°38'50.38"N 84°13'38.14"E) At Baluan (25°37'26.50"N 84°17'7.88"E) At Udhuara (25°38'6.58"N 84°18'38.31"E) At Mahuar (25°39'55.95"N 84°20'6.28"E) At Nainijor (25°40'47.95"N 84°20'6.61"E) For Sunki Suhiya- At Isharpura (25°41'57.8"N 84°23'37.9"E) At Sonvarsha (25°40'0.34"N 84°23'0.10"E) At Suhiya (25°38'58.48"N 84°24'4.57"E)	High
		2.3.1.2	Record and monitor water quality changes	PHED	FDB, BSPCB	Monitoring and research centre at Gayghat	High
		2.3.1.3	Conduct meeting with stakeholders to discuss the result	PHED	LD, PRI, NGOs, CBOs and CG	Gayghat	High
		2.3.1.4	Document water quality report	PHED	FDB, BSPCB,WISA	Monitoring and research centre at Gayghat	High
3. Management component: Species and habitat conservation							
3.1 Asian water birds census							
	3.1.1	Training on bird counting and census protocols					
		3.1.1.1	Training on bird counting and census protocols	WISA	FDB, MNC, BNHS, and	Gayghat, Suhiya	Medium
		3.1.1.2	Conduct annual bird census	FDB	MNC, BNHS	Gokul Jalashay wetland complex	Medium
		3.1.1.3	Operationalize bird ringing station at Gayghat	FDB	MNC, BNHS	Gayghat	Medium
		3.1.1.4	Train staffs on bird ringing	FDB	MNC, BNHS and WISA	Brahampur, Chakki, Shahapur	Medium
3.2 Peoples biodiversity registers							
	3.2.1	Training on developing PBR					
		3.2.1.1	Creation of Peoples Biodiversity Register (PBR)	Bihar State Biodiversity Board (BSBB)	FDB,WISA	Buxar and Bhojpur	High
		3.2.1.2	Training on Peoples' Biodiversity Register for the experts	Bihar State Biodiversity	FDB,WISA	Buxar and Bhojpur	High
3.3 Habitat mapping and surveillance							
	3.3.1	Habitat mapping and surveillance					
		3.3.1.1	Mapping of key habitat and breeding areas	FDB	WISA, MNC, BNHS, CG	Dallupur-Nainijore,2.Bihar Ghat, Peepa Pul, Ganga River , 3. Udaura-Gayghat, 4.Gayghat-Hanuman Mandir to Chakki	High
		3.3.1.2	Formation of bird protection committees to monitor waterbird habitats	FDB	MNC, BNHS, CG	Chakki, Gayghat, Mahuar, Suhiya	High
		3.3.1.3	Training of community to become bird guides	FDB	MNC, BNHS, CG	Chakki, Gayghat, Mahuar,Nainijor, Suhiya	Medium
3.4 Maintain habitat of migratory birds							
	3.4.1	Habitat conservation for migratory birds					
		3.4.1.1	Mapping the bird congregation areas as per Zonal Plan	WISA	FDB, MNC, BNHS	1. Dallupur-Nainijore,2.Bihar Ghat, Peepa Pul, Ganga River , 3. Udaura-Gayghat, 4.Gayghat-Hanuman Mandir to Chakki	High
		3.4.1.2	Monitoring the anthropogenic disturbance of key habitats through surveillance	FDB	MNC, BNHS	1. Dallupur-Nainijore,2.Bihar Ghat, Peepa Pul, Ganga River , 3. Udaura-Gayghat, 4.Gayghat-Hanuman Mandir to Chakki	High
		3.4.1.3	Planting native fruit bearing trees in villages for terrestrial birds	FDB	MNC, BNHS	Chakki, Gayghat, Baluaon, Udhaura, Mahuar, Nainijor, Suhiya, Dhamwal & Chamarpur	Medium
		3.4.1.4	Conducting study to understand the drawdown area creation of bird habitats on wetland ecology	FDB	MNC, WISA	Diara, Saphi, Sonvarsha, Isharpura,	Medium
		3.4.1.5	Strengthening of village-based antipoaching committees by providing them ID cards and monitory incentives, and guidelines for monitoring and poaching	FDB	MNC, PRI, CG	Chakki, Gayghat, Baluaon, Udhaura, Mahuar, Nainijor, Suhiya, Dhamwal & Chamarpur	High

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
		3.4.1.6	Developing an SOP in cases of avian disease breakouts in the region and its institutionalization	FDB	MNC and BNHS	Chakki, Gayghat, Baluan, Nainijor, Ishapura, Suhiya, Chamarpur, Dhamwal	High
		3.4.1.7	Activities for habitat restoration and adaptive management	FDB	MNC and BNHS	Chakki, Gayghat, Baluan, Nainijor, Ishapura, Suhiya, Chamarpur, Dhamwal	High
		3.4.1.8	Awareness workshops and festivals (annual Gokul Jalashay bird festival) on waterbird conservation	FDB	LD, MNC and BNHS, PRI and CG	Brahampur, Chakki, Shahapur	Medium
3.5 Invasive species management							
	3.5.1	Mangement of Invasive species					
		3.5.1.1	Site survey for identification of areas with high presence of invasive species	FDB	WRD, CG	Gokul Jalashay and Sunki Suhiya & Dharmawati river	High
		3.5.1.2	Development of maps indicating areas requiring interventions for invasion control	FDB	WRD, CG	Gokul Jalashay and Sunki Suhiya & Dharmawati river	High
		3.5.1.3	Alternative uses of invasive macrophytes in manure, handicrafts products development.	FDB	WRD, MSME, CG	Gayghat, Chakki, Nainijor & Suhiya	Medium
		3.5.1.4	Study on the possiblities on biological control of macrophytes invasion by introducing carps	FDB	WRD, FD, CG	Saphi,Uhaura & Sonvarsha,	Medium
3.6 Maintain fish diversity and check invasives fish							
	3.6.1	Maintianing fish diverstiy in the wetland complex					
		3.5.2.1	Stocking of fingerlings for fish breeding in bird congregating	FDB	FD, ICAR-CIFRI	Buxar and Bojpur	High
		3.5.2.2	Promote in-situ seed raising of native fish species	FDB	FD, ICAR-CIFRI	Gayghat, Chakki, Baluaon, Chakki, Suhiya, Dhamawal, Chamarpur	High
		3.5.2.3	Prohibit illegal fishing	FDB	FD, PRI, CG	Gokul Jalashay and Sunki Suhiya	High
		3.5.2.4	Sensitize local fishermen on sustainable fishing	FDB	FD, PRI, CG	Brahampur, Chakki, Shahapur	High
		3.5.2.5	Conduct periodic patrolling	FDB	FD, PRI, CG	Gokul Jalashay and Sunki Suhiya	Low
		3.5.2.6	Diseases monitoring	FDB	FD,ICAR-CIFRI	Gokul Jalashay and Sunki Suhiya	High
3.7 Protect breeding sites of wetland dependent birds							
	3.7.1	Protection of breeding sites of waterbrids					
		3.7.1.1	Identify bird breeding areas	FDB	MNC, BNHS	Chakki, Gayghat, Baluan, Nainijor, Ishapura, Suhiya, Chamarpur, Dhamwal	High
		3.7.1.2	Distribution of proper harvesting gadgets to the fisher Cooperatives	FDB	FD	Chakki- Gayghat Hanuman Mandir- Gayghat- Udhaura, Bihar ghat, Dallupur- Naninjor, Suhiya	Medium
		3.7.1.3	Awareness workshop on wterbird conservation	FDB	MNC, BNHS	Chakki, Gayghat, Baluan, Nainijor, Ishapura, Suhiya, Chamarpur, Dhamwal	High
3.8 Check macrophyte growth in the wetland							
	3.8.1	Check macrophytes growth near inlets of the wetland					
		3.8.1.1	Conduct water quality tests for invasive macrophyte growth	Public Health Engineering Department	MNC, WRD	Gayghat(near dharmawati confluence), Chakki, Baluaon, Chakki, Ishapura, Suhiya, Chamarpur (near Dharmawati	High
		3.8.1.2	Periodic monitoring of invasive macrophytes growth	FDB	MNC, WRD	Chakki, Gayghat, Baluan, Nainijor, Ishapura, Suhiya, Chamarpur, Dhamwal and the connective dharwati river channel passing through Brahampur,	Medium
3.9 Establishing centres for veterinary care, shelter and preparedness for wildlife during and after extreme events							
	3.9.1	Veterinary support					
		3.9.1.1	Construction of one veterinary shelter for care and shelter wildlife during and post disasters	DAHD	FDB	Gayghat	Low
		3.9.1.2	Maintanance of veterinary centre	DAHD	FDB	Gayghat	Low
3.10 Disease control							
	3.10.1	Disease control					
		3.10.1.1	Develop an SOP for handling avian diseases episodes.	FDB	DAHD,MNC, BNHS	Brahampur, Chakki, Shahapur	Medium
		3.10.1.2	Conduct workshops to spread awareness on avian diseases and their controls	FDB	DAHD,MNC, BNHS	Brahampur, Chakki, Shahapur	Medium
		3.10.1.3	Undertake safety protocols to control spread of zoonotic diseases like isolation of affected individual and clearing debris	FDB	DAHD,MNC, BNHS	Brahampur, Chakki, Shahapur	Medium

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
		3.10.1.4	Purchase and installation of ATVs for surveillance at Gayghat, Chakki, Baluaon, Suhiya and Dhamwal villages	FDB	DAHD	Gayghat, Chakki, Baluaon, Suhiya, Dhamawal,	Medium
		3.10.1.5	Purchase of kits to undertake animal/bird debris clearance	FDB	DAHD	Gayghat, Chakki, Baluaon, Suhiya, Dhamawal,	Medium
		3.10.1.6	Surveillance and reporting	FDB	DAHD, CG	Buxar and Bhojpur	Medium
3.11 Communication and education facilities							
	3.11.1	Communication and education facilities to expand knowlege about wetland conservation					
		3.11.1.1	Exhibitions	FDB	DAHD, ED	Buxar and Bhojpur	Medium
		3.11.1.2	Field excursions	FDB	DAHD,MNC		Medium
4 Management component: Livelihood							
4.1 Sustainable fishing							
	4.1.1	Sustainable fishing to enhance livelihood for the wetland dependent communities					
		4.1.1.1	Feasibility assessment	FD	FDB, BAU, RDD and WISA	Gayghat, Chakki, Nainijor and Suhiya, Chamarpur	High
		4.1.1.2	Training of fishers on use of licensed gears and illegal activities	FD	FDB, BAU	Gayghat, Chakki, Nainijor and Suhiya, Chamarpur	High
		4.1.1.3	Training of fishers on stocking	FD	FDB, BAU, RDD	Gayghat, Chakki, Nainijor and Suhiya, Chamarpur	High
4.2 Post harvesting and marketing							
	4.2.1	Post harvesting and marketing support					
		4.2.1.1	Distribution of proper harvesting gadgets to the fisher Cooperative members	FD	FDB, FC, BAU, RDD	Gayghat, Chakki, Nainijor and Suhiya, Chamarpur	Medium
		4.2.1.2	Fish holding and storage facilities for the fisher groups near Gayghat, Chakki, Nainijor and Suhiya and Chamarpur	FD	FDB, FC, BAU	Gayghat, Chakki, Nainijor and Suhiya, Chamarpur	Medium
		4.2.1.3	Support cooperatives with live fish transport mechanism for better pricing	FD	FDB, FC, BAU	Gayghat, Chakki, Nainijor and Suhiya,Dhamwal Chamarpur	Medium
		4.2.1.4	Market chain including E-Markets to expand demand of Gokul Jalashay wetland Complex	FD	FDB, FC, BAU, RDD	Gayghat, Nainijor and Suhiya,	Medium
		4.2.1.5	Capacity building trainings to the fishers groups on post harvesting and marketing by FD	FD	FDB, FC, BAU, RDD	Gayghat, Nainijor and Suhiya,	Medium
4.3 Diversification of cropping pattern							
	4.3.1	Promotion of organic agriculture					
		4.3.1.1	Feasibility assessment	AD	FDB	Gayghat, Chakki, Diara, Suhiya, Chamarpur, Ishapur	Medium
		4.3.1.2	Training on organic agriculture practice	AD	FDB	Gayghat, Chakki, Diara, Suhiya, Chamarpur, Ishapur	Medium
		4.3.1.3	Monitoring overgrazing and agriculture	AD	FDB	Gayghat, Chakki, Diara, Suhiya, Chamarpur, Ishapur	Medium
	4.3.2	Promotion of organic horticulture					
		4.3.2.1	Cultivation of fruit crops such as Guava, Mango, Ber (Kul) and	HD	FDB	Diara, Gayghat,Baluaon. Ishapura, Chamarpur, Suhiya, Dhamwal	Medium
		4.3.2.2	Cultivation of high-value vegetables such as green and yellow capsicum and ornamental cabbage c) Floriculture (Jasmine, Marigold and Sunflower)	HD	FDB	Diara, Gayghat,Baluaon. Ishapura, Chamarpur, Suhiya, Dhamwal	Medium
		4.3.2.3	Crop rotation to maintan soil nutrients and manure management, pest controlling is	HD	FDB	Diara, Gayghat,Baluaon. Ishapura, Chamarpur, Suhiya	Medium
		4.3.2.4	Preparation of crop calendars based on seasonality to minimise water stress to the wetand and inclrease productivity	HD	FDB	Diara, Gayghat,Baluaon. Ishapura, Chamarpur, Suhiya	Medium
	4.3.3	Medicinal plants					
		4.3.3.1	Training for culitivation and marketing of medicinal plants	AD	FDB, RDD	Diara, Gayghat,Baluaon. Ishapura, Chamarpur, Suhiya	Medium
4.4 Crop intensification							
	4.4.1	Crop intensification					
		4.4.1.1	Promotion of SRI/SWI/SCI technicques to minise water consumptions for judicious use of wetland water	AD	FDB, CG, NGOs	Diara, Gayghat,Baluaon. Ishapura, Chamarpur, Suhiya	Medium

Activity			Sub-activity	Responsible agency		Implementation location	Priority
				Lead	Support		
4.5 Organic manure and pest control							
	4.5.1	Organic manure and pest control					
		4.5.1.1	Training on organic manure/vermin composing to 100 wetland dependant farmers to minimize the use of chemical fartilisers	AD	FDB, CG, NGOs	Diara, Gayghat, Nainijor,Udhaura,Chakki,Suhiya,Chamarpur,Dhamwal	Medium
		4.5.1.2	Training on organic pest controller to 100 wetland dependant farmers to control over use of chemical pesticides and fungicides	AD	FDB, CG, NGOs	Diara, Gayghat, Nainijor,Udhaura,Chakki,Suhiya,Chamarpur,Dhamwal	Medium
4.6 Eco-tourism							
	4.6.1	Development of tourism plan					
		4.6.1.1	Preparation of a masterplan for community led ecotourism	TD	ACYD, PRI, CG	Udhaura, Suhiya, Nainijor, Gayghat, Chakki	High
		4.6.1.2	Training and recruitment of local tour guides (bird guides, boat ride, etc)	TD	ACYD, PRI, CG	Udhaura, Suhiya, Nainijor, Gayghat, Chakki	High
	4.6.2	Infrastructure development					
		4.6.2.1	Eco-huts - 2 Locations	TD	ACYD, PRI, CG	Nainijor and Gayghat	Medium
		4.6.2.2	Construction of watchtowers- 4 Towers	TD	FDB, PRI, CG	Nainijor, Gayghat, Chakki, Suhiya, Isharpura	Medium
		4.6.2.3	Operationalize tenting platforms	TD	FDB, PRI, CG	Nainijor, Chakki, Diara, Dhamwal	Medium
		4.6.2.4	Board walk, cycling, nature trails	TD	FDB, PRI, CG	Chakki-Nainijor, Suhiya-Chamarpur and Band Road upto Isharpura	Medium
		4.6.2.5	Construction of adequate public amenities - drinking water, toilets, resting	TD	FDB, PRI, PHED, CG	Gaygaht, Nainijor, Chakki,Dhamwal & Suhiya	Medium
		4.6.2.6	Sheds, eateries	TD	RWD, PRI, CG	Gayghat, Nainijor & Suhiya	Medium
		4.6.2.7	Waste management - solid and wastewater - rainwater harvesting,	TD	ACYD, PRI, CG	Gaygaht, Baluan, Suhiya	Medium
		4.6.2.8	Purchase and maintenance of paddle boats	TD	ACYD, PRI, CG	Boating at Gayghat, Nainiojor, Chakki & Suhiya	Medium
		4.6.2.9	Souvenir shop	TD	ACYD, PRI, CG	Interpretation centre-Nainijor	Medium
		4.6.2.10	Maintenance of sites of cultural significance	TD	ACYD, PRI, CG	Buxar and Bhojpur	Medium
		4.6.2.11	Training for the ecotourism guides	TD	ACYD, PRI, CG	Brahampur and Shahpur	Medium
		4.6.2.12	Exposure visits	TD	ACYD, PRI, CG	Buxar and Bhojpur	Low
4.7 Infrastructure for education							
	4.7.1	Interpretation centre					
		4.7.1.1	Identify suitable location for interpretation centre	FDB	TD, MNC	Nainijor	Medium
		4.7.1.2	Design and estimates	FDB	TD, MNC	Nainijor	Medium
		4.7.1.3	Establishment of a wetland interpretation center	FDB	TD	Nainijor	Medium
		4.7.1.4	Purchase of binoculars, lifejackets and field identifications/guidebooks for	FDB	TD	Nainijor	Medium
		4.7.1.5	Training for ecotourism guides	FDB	TD, MNC	Nainijor	Medium
		4.7.1.6	Exposure visits to aquire knowlege of ecotourim	FDB	TD, MNC		Medium
4.8 Community infrastructure							
	4.8.1	Medical health camps					
		4.8.1.1	Health camps for wetlands communities	Health Department	FDB, PRI	Diara, Gayghat, Nainijor, Udhaura, Chakki, Suhiya, Chamarpur, Dhamwal	Medium
		4.8.1.2	Medical stock for disaster/Flooding events	Health Department	FDB, PRI	Diara, Gayghat, Nainijor, Udhaura, Chakki, Suhiya, Chamarpur, Dhamwal	Medium
		4.8.1.3	Moible health care support facilities	Health Department	FDB, PRI	Diara, Gayghat, Nainijor, Udhaura, Chakki, Suhiya, Chamarpur, Dhamwal	Medium
	4.8.2	Safe drinking water facilities					
		4.8.2.1	Arsenic filters installation	Public Health Engineering Department/ WRD	CG, PRI	Diara, Chakki, Gayghat, Nainijor, Udaura, Baluaon, ishapura, Sonvarsha, Dhamawal and Chamarpur	Medium

8 Budget and Phasing

8.1 Budget

Implementation will entail a budget of Rs. 61.53 crores of this, the component on Livelihood is allocated 31.08 %. This is followed by an allocation of 30.23 % for implementing actions under the component for the conservation of species and habitat. The components of Institution and Governance and land and water management have been allocated 21.61 % and 17.08 % of the budget respectively (Table 14).

Table 14: Summary of budget

Sr no	Management Plan Component	Budget (In Lakhs)
1	Institution and Governance	1329.80
2	Land and water management	1051.00
3	Conservation of Species and Habitat	1860.00
4	Livelihood	1912.00
	Grand Total	**6152.80**

*Forest Division, Bhojpur shall have the authority to change/revise the indicative allocations in this budget proposal, depending upon the circumstances and considering the "needs" of the wetlands management.

The implementation of the management plan is proposed to be through funds provided by the MoEFCC (under NPCA), the Government of Bihar (in the form of state's share) and funds leveraged by building convergence with ongoing schemes of other departments. Table 15 provides an overview of the analysis of convergence funding and Table 16 gives a detailed activity-wise budget.

Table 15: Analysis of Convergence funding

Management component:		Activity/Sub activity		Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
1. Institutions and Governance							
1.1 Notification of Wetland complex under wetlands(Conservation and Management) Rules, 2016							
	1.1.1	Delineation of wetland complex					
		1.1.1.1	Field reconnaissance survey for boundary identification		8		8
		1.1.1.2	Delineation of wetland boundary on a geo-coded map		5		5
		1.1.1.3	Delineation of zone of influence of the wetland complex		5		5
		1.1.1.4	Ground truthing of wetland maps		2		2
		1.1.1.5	Production of ground truthed map		2		2
		1.1.1.6	Stakeholder consultation		4		4
		1.1.1.7	Map finalization and publication		4		4
	1.1.2	Notifying wetland complex under Wetlands (					
		1.1.2.1	Preparation of brief document		2		2
		1.1.2.2	Submission of brief document to Bihar State Wetland Authority (BSWA)		1		1
		1.1.2.3	Preparation of draft notification		4		4
		1.1.2.4	Public consultation		6		6
		1.1.2.5	Final notification		6		6
	1.1.3	Wetland Demarcation					
		1.1.3.1	Survey of land rights		5		5

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		1.1.3.2	Publication of draft land right maps		6		6
		1.1.3.3	Stakeholder consultation		4		4
		1.1.3.4	Land right conflict resolution as per established procedure		6		6
		1.1.3.5	Map finalization and publication		4		4
		1.1.3.6	Registration of wetland boundaries into revenue records		6		6
		1.1.3.7	Identification of geo-tagged pillar location points (Preferably at 250 meters interval)		24		24
		1.1.3.8	Installation of geo-tagged pillars along the wetland boundary including estimation and procurement		72		72
		1.1.3.9	Maintenance of installed pillars		12		12
1.2 Establishment of proper Institutions for effective management regime							
	1.2.1	Workshop for constitution of wetland mitra network					
		1.2.1.1	Workshop for identification of possible wetland mitras		2		2
		1.2.1.2	Vacancy announcement for the post of wetland mitra on social media and local newspapers		2		2
		1.2.1.3	Recruitment of wetland mitras		2		2
1.3 Management zoning/Regulatory regimes							
	1.3.1	Establishment of management zones					
		1.3.1.1	Preparation of draft zonal management plans		40		40
		1.3.1.2	Stakeholder consultation		4		4

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		1.3.1.3	Finalization and publication		4		4
1.4 Wetlands Inventory, Assessment and Monitoring System							
	1.4.1	Establishment of wetland monitoring and research					
		1.4.1.1	Identification of potential site for construction of wetland monitoring and research centre		2		2
		1.4.1.2	Construction of research centre		50		50
		1.4.1.3	Lab accreditation from National Accreditation Board for Testing and Calibration Laboratories(NABL)L and other regulatory agencies		2		2
		1.4.1.4	Procurement of laboratory equipment and reagents		10		10
		1.4.1.5	Recruitment of research personnel	*SGS*	120	120	0
		1.4.1.6	Identification of suitable sites for installation of hydro meteorological stations		4		4
		1.4.1.7	Procurement of instruments for hydrometeorolgical monitoring including sediment and water flow and depth monitoring equipment and local weather monitoring equipment	*SGS*	30	30	0
		1.4.1.8	Installation of hydro meteorological stations	*SGS*	15	15	0
		1.4.1.9	Maintenance of hydro meteorological equipment		6		6

Management component:			*Activity/Sub activity*	*Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)**	*Total Budget (in Lakhs*	*Convergence Fund (in Lakhs)*	*Fund requested in Lakhs*
		1.4.1.10	Identification of suitable sites for water quality sampling stations		1.8		1.8
		1.4.1.11	Procurement of instruments for water quality monitoring		40		40
		1.4.1.12	Installation of water quality monitoring equipment		4		4
		1.4.1.13	Maintenance of water quality monitoring equipment		6		6
	1.4.2	Development of database management system					
		1.4.2.1	Development of data quality management and assurance plan		5		5
		1.4.2.2	Development of GIS based database management system		10		10
	1.4.3	Wetland monitoring and evaluation					
		1.4.3.1	Development of draft wetland monitoring and inventory tool		10		10
		1.4.3.2	Field testing of monitoring and inventory tool		8		8
		1.4.3.3	Stakeholder consultation		10		10
		1.4.3.4	Finalization of wetland monitoring and inventory tool		4		4
	1.4.4	Surveillance system					
		1.4.4.1	Development of mobile-based surveillance system/app		15		15
		1.4.4.2	Field testing		4		4

Management component:			*Activity/Sub activity*	*Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)**	*Total Budget (in Lakhs*	*Convergence Fund (in Lakhs)*	*Fund requested in Lakhs*
		1.4.4.3	Stakeholder consultation		4		4
		1.4.4.4	Finalization of surveillance app		1		1
		1.4.4.5	Procurement of drones and CCTV cameras		10		10
		1.4.4.6	Installation of CCTVs at appropriate locations		3		3
		1.4.4.7	Surveillance of the wetland complex using drones and CCTVs		10		10
	1.4.5	Ecosystem Health Report Card					
		1.4.5.1	Convening a methodology workshop for health card development		5		5
		1.4.5.2	Development of Ecosystem Health Report Card		10		10
		1.4.5.3	Report card publication		10		10
		1.4.5.4	Stakeholder dissemination workshop		5		5
	1.4.6	Tracking of management effectiveness					
		1.4.6.1	Development of Management Effectiveness Tracking Tool (METT)		20		20
		1.4.6.2	Pilot testing of METT		8		8
		1.4.6.3	Stakeholders consultation		8		8
		1.4.6.4	Finalisation of METT		10		10
		1.4.6.5	Periodic monitoring of management effectiveness using METT		5		5
1.5 Research							
	1.5.1	Climate risk assessment					
		1.5.1.1	Inception workshop	*D (IMWBES Project, GEF)*	5	5	0
		1.5.1.2	Study	*D (IMWBES Project, GEF)*	50	50	0

Management component:			*Activity/Sub activity*	*Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)**	*Total Budget (in Lakhs*	*Convergence Fund (in Lakhs)*	*Fund requested in Lakhs*
		1.5.1.3	Result sharing	*D (IMWBES Project, GEF)*	5	5	0
		1.5.1.4	Publication	*D (IMWBES Project, GEF)*	5	5	0
	1.5.2	Habitat study for foraging birds especially black-headed					
		1.5.2.1	Inception workshop	*D (IMWBES Project, GEF)*	5	5	0
		1.5.2.2	Study -Bathymetry -Flow measurement -Hydrological Connectivity -Groundwater quality and quantity assessment	*D (IMWBES Project, GEF)*	50	50	0
		1.5.2.3	Result sharing	*D (IMWBES Project, GEF)*	5		5
		1.5.2.4	Publication	*D (IMWBES Project, GEF)*	5		5
	1.5.3		Hydrological connectivity assessment				
		1.5.3.1	Inception workshop	*D (IMWBES Project, GEF)*	5	5	0
		1.5.3.2	Study	*D (IMWBES Project, GEF)*	50	50	0
		1.5.3.3	Result sharing	*D (IMWBES Project, GEF)*	5	5	0
		1.5.3.4	Publication	*D (IMWBES Project, GEF)*	5	5	0
1.6 Capacity development							
	1.6.1	Site Manager training					
		1.6.1.1	Development of Capacity and Training Needs Assessment (CTNA) tool	*D (IMWBES Project, GEF)*	20	20	0
		1.6.1.2	Training workshop for CTNA	*D (IMWBES Project, GEF)*	25	25	0
		1.6.1.3	Assessment through CTNA tool	*D (IMWBES Project, GEF)*	20	20	0
		1.6.1.4	Prepare training calendar as per CTNA	*D (IMWBES Project, GEF)*	1.5	1.5	0

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		1.6.1.5	Provide trainings to site managers as per CTNA (such as wetland ecology, participatory planning, health card preparation, conflict resolution, community engagements)	*D (IMWBES Project, GEF)*	25	25	0
	1.6.2	Frontline staff training					
		1.6.2.1	Training of staff on sampling and instrumentation		10		10
		1.6.2.2	Systematic training on wildlife disease identification		10		10
		1.6.2.3	Bird ringing		12		12
		1.6.2.4	Poaching prevention		15		15
	1.6.3	Resource users training					
		1.6.3.1	Identify key wetland dependent resources groups using participatory mapping		10		10
		1.6.3.2	Identify key training needs for identified groups such as agriculturalists, horticulturalists, fishers, fodder and forage users, dairy and cultural groups		10		10
		1.6.3.3	Convergence workshop with line departments and resource user groups		4		4
	1.6.4	Line departments and local community training					
		1.6.4.1	Provide trainings to community groups, PRI members and line departments on participatory planning process		10		10

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		1.6.4.2	Gender mainstream training and ensuring participation of women in leadership and decision making roles		10		10
		1.6.4.3	Integrate wetland management actions into development planning process during Gram Sabha		4		4
		1.6.4.4	Extant wetland management rules and regulations awareness programme		2		2
		1.6.4.5	Training of local communities and bodies such as Panchayati Raj Institutions and CBOs on ecosystem-based wetland management		5		5
	1.6.5	Community mobilisation and proactive stakeholder					
		1.6.5.1	Establishment of community advisory groups for liasoning workshops and meetings		2		2
		1.6.5.2	Establishment of community-based wetland management groups (WMC)		4		4
		1.6.5.3	Creation of wetland peoples Biodiversity Register-ToR, Stakeholders Consultations		10		10
		1.6.5.4	Distribution of portable water quality test kits		10		10
		1.6.5.5	Training on water quality test kits		10		10
		1.6.5.6	Participatory water quality monitoring		50		50
1.7 Communication and outreach							
	1.7.1	Stakeholder engagement in wetland management					
		1.7.1.1	Installation of signage in key locations-in all entrance and exits points		5		5

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		1.7.1.2	Creation of webpage		5		5
		1.7.1.3	Information boards showcasing significance of site		2.5		2.5
		1.7.1.4	Celebration on important public events		75		75
		1.7.1.5	Production of resources material		50		50
		1.7.1.6	Organising nukkad nataks to sensitize communities on wise use of wetlands		10		10
2. Management component: Land and water management							
2.1 Maintain the environmental flows							
	2.1.1	Improvement of inflow of inlets/channels using selective					
		2.1.1.1	Identification of sites for selective dredging		16		16
		2.1.1.2	Selective dredging of Dharmavati river channel		100		100
		2.1.1.3	Identification of sites for selective dredging within the wetland complex		8		8
		2.1.1.4	Selective dredging of wetland complex to maintain water depth		200		200
		2.1.1.5	Selective dredging of drain connecting Gokul Jalashay and Sunki Suhiya		4		4
	2.1.2	Regulation of flood pulses from river Ganga					
		2.1.2.1	Identification of zone of vulnerability due to flood pulses		5		5
		2.1.2.2	Preparation of technical design with estimations for the restoring broken sections of the embankment		5		5

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		2.1.2.2	Preparation of technical design with estimations for the restoring broken sections of the embankment		5		5
		2.1.2.3	Procurements of raw materials		100		100
		2.1.2.4	Repairing of approx. 250 m embankment breach at Isharpura		50		50
		2.1.2.5	Design and estimation of culverts required in the broken section of embankment at Isharpura		2		2
		2.1.2.6	Construction of approx. 5 culverts to maintain the connectivity between river Ganga and the wetland complex		50		50
	2.1.3	Restoration of hydrological connectivity					
		2.1.3.1	Site survey for identification of potential sites for construction of culverts and sluice gates		2		2
		2.1.3.2	Preparation of technical design with estimations for construction of culverts and sluice gates		4		4
		2.1.3.3	Construction of 2 culverts at Nainijor		20		20
		2.1.3.4	Construction of 2 sluice gates		20		20
		2.1.3.5	Site survey for identification of dredging site at Nainijor to restore connectivity of Gokul Jalashay and Sunki Suhiya		2.5		2.5

Management component:			*Activity/Sub activity*	*Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)**	*Total Budget (in Lakhs*	*Convergence Fund (in Lakhs)*	*Fund requested in Lakhs*
		2.1.3.6	Selected dredging at Nainijor to restore connectivity between Gokul Jalashay and Sunki Suhiya		20		20
	2.1.4	Removal of invasive macrophytes					
		2.1.4.1	Site survey for the identification of region with high invasive macrophytes		2		2
		2.1.4.2	Periodical trapping and removing of invasive macrophytes		15		15
		2.1.4.3	Undertake awareness campaigns in wetland dependent villages		10		10
		2.1.4.4	Placing of signboards to generate awareness		1.5		1.5
	2.1.5	Cleaning of sections with temporary structures such as					
		2.1.5.1	Identification of temporary structures with high sedimentations		6		6
		2.1.5.2	Periodic removal of debris/sediment near temporary structures		100		100
		2.1.5.3	Maintenance of the temporary structures		40		40
2.2 Pollution control							
	2.2.1	Activities for pollution abatement are as follows:					
		2.2.1.1	Survey of storm drains with high pollution load		20		20
		2.2.1.2	Preparation of pollution abatement plans		5		5

Management component:			*Activity/Sub activity*	*Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)**	*Total Budget (in Lakhs*	*Convergence Fund (in Lakhs)*	*Fund requested in Lakhs*
		2.2.1.3	Procurements of raw materials and equipment for waste management	*CGS (Swachh Bharat Abhiyan)*	20	20	0
		2.2.1.4	Manual scouring of scum and other waste material	*CGS (Swachh Bharat Abhiyan)*	50	50	0
		2.2.1.5	Relocation of dumping sites	*CGS (Swachh Bharat*	30	30	0
		2.2.1.6	Installation of mesh for screening out of waste from Dharmawati river		15		15
		2.2.1.7	Construction of sand-gravel bed for inflow filtration		15	15	0
		2.2.1.8	Provide trainings to community groups, PRI members and line departments on waste management and segregations	*CGS (Swachh Bharat Abhiyan)*	5	5	0
		2.2.1.9	Installation of colour coded bins for wastes at the designated waste dumping sites	*CGS (Swachh Bharat Abhiyan)*	30	30	0
2.3 Water quality parameter testing							
	2.3.1	Water quality parameter testing					
		2.3.1.1	Conduct periodic water quality testing at sampling points within the wetland and catchment	*SGS(Schemes undertaken by PHED)*	15	15	0
		2.3.1.2	Record and monitor water quality changes	*SGS(Schemes undertaken*	30	30	0
		2.3.1.3	Conduct meeting with stakeholders to discuss the result	*SGS(Schemes undertaken by PHED)*	3	3	0
		2.3.1.4	Document water quality report	*SGS(Schemes undertaken*	30	30	0

Management component:		Activity/Sub activity		Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
3. Management component: Species and habitat conservation							
3.1 Asian water birds census							
	3.1.1	Training on bird counting and census protocols					
		3.1.1.1	Training on bird counting and census protocols	*D (IMWBES Project, GEF, Currently conducted by*	50	50	0
		3.1.1.2	Conduct annual bird census	*D (IMWBES Project, GEF, Currently conducted by*	25	25	0
		3.1.1.3	Operationalize bird ringing station at Gayghat		25		25
		3.1.1.4	Train staffs on bird ringing		50		50
3.2 Peoples biodiversity registers							
	3.2.1	Training on developing PBR			0		0
		3.2.1.1	Creation of Peoples Biodiversity Register (PBR)		10		10
		3.2.1.2	Training on Peoples' Biodiversity Register for the experts		20		20
3.3 Habitat mapping and surveillance							
	3.3.1	Habitat mapping and surveillance			0		0
		3.3.1.1	Mapping of key habitat and breeding areas		10		10
		3.3.1.2	Formation of bird protection committees to monitor water bird habitats		10		10
		3.3.1.3	Training of community to become bird guides		50		50
3.4 Maintain habitat of migratory birds							
	3.4.1	Habitat conservation for migratory birds			0		0
		3.4.1.1	Mapping the bird congregation areas as per Zonal Plan		5		5

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		3.4.1.2	Monitoring the anthropogenic disturbance of key habitats through surveillance		10		10
		3.4.1.3	Planting native fruit bearing trees in villages for terrestrial birds		25		25
		3.4.1.4	Conducting study to understand the drawdown area creation of bird habitats on wetland ecology		16		16
		3.4.1.5	Strengthening of village-based ant poaching committees by providing them ID cards and monitory incentives, and guidelines for monitoring and poaching		10		10
		3.4.1.6	Developing an SOP in cases of avian disease breakouts in the region and its institutionalization by authority		5		5
		3.4.1.7	Activities for habitat restoration and adaptive management		15		15
		3.4.1.8	Awareness workshops and festivals (annual Gokul Jalashay bird festival) on water bird conservation		15		15
3.5 Invasive species management							
	3.5.1	Management of Invasive species			0		0
		3.5.1.1	Site survey for identification of areas with high presence of invasive species		10		10
		3.5.1.2	Development of maps indicating areas requiring interventions for invasion control		5		5

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		3.5.1.3	Alternative uses of invasive macrophytes in manure, handicrafts products development.		90		90
		3.5.1.4	Study on the possibilities on biological control of macrophytes invasion by introducing carps		120		120
3.6 Maintain fish diversity and check invasive fish							
	3.6.1	Maintaining fish diversity in the wetland complex			0		0
		3.5.2.1	Stocking of fingerlings for fish breeding in bird congregating areas	*CGS (PM Matsya Sampada Yojana)*	125	125	0
		3.5.2.2	Promote in-situ seed raising of native fish species	*CGS (PM Matsya Sampada Yojana)*	125	125	0
		3.5.2.3	Prohibit illegal fishing		100		100
		3.5.2.4	Sensitize local fishermen on sustainable fishing	*CGS (PM Matsya Sampada Yojana)*	200	200	0
		3.5.2.5	Conduct periodic patrolling	*SGS (Schemes undertaken*	80	80	0
		3.5.2.6	Diseases monitoring		20		20
3.7 Protect breeding sites of wetland dependent birds							
	3.7.1	Protection of breeding sites of water birds					
		3.7.1.1	Identify bird breeding areas		10		10
		3.7.1.2	Distribution of proper harvesting gadgets to the fisher Cooperatives	*CGS (PM Matsya Sampada Yojana)*	500	500	0
		3.7.1.3	Awareness workshop on water bird conservation		5		5

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
3.8 Check macrophyte growth in the wetland							
	3.8.1	Check macrophytes growth near inlets of the wetland			0		0
		3.8.1.1	Conduct water quality tests for invasive macrophyte growth		4.5		4.5
		3.8.1.2	Periodic monitoring of invasive macrophytes growth		7.5		7.5
3.9 Establishing centres for veterinary care, shelter and preparedness for wildlife during and after extreme events							
	3.9.1	Veterinary support			0		0
		3.9.1.1	Construction of one veterinary shelter for care and shelter wildlife during and post disasters		30		30
		3.9.1.2	Maintenance of veterinary centre		10		10
3.10 Disease control							
	3.10.1	Disease control			0		0
		3.10.1.1	Develop an SOP for handling avian diseases episodes.		2		2
		3.10.1.2	Conduct workshops to spread awareness on avian diseases and their controls		10		10
		3.10.1.3	Undertake safety protocols to control spread of zoonotic diseases like isolation of affected individual and clearing debris		5		5
		3.10.1.4	Purchase and installation of ATVs for surveillance at Gayghat, Chakki, Baluaon, Suhiya and Dhamwal villages		10		10

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		3.10.1.5	Purchase of kits to undertake animal/bird debris clearance		10		10
		3.10.1.6	Surveillance and reporting		20		20
3.11 Communication and education facilities							
	3.11.1	Communication and education facilities to expand			0		0
		3.11.1.1	Exhibitions		5		5
		3.11.1.2	Field excursions		5		5
4 Management component: Livelihood							
4.1 Sustainable fishing							
	4.1.1	Sustainable fishing to enhance livelihood for the					
		4.1.1.1	Feasibility assessment	*CG(PMMSY),SGS(BMPY)*	5	5	0
		4.1.1.2	Training of fishers on use of licensed gears and illegal activities	*CG(PMMSY),SGS(BMPY)*	20	20	0
		4.1.1.3	Training of fishers on stocking	*CG(PMMSY),SGS(BMPY)*	20	20	0
4.2 Post harvesting and marketing							
	4.2.1	Post harvesting and marketing support			0	0	0
		4.2.1.1	Distribution of proper harvesting gadgets to the fisher Cooperative members	*CG(PMMSY),SGS(BMPY)*	60	60	0
		4.2.1.2	Fish holding and storage facilities for the fisher groups near Gayghat, Chakki, Nainijor and Suhiya and Chamarpur	*CG(PMMSY),SGS(BMPY)*	200	200	0
		4.2.1.3	Support cooperatives with live fish transport mechanism for better pricing	*CG(PMMSY),SGS(BMPY)*	60	60	0
		4.2.1.4	Market chain including E-Markets to expand demand of Gokul Jalashay wetland Complex	*CG(PMMSY),SGS(BMPY)*	40	40	0

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		4.2.1.5	Capacity building trainings to the fishers groups on post harvesting and marketing by fisheries department	*CG(PMMSY),SGS(BMPY)*	20	20	0
4.3 Diversification of cropping pattern							
	4.3.1	Promotion of organic agriculture					
		4.3.1.1	Feasibility assessment	*CGS (Rashtriya Krishi*	4	4	0
		4.3.1.2	Training on organic agriculture practice	*CGS (Rashtriya Krishi*	20	20	0
		4.3.1.3	Monitoring overgrazing and agriculture	*CGS (Rashtriya Krishi*	20	20	0
	4.3.2	Promotion of organic horticulture					
		4.3.2.1	Cultivation of fruit crops such as Guava, Mango, Ber (Kul) and Banana	*CGS (Rashtriya Krishi Vikas Yojana)*	50	50	0
		4.3.2.2	Cultivation of high-value vegetables such as green and yellow capsicum and ornamental cabbage c) Floriculture (Jasmine, Marigold and Sunflower)	*CGS (Rashtriya Krishi Vikas Yojana)*	50	50	0
		4.3.2.3	Crop rotation to maintain soil nutrients and manure management, pest controlling is also required	*CGS (Rashtriya Krishi Vikas Yojana)*	50	50	0
		4.3.2.4	Preparation of crop calendars based on seasonality to minimise water stress to the wetland and increase productivity	*CGS (Rashtriya Krishi Vikas Yojana)*	50	50	0
	4.3.3	Medicinal plants			0	0	0
		4.3.3.1	Training for cultivation and marketing of medicinal plants	*CGS (Rashtriya Krishi Vikas Yojana)*	15	15	0

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
4.4 Crop intensification							
	4.4.1	Crop intensification			0	0	0
		4.4.1.1	Promotion of SRI/SWI/SCI techniques to minimize water consumptions for judicious use of wetland water	*CGS (Rashtriya Krishi Vikas Yojana)*	100	100	0
4.5 Organic manure and pest control							
	4.5.1	Organic manure and pest control					
		4.5.1.1	Training on organic manure/vermin composing to 100 wetland dependant farmers to minimize the use of chemical fertilizers	*CGS (Rashtriya Krishi Vikas Yojana)*	3	3	0
		4.5.1.2	Training on organic pest controller to 100 wetland dependant farmers to control over use of chemical pesticides and fungicides	*CGS (Rashtriya Krishi Vikas Yojana)*	3	3	0
4.6 Eco-tourism							
	4.6.1	Development of tourism plan					
		4.6.1.1	Preparation of a master plan for community led ecotourism		5		5
		4.6.1.2	Training and recruitment of local tour guides (bird guides, boat ride, etc.)		4		4
	4.6.2	Infrastructure development			0		0
		4.6.2.1	Eco-huts - 2 Locations		60		60
		4.6.2.2	Construction of watchtowers- 4 Towers		80		80
		4.6.2.3	Operationalize tenting platforms		40		40
		4.6.2.4	Board walk, cycling, nature trails		80		80

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
		4.6.2.5	Construction of adequate public amenities - drinking water, toilets, resting	*SGS (Har Ghar Nal Ka Jal- drinking water)*	300	300	0
		4.6.2.6	Sheds, eateries		100		100
		4.6.2.7	Waste management - solid and wastewater - rainwater harvesting,		60		60
		4.6.2.8	Purchase and maintenance of paddle boats		20		20
		4.6.2.9	Souvenir shop		30		30
		4.6.2.10	Maintenance of sites of cultural significance		20		20
		4.6.2.11	Training for the ecotourism guides		25		25
		4.6.2.12	Exposure visits		10		10
4.7 Infrastructure for education							
	4.7.1	Interpretation centre					
		4.7.1.1	Identify suitable location for interpretation centre		3		3
		4.7.1.2	Design and estimates		5		5
		4.7.1.3	Establishment of a wetland interpretation centre		100		100
		4.7.1.4	Purchase of binoculars, lifejackets and field identifications/guidebooks for wetland mitras		20		20
		4.7.1.5	Training for ecotourism guides		25		25
		4.7.1.6	Exposure visits to acquire knowledge of ecotourism		5		5

Management component:			Activity/Sub activity	Convergence Funding (Central Govt Scheme (CGS)/State Government Scheme (SGS)/Donor (D)/ Private Sector (PS)*	Total Budget (in Lakhs	Convergence Fund (in Lakhs)	Fund requested in Lakhs
4.8 Community infrastructure							
	4.8.1	Medical health camps					
		4.8.1.1	Health camps for wetlands communities	*CGS (National Health*	10	10	0
		4.8.1.2	Medical stock for disaster/Flooding events	*CGS (National Health*	10	10	0
		4.8.1.3	Mobile health care support facilities	*CGS (National Health*	10	10	0
	4.8.2	Safe drinking water facilities			0	0	0
		4.8.2.1	Arsenic filters installation		100		100
			Total		6152.8	2894.5	3258.3

Table 16: Detailed activity wise budget

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
1. Institutions and Governance																		
1.1 Notification of Wetland complex under wetlands (Conservation and Management) Rules, 2017																		
	1.1.1	Delineation of wetland complex																
		1.1.1.1	Field reconnaissance survey for boundary identification	2	Survey	4	8	2	8									Core
		1.1.1.2	Delineation of wetland boundary on a geo-coded map	1	Map	5	5	1	5									Core
		1.1.1.3	Delineation of zone of influence of the wetland complex	1	Shape file/document	5	5	1	5									Core
		1.1.1.4	Ground truthing of wetland maps	1	Verification	2	2	1	2									Core
		1.1.1.5	Production of ground truthed map	1	Map	2	2	1	2									Core
		1.1.1.6	Stakeholder consultation	1	Consultation	4	4	1	4									Non-core
		1.1.1.7	Map finalization and publication	1	Publishment	4	4	1	4									Core
	1.1.2	Notifying wetland complex under Wetlands (Conservation and Management) Rules, 2017							0									
		1.1.2.1	Preparation of brief document	1	Document	2	2	1	2									Core
		1.1.2.2	Submission of brief dccument to Bihar State Wetland Authority (BSWA)	1	Document	1	1	1	1									Core
		1.1.2.3	Preparation of draft notification	2	Document	2	4	2	4									Core
		1.1.2.4	Public consultation	2	Consultation	3	6	2	6									Core
		1.1.2.5	Final notification	2	Document	3	6	2	6									Core
	1.1.3	Wetland Demarcation							0									Core
		1.1.3.1	Survey of land rights	1	Survey	5	5	1	5									Core
		1.1.3.2	Publication of draft land right maps	2	Publication	3	6	2	6									Core
		1.1.3.3	Stakeholder consultation	2	Consultation	2	4	2	4									Non-core
		1.1.3.4	Land right conflict resolution as per established procedure	2	Conflict resolution	3	6	2	6									Core
		1.1.3.5	Map finalization and publication	2	Map	2	4	2	4									Core
		1.1.3.6	Registration of wetland boundaries into revenue records	2	Registration	3	6	2	6									Core
		1.1.3.7	Identification of geo-tagged pillar location points (Preferablly at 250 meters interval)	240	Identification	0.1	24	80	8	80	8	80	8					Core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		1.1.3.8	Installation of geo-tagged pillars along the wetland boundary including estimation and procurement	240	Installation	0.3	72	80	24	80	24	80	24					Core
		1.1.3.9	Maintainance of installed pillars	240	Maintainance	0.05	12							120	6	120	6	Non-core
1.2 Establishment of proper Institutions for effective management regime																		
	1.2.1	Workshop for constitution of wetland mitra																
		1.2.1.1	Workshop for identification of possi ble wetland mitras	2	Workshop	1	2			2	2							Non-core
		1.2.1.2	Vacancy announcement for the post of wetland mitra on social media and local newspapers	2	Vacancy	1	2			2	2							Non-core
		1.2.1.3	Recruitement of wetland mitras	2	Recruitment	1	2			2	2							Core
1.3 Management zoning/Regulatory regimes																		
	1.3.1	Establishment of management zones																
		1.3.1.1	Preparation of draft zonal management plans	2	Plan	20	40	1	20	1	20							Core
		1.3.1.2	Stakeholder consultation	2	Consultation	2	4	1	2	1	2							Non-core
		1.3.1.3	Finalization and publication	2	Publication	2	4	1	2	1	2							Core
1.4 Wetlands Inventory, Assessment and Monitoring System																		
	1.4.1	Establishment of wetland monitoring and research																
		1.4.1.1	Identification of potential site for construction of wetland monitoring and research centre	1	Identification	2	2					1	2					Core
		1.4.1.2	Construction of research centre	1	Construction	50	50			1	50							Core
		1.4.1.3	Lab accredation from Nationlal Accredation Board for Testing and Calibration Laboretories(NABL)L and other regulatory agencies	1	Lab	2	2					1	2					Core
		1.4.1.4	Procurement of laboratory equipment and reagents	1	Procurement	10	10							1	10			Core
		1.4.1.5	Recruitement of research personnels	4	Recruitement	30	120				22		30		33		35	Core
		1.4.1.6	Identifcation of suitable sites for installation of hydrometeorological stations	4	Identifcation	1	4	2	2	2	2		0					Core
		1.4.1.7	Procurement of instruments for hydrometeorolgical monitoring including sediment and water flow and depth monitoring equipements and local weather monitoring equipments	3	Procurement	10	30	1	10	1	10	1	10					Core
		1.4.1.8	Installation of hydrometeorological stations	3	Installation	5	15	1	5	1	5	1	5					Core
		1.4.1.9	Maintainance of hydrometeorological equipements	3	Maintainance	2	6					1	2	1	2	1	2	Non-core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		1.4.1.10	Identifcation of suitable sites for water quality sampling stations	6	Identifcation	0.3	1.8	2	0.6	2	0.6	2	0.6					Core
		1.4.1.11	Procurement of instruments for water quality monitoring	2	Procurement	20	40	1	20	1	20							Core
		1.4.1.12	Installation of water quality monitoring equipments	2	Installation	2	4	1	2	1	2							Core
		1.4.1.13	Maintainance of water quality monitoring equipments	3	Maintainance	2	6					1	2	1	2	1	2	Non-core
	1.4.2	Development of database management system																
		1.4.2.1	Development of data quality management and assurance plan	1	Plan	5	5			1	5							Core
		1.4.2.2	Development of GIS based database management system	2	Database	5	10			1	5	1	5					Core
	1.4.3	Wetland monitoring and evaluation																
		1.4.3.1	Development of draft wetland monitoring and inventory tool	2	Tool	5	10	1	5	1	5							Core
		1.4.3.2	Field testing of minitoring and inventory tool	2	Field testing	4	8			1	4	1	4					Core
		1.4.3.3	Stakeholder consultation	2	cosultation	5	10	1	5	1	5							Non-core
		1.4.3.4	Finalization of wetland monitoring and inventory tool	2	Tool	2	4	1	2	1	2							Core
	1.4.4	Surveillance system																
		1.4.4.1	Development of mobile-based surveillance system/app	1	App	15	15			1	15							Non-core
		1.4.4.2	Field testing	2	Testing	2	4			1	2	1	2					Core
		1.4.4.3	Stakeholder consultation	2	Consultation	2	4			1	2	1	2					Non-core
		1.4.4.4	Finalization of surveillance app	1	App	1	1			1	1							Core
		1.4.4.5	Procurement of drones and CCTV cameras	10	Procurement	1	10			5	5	3	3	2	2			Core
		1.4.4.6	Installation of CCTVs at appropriate locations	10	Installation	0.3	3			5	1.5	3	0.9	2	0.6			Core
		1.4.4.7	Surveillance & maintanance instruments-CCTVs, Drones	10	Surveillance	1	10			2	2	3	3	2	2	3	3	Non-core
	1.4.5	Ecosystem Health Report Card																
		1.4.5.1	Convening a methodology workshop for healthcard development	1	Workshop	5	5	1	5									Non-core
		1.4.5.2	Development of Ecosystem Health Report Card	1	Report	10	10			1	10							Core
		1.4.5.3	Report card publication	1	Publication	10	10			1	10							Core
		1.4.5.4	Stakeholder dissemination workshop	1	Workshop	5	5			1	5							Non-core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
	1.4.6	Tracking of management effectiveness									0							
		1.4.6.1	Development of Management Effectiveness Tracking Tool (METT)	2	Tool	10	20	1	10	1	10							Core
		1.4.6.2	Pilot testing of METT	2	Testing	4	8	1	4	1	4							Core
		1.4.6.3	Stakeholders consultation	2	Consultation	4	8	1	4	1	4							Non-core
		1.4.6.4	Finalisation of METT	2	Tool	5	10			1	5	1	5					Core
		1.4.6.5	Periodic monitoring of management effectiveness using METT	5	Monitoring	1	5			1	1	1	1	2	2	1	1	Non-core
1.5 Research																		
	1.5.1	Cliamte risk assessment																
		1.5.1.1	Inception workshop	1	Workshop	5	5							1	5			Non-core
		1.5.1.2	Study	1	Study	50	50							1	50			Core
		1.5.1.3	Result sharing	1	Report	5	5							1	5			Core
		1.5.1.4	Publication	1	Publication	5	5							1	5			Core
	1.5.2	Habitat study for foraging birds especially black-																
		1.5.2.1	Inception workshop	1	Workshop	5	5					1	5					Non-crore
		1.5.2.2	Study	1	Study	50	50					1	50					Core
		1.5.2.3	Result sharing	1	Sharing	5	5					1	5					Core
		1.5.2.4	Publication	1	Publication	5	5					1	5					Core
	1.5.3	Hydrological connectivity assessement																Core
		1.5.3.1	Inception workshop	1	Workshop	5	5	1	5									Non-core
		1.5.3.2	Study -Bathymetry -Flow measurement -Hydrological Connectivity -Groundwater quality and quantity assessement	1	Study	50	50	1	50									Non-core
		1.5.3.3	Result sharing	1	Sharing	5	5	1	5									Core
		1.5.3.4	Publication	1	Publication	5	5	1	5									Core
1.6 Capacity development																		
	1.6.1	Site Manager training																
		1.6.1.1	Development of Capacity and Training Needs Assessment (CTNA) tool	2	Tool	10	20	1	10	1	10							Core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		1.6.1.2	Training workshop for CTNA	5	Training	5	25	1	5	1	5	1	5	1	5	1	5	Core
		1.6.1.3	Assessment through CTNA tool	5	Assessment	4	20	1	4	1	4	1	4	1	4	1	4	Core
		1.6.1.4	Prepare training calender as per CTNA	5	Calender	0.3	1.5	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	Core
		1.6.1.5	Provide trainings to site managers as per CTNA (such as wetland ecology, participatory planning, health card preparation, conflict resolution, community engagements)	5	Training	5	25	1	5	1	5	1	5	1	5	1	5	Core
	1.6.2		Frontline staff training															
		1.6.2.1	Training of staff on sampling and instrumentation	5	Training	2	10	1	2	1	2	1	2	1	2	1	2	Core
		1.6.2.2	Systematic training on wildlife disease identification	5	Training	2	10	1	2	1	2	1	2	1	2	1	2	Core
		1.6.2.3	Bird ringing	4	Implementation	3	12		0	1	3	1	3	1	3	1	3	Core
		1.6.2.4	Poaching prevention	5	Prevention	3	15	1	3	1	3	1	3	1	3	1	3	Core
	1.6.3		Resource users training															
		1.6.3.1	Identify key wetland dependent resources groups using participatory mapping	2	Identification	5	10	1	5	1	5						0	Core
		1.6.3.2	Identify key training needs for identified groups such as agriculturalists, horticulturalists, fishers, fodder and forage users, dairy and cultural groups	5	Identification	2	10	1	2	1	2	1	2	1	2	1	2	Core
		1.6.3.3	Convergence workshop with line departments and resource user groups	2	Workshop	2	4	1	2	1	2							Core
	1.6.4		Line departments and local community training															
		1.6.4.1	Provide trainings to community groups, PRI members and line departments on participatory planning process	10	Training	1	10	2	2	2	2	2	2	2	2	2	2	Core
		1.6.4.2	Gender mainstream training and ensuring participation of women in leadership and decision making roles	10	Awareness	1	10	2	2	2	2	2	2	2	2	2	2	Core
		1.6.4.3	Integrate wetland management actions into development planning process during Gram Sabha	2	Plan	2	4	1	2	1	2							Core
		1.6.4.4	Extant wetland management rules and regulations awareness programme	2	Awareness	1	2	1	1	1	1							Non-core
		1.6.4.5	Training of local communities and bodies such as Panchayati Raj Institutions and CBOs on ecosystem-based wetland management	10	Training	0.5	5	2	1	2	1	2	1	2	1	2	1	Core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
	1.6.5		Community mobilisation and proactive stakeholder															
		1.6.5.1	Establishment of community advisory groups for liasoning workshops and meetings	2	Group	1	2			1	1					1	1	Core
		1.6.5.2	Establishment of community-based wetland management groups (WMC)	2	Group	2	4					1	2	1	2			Core
		1.6.5.3	Creation of wetland peoples Biodiversity Register-ToR, Stakeholders Consultations	2	Creation	5	10	1	5	1	5							Core
		1.6.5.4	Distribution of portable water quality test kits	2	Distribution	5	10	1	5	1	5							Core
		1.6.5.5	Training on water quality test kits	10	Training	1	10	2	2	2	2	2	2	2	2	2	2	Core
		1.6.5.6	Participatory water quality monitoring	10	Monitoring	5	50	2	10	2	10	2	10	2	10	2	10	Core
1.7 Communication and outreach																		
	1.7.1		Stakeholder engagement in wetland management															
		1.7.1.1	Installation of signage in key locations-in all entrance and exits points	10	Installation	0.5	5	4	2	4	2	2	1					Core
		1.7.1.2	Creation of webpage	1	Creation	5	5			1	5							Non-core
		1.7.1.3	Information boards showcasing significance of site	5	Information dissemination	0.5	2.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	Non-core
		1.7.1.4	Celebration on important public events	15	Celebration	5	75	3	15	3	15	3	15	3	15	3	15	Core
		1.7.1.5	Production of resources material	10	Resoruce materials	5	50	2	10	2	10	2	10	2	10	2	10	Core
		1.7.1.6	Oragnising nukkad nataks to sensitize communities on wise use of wetlands	20	Drama	0.5	10	4	2	4	2	4	2	4	2	4	2	Non-core
2. Land and water management																		
2.1 Maintaing the environmental flows																		
	2.1.1		Improvement of inflow of inlets/channels using															
		2.1.1.1	Identification of sites for selective dredging	8	Identification	2	16	2	4	2	4	2	4	2	4			Core
		2.1.1.2	Selective dredging of Dharmavati river channel	10	Dredging	10	100	2	20	2	20	2	20	2	20	2	20	Core
		2.1.1.3	Identification of sites for selective dredging within the wetland complex	4	Identification	2	8	1	2	1	2	1	2	1	2			Core
		2.1.1.4	Selective dredging of wetland complex to maintain water depth	4	Dredging	50	200			1	50	1	50	1	50	1	50	Core
		2.1.1.5	Selective dredging of drain connecting Gokul Jalashay and Sunki Suhiya	2	Dredging	2	4	1	2	1	2							Core
	2.1.2		Regulation of flood pulses from river Ganga															
		2.1.2.1	Identification of zone of vulnerablity due to flood pulses	1	Identification	5	5	1	5									Core
		2.1.2.2	Preparation of technical design with estimations for the restoring broken sections of the embankment	1	Design	5	5	1	5									Core
		2.1.2.3	Procurements of raw meterials	1	Procurement	100	100			1	100							Core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		2.1.2.4	Repairing of approx. 250 m embankment breach at Isharpura	1	Repairing	50	50			1	50							Core
		2.1.2.5	Design and estimation of culverts required in the broken section of embankment at Isharpura	1	Design & estimation	2	2	1	2									Core
		2.1.2.6	Construction of approx. 5 culverts to maintain the connectivity between river Ganga and the wetland complex	5	Construction	10	50	1	10	2	20	2	20					Core
	2.1.3		Restoration of hydrological connectivity															
		2.1.3.1	Site survey for identification of potential sites for construction of culverts and sluice gates	1	Survey	2	2	1	2									Core
		2.1.3.2	Preparation of technical design with estimations for construction of culverts and sluice gates	2	Design & estimation	2	4	1	2	1	2							Core
		2.1.3.3	Construction of 2 culverts at Nainijor	2	Culverts	10	20			1	10	1	10					Core
		2.1.3.4	Construction of 2 sluice gates	2	Sluice gates	10	20			1	10	1	10					Core
		2.1.3.5	Site survey for identification of dredging site at Nainijor to restore connectivity of Gokul Jalashay and Sunki Suhiya	5	Survey	0.5	2.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	Core
		2.1.3.6	Selected dredging at Nainijor to restore connectivity between Gokul Jalashay and Sunki Suhiya	10	Dredging	2	20	2	4	2	4	2	4	2	4	2	4	Core
	2.1.4		Removal of invasive macrophytes															
		2.1.4.1	Site survey for the identification of region with high invasive macrophytes	1	Survey	2	2	1	2									Core
		2.1.4.2	Periodical trapping and removing of invasive macrophytes	5	Trapping	3	15	1	3	1	3	1	3	1	3	1	3	Core
		2.1.4.3	Undertake awareness campaigns in wetland dependent villages	10	Awareness	1	10	2	2	2	2	2	2	2	2	2	2	Core
		2.1.4.4	Placing of signboards to generate awareness	5	Signboards	0.3	1.5	1	0.3	1	0.3	1	0.3	2	0.6			Core
	2.1.5		Cleaning of sections with temporary structures such															
		2.1.5.1	Identification of temporary structures with high sedimentions	20	Identification	0.3	6	4	1.2	4	1.2	4	1.2	4	1.2	4	1.2	Core
		2.1.5.2	Periodic removal of debris/sediment near temporary structures	20	Removal	5	100	4	20	4	20	4	20	4	20	4	20	Core
		2.1.5.3	Maintanance of the temporary structures	20	Maintanance	2	40	4	8	4	8	4	8	4	8	4	8	Non-core
2.2 Pollution control																		
	2.2.1		Activities for pollution abatement are as follows:															
		2.2.1.1	Survey of storm drains with high pollution load	10	Survey	2	20	5	10	5	10							Core
		2.2.1.2	Preparation of pollution abatement plans	1	Plan	5	5	1	5									Core
		2.2.1.3	Procurements of raw meterials and equipments for waste management	1	Procurement	20	20	1	20									Core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		2.2.1.4	Manual scouring of scum and other waste material	10	Removal	5	50	2	10	2	10	2	10	2	10	2	10	Core
		2.2.1.5	Relocation of dumping sites	3	Relocation	10	30			1	10	1	10	1	10			Core
		2.2.1.6	Installation of mesh for screening out of waste from Dharmawati river	3	Installation	5	15			1	5	1	5	1	5			Non-core
		2.2.1.7	Construction of sand-gravel bed for inflow filtration	3	Construction	5	15			1	5	1	5	1	5			Core
		2.2.1.8	Provide trainings to community groups, PRI members and line departments on waste mangement and segregations	10	Training	0.5	5	2	1	2	1	2	1	2	1	2	1	Core
		2.2.1.9	Installation of colour coded bins for wastes at the designated waste dumping sites	100	Installation	0.3	30	20	6	20	6	20	6	20	6	20	6	Core
2.3 Water quality parameter testing																		
	2.3.1		Water quality parameter testing															
		2.3.1.1	Conduct periodic water quality testing at sampling points within the wetland and catchment	15	Sampling	1	15	3	3	3	3	3	3	3	3	3	3	Core
		2.3.1.2	Record and monitor water quality changes	15	Monitoring	2	30	3	6	3	6	3	6	3	6	3	6	Core
		2.3.1.3	Conduct meeting with stakeholders to discuss the result	1	Meeting	3	3	1	3									Core
		2.3.1.4	Document water quality report	15	Report	2	30	3	6	3	6	3	6	3	6	3	6	Core
3. Species and habitat conservation																		
3.1 Asian water birds census																		
	3.1.1		Training on bird counting and census protocols															Core
		3.1.1.1	Training on bird counting and census protocols	10	Training	5	50	2	10	2	10	2	10	2	10	2	10	Core
		3.1.1.2	Conduct annual bird census	5	Census	5	25	1	5	1	5	1	5	1	5	1	5	Core
		3.1.1.3	Operationalize bird ringing station at Gayghat	5	Bird ringing station	5	25	1	5	1	5	1	5	1	5	1	5	Core
		3.1.1.4	Train staffs on bird ringing	10	Training	5	50	2	10	2	10	2	10	2	10	2	10	Core
3.2 Peoples biodiversity registers																		
	3.2.1		Training on developing PBR															
		3.2.1.1	Creation of Peoples Biodiversity Register (PBR)	2	Register	5	10	1	5	1	5							Core
		3.2.1.2	Training on Peoples' Biodiversity Register for the experts	10	Training	2	20	2	4	2	4	2	4	2	4	2	4	Core
3.3 Habitat mapping and surveillance																		
	3.3.1		Habitat mapping and surveillance															
		3.3.1.1	Mapping of key habitat and breeding areas	1	Map	10	10	1	10									Core
		3.3.1.2	Formation of bird protection committees to monitor waterbird habitats	5	Committee formation	2	10	1	2	1	2	1	2	1	2	1	2	Core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		3.3.1.2	Formation of bird protection committees to monitor waterbird habitats	5	Committee formation	2	10	1	2	1	2	1	2	1	2	1	2	Core
		3.3.1.3	Training of community to become bird guides	10	Training	5	50	2	10	2	10	2	10	2	10	2	10	Core
3.4 Maintain habitat of migratory birds																		
	3.4.1		Habitat conservation for migratory birds															
		3.4.1.1	Mapping the bird congregation areas as per Zonal Plan	1	Map	5	5			1	5							Core
		3.4.1.2	Monitoring the anthropogenic disturbance of key habitats through surveillance	5	Monitoring	2	10	1	2	1	2	1	2	1	2	1	2	Core
		3.4.1.3	Planting native fruit bearing trees in villages for terrestrial birds	5	Planting	5	25	1	5	1	5	1	5	1	5	1	5	Core
		3.4.1.4	Conducting study to understand the drawdown area creation of bird habitats on wetland ecology	2	Study	8	16	1	8	1	8							Core
		3.4.1.5	Strengthening of village-based antipoaching committees by providing them ID cards and monitory incentives, and guidelines for monitoring and poaching	5	Strenthening	2	10	1	2	1	2	1	2	1	2	1	2	Non-core
		3.4.1.6	Developing an SOP in cases of avian disease breakouts in the region and its institutionalization by authority	1	SOP	5	5			1	5							Core
		3.4.1.7	Activities for habitat restoration and adaptive management	5	Habitat restoration	3	15	1	3	1	3	1	3	1	3	1	3	Core
		3.4.1.8	Awareness workshops and festivals (annual Gokul Jalashay bird festival) on waterbird conservation	5	Awareness	3	15	1	3	1	3	1	3	1	3	1	3	Core
3.5 Invasive species management																		
	3.5.1		Mangement of Invasive species															
		3.5.1.1	Site survey for identification of areas with high presence of invasive species	5	Survey	2	10	1	2	1	2	1	2	1	2	1	2	Core
		3.5.1.2	Development of maps indicating areas requiring interventions for invasion control	1	Map	5	5	1	5									Core
		3.5.1.3	Alternative uses of invasive macrophytes in manure, handicrafts products development .	3	Uses	30	90					1	30	1	30	1	30	Non-core
		3.5.1.4	Study on the possiblities on biological control of macrophytes invasion by introducing carps	3	Study	40	120					1	40	1	40	1	40	Non-core
3.6 Maintain fish diversity and check invasives fish																		
	3.6.1		Maintianing fish diverstiy in the wetland complex				0											
		3.5.2.1	Stocking of fingerlings for fish breeding in bird congregating areas	5	Stock	25	125	1	25	1	25	1	25	1	25	1	25	Core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		3.5.2.2	Promote in-situ seed raising of native fish species	5	Production	25	125	1	25	1	25	1	25	1	25	1	25	Core
		3.5.2.3	Prohibit illegal fishing	5	Ban	20	100	1	20	1	20	1	20	1	20	1	20	Core
		3.5.2.4	Sensitize local fishermen on sustainable fishing	10	Sensitize	20	200	2	40	2	40	2	40	2	40	2	40	Core
		3.5.2.5	Conduct periodic patrolling	20	Pattrolling	4	80	4	16	4	16	4	16	4	16	4	16	Core
		3.5.2.6	Diseases monitoring	2	Monitoring	10	20					1	10		0	1	10	Core
3.7 Protect breeding sites of wetland dependent birds																		
	3.7.1	Protection of breeding sites of waterbrids																
		3.7.1.1	Identify bird breeding areas	5	identification	2	10	1	2	1	2	1	2	1	2	1	2	Core
		3.7.1.2	Distribution of proper harvesting gadgets to the fisher Cooperatives	100	identification	5	500	20	100	20	100	20	100	20	100	20	100	Core
		3.7.1.3	Awareness workshop on waterbird conservation	5	Awareness	1	5	1	1	1	1	1	1	1	1	1	1	Core
3.8 Check macrophyte growth in the wetland																		
	3.8.1	Check macrophytes growth near inlets of the																
		3.8.1.1	Conduct water quality tests for invasive macrophyte growth	15	Testing	0.3	4.5	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9	Non-core
		3.8.1.2	Periodic monitoring of invasive macrophytes growth	15	Monitoring	0.5	7.5	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5	Core
3.9 Establishing centres for veterinary care, shelter and preparedness for wildlife during																		
	3.9.1	Veterinary support																
		3.9.1.1	Construction of one veterinary shelter for care and shelter wildlife during and post disasters	1	Construction	30	30					1	30				0	Non-core
		3.9.1.2	Maintanance of veterinary centre	2	Centre	5	10							1	5	1	5	Non-core
3.10 Disease control																		
	3.10.1	Disease control																
		3.10.1.1	Develop an SOP for handling avian diseases episodes.	1	SOP	2	2			1	2							Core
		3.10.1.2	Conduct workshops to spread awareness on avian diseases and their controls	5	Workshop	2	10	1	2	1	2	1	2	1	2	1	2	Core
		3.10.1.3	Undertake safety protocols to control spread of zoonotic diseases like isolation of affected individual and clearing debris	1	Protocol	5	5			1	5							Core
		3.10.1.4	Purchase and installation of ATVs for surveillance at Gayghat, Chakki, Baluaon, Suhiya and Dhamwal villages	5	Purchase and installation	2	10	1	2	1	2	1	2	1	2	1	2	Non-core
		3.10.1.5	Purchase of kits to undertake animal/bird debris clearance	5	Kits	2	10	2	4	2	4	1	2					Non-core
		3.10.1.6	Surveillance and reporting	5	Surveillance and report	4	20	1	4	1	4	1	4	1	4	1	4	Non-core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1 Physical target	Year 1 Amount (in Lakhs)	Year 2 Physical target	Year 2 Amount (in Lakhs)	Year 3 Physical target	Year 3 Amount (in Lakhs)	Year 4 Physical target	Year 4 Amount (in Lakhs)	Year 5 Physical target	Year 5 Amount (in Lakhs)	Acticvity Core/Non-core
3.11 Communication and education facilities																		
	3.11.1		Communication and education facilities to expand knowlege about wetland conservation															
		3.11.1.1	Exhibitions	1	Exhibition	5	5									1	5	Non-core
		3.11.1.2	Field excursions	1	Excursions	5	5									1	5	Non-core
4 Livelihood																		
4.1 Sustainable fishing																		
	4.1.1		Sustainable fishing to enhance livelihood for the															
		4.1.1.1	Feasibility assessment	1	Assessment	5	5	1	5									Core
		4.1.1.2	Training of fishers on use of licensed gears and illegal activities	10	Training	2	20	2	4	2	4	2	4	2	4	2	4	Core
		4.1.1.3	Training of fishers on stocking	10	Training	2	20	2	4	2	4	2	4	2	4	2	4	Core
4.2 Post harvesting and marketing																		
	4.2.1		Post harvesting and marketing support															
		4.2.1.1	Distribution of proper harvesting gadgets to the fisher Cooperative members	2	Distribution	30	60			1	30	1	30					Core
		4.2.1.2	Fish holding and storage facilities for the fisher groups near Gayghat, Chakki, Nainijor and Suhiya and Chamarpur	5	Storage	40	200	1	40	1	40	1	40	1	40	1	40	Core
		4.2.1.3	Support cooperatives with live fish transport mechanism for better pricing	2	Support	30	60					1	30	1	30			Core
		4.2.1.4	Market chain including E-Markets to expand demand of Gokul Jalashay wetland Complex	2	E-market	20	40					1	20	1	20			Non-core
		4.2.1.5	Capacity building trainings to the fishers groups on post harvesting and marketing by fisheries department	10	Capacity building	2	20	2	4	2	4	2	4	2	4	2	4	Core
4.3 Diversification of cropping pattern																		
	4.3.1		Promotion of organic agriculture															
		4.3.1.1	Feasibility assessment	1	Feasibility	4	4	1	4									Core
		4.3.1.2	Training on organic agriculture practice	10	Training	2	20	2	4	2	4	2	4	2	4	2	4	Core
		4.3.1.3	Monitoring overgrazing and agriculture	10	Monitoring	2	20	2	4	2	4	2	4	2	4	2	4	Core
	4.3.2		Promotion of organic horticulture															
		4.3.2.1	Cultivation of fruit crops such as Guava, Mango, Ber (Kul) and Banana	100	Cultivation	0.5	50	20	10	20	10	20	10	20	10	20	10	Core
		4.3.2.2	Cultivation of high-value vegetables such as green and yellow capsicum and ornamental cabbage c) Floriculture (Jasmine, Marigold and Sunflower)	100	Cultivation	0.5	50	20	10	20	10	20	10	20	10	20	10	Core
		4.3.2.3	Crop rotation to maintan soil nutrients and manure management, pest controlling is also required	100	Crop rotation	0.5	50	20	10	20	10	20	10	20	10	20	10	Non-core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		4.3.2.4	Preparation of crop calendars based on seasonality to minimise water stress to the wetand and inclrease productivity	100	Calender	0.5	50	20	10	20	10	20	10	20	10	20	10	Non-core
	4.3.3		Medicinal plants															
		4.3.3.1	Training for culitivation and marketing of medicinal plants	50	Training	0.3	15	10	3	10	3	10	3	10	3	10	3	Non-core
4.4 Crop intensification																		
	4.4.1		Crop intensification															
		4.4.1.1	Promotion of SRI/SWI/SCI technicques to minise water consumptions for judicious use of wetland water	50	Promotion	2	100	10	20	10	20	10	20	10	20	10	20	Core
4.5 Organic manure and pest control																		
	4.5.1		Organic manure and pest control															
		4.5.1.1	Training on organic manure/vermin composing to 100 wetland dependant farmers to minimize the use of chemical fartilisers	10	Training	0.3	3	2	0.6	2	0.6	2	0.6	2	0.6	2	0.6	Core
		4.5.1.2	Training on organic pest controller to 100 wetland dependant farmers to control over use of chemical pesticides and fungicides	10	Training	0.3	3	2	0.6	2	0.6	2	0.6	2	0.6	2	0.6	Core
4.6 Eco-tourism																		
	4.6.1		Development of tourism plan															
		4.6.1.1	Preparation of a masterplan for community led ecotourism	1	Masterplan	5	5			1	5							Core
		4.6.1.2	Training and recruitment of local tour guides (bird guides, boat ride, etc)	2	Training	2	4					2	4					Core
	4.6.2		Infrastructure development															
		4.6.2.1	Eco-huts - 2 Locations	2	Eco-huts	30	60					1	30	1	30			Core
		4.6.2.2	Construction of watchtowers- 4 Towers	4	Construction	20	80					2	40	1	20	1	20	Core
		4.6.2.3	Operationalize tenting platforms	4	Tent	10	40					1	10	1	10	2	20	Non-core
		4.6.2.4	Board walk, cycling, nature trails	2	Board walk..	40	80					1	40	1	40			Core
		4.6.2.5	Construction of adequate public amenities - drinking water, toilets, resting	5	Construction	60	300					2	120	1	60	2	120	Core
		4.6.2.6	Sheds, eateries	5	Shed	20	100					2	40	2	40	1	20	Core
		4.6.2.7	Waste management - solid and wastewater - rainwater harvesting,	2	Waste management	30	60								0	2	60	Core
		4.6.2.8	Purchase and maintenance of paddle boats	10	Paddle boat	2	20							5	10	5	10	Core
		4.6.2.9	Souvenir shop	2	Soveinir shop	15	30							2	30			Core
		4.6.2.10	Maintenance of sites of cultural significance	2	Maintance	10	20							1	10	1	10	Core

Mananagement Component			Activity/Sub-Activity	Physical targets	Unit	Rate (In Lakhs)	Amount (in Lakhs)	Year 1		Year 2		Year 3		Year 4		Year 5		Acticvity Core/Non-core
								Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	Physical target	Amount (in Lakhs)	
		4.6.2.11	Training for the ecotourism guides	5	Training	5	25	1	5	1	5	1	5	1	5	1	5	Core
		4.6.2.12	Exposure visits	2	Exposure visit	5	10			1	5	1	5					Core
4.7 Infrastructure for education																		
	4.7.1		Interpretation centre															
		4.7.1.1	Identify suitable location for interpretation centre	1	Identification	3	3			1	3							Core
		4.7.1.2	Design and estimates	1	Design and estimates	5	5			1	5							Core
		4.7.1.3	Establishment of a wetland interpretation center	1	Establishment	100	100					1	100					Core
		4.7.1.4	Purchase of binoculars, lifejackets and field identifications/guidebooks for wetland mitras	1	Purchase	20	20					1	20					Core
		4.7.1.5	Training for ecotourism guides	5	Training	5	25	1	5	1	5	1	5	1	5	1	5	Core
		4.7.1.6	Exposure visits to aquire knowlege of ecotourim	1	Exposure visits	5	5							1	5			Non-core
4.8 Community infrastructure																		
	4.8.1		Medical health camps															
		4.8.1.1	Health camps for wetlands communities	5	Health camps	2	10	1	2	1	2	1	2	1	2	1	2	Non-core
		4.8.1.2	Medical stock for disaster/Flooding events	5	Medical stock	2	10	1	2	1	2	1	2	1	2	1	2	Non-core
		4.8.1.3	Moible health care support facilities	2	Mobile health care	5	10			1	5	1	5					Non-core
	4.8.2		Safe drinking water facilities															
		4.8.2.1	Arsenic filters installation	20	Filter	5	100	4	20	4	20	4	20	4	20	4	20	Non-core
	Total						**6153**		**1042**		**1305**		**1524**		**1205**		**1077**	

8.2 Financing

The year-wise breakup of the requirement of funds in terms of core and non-core activities is provided in Table 17

Table 17: Year wise breakup of requirement of funds

	Year 1		**Year 2**		**Year 3**		**Year 4**		**Year 5**		Total
	Core	**Non-core**	**Core**	**Non-core**	**Core**	**Non-core**	**Core**	**Non-core**	**Core**	**Non-core**	
Management Plan Component											
Institution and Governance	292.9	82.5	337.4	48.5	232.8	17.5	175.9	21.5	104.3	16.5	**1329.8**
Land and water management	157	8	358	13	194	13	154.3	13	132.7	8	**1051**
Species and habitat conservation	321.5	12.9	323.5	12.9	303.5	110.9	293.5	83.9	303.5	93.9	**1860**
Livelihood	120.2	47	159.2	52	570.2	82	381.2	82	351.2	67	**1912**
Grand total	**891.6**	**150.4**	**1178.1**	**126.4**	**1300.5**	**223.4**	**1004.9**	**200.4**	**891.7**	**185.4**	**6152.8**

8.3 Phasing of Activities

Table 18 provides year wise phasing of activities for integrated management of Gokul Jalashay wetland complex.

Table 18: Year wise phasing of activities

Management Component		Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
1. Institutions and Governance												
1.1 Notification of Wetland complex under wetlands (Conservation and Management) Rules, 2017												
1.1.1	Delineation of wetland complex											
	1.1.1.1	Field reconnaissance survey for boundary identification										
	1.1.1.2	Delineation of wetland boundary on a geo-coded map										
	1.1.1.3	Delineation of zone of influence of the wetland complex										
	1.1.1.4	Ground truthing of wetland maps										
	1.1.1.5	Production of ground truth map										
	1.1.1.6	Stakeholder consultation										
	1.1.1.7	Map finalization and publication										
1.1.2	Notifying wetland complex under Wetlands (Conservation and Management) Rules, 2017											
	1.1.2.1	Preparation of brief document										
	1.1.2.2	Submission of brief document to Bihar State Wetland Authority (BSWA)										
	1.1.2.3	Preparation of draft notification										
	1.1.2.4	Public consultation										
	1.1.2.5	Final notification										
1.1.3	Wetland Demarcation											
	1.1.3.1	Survey of land rights										
	1.1.3.2	Publication of draft land right maps										
	1.1.3.3	Stakeholder consultation										
	1.1.3.4	Land right conflict resolution as per established procedure										
	1.1.3.5	Map finalization and publication										
	1.1.3.6	Registration of wetland boundaries into revenue records										

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
		1.1.3.7	Identification of geo-tagged pillar location points (Preferably at 250 meters interval)										
		1.1.3.8	Installation of geo-tagged pillars along the wetland boundary including estimation and procurement										
		1.1.3.9	Maintenance of installed pillars										
1.2 Establishment of proper Institutions for effective management regime													
	1.2.1		Workshop for constitution of wetland mitra network										
		1.2.1.1	Workshop for identification of possible wetland mitras										
		1.2.1.2	Vacancy announcement for the post of wetland mitra on social media and local newspapers										
		1.2.1.3	Recruitment of wetland mitras										
1.3 Management zoning/Regulatory regimes													
	1.3.1		Establishment of management zones										
		1.3.1.1	Preparation of draft zonal management plans										
		1.3.1.2	Stakeholder consultation										
		1.3.1.3	Finalization and publication										
1.4 Wetlands Inventory, Assessment and Monitoring System													
	1.4.1		Establishment of wetland monitoring and research centre										
		1.4.1.1	Identification of potential site for construction of wetland monitoring and research centre										
		1.4.1.2	Construction of research centre										
		1.4.1.3	Lab accreditation from National Accreditation Board for Testing and Calibration Laboratories(NABL)L and other regulatory agencies										
		1.4.1.4	Procurement of laboratory equipment and reagents										
		1.4.1.5	Recruitment of research personnel										
		1.4.1.6	Identification of suitable sites for installation of										

Management Component		Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
		hydro meteorological stations										
	1.4.1.7	Procurement of instruments for hydrometeorolgical monitoring including sediment and water flow and depth monitoring equipment and local weather monitoring equipment										
	1.4.1.8	Installation of hydro meteorological stations										
	1.4.1.9	Maintenance of hydro meteorological equipment										
	1.4.1.10	Identification of suitable sites for water quality sampling stations										
	1.4.1.11	Procurement of instruments for water quality monitoring										
	1.4.1.12	Installation of water quality monitoring equipment										
	1.4.1.13	Maintenance of water quality monitoring equipment										
1.4.2	Development of database management system											
	1.4.2.1	Development of data quality management and assurance plan										
	1.4.2.2	Development of GIS based database management system										
1.4.3	Wetland monitoring and evaluation											
	1.4.3.1	Development of draft wetland monitoring and inventory tool										
	1.4.3.2	Field testing of monitoring and inventory tool										
	1.4.3.3	Stakeholder consultation										
	1.4.3.4	Finalization of wetland monitoring and inventory tool										
1.4.4	Surveillance system											
	1.4.4.1	Development of mobile-based surveillance system/app										
	1.4.4.2	Field testing										

Management Component		Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
	1.4.4.3	Stakeholder consultation										
	1.4.4.4	Finalization of surveillance app										
	1.4.4.5	Procurement of drones and CCTV cameras										
	1.4.4.6	Installation of CCTVs at appropriate locations										
	1.4.4.7	Surveillance of the wetland complex using drones and CCTVs										
1.4.5	Ecosystem Health Report Card											
	1.4.5.1	Convening a methodology workshop for healthcard development										
	1.4.5.2	Development of Ecosystem Health Report Card										
	1.4.5.3	Report card publication										
	1.4.5.4	Stakeholder dissemination workshop										
1.4.6	Tracking of management effectiveness											
	1.4.6.1	Development of Management Effectiveness Tracking Tool (METT)										
	1.4.6.2	Pilot testing of METT										
	1.4.6.3	Stakeholders consultation										
	1.4.6.4	Finalisation of METT										
	1.4.6.5	Periodic monitoring of management effectiveness using METT										
1.5 Research												
1.5.1	Climate risk assessment											
	1.5.1.1	Inception workshop										
	1.5.1.2	Study										
	1.5.1.3	Result sharing										
	1.5.1.4	Publication										
1.5.2	Habitat study for foraging birds especially black-headed Ibis											
	1.5.2.1	Inception workshop										
	1.5.2.2	Study										
	1.5.2.3	Result sharing										
	1.5.2.4	Publication										
1.5.3	Hydrological connectivity assessment											
	1.5.3.1	Inception workshop										
	1.5.3.2	Study										
	1.5.3.3	Result sharing										
	1.5.3.4	Publication										
1.6 Capacity development												

Management Component		Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
1.6.1	Site Manager training											
	1.6.1.1	Development of Capacity and Training Needs Assessment (CTNA) tool										
	1.6.1.2	Training workshop for CTNA										
	1.6.1.3	Assessment through CTNA tool										
	1.6.1.4	Prepare training calendar as per CTNA										
	1.6.1.5	Provide trainings to site managers as per CTNA (such as wetland ecology, participatory planning, health card preparation, conflict resolution, community engagements)										
1.6.2	Frontline staff training											
	1.6.2.1	Training of staff on sampling and instrumentation										
	1.6.2.2	Systematic training on wildlife disease identification										
	1.6.2.3	Bird ringing										
	1.6.2.4	Poaching prevention										
1.6.3	Resource users training											
	1.6.3.1	Identify key wetland dependent resources groups using participatory mapping										
	1.6.3.2	Identify key training needs for identified groups such as agriculturalists, horticulturalists, fishers, fodder and forage users, dairy and cultural groups										
	1.6.3.3	Convergence workshop with line departments and resource user groups										
1.6.4	Line departments and local community training											
	1.6.4.1	Provide trainings to community groups, PRI members and line departments on participatory planning process										
	1.6.4.2	Gender mainstream training and ensuring participation of women in										

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
			leadership and decision-making roles										
		1.6.4.3	Integrate wetland management actions into development planning process during Gram Sabha										
		1.6.4.4	Extant wetland management rules and regulations awareness programme										
		1.6.4.5	Training of local communities and bodies such as Panchayati Raj Institutions and CBOs on ecosystem-based wetland management										
	1.6.5	Community mobilisation and proactive stakeholder engagement											
		1.6.5.1	Establishment of community advisory groups for liasoning workshops and meetings										
		1.6.5.2	Establishment of community-based wetland management groups (WMC)										
		1.6.5.3	Creation of wetland peoples Biodiversity Register-ToR, Stakeholders Consultations										
		1.6.5.4	Distribution of portable water quality test kits										
		1.6.5.5	Training on water quality test kits										
		1.6.5.6	Participatory water quality monitoring										
1.7 Communication and outreach													
	1.7.1	Stakeholder engagement in wetland management through communication and awareness											
		1.7.1.1	Installation of signage in key locations-in all entrance and exits points										
		1.7.1.2	Creation of webpage										
		1.7.1.3	Information boards showcasing significance of site										
		1.7.1.4	Celebration on important public events										

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
		1.7.1.5	Production of resources material										
		1.7.1.6	Organising nukkad nataks to sensitize communities on wise use of wetlands										
2. Land and water management													
2.1 Maintain the environmental flows													
	2.1.1	Improvement of inflow of inlets/channels using selective dredging											
		2.1.1.1	Identification of sites for selective dredging										
		2.1.1.2	Selective dredging of Dharmawati river channel										
		2.1.1.3	Identification of sites for selective dredging within the wetland complex										
		2.1.1.4	Selective dredging of wetland complex to maintain water depth										
		2.1.1.5	Selective dredging of drain connecting Gokul Jalashay and Sunki Suhiya										
	2.1.2	Regulation of flood pulses from river Ganga											
		2.1.2.1	Identification of zone of vulnerability due to flood pulses										
		2.1.2.2	Preparation of technical design with estimations for the restoring broken sections of the embankment										
		2.1.2.3	Procurements of raw materials										
		2.1.2.4	Repairing of approx. 250 m embankment breach at Isharpura										
		2.1.2.5	Design and estimation of culverts required in the broken section of embankment at Isharpura										
		2.1.2.6	Construction of approx. 5 culverts to maintain the connectivity between river Ganga and the wetland complex										
	2.1.3	Restoration of hydrological connectivity											
		2.1.3.1	Site survey for identification of potential										

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
			sites for construction of culverts and sluice gates										
		2.1.3.2	Preparation of technical design with estimations for construction of culverts and sluice gates										
		2.1.3.3	Construction of 2 culverts at Nainijor										
		2.1.3.4	Construction of 2 sluice gates										
		2.1.3.5	Site survey for identification of dredging site at Nainijor to restore connectivity of Gokul Jalashay and Sunki Suhiya										
		2.1.3.6	Selected dredging at Nainijor to restore connectivity between Gokul Jalashay and Sunki Suhiya										
	2.1.4	Removal of invasive macrophytes											
		2.1.4.1	Site survey for the identification of region with high invasive macrophytes										
		2.1.4.2	Periodical trapping and removing of invasive macrophytes										
		2.1.4.3	Undertake awareness campaigns in wetland dependent villages										
		2.1.4.4	Placing of signboards to generate awareness										
	2.1.5	Cleaning of sections with temporary structures such as check dams and temporary roads											
		2.1.5.1	Identification of temporary structures with high sedimentations										
		2.1.5.2	Periodic removal of debris/sediment near temporary structures										
		2.1.5.3	Maintenance of the temporary structures										
2.2 Pollution control													
	2.2.1	Activities for pollution abatement are as follows:											
		2.2.1.1	Survey of storm drains with high pollution load										
		2.2.1.2	Preparation of pollution abatement plans										

Management Component		Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
	2.2.1.3	Procurements of raw materials and equipment for waste management										
	2.2.1.4	Manual scouring of scum and other waste material										
	2.2.1.5	Relocation of dumping sites										
	2.2.1.6	Installation of mesh for screening out of waste from Dharmawati river										
	2.2.1.7	Construction of sand-gravel bed for inflow filtration										
	2.2.1.8	Provide trainings to community groups, PRI members and line departments on waste management and segregations										
	2.2.1.9	Installation of colour coded bins for wastes at the designated waste dumping sites										
2.3 Water quality parameter testing												
2.3.1	Water quality parameter testing											
	2.3.1.1	Conduct periodic water quality testing at sampling points within the wetland and catchment										
	2.3.1.2	Record and monitor water quality changes										
	2.3.1.3	Conduct meeting with stakeholders to discuss the result										
	2.3.1.4	Document water quality report										
3. Species and habitat conservation												
3.1 Asian water birds census												
3.1.1	Training on bird counting and census protocols											
	3.1.1.1	Training on bird counting and census protocols										
	3.1.1.2	Conduct annual bird census										
	3.1.1.3	Operationalize bird ringing station at Gaighat										
	3.1.1.4	Train staffs on bird ringing										
3.2 Peoples biodiversity registers												
3.2.1	Training on developing PBR											

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
		3.2.1.1	Creation of Peoples Biodiversity Register (PBR)										
		3.2.1.2	Training on Peoples' Biodiversity Register for the experts										
3.3 Habitat mapping and surveillance													
	3.3.1	Habitat mapping and surveillance											
		3.3.1.1	Mapping of key habitat and breeding areas										
		3.3.1.2	Formation of bird protection committees to monitor water bird habitats										
		3.3.1.3	Training of community to become bird guides										
3.4 Maintain habitat of migratory birds													
	3.4.1	Habitat conservation for migratory birds											
		3.4.1.1	Mapping the bird congregation areas as per Zonal Plan										
		3.4.1.2	Monitoring the anthropogenic disturbance of key habitats through surveillance										
		3.4.1.3	Planting native fruit bearing trees in villages for terrestrial birds										
		3.4.1.4	Conducting study to understand the drawdown area creation of bird habitats on wetland ecology										
		3.4.1.5	Strengthening of village-based anti-poaching committees by providing them ID cards and monitory incentives, and guidelines for monitoring and poaching										
		3.4.1.6	Developing an SOP in cases of avian disease breakouts in the region and its institutionalization by authority										
		3.4.1.7	Activities for habitat restoration and adaptive management										

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
		3.4.1.8	Awareness workshops and festivals (annual Gokul Jalashay bird festival) on water bird conservation										
3.5 Invasive species management													
	3.5.1	Management of Invasive species											
		3.5.1.1	Site survey for identification of areas with high presence of invasive species										
		3.5.1.2	Development of maps indicating areas requiring interventions for invasion control										
		3.5.1.3	Alternative uses of invasive macrophytes in manure, handicrafts products development.										
		3.5.1.4	Study on the possibilities on biological control of macrophytes invasion by introducing carps										
3.6 Maintain fish diversity and check invasives fish													
	3.6.1	Maintaining fish diversity in the wetland complex											
		3.5.2.1	Stocking of fingerlings for fish breeding in bird congregating areas										
		3.5.2.2	Promote in-situ seed raising of native fish species										
		3.5.2.3	Prohibit illegal fishing										
		3.5.2.4	Sensitize local fishermen on sustainable fishing										
		3.5.2.5	Conduct periodic patrolling										
		3.5.2.6	Diseases monitoring										
3.7 Protect breeding sites of wetland dependent birds													
	3.7.1	Protection of breeding sites of water birds											
		3.7.1.1	Identify bird breeding areas										
		3.7.1.2	Distribution of proper harvesting gadgets to the fisher Cooperatives										
		3.7.1.3	Awareness workshop on water bird conservation										
3.8 Check macrophyte growth in the wetland													
	3.8.1	Check macrophytes growth near inlets of the wetland											

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
		3.8.1.1	Conduct water quality tests for invasive macrophyte growth										
		3.8.1.2	Periodic monitoring of invasive macrophytes growth										
3.9 Establishing centres for veterinary care, shelter and preparedness for wildlife during and after extreme events													
	3.9.1	Veterinary support											
		3.9.1.1	Construction of one veterinary shelter for care and shelter wildlife during and post disasters										
		3.9.1.2	Maintenance of veterinary centre										
3.10 Disease control													
	3.10.1	Disease control											
		3.10.1.1	Develop an SOP for handling avian diseases episodes.										
		3.10.1.2	Conduct workshops to spread awareness on avian diseases and their controls										
		3.10.1.3	Undertake safety protocols to control spread of zoonotic diseases like isolation of affected individual and clearing debris										
		3.10.1.4	Purchase and installation of ATVs for surveillance at Gaighat, Chakki, Baluaon, Suhiya and Dhamwal villages										
		3.10.1.5	Purchase of kits to undertake animal/bird debris clearance										
		3.10.1.6	Surveillance and reporting										
3.11 Communication and education facilities													
	3.11.1	Communication and education facilities to expand knowledge about wetland conservation											
		3.11.1.1	Exhibitions										
		3.11.1.2	Field excursions										
4 Livelihood													
4.1 Sustainable fishing													
	4.1.1	Sustainable fishing to enhance livelihood for the wetland dependent communities											
		4.1.1.1	Feasibility assessment										

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
		4.1.1.2	Training of fishers on use of licensed gears and illegal activities										
		4.1.1.3	Training of fishers on stocking										
4.2 Post harvesting and marketing													
	4.2.1	Post harvesting and marketing support											
		4.2.1.1	Distribution of proper harvesting gadgets to the fisher Cooperative members										
		4.2.1.2	Fish holding and storage facilities for the fisher groups near Gaighat, Chakki, Nainijor and Suhiya and Chamarpur										
		4.2.1.3	Support cooperatives with live fish transport mechanism for better pricing										
		4.2.1.4	Market chain including E-Markets to expand demand of Gokul Jalashay wetland Complex										
		4.2.1.5	Capacity building trainings to the fishers groups on post harvesting and marketing by fisheries department										
4.3 Diversification of cropping pattern													
	4.3.1	Promotion of organic agriculture											
		4.3.1.1	Feasibility assessment										
		4.3.1.2	Training on organic agriculture practice										
		4.3.1.3	Monitoring overgrazing and agriculture										
	4.3.2	Promotion of organic horticulture											
		4.3.2.1	Cultivation of fruit crops such as Guava, Mango, Ber (Kul) and Banana										
		4.3.2.2	Cultivation of high-value vegetables such as green and yellow capsicum and ornamental cabbage c) Floriculture (Jasmine, Marigold and Sunflower)										
		4.3.2.3	Crop rotation to maintain soil nutrients and manure management, pest controlling is also required										

Management Component		Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
	4.3.2.4	Preparation of crop calendars based on seasonality to minimise water stress to the wetland and increase productivity										
4.3.3	Medicinal plants											
	4.3.3.1	Training for cultivation and marketing of medicinal plants										
4.4 Crop intensification												
4.4.1	Crop intensification											
	4.4.1.1	Promotion of SRI/SWI/SCI techniques to minimize water consumptions for judicious use of wetland water										
4.5 Organic manure and pest control												
4.5.1	Organic manure and pest control											
	4.5.1.1	Training on organic manure/vermin composing to 100 wetland dependant farmers to minimize the use of chemical fertilizers										
	4.5.1.2	Training on organic pest controller to 100 wetland dependant farmers to control over use of chemical pesticides and fungicides										
4.6 Eco-tourism												
4.6.1	Development of tourism plan											
	4.6.1.1	Preparation of a master plan for community led ecotourism										
	4.6.1.2	Training and recruitment of local tour guides (bird guides, boat ride, etc.)										
4.6.2	Infrastructure development											
	4.6.2.1	Eco-huts - 2 Locations										
	4.6.2.2	Construction of watchtowers- 4 Towers										
	4.6.2.3	Operationalize tenting platforms										
	4.6.2.4	Board walk, cycling, nature trails										
	4.6.2.5	Construction of adequate public amenities - drinking water, toilets, resting										
	4.6.2.6	Sheds, eateries										

Management Component			Activity/Sub-Activity	Year 1		Year 2		Year 3		Year 4		Year 5	
				1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
		4.6.2.7	Waste management - solid and wastewater - rainwater harvesting,										
		4.6.2.8	Purchase and maintenance of paddle boats										
		4.6.2.9	Souvenir shop										
		4.6.2.10	Maintenance of sites of cultural significance										
		4.6.2.11	Training for the ecotourism guides										
		4.6.2.12	Exposure visits										
4.7 Infrastructure for education													
	4.7.1	Interpretation centre											
		4.7.1.1	Identify suitable location for interpretation centre										
		4.7.1.2	Design and estimates										
		4.7.1.3	Establishment of a wetland interpretation centre										
		4.7.1.4	Purchase of binoculars, lifejackets and field identifications/guidebooks for wetland mitras										
		4.7.1.5	Training for ecotourism guides										
		4.7.1.6	Exposure visits to acquire knowledge of ecotourism										
4.8 Community infrastructure													
	4.8.1	Medical health camps											
		4.8.1.1	Health camps for wetlands communities										
		4.8.1.2	Medical stock for disaster/Flooding events										
		4.8.1.3	Mobile health care support facilities										
	4.8.2	Safe drinking water facilities											
		4.8.2.1	Arsenic filters installation										

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Annex1

List of wetland dependent villages

SL	TYPE	STATE	NAME	DISTRICT	SUB_DIST	Latitude	Longitude	Area_ha
1	Village	Bihar	Isharpura	Bhojpur	Shahpur	25.700000000000	84.383700000000	1986
2	Village	Bihar	Sonbarsa	Bhojpur	Shahpur	25.683700000000	84.394100000000	280
3	Village	Bihar	Mahaz Rashulpur	Bhojpur	Shahpur	25.688500000000	84.414500000000	200
4	Village	Bihar	Goreriya	Bhojpur	Shahpur	25.683500000000	84.428100000000	253
5	Village	Bihar	Jagdeopur	Bhojpur	Shahpur	25.686400000000	84.388200000000	55
6	Village	Bihar	Sonbarsa	Bhojpur	Shahpur	25.672000000000	84.403400000000	309
7	Village	Bihar	Dharmangatpur	Bhojpur	Shahpur	25.681700000000	84.340600000000	42
8	Village	Bihar	Masume Rasulpur	Bhojpur	Shahpur	25.678000000000	84.413300000000	140
9	Village	Bihar	Bhusahula	Bhojpur	Shahpur	25.666500000000	84.427700000000	297
10	Village	Bihar	Nandpur	Bhojpur	Shahpur	25.667600000000	84.413800000000	134
11	Village	Bihar	Ramchandar Semaria	Bhojpur	Shahpur	25.665100000000	84.378200000000	160
12	Village	Bihar	Kazi Chak	Bhojpur	Shahpur	25.665000000000	84.395200000000	124
13	Village	Bihar	Mohji Nardarai	Bhojpur	Shahpur	25.666000000000	84.442100000000	96
14	Village	Bihar	Bhikhampur	Bhojpur	Shahpur	25.665000000000	84.384600000000	32
15	Village	Bihar	Parsonda	Bhojpur	Shahpur	25.658200000000	84.387900000000	251
16	Village	Bihar	Nardara Khas	Bhojpur	Shahpur	25.657100000000	84.441500000000	140
17	Village	Bihar	Sonki	Bhojpur	Shahpur	25.656600000000	84.415800000000	90
18	Village	Bihar	Deomalpur	Bhojpur	Shahpur	25.647500000000	84.348500000000	581
19	Village	Bihar	Gangapur	Bhojpur	Shahpur	25.654500000000	84.428700000000	134
20	Village	Bihar	Suhiya	Bhojpur	Shahpur	25.645200000000	84.408400000000	513
21	Village	Bihar	Baharwar	Bhojpur	Shahpur	25.641900000000	84.389100000000	252
22	Village	Bihar	Mahaur Naubara	Buxar	Chakki	25.696600000000	84.328800000000	758
23	Village	Bihar	Nainijor	Buxar	Barhampur	25.701200000000	84.354200000000	1032

SL	TYPE	STATE	NAME	DISTRICT	SUB_DIST	Latitude	Longitude	Area_ha
24	Village	Bihar	Mahuar	Buxar	Barhampur	25.668000000000	84.338100000000	446
25	Village	Bihar	Pranpur	Buxar	Chakki	25.672200000000	84.295700000000	34
26	Village	Bihar	Sheopur Diar	Buxar	Chakki	25.672900000000	84.291400000000	9
27	Village	Bihar	Manipur	Buxar	Chakki	25.669900000000	84.299700000000	35
28	Village	Bihar	Bisupur	Buxar	Barhampur	25.666800000000	84.312300000000	80
29	Village	Bihar	Sapahi	Buxar	Chakki	25.666500000000	84.302800000000	27
30	Village	Bihar	Milki Bisupur	Buxar	Barhampur	25.664400000000	84.311100000000	6
31	Village	Bihar	Dhaf Chapra	Buxar	Chakki	25.649700000000	84.233900000000	436
32	Village	Bihar	Bahduri	Buxar	Barhampur	25.660300000000	84.325700000000	30
33	Village	Bihar	Diara Pachhim	Buxar	Chakki	25.655700000000	84.300200000000	48
34	Village	Bihar	Somali	Buxar	Chakki	25.644100000000	84.280600000000	204
35	Village	Bihar	Kalyanpur	Buxar	Chakki	25.644800000000	84.274700000000	200
36	Village	Bihar	Jawahi	Buxar	Chakki	25.643800000000	84.268900000000	272
37	Village	Bihar	Jawahir Diara	Buxar	Chakki	25.647600000000	84.259800000000	274
38	Village	Bihar	Minapur	Buxar	Chakki	25.652200000000	84.247300000000	219
39	Village	Bihar	Ekdar	Buxar	Barhampur	25.651600000000	84.309700000000	191
40	Village	Bihar	Dundh Chapra	Buxar	Chakki	25.652100000000	84.296500000000	104
41	Village	Bihar	Chakani	Buxar	Barhampur	25.647500000000	84.318700000000	277
42	Village	Bihar	Baghaunch	Buxar	Chakki	25.645600000000	84.291900000000	153
43	Village	Bihar	Turkau	Buxar	Chakki	25.643800000000	84.286700000000	188
44	Village	Bihar	Chandarpura	Buxar	Barhampur	25.647600000000	84.330100000000	146
45	Village	Bihar	Charkhi	Buxar	Chakki	25.638300000000	84.223400000000	874
46	Village	Bihar	Sheopur Diara	Buxar	Chakki	25.629300000000	84.220200000000	1111
47	Village	Bihar	Pokhra	Buxar	Chakki	25.641400000000	84.299500000000	66

SL	TYPE	STATE	NAME	DISTRICT	SUB_DIST	Latitude	Longitude	Area_ha
48	Village	Bihar	Dallupur	Buxar	Barhampur	25.640800000000	84.307300000000	45
49	Village	Bihar	Pandepur Path	Buxar	Chakki	25.634900000000	84.256100000000	147
50	Village	Bihar	Udhaura	Buxar	Barhampur	25.629400000000	84.310100000000	266
51	Village	Bihar	Bairia	Buxar	Barhampur	25.627900000000	84.294400000000	87
52	Village	Bihar	Janubi	Buxar	Chakki	25.629700000000	84.265700000000	64
53	Village	Bihar	Panrepur	Buxar	Barhampur	25.625600000000	84.300500000000	102
54	Village	Bihar	Balua	Buxar	Barhampur	25.623300000000	84.285500000000	120
55	Village	Bihar	Nandpur	Buxar	Barhampur	25.623300000000	84.277600000000	49
56	Village	Bihar	Gaighat	Buxar	Barhampur	25.620400000000	84.264900000000	211

Annex 2

Fisheries data (Gokul Jalashay)

Brief report shared from Fisheries department, Buxar on July 7, 2022

Economic species & catch

- Major carp (Catla, Labeo rohita, Cirrhinus mrigala, Labeo calbasu)
- Murrels (*Channa maurilius, C.striatus, Channa punctatus*)
- Cat Fish *(Wallago attu, Mystus seenghala, Mystus punctatus*)
- Anabas testudienus
- Freshwater eel
- *Heteropneustes fossilis* (singhi)
- *Labeo reba*
- *Punctius sarana.*
- Prawn (*M. malcolmsonii, M.chopri, M.ruddis, M.sabriculus*).
- Total catch per year- 56.42 ton/ annum
- Yield/hectare/year – 0.34 MT
- Source of water – Dharmawati river
- Area covered – 410 acre
- Trends in the catch in the last 10 years – Mostly wild catch
- List of fish species including ornamental species – Not observed

Capture and Culture

- Major fishing areas – Chandrapura to Balua Gaighat
- Number of fisherman - 451
- Cooperatives name – Prakhand Matasyajivi Sahyog samiti limited,bramhpur
- Year of formation - 1976
- Current members - 451
- Net harvest per annum-56.42 Mt
- Number of non-registered fishers - 0
- Any introduced species- No
- Key fishing seasons – All over year except monsoon
- Closed seasons are observed(if any)- Monsoon
- Details of fishing with or without a lease no - 324
- Fishing restrictions – Nothing except monsoon season

Crafts and Gears

- Number of boats used- 143 (1.6 to 3.5 m)
- Types of nets and their sizes - Cast net, gill net, Drag net,hooks
- Harvest and Post-harvest infrastructure - Traditional
- Markets availability - Local Market, Bramhpur, Buxar
- Transport availability - Connected by road
- Storages spaces – Not available
- Processing facilities – Traditional

Fishing Institutions

- Whether fisher cooperatives have been registered - Yes
- Major projects running by the fisheries department in Gokul Jalashay – Not observed.
- Ongoing schemes or subsidies – 4 wheeler & 2 wheeler on subsidy provided by Buxar fisheries department.

Key challenges

- Introduction of new economically important species
- Biodiversity of aquatic species decreasing.
- Annual migration of wild species to Ganga River during floods.
- Lesser production compare to moderate pond culture.
- Continuous fishing during rainy season.
- Income is decreasing annually due to lower production of fish in Gokul Jalasay

Any other institute/research organizations/NGO/CBO/local groups working at Gokul Jalashay related to fisheries

- Prakhand Matasyajivi Sahyog Samiti limited,Bramhpur

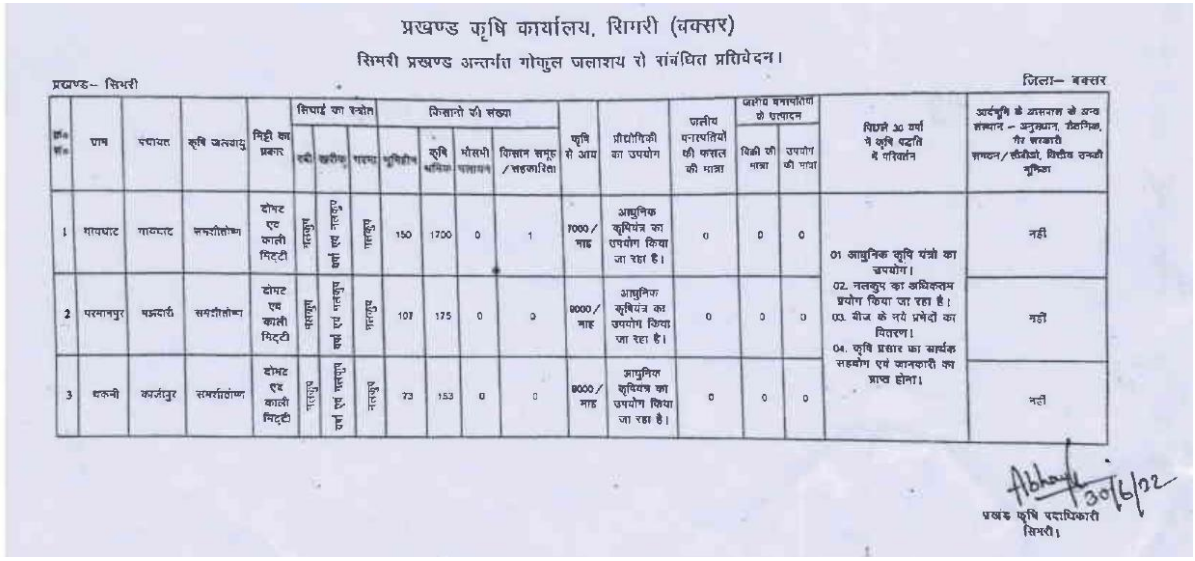
Any future fisheries development plan for Gokul jalashay

NA

Annex 3

Agriculture data (Gokul Jalashay)

Brief report shared by Agriculture department, Buxar on July 1, 2022



प्रखण्ड कृषि कार्यालय, सिमरी (बक्सर)

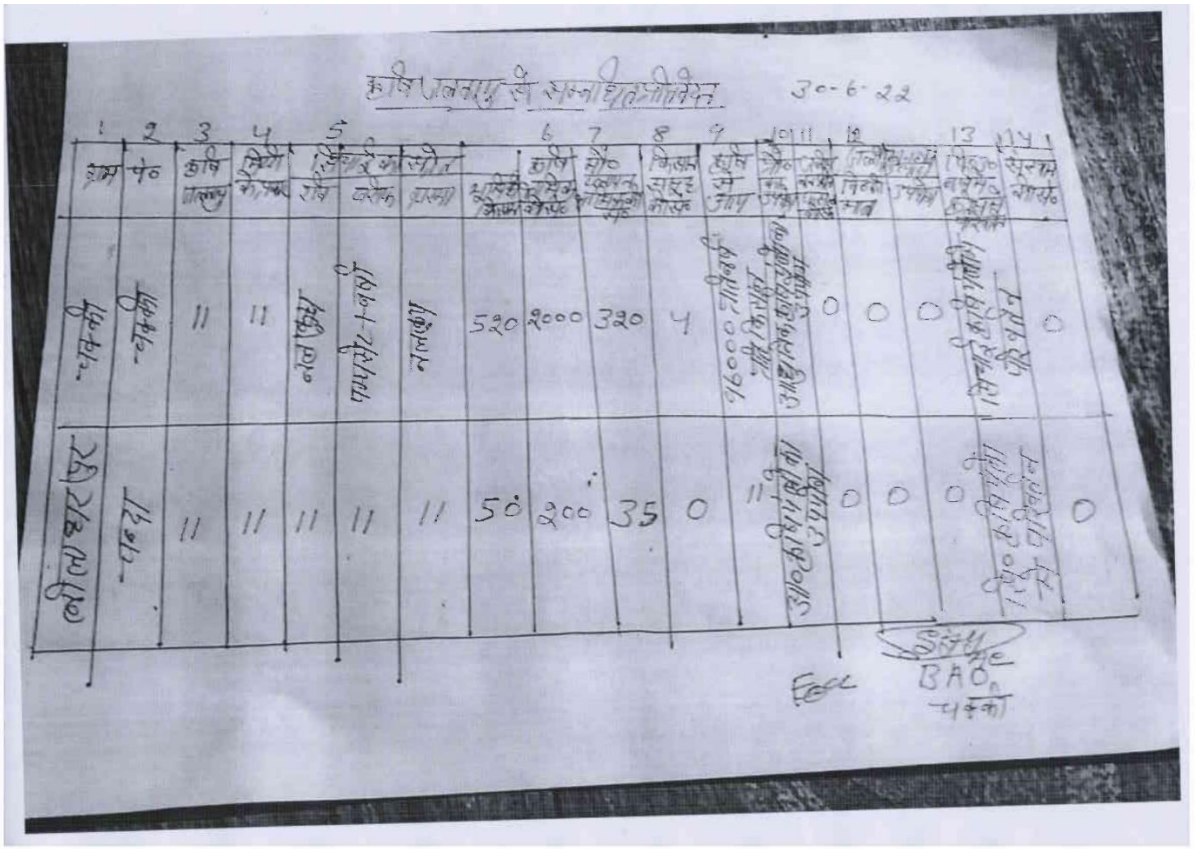
सिमरी प्रखण्ड अन्तर्गत गोकुल जलाशय से संबंधित प्रतिवेदन।

प्रखण्ड– सिमरी जिला– बक्सर

क्र० सं०	ग्राम	पंचायत	कृषि जलवायु	मिट्टी का प्रकार	सिंचाई का स्त्रोत			किसानों की संख्या				कृषि से आय	प्रौद्योगिकी का उपयोग	जलीय वनस्पतियों की कटाई की मात्रा	जलीय वनस्पतियों से उत्पादन		पिछले 10 वर्षों में कृषि पद्धति में परिवर्तन	आर्द्रभूमि के आसपास के अन्य संस्थान – अनुसंधान, शैक्षणिक, गैर सरकारी संगठन/सोसाइटी, वित्तीय संस्थाएँ मुखिया
					रबी	खरीफ	गरमा	भूमिहीन	कृषि श्रमिक	पशुपालन	विज्ञान समूह /सहकारिता				बिक्री की मात्रा	उपयोग की मात्रा		
1	गायघाट	गायघाट	जलवायुवीय	दोमट एवं काली मिट्टी	नलकूप		नलकूप	150	1700	0	1	7000/ माह	आधुनिक कृषियंत्र का उपयोग किया जा रहा है।	0	0	0	01 आधुनिक कृषि यंत्रों का उपयोग।	नहीं
2	परमानपुर	मझदारी	समशीतोष्ण	दोमट एवं काली मिट्टी	नलकूप		नलकूप	107	175	0	0	9000/ माह	आधुनिक कृषियंत्र का उपयोग किया जा रहा है।	0	0	0	02. नलकूप का अधिकतम प्रयोग किया जा रहा है। 03. बीज के नये प्रभेदों का वितरण। 04. कृषि प्रसार का कार्यक सहयोग एवं जानकारी का प्राप्त होना।	नहीं
3	थकनी	कजरीपुर	समशीतोष्ण	दोमट एवं काली मिट्टी	नलकूप		नलकूप	73	153	0	0	8000/ माह	आधुनिक कृषियंत्र का उपयोग किया जा रहा है।	0	0	0		नहीं

30/6/22

प्रखंड कृषि पदाधिकारी
सिमरी।



प्रखण्ड कृषि कार्यालय, ब्रहापुर

गोकुल जलाशय से संबंधित प्रतिवेदन।

क्र० स०	ग्राम	पंचायत	कृषि जलवायु	मिट्टी का प्रकार	सिचाई का स्त्रोत			किसानों की संख्या				कृषि से आय	प्रौद्योगिकी का उपयोग	जलीय वनस्पतियों की फसल की मात्रा	जलीय वनस्पतियों के उत्पादन		पिछले 30 वर्षो मे कृषि पद्धति में परिवर्तन	आर्द्रभूमि के आसपास के अन्य संस्थान – अनुसंधान, शैक्षणिक, गैर सरकारी, संगठन/सीबीओ, वित्तीय उनकी भूमिका
					रबी	खरीफ	गरमा	भूमिहीन	कृषि श्रमिक	मौसमी पलायन	किसान समूह /सहकारिता				बिक्री की मात्रा	उपयोग की मात्रा		
1	बिसुपुर	महुआर	समशीतोष्ण	बलुई दोमट	पंपसेट	पंपसेट	पंपसेट	50	150	10	1	12000 प्रति माह	आधुनिक कृषि यंत्र	0	0	0	सिचाई में पंपसेट का व्यवस्था, उन्नत किस्म का समय से प्रयोग, सब्जी की खेती एवं किसान का समय समय पर प्रशिक्षण होता है। पहले से खेती की प्रकिया में बहुत सुधार हुआ है। उत्पादन में वृद्धि हुई है।	नहीं
2	एकडाढ	महुआर	समशीतोष्ण	बलुई दोमट	पंपसेट	पंपसेट	पंपसेट	45	40	10	–	10000 प्रति माह	आधुनिक कृषि यंत्र	0	0	0		नहीं
3	सपही	बैरिया	समशीतोष्ण	बलुई दोमट	पंपसेट	पंपसेट	पंपसेट	80	50	20	1	10000 प्रति माह	आधुनिक कृषि यंत्र	0	0	0		नही
4	चकनी	महुआर	समशीतोष्ण	बलुई दोमट	पंपसेट	पंपसेट	पंपसेट	125	100	20	1	90000 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नही
5	बैरिया	बैरियां	समशीतोष्ण	बलुई दोमट	पंपसेट	पंपसेट	पंपसेट	0	0	0	0	0	0	0	0	0		नहीं (अवादी नहीं है)
6	गायघाट	गायघाट	समशीतोष्ण	बलुई दोमट	पपसेट	पपसेट	पंपसेट	100	100	30	2	15000 रू0 माह	आधुनिक कृषि यंत्र	0	0	0		नहीं
7	भलुआ	बैरियां	समशीतोष्ण	बलुई दोमट	पंपसेट	पपसेट	पंपसेट	30	50	20	2	12000 रू0 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नही
8	नन्दपुर	गायघाट	समशीतोष्ण	बलुई दोमट	पपसेट	पंपसेट	पंपसेट	70	50	0	0	10000 रू0 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नही
9	चौबेचौक	बैरिया	समशीतोष्ण	बलुई दोमट	पंपसेट	पंपसेट	पंपसेट	30	15	0	0	12000 रू0 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नहीं
10	दुल्लुपुर	हरनाथपुर	समशीतोष्ण	बलुई दोमट	पंपसेट	पंपसेट	पंपसेट	35	50	10	0	10000 रू0 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नही
11	उधौरा	हरनाथपुर	समशीतोष्ण	बलुई दोमट	पपसेट	पंपरोट	पंपसेट	50	70	15	1	10000 रू0 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नही
12	हरनाथपुर	हरनाथपुर	समशीतोष्ण	बलुई दोमट	पपसेट	पंपसेट	पंपसेट	20	40	10	0	9000 रू0 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नहीं
13	महुआर	महुआर	समशीतोष्ण	बलुई दोमट	पंपसेट	पंपसेट	पंपसैट	200	230	25	3	12000 रू0 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नही
14	नैनीजोर	नैनीजोर	समशीतोष्ण	बलुई दोमट	पंपसेट	पपसेट	पंपसेट	550	650	50	4	10000 रू0 प्रतिमाह	आधुनिक कृषि यंत्र	0	0	0		नही

प्रखड कृषि पदाधिकारी
का हस्ताक्षर

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15	गायघाट	गायघाट	समशीतोष्ण	दोमट एवं काली मिट्टी	नलकुप	वर्षा एवं नलकुप	नलकुप	150	1700	0	1	7000 रू० / प्रतिमाह	आधुनिक कृषि यंत्र का उपयोग किया जा रहा है।	0	0	0	1 आधुनिक कृषि यन्त्रो का उपयोग। 2 नलकुप का अधिकतम प्रयोग किया जा रहा है। 3 बीज के नये प्रभेदो का वितरण। 4 कृषि प्रसार का सार्थक सहयोग एवं नाजकारी का प्राप्त होना।	–	नही
16	परमानपुर	मझवारी	समशीतोष्ण		नलकुप		नलकुप	107	175	0	0	9000 रू० / प्रतिमाह		0	0	0		–	नही
17	चकनी	काजीपुर	समशीतोष्ण		नलकुप		नलकुप	73	153	0	0	9000 रू० / प्रतिमाह		0	0	0		–	नही
18	जवही दियर	जवही दियर	समशीतोष्ण	बलुई दोमट	नलकुप	पम्पसेट	नलकुप	65	250	40	0	96000 रू० / प्रतिवर्ष	आधुनिक कृषि यंत्र	0	0	0	सिचाई कृषि यंत्रो में परिवर्तन	–	नहीं
19	मणिपुर		समशीतोष्ण		नलकुप		नलकुप	65	250	40	0		आधुनिक कृषि यंत्र	0	0	0		–	नहीं
20	चक्की	चक्की	समशीतोष्ण		नलकुप		नलकुप	260	1000	160	4		आधुनिक कृषि यंत्र	0	0	0		–	नहीं
21	लिलाधरपुर	चन्दा	समशीतोष्ण		नलकुप		नलकुप	50	200	35	0		आधुनिक कृषि यंत्र	0	0	0		–	नही

जिला कृषि पदाधिकारी,
बक्सर

D:\Vikash Singh 2022-23\other\July

Annex 4

List of species (flora & fauna)

List of macrophytes

SL	Common name	Scientific Name	Family	IUCN Conservation Status (version 15.1)
Gokul Jalashay				
1	Water Hyacinth	*Eichhornia crassipes*	Pontederiaceae	LC
2	Brownbeard rice	*Oryza rufipogon*	Poaceae	LC
3	Chhoti Jalkumbhee	*Pistia stratiotes*	Araceae	LC
4	Alligator weed	*Alternanthera philaxeroides*	Acanthaceae	LC
5	Hydrilla	*Hydrilla verticillata*	Hydrocharitaceae	LC
6	Arrow head	*Sagittaria sagtifolia*	Alismaceae	LC
7	Scirpus	*Scirpus articulatus*	Cyperaceae	LC
8	Duck weed	*Lemna minor*	Lemnaceae	LC
9	Shushni	*Marsilea minuta*	Marsileaceae	LC
10	Hornwort	*Ceratophyllum demersum L.*	Ceratophyllaceae	LC
11	Potamagetone	*Potamogeton crispus*	Potamogetonaceae	LC
12	Sago pondweed	*Potamogeton pectinatus*	Potamogetonaceae	LC
13	Aponogetone	*Aponogeton natans*	Aponogetonaceae	LC
14	Pond Silk	*Spirodela polyrhiza*	Araceae	LC
15	Pond Silk	*Spirogyra porticalis*	Zygnemataceae	LC
16	Vallesnaria /Tape weed	*Vallisnaria spiralis*	Hydrocharitaceae	LC
17	Rice flat sedge	*Cyperus iria*	Cyperaceae	LC
18	Variable flatsedge	*Cyperus deformis*	Cyperaceae	LC
19	Creeping spikerush	*Eleochais palustris*	Cyperaceae	LC
20		*Eleochais acutangula*	Cyperaceae	LC
21	Bladderwort	*Utricularia sp.*	Lentibulariaceae	LC
22	Chara	*Chara globularis*	Characeae	LC
23	Nitella	*Nitella mucronata*	Characeae	LC
24	Water spinach	*Ipomea aquatica*	Convolvulaceae	LC
25	Ban Palak	*Rumex dentatus*	Polygonaceae	LC
26	Narrowleaf cattail	*Typha angustifolia*	Typhaceae	LC
27	Broadleaf Flowering Rush	*Butomopsis latifolia*	Butomaceae	LC
28	Jangali Kachu	*Alocasia sp.*	Araceae	LC
29	Benghal dayflower	*Commelina benghalensis*	Commelinaceae	LC
30	Mosquito Fern	*Azolla pinnata*	Salviniaceae	LC

31	Celery-leaved buttercup	*Ranunculus Scleratus*	Ranunculaceae	LC
32	Water lily	*Nymphoides indica*	Menyanthaceae	LC
33	Blue lotus	*Nymphaea nouchali*	Nymphaeaceae	LC
34	Pink water lily	*Nymphaea pubescence*	Nymphaeaceae	LC
35	Nelambo	*Nelumbo nucifera*	Nelumbonaceae	LC
Sunki Suhiya				
1	Water Hyacinth	*Eichhornia crassipes*	Pontederiaceae	LC
2	Aligator weed	*Alternanthera philaxeroides*	Acanthaceae	LC
3	Hydrilla	*Hydrilla verticillata*	Hydrocharitaceae	LC
4	Arrow head	*Sagittaria sagtifolia*	Alismaceae	LC
5	Scirpus	*Scirpus articulatus*	Cyperaceae	LC
6	Duck weed	*Lemna minor*	Lemnaceae	LC
7	Shushni	*Marsilea minuta*	Marsileaceae	LC
8	Hornwort	*Ceratophyllum demersum L.*	Ceratophyllaceae	LC
9	Pond Silk	*Spirodela polyrhiza*	Araceae	LC
10	Vallesnaria /Tape weed	*Vallisnaria spiralis*	Hydrocharitaceae	LC
11	Alligator weed	*Cyperus iria*	Cyperaceae	LC
12	smallflower umbrella-sedge	*Cyperus deformis*	Cyperaceae	LC
13	Creeping spikerush	*Eleochais palustris*	Cyperaceae	LC
14	Bladderwort	*Utricularia sp.*	Lentibulariaceae	LC
15	Nitella	*Nitella mucronata*	Characeae	LC
16	Water spinach	*Ipomea aquatica*	Convolvulaceae	LC
17	Ban Palak	*Rumex dentatus*	Polygonaceae	LC
18	Bulrush Elephant grass	*Typha angustifolia*	Typhaceae	LC
19	Jangali Kachu	*Alocasia sp.*	Araceae	LC
20	Mosquito Fern	*Azolla pinnata*	Salviniaceae	LC
21	Water lily	*Nymphoides indica*	Menyanthaceae	LC
22	Blue lotus	*Nymphaea nouchali*	Nymphaeaceae	LC
23	Nelambo	*Nelumbo nucifera*	Nelumbonaceae	LC

List of invasive species (vascular plants)

SL	**Common name**	**Scientific Name**	**Family**	**Nativity**
Gokul Jalashay				
1.	Alligator weed	*Alternanthera philaxeroides*	Acantheceae	Temperate regions of tropical South America
2.	Hornwort	*Ceratophyllum demersum L.*	Ceratophyllaceae	North America

3.	Common Water Hyacinth	*Eichhornia crassipes*	Pontederiaceae	Tropical America
4.	Hydrilla	*Hydrilla verticillata*	Hydrocharitaceae	Africa and south and southeast Asia (Zhuang and Beentje, 2017)
5.	Parthenium	*Parthenium hysterophorus*	Asteraceae.	Tropical North America
Sunki Suhiya				
1.	Alligator weed	*Alternanthera philaxeroides*	Acantheceae	Temperate regions of tropical South America
2.	Hornwort	*Ceratophyllum demersum L.*	Ceratophyllaceae	North America
3.	Common Water Hyacinth	*Eichhornia crassipes*	Pontederiaceae	Tropical America
4.	Hydrilla	*Hydrilla verticillata*	Hydrocharitaceae	Africa and south and southeast Asia (Zhuang and Beentje, 2017)
5.	Parthenium	*Parthenium hysterophorus*	Asteraceae.	Tropical North America

List of Floristic Diversity

SL	**Common name**	**Scientific Name**	**Habit**	**IUCN Conservation Status(version 15.1)**
Gokul Jalashay				
1	Acalypha	*Acalypha indica*	Herb	LC
2	Punarnava	*Boerhavia diffusa*	Herb	LC
3	Kala Bhangra/ Ban tulshi	*Croton bonplandianus*	Herb	LC
4	Polygonum	*Polygonum plebeum*	Herb	LC
5	Ban kulthi	*Atylosia scarabaeoides*	Herb	LC
6	Fulki	*Gnaphalium lutea -album*	Herb	LC
7	Mahkawa	*Ageratum conyzoides*	Herb	LC
8	Kasuti/bhingraj	*Eclipta prostrata*	Herb	LC
9	Banmirchi	*Scoparia dulcis*	Herb	LC
10	Dudhkoria	*Launaea procumbens*	Herb	LC
11	Ash colored fleabane	*Vernonia cinerea*	Herb	LC
12	Shankhaphuli	*Evolvulus nummularius*	Herb	LC
13	Dub Grass	*Cynodon dactylon*	Herb	LC
14	Motha	*Cyperus rotundus*	Herb	LC
15	Motha	*Cyperus exaltatus*	Herb	LC
16	Prostrate Sandmat	*Euphorbia prostrata*	Herb	LC
17	The lakeshore bulrush	*Schoenoplctus lacustris*	Herb	LC
18	Flowering Rush	*Butomus umbelatus*	Herb	LC

19	Imperata	*Imperata cylindrica*	Herb	LC
20	Varaku or Koovaraku	*Paspalum scrobiculatum*	Herb	LC
21	Parthenium	*Parthenium hysterophorus*	Herb	LC
22	Bhang	*Cannabis sativa*	Herb	LC
23	Sessile joyweed	*Alternanthera sessilis*	Herb	LC
24	Anagallis	*Anagallis arvensis*	Herb	LC
25	Bera/Besaram	*Ipomoea carnea*	Shrub	LC
26	Chakora	*Cassia tora*	Shrub	LC
27	Anant mul	*Hemidesmus indicus*	Shrub	LC
28	Ban kundari	*Coccinia grandis*	Shrub	LC
29	Kumarika	*Smilex zeylanica*	Shrub	LC
30	Siyalkanta	*Argemone mexicana*	Shrub	LC
31	Lalbariala	*Sida rhombifolia.*	Shrub	LC
32	Bhatkantya	*Solanum surattense*	Shrub	LC
33	Kasal	*Saccharum spontaneum*	Shrub	LC
34	Sar	*Saccharum munja*	Shrub	LC
35	Johnson Grass	*Sorghum helpense*	Shrub	LC
36	Aak	*Calotropis gigantea*	Shrub	LC
37	Aak	*Calotropis procera*	Shrub	LC
38	Titbhat/Bharangi	*Clerodendrum indicum*	Shrub	LC
39	Sinwaar	*Vitex negundo*	Shrub	LC
40	Dodder Plant	*Cuscuta reflexa*	Shrub	LC
41	Ban Angoor	*Caryota trifolia*	Shrub	LC
42	Giloya/Gurich	*Tinosopora cordifolia*	Shrub	LC
43	Ban Kachho	*Colocasia esculenta*	Shrub	LC
44	Putus	*Lantana camara*	Shrub	LC
45	Lippia	*Lippia alba*	Shrub	LC
46	Bakas	*Adhtoda vasaca*	Shrub	LC
47	Urkusi	*Mucuna prurienas*	Shrub	LC
48	Chichiri	*Achyranthus aspera*	Shrub	LC
49	Dhatoora	*Datura metal*	Shrub	LC
50	Polygonum	*Polygonum babatum*	Shrub	LC
51	Khas	*Vetiveria Zizanioides*	Shrub	LC
52	Country mallow	*Abutilon indica*	Shrub	LC
53	Van Tulsi	*Anisomeles indica*	Shrub	LC
54	Honeyweed	*Leonurus sibiricus*	Shrub	LC
55	Phragmites	*Phragmites karka*	Shrub	LC
56	Aam	*Mangifera indica.*	Tree	LC
57	Sahjan	*Moringa oleifera*	Tree	LC
58	Banana	*Musa paradisiaca*	Tree	LC
59	Jamun	*Syzygium cumini*	Tree	LC
60	Bel	*Aegle marmelos*	Tree	LC

61	Amra	*Spondias pinnata*	Tree	LC
62	Ber	*Zizyphus mauritiana*	Tree	LC
63	Khajur	*Phoenix syvestris*	Tree	LC
64	Tad	*Borassus flabellifer*	Tree	LC
65	Sarifa	*Anona squamosa*	Tree	LC
66	Amla	*Embelica officinalis*	Tree	LC
67	Imli	*Tamarindus indicus*	Tree	LC
68	Gular	*Ficus glomerata*	Tree	LC
69	Pakad/pakar	*Ficus virens*	Tree	LC
70	Kathal	*Artocarpus integrifolia*	Tree	LC
71	Guava	*Psidium guajava*	Tree	LC
72	Babool	*Acacia nilotica*	Tree	LC
73	Kadam	*Anthocephalus indicus*	Tree	LC
74	Neem	*Azadirachta indica*	Tree	LC
75	Jungle Jalebi	*Pithecellobium dulce*	Tree	LC
76	Sirish	*Albiza lebbeck*	Tree	LC
77	Semul	*Bombax ciba*	Tree	LC
78	Salai /Guggul	*Boswellia serrata*	Tree	LC
79	Green semul	*Cieba pentandra*	Tree	LC
80	Palash	*Butea monosperma*	Tree	LC
81	Amaltas	*Cassia fistula*	Tree	LC
82	Shishum/ Black Shishum	*Dalbergia latifolia*	Tree	LC
83	Shishum	*Dalbergia sissoo*	Tree	LC
84	Poplar	*Poplus sp.*	Tree	LC
85	Ijjul/ Fish killer tree	*Baringtonia recemosa*	Tree	LC
86	Banyan tree/Bargad	*Ficus bengalensis*	Tree	LC
87	Peeple	*Ficus religiosa*	Tree	LC
88	Gular	*Ficus glomerata*	Tree	LC
89	Mahua	*Madhuca longifolia*	Tree	LC
90	Junjle Jalebi	*Pithecellobium dulce*	Tree	LC
91	Arjun	*Terminalia arjuna*	Tree	LC
92	Imli	*Tamarindus indicus*	Tree	LC
93	Teak	*Tectona grandis*	Tree	LC
94	Kachnar	*Bauhinia purpurea*	Tree	LC
95	Kachnar	*Bauhinia variegata*	Tree	LC
96	Chilbil	*Holoptelea integrifolia*	Tree	LC
97	Subabool	*Leucaena leucocephala*	Tree	LC
98	Australian Babool	*Acacia auriculiformis*	Tree	LC
99	Bamboo	*Bambusa tulda*	Tree	LC
100	Bamboo	*Bambusa balcoa*	Tree	LC
101	Gamhar	*Gmelina arborea*	Tree	LC
102	Eucalyptus	*Eucalyptus sp.*	Tree	LC

103	Bakin	*Melia azedarachta*	Tree	LC
104	Karanj	*Pongamia pinnata*	Tree	LC
105	Chhatban	*Alstonia scholaris*	Tree	LC
106	Ashok	*Polyanthia longifolia*	Tree	LC
107	Siura	*Streblus asper*	Tree	LC
108	Lasora	*Cordia dichotoma*	Tree	LC
Sunki Suhiya				
1	Acalypha	*Acalypha indica*	Herb	LC
2	Punarnava	*Boerhavia diffusa*	Herb	LC
3	Kala Bhangra/ Ban tulshi	*Croton bonplandianus*	Herb	LC
4	Fulki	*Gnaphalium lutea -album*	Herb	LC
5	Mahkawa	*Ageratum conyzoides*	Herb	LC
6	Kasuti/bhingraj	*Eclipta prostrata*	Herb	LC
7	Banmirchi	*Scoparia dulcis*	Herb	LC
8	Dudhkoria	*Launaea procumbens*	Herb	LC
9	Ash colored fleabane	*Vernonia cinerea*	Herb	LC
10	Shankhaphuli	*Evolvulus nummularius*	Herb	LC
11	Dub Grass	*Cynodon dactylon*	Herb	LC
12	Motha	*Cyperus rotundus*	Herb	LC
13	Motha	*Cyperus exaltatus*	Herb	LC
14	Prostrate sand mat	*Euphorbia prostrata*	Herb	LC
15	Imperata	*Imperata cylindrica*	Herb	LC
16	Kodo millet	*Paspalum scrobiculatum*	Herb	LC
17	Parthenium	*Parthenium hysterophorus*	Herb	LC
18	Bhang	*Cannabis sativa*	Herb	LC
19	Stalkless Joyweed	*Alternanthera sessilis*	Herb	LC
20	Bera/Besaram	*Ipomoea carnea*	Shrub	LC
21	Chakora	*Cassia tora*	Shrub	LC
22	Ban kundari	*Coccinia grandis*	Shrub	LC
23	Siyalkanta	*Argemone mexicana*	Shrub	LC
24	Lalbariala	*Sida rhombifolia.*	Shrub	LC
25	Bhatkantya	*Solanum surattense*	Shrub	LC
26	Kasal	*Saccharum spontaneum*	Shrub	LC
27	Aak	*Calotropis gigantea*	Shrub	LC
28	Titbhat/Bharangi	*Clerodendrum indicum*	Shrub	LC
29	Ban Kachho	*Colocasia esculenta*	Shrub	LC
30	Putus	*Lantana camara*	Shrub	LC
31	Lippia	*Lippia alba*	Shrub	LC
32	Chichiri	*Achyranthus aspera*	Shrub	LC
33	Dhatoora	*Datura metal*	Shrub	LC
34	Polygonum	*Polygonum babatum*	Shrub	LC
35	Khas	*Vetiveria Zizanioides*	Shrub	LC

36	Phragmites	*Phragmites karka*	Shrub	LC
37	Babool	*Acacia nilotica*	Tree	LC
38	Amaltas	*Cassia fistula*	Tree	LC
39	Shishum	*Dalbergia sissoo*	Tree	LC
40	Ijjul/ Fish killer tree	*Baringtonia recemosa*	Tree	LC
41	Banyan tree/Bargad	*Ficus bengalensis*	Tree	LC
42	Peeple	*Ficus religiosa*	Tree	LC
43	Gular	*Ficus glomerata*	Tree	LC
44	Salai guggul	*Boswellia serrata*	Tree	LC
45	Junjle Jalebi	*Pithecellobium dulce*	Tree	LC
46	Subabool	*Leucaena leucocephala*	Tree	LC
47	Bamboo	*Bambusa tulda*	Tree	LC
48	Bamboo	*Bambusa balcoa*	Tree	LC
49	Gamhar	*Gmelina arborea*	Tree	LC
50	Bakin	*Melia azedarachta*	Tree	LC
51	Karanj	*Pongamia pinnata*	Tree	LC
52	Chhatban	*Alstonia scholaris*	Tree	LC
53	Aam	*Mangifera indica.*	Tree	LC
54	Papaya	*Carica papaya*	Tree	LC
55	Banana	*Musa paradisiaca*	Tree	LC
56	Jamun	*Syzygium cumini*	Tree	LC
57	Ber	*Zizyphus mauritiana*	Tree	LC
58	Amla	*Embelica officinalis*	Tree	LC
59	Gular	*Ficus glomerata*	Tree	LC
60	Pakad/pakar	*Ficus virens*	Tree	LC
61	Guava	*Psidium guajava*	Tree	LC

List of Agro-flora (Cultivation crop)

SL	**Common name**	**Scientific Name**	**Family**	**IUCN Conservation Status (version 15.1)**
Gokul Jalashay				
1	Paddy	*Oryza sativa*	Poaceae	LC
2	Maize	*Zea mays*	Poaceae	LC
3	Wheat	*Triticum aestivum*	Poaceae	LC
4	Barley	*Hordeum vulgare*	Poaceae	LC
5	Pearl millet	*Pennisetum glaucum*	Poaceae	LC
6	Indian Millet,	*Sorghum bicolor*	Panicoideae	LC
7	Arhar	*Cajanus cajan*	Fabaceae	LC
8	Gram/chana	*Cicer arietinum*	Fabaceae	LC
9	Masoor	*Lens culinaris*	Fabaceae	LC
10	Mung	*Phaseolus aureus*	Fabaceae	LC
11	Khesari	*Lathyrus sativus*	Fabaceae	LC
12	Kalai	*Phaseolus mungo*	Fabaceae	LC

13	Mustard	*Brassica camprestris*	Brassicaceae	LC
14	Castor	*Ricinus communis*	Euphorbiaceae	LC
15	Sunflower	*Helianthus annus*	Asteraceae	LC
16	Til	*Sesamum orientale*	Pedaliaceae	LC
17	Tisi	*Linum usitatissimum*	Linaceae	LC
18	Chilly	*Capsicum annum*	Solanaceae	LC
19	Adrak	*Zingiber officinale*	Zingiberaceae	LC
20	Onion	*Allium cepa*	Liliaceae	LC
21	Garlic	*Alium sativum*	Liliaceae	LC
22	Turmeric	*Curcuma longa*	Zingiberaceae	LC
23	Coriander	*Coriandrum sativum*	Umbelliferae	LC
24	Fennel	*Foeniculum vulgare*	Umbelliferae	LC
25	Potato	*Solanum tuberosum*	Solanaceae	LC
26	Brinjal	*Solanum melongena*	Solanaceae	LC
27	Tomato	*Lycopersicum esculentum*	Solanaceae	LC
28	Cauliflower	*Brassica oleracea var. botrytis*	Brassicaceae	LC
29	Cabbage	*Brassica oleracea*	Brassicaceae	LC
30	Pumpkin	*Cucurbita pepo*	Cucurbitaceae	LC
31	Kadima	*Legenaria sineraria*	Cucurbitaceae	LC
32	Papaya	*Carica papaya*	Caricaceae	LC
33	Lady's finger	*Abelmoschus esculentus*	Malvaceae	LC
34	Radish	*Raphanus satius*	Brassicaceae	LC
35	Parol	*Luffa cylindrica*	Cucurbitaceae	LC
36	Pointed Gourd	*Trichosanthes dioica*	Cucurbitaceae	LC
37	Jhinga	*Luffa acutangula*	Cucurbitaceae	LC
38	Kundri	*Coccinia grandis*	Cucurbitaceae	LC
39	Kohara	*Cucurbita maxima*	Cucurbitaceae	LC
40	Karela	*Mimordica charantia*	Cucurbitaceae	LC
41	Seem	*Lablab purpurius*	Fabaceae	LC
42	Bean	*Phaseolus vulgaris*	Fabaceae	LC
43	Guar Gum	*Cyamopsis tetragonoloba*	Fabaceae	LC
Sunki Suhiya				
1	Paddy	*Oryza sativa*	Poaceae	LC
2	Maize	*Zea mays*	Poaceae	LC
3	Wheat	*Triticum aestivum*	Poaceae	LC
4	Barley	*Hordeum vulgare*	Poaceae	LC
5	Arhar	*Cajanus cajan*	Fabaceae	LC
6	Gram/chana	*Cicer arietinum*	Fabaceae	LC
7	Masoor	*Lens culinaris*	Fabaceae	LC

8	Mung	*Phaseolus aureus*	Fabaceae	LC
9	Khesari	*Lathyrus sativus*	Fabaceae	LC
10	Kalai	*Phaseolus mungo*	Fabaceae	LC
11	Mustard	*Brassica camprestris*	Brassicaceae	LC
12	Castor	*Ricinus communis*	Euphorbiaceae	LC
13	Sunflower	*Helianthus annus*	Asteraceae	LC
14	Til	*Sesamum orientale*	Pedaliaceae	LC
15	Tisi	*Linum usitatissimum*	Linaceae	LC
16	Chilly	*Capsicum annum*	Solanaceae	LC
17	Adrak	*Zingiber officinale*	Zingiberaceae	LC
18	Onion	*Allium cepa*	Liliaceae	LC
19	Garlic	*Alium sativum*	Liliaceae	LC
20	Coriander	*Coriandrum sativum*	Umbelliferae	LC
21	Fennel	*Foeniculum vulgare*	Umbelliferae	LC
22	Potato	*Solanum tuberosum*	Solanaceae	LC
23	Brinjal	*Solanum melongena*	Solanaceae	LC
24	Tomato	*Lycopersicum esculentum*	Solanaceae	LC
25	Cauliflower	*Brassica oleracea var. botrytis*	Brassicaceae	LC
26	Cabbage	*Brassica oleracea*	Brassicaceae	LC
27	Pumpkin	*Cucurbita pepo*	Cucurbitaceae	LC
28	Kadima	*Legenaria sineraria*	Cucurbitaceae	LC
29	Sahjan	*Moringa oleifera*	Moringaceae	LC
30	Lady’s finger	*Abelmoschus esculentus*	Malvaceae	LC
31	Radish	*Raphanus satius*	Brassicaceae	LC
32	Parol	*Luffa cylindrica*	Cucurbitaceae	LC
33	Pointed Gourd	*Trichosanthes dioica*	Cucurbitaceae	LC
34	Jhinga	*Luffa acutangula*	Cucurbitaceae	LC
35	Kundri	*Coccinia grandis*	Cucurbitaceae	LC
36	Kohara	*Cucurbita maxima*	Cucurbitaceae	LC
37	Karela	*Mimordica charantia*	Cucurbitaceae	LC
38	Seem	*Lablab purpurius*	Fabaceae	LC
39	Bean	*Phaseolus vulgaris*	Fabaceae	LC

List of Fish Species

SL	**Common name**	**Scientific Name**	**IUCN Conservation Status (version 15.1)**	**Remark**
Gokul Jalashay				
1	Catla	*Catla catla*	LC	Edible

2	Rehu	*Labeo rohita*	LC	Edible
3	Kursa	*Labeo gonius*	LC	Edible
4	Arangi	*Labeo dero*	LC	Edible
5	Pothia	*Puntius tico*	LC	Edible/ornamental
6	Sindhari	*Puntius conchonius*	LC	Edible/ornamental
7	Pothia	*Puntius sophore*	LC	Edible/ornamental
8	Dharhee	*Puntius sarana*	LC	Edible/ornamental
9	Sindhari	*Puntius phutunio*	LC	Edible/ornamental
10	Naini	*Cirrhinus mrigala*	LC	Edible
11	Reba	*Cirrhinus reba*	LC	Edible
12	Chalhawa	*Oxygaster bacaila*	LC	Edible
13	Chilwa	*Aspidoparia morar*	LC	Edible
14	Chelhwa	*Laubuca laubuca*	LC	Edible
15	Dendua	*Esomus danricus*	LC	Edible
16	Nakati	*Lapidocephalus guntia*	LC	Edible
17	Baghua	*Botia dario*	LC	Edible/ornamental
18	Tengra	*Mystus tengara*	LC	Edible/ornamental
19	Tengra	*Mystus cavasius*	LC	Edible/ornamental
20	Daryai tengra	*Sperata aor*	LC	Edible
21	Tengra	*Sperata seenghala*	LC	Edible
22	Tengra	*Mystus vittatus*	LC	Edible/ornamental
23	Jalcapoor	*Ompok bimaculam*	LC	Edible/ornamental
24	Barari	*Wallago attu*	LC	Edible
25	Bachwa	*Eutropichthys vacha*	LC	Edible
26	Patasi	*Ailia coilia*	DD	Edible
27	maguri	*Clarias batrachus*	LC	Edible/medicinal/Ornamental
28	Singhi	*Heteropneustes fossilis*	LC	Edible/medicinal
29	Dhebari	*Nandus nandus*	LC	Edible/ornamental
30	Sumla	*Badis badis*	LC	Edible/ornamental
31	Chamwa	*Ambassis nama*	LC	Edible/ornamental

32	Chanari	*Ambassis ranga*	LC	Edible/ornamental
33	cheli	*Colisa fasciatus*	DD	Edible/ornamental
34	Kabai	*Anabas testudineus*	LC	Edible/Medicinal
35	Saur	*Channa marulius*	LC	Edible/ornamental
36	Chenga	*Channa orientalis*	LC	Edible/ornamental
37	Sauri	*Channa striatus*	LC	Edible/ornamental
38	Garai	*Channa punctatus*	LC	Edible/ornamental
39	Bami	*Mastacembelus armatus*	LC	Edible/ornamental
40	Gonchi	*Macrognathus aral*	LC	Edible/ornamental
41	moh	*Notopterus notopterus*	LC	Edible/ornamental
42	Chapri	*Gadusia chapra*	LC	Edible/ornamental
43	Phasa	*Setipinna phasa*	LC	Edible
44	Gaphulmi	*Tetrsdon cutcutia*	DD	Edible/ornamental
Sunki Suhiya				
1	Boari	*Wallago attu*	LC	Edible
2	Tengra	*Tengara mystus*	LC	Edible/ornamental
3	Telapia	*Telapia Sp.*	LC	Edible
4	Pothia	*Puntius spp.*	LC	Edible/ornamental
5	Rohu	*Labeo rohita*	LC	Edible
6	Sauri	*Cololabis adocetus*	LC	Edible
7	Naini	*Cirrhinus mrigala*	LC	Edible
8	Katla / Farha	*Catla catla*	LC	Edible
9	Kawai	*Anabas testudinus*	LC	Edible
10	Dhawai	*Amblypharyngodon mierolepis*	LC	Edible
11	Suiya	*Gonialosa manmina*	LC	Edible
12	Barari	*Wallago attu*	LC	Edible
13	Sawai		LC	Edible
14	Palwa		LC	Edible
15	Jhinga	*Macrobrachium rosenbergii*	LC	Edible

List of Bird Species

SL	Common name	Scientific Name	Family	IUCN Conservation Status(version 15.1)
Gokul Jalashay				
1	Red-wattled Lapwing	*Vanellus indicus*	Charadriidae	LC
2	Little Egret	*Egretta garzetta*	Ardeidae	LC
3	Red-naped Ibis	*Pseudibis papillosa*	Threskiornithidae	LC
4	House Crow	*Corvus splendens*	Corvidae	LC
5	Bank Myna	*Acridotheres ginginianus*	Sturnidae	LC
6	Asian Openbill	*Anastomus oscitans*	Ciconiidae	LC
7	White-throated Kingfisher	*Halcyon smyrnensis*	Alcedinidae	LC
8	Lesser whistling Duck	*Dendrocygna javanica*	Anatidae	LC
9	Indian Pond Heron	*Ardeola grayii*	Ardeidae	LC
10	Intermediate Egret	*Ardea intermedia*	Ardeidae	LC
11	Indian Grey Hornbill	*Ocyceros birostris*	Bucerotidae	LC
12	Plain Prinia	*Prinia inornata*	Cisticolidae	LC
13	Common Pigeon	*Columba livia*	Columbidae	LC
14	Spotted Dove	*Spilopelia chinensis*	Columbidae	LC
15	Large-billed Crow	*Corvus macrorhynchos*	Corvidae	LC
16	Greater Coucal	*Centropus sinensis*	Cuculidae	LC
17	Black Drongo	*Dicrurus macrocercus*	Dicruridae	LC
18	Bronze-winged Jacana	*Metopidius indicus*	Jacanidae	LC
19	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	Jacanidae	LC
20	Oriental Magpie Robin	*Copsychus saularis*	Muscicapidae	LC
21	Purple Sunbird	*Nectarinia asiatica*	Nectariniidae	LC
22	Eurasian Golden Oriole	*Oriolus oriolus*	Oriolidae	LC
23	Little Cormorant	*Microcarbo niger / Phalacrocorax niger*	Phalacrocoracidae	LC
24	Grey Francolin	*Francolinus pondicerianus*	Phasianidae	LC
25	Little Grebe	*Tachybaptus ruficollis*	Podicipedidae	LC
26	Red-vented Bulbul	*Pycnonotus cafer*	Pycnonotidae	LC
27	White-breasted Waterhen	*Amaurornis phoenicurus*	Rallidae	LC
28	Common Moorhen	*Gallinula chloropus*	Rallidae	LC
29	Asian Pied Starling	*Sturnus contra*	Sturnidae	LC

30	Common Myna	*Acridotheres tristis*	Sturnidae	LC
31	Black-headed Ibis	*Threskiornis melanocephalus*	Threskiornithidae	NT
32	Jungle Babbler	*Turdoides striata*	Timaliidae	LC
33	Pied Kingfisher	*Ceryle rudis*	Alcedinidae	LC
34	Common Kingfisher	*Alcedo atthis*	Alcedinidae	LC
35	Cotton Pigmy-goose	*Nettapus coromandelianus*	Anatidae	LC
36	Black crowned Night Heron	*Nycticorax nycticoras*	Ardeidae	LC
37	Cattle Egret	*Bubulcus ibis*	Ardeidae	LC
38	Jungle Prinia	*Prinia sylvatica*	Cisticolidae	LC
39	Eurasian Collared Dove	*Streptopelia decaocto*	Columbidae	LC
40	Grey-headed Swamphen	*Porphyrio poliocephalus*	Rallidae	LC
41	Striated Babbler	*Argya earlei*	Timaliidae	LC
42	Black hooded Oriole	*Oriolus xanthornus*	Oriolidae	LC
43	Asian Palm Swift	*Cypsiurus balasiensis*	Apodidae	LC
44	Green Bee-eater	*Merops orientalis*	Meropidae	LC
45	Blue tailed Bee-eater	*Merops philippinus*	Meropidae	LC
46	Common Tailorbird	*Orthotomus sutorius*	Sylviidae	LC
47	Asian Koel	*Eudynamys scolopaceus*	Cuculidae	LC
48	Jacobin Cuckoo	*Clamator jacobinus*	Cuculidae	LC
49	Common Hawk Cuckoo	*Hierococcyx varius*	Cuculidae	LC
50	Black shouldered Kite	*Elanus caeruleus*	Accipitridae	LC
51	Shikra	*Accipiter badius*	Accipitridae	LC
52	Chestnut shouldered Petronia	*Gymnoris xanthocollis*	Passeridae	LC
53	Indian Silverbill	*Euodice malabarica / Lonchura malabarica*	Estrildidae	LC
54	Baya Weaver	*Ploceus philippinus*	Ploceidae	LC
55	Barn Owl	*Tyto alba*	Strigidae	LC
56	Sand Lark	*Calandrella raytal*	Alaudidae	LC
57	Ashy-crowned Sparrow Lark	*Eremopterix griseus*	Alaudidae	LC
58	Paddyfield Pipit	*Anthus rufulus*	Motacillidae	LC
59	Indian Peafowl	*Pavo cristatus*	Phasianidae	LC
Sunki Suhiya				
1	White-throated Kingfisher	*Halcyon smyrnensis*	Alcedinidae	LC
2	Cotton Pigmy-Goose	*Nettapus coromandelianus*	Anatidae	LC

3	Cattle Egret	*Bubulcus ibis*	Ardeidae	LC
4	Indian Pond Heron	*Ardeola grayii*	Ardeidae	LC
5	Intermediate Egret	*Ardea intermedia*	Ardeidae	LC
6	Yellow Bittern	*Ixobrychus sinensis*	Ardeidae	LC
7	Little Egret	*Egretta garzetta*	Ardeidae	LC
8	Red-wattled Lapwing	*Vanellus indicus*	Charadriidae	LC
9	Asian Openbill	*Anastomus oscitans*	Ciconiidae	LC
10	Ziting Cisticola	*Cisticola juncidis*	Cisticolidae	LC
11	Eurasian Collared Dove	*Streptopelia decaocto*	Columbidae	LC
12	Common Pigeon	*Columba livia*	Columbidae	LC
13	House Crow	*Corvus splendens*	Corvidae	LC
14	Plain Martin	*Riparia paludicola*	Hirundinidae	LC
15	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	Jacanidae	LC
16	Green Bee-eater	*Merops orientalis*	Meropidae	LC
17	Blue tailed Bee-eater	*Merops philippinus*	Meropidae	LC
18	Paddy Field Pipit	*Anthus rufulus*	Motacillidae	LC
19	Little Cormorant	*Microcarbo niger / Phalacrocorax niger*	Phalacrocoracidae	LC
20	Grey Francolin	*Francolinus pondicerianus*	Phasianidae	LC
21	Little Grebe	*Tachybaptus ruficollis*	Podicipedidae	LC
22	Common Moorhen	*Gallinula chloropus*	Rallidae	LC
23	Grey-headed Swamphen	*Porphyrio poliocephalus*	Rallidae	LC
24	Black-winged Stilt	*Himantopus himantopus*	Recurvirostridae	LC
25	Common Myna	*Acridotheres tristis*	Sturnidae	LC
26	Bank Myna	*Acridotheres ginginianus*	Sturnidae	LC
27	Red-naped Ibis	*Pseudibis papillosa*	Threskiornithidae	LC

List of Mammals

SL	**Common name**	**Scientific Name**	**IUCN Conservation Status(version 15.1)**
Gokul Jalashay			
1	Black Buck	*Antilope cervicapra*	LC
2	Blue Bull	*Boselaphus tragocamelus*	LC
3	Golden Jackal	*Canis aureus*	LC
4	Indian Grey Mongoose	*Urva edwardsii*	LC
5	Common Gray Langoor	*Semnopithecus (Presbytis) entellus*	LC

6	Rhesus Macaque	*Macaca mulatta*	LC
7	Indian Palm Squirrel	*Funambulus palmarum*	LC
8	Indian or Black naped Hare	*Lepus nigricollis*	LC
9	Wild Boar	*Sus scrofa*	LC
10	Jungle Cat	*Felis chaus*	LC
11	Indian Crested Porcupine	*Hystrix indica*	LC
12	Asian Palm Civet	*Paradoxurus hermaphroditus*	LC
13	Smooth Coated Otter	*Lutrogale perspicillata*	VU
14	Ganges River Dolphin	*Platanista gangetica*	EN
Sunki Suhiya			
1	Black Buck	*Antilope cervicapra*	LC
2	Blue Bull	*Boselaphus tragocamelus*	LC
3	Indian Grey Mongoose	*Urva edwardsii*	LC
4	Common Gray Langoor	*Semnopithecus (Presbytis) entellus*	LC
5	Rhesus Macaque	*Macaca mulatta*	LC
6	Indian Palm Squirrel	*Funambulus palmarum*	LC
7	Indian or Black naped Hare	*Lepus nigricollis*	LC
8	Wild Boar	*Sus scrofa*	LC
9	Jungle Cat	*Felis chaus*	LC
10	Indian or Black naped Hare	*Lepus nigricollis*	LC
11	Indian Crested Porcupine	*Hystrix indica*	LC
12	Asian Palm Civet	*Paradoxurus hermaphroditus*	LC

List of Reptiles

SL	**Common name**	**Scientific Name**	**IUCN Conservation Status(version 15.1)**
Gokul Jalashay			
1	Indian Garden Lizard	*Calotes versicolor*	LC
2	Bengal or Common Indian Monitor Lizard	*Varanus bengalensis*	NT
3	Mugger Crocodile	*Crocodylus palustris*	VU
4	Gharial	*Gavialis gangeticus*	CR
	Snakes		
5	Cobra / Spectacled Cobra	*Naja naja*	LC
6	Monocled Cobra	*Naja kaouthia*	LC
7	Common Krait	*Bangarus caeruleus*	NE
8	Rat Snake /Dhamin	*Ptyas mucosus*	LC
9	Sand Boa / Thuthu	*Gongylophis conicus*	NT
10	Red Sand Boa	*Eryx johnii*	NT
11	Indian Python	*Python molurus*	NT
12	Wolf Snake	*Lycodon aulicus*	LC
13	Banded Kukri	*Oligodon arnensis*	VU

14	Trinket Snake	*Coelognathus helenae*	LC
15	Worm snake	*Indotyphlops braminus*	LC
16	Banded Racer	*Platyceps plinii*	LC
17	Chekkered Keelback	*Xenochrophis (Folwea) piscator*	LC
18	Buff Stripped Keelback	*Amphiesma stolatum*	LC
Sunki Suhiya			
1	Indian Garden Lizard	*Calotes versicolor*	LC
2	Bengal or Common Indian Monitor Lizard	*Varanus bengalensis*	NT
3	Mugger Crocodile	*Crocodylus palustris*	VU
4	Gharial	*Gavialis gangeticus*	CR
	Snakes		
5	Cobra / Spectacled Cobra	*Naja naja*	LC
6	Monocled Cobra	*Naja kaouthia*	LC
7	Chekkered Keelback	*Xenochrophis (Folwea) piscator*	LC
8	Common Krait	*Bangarus caeruleus*	NE

List of Amphibian

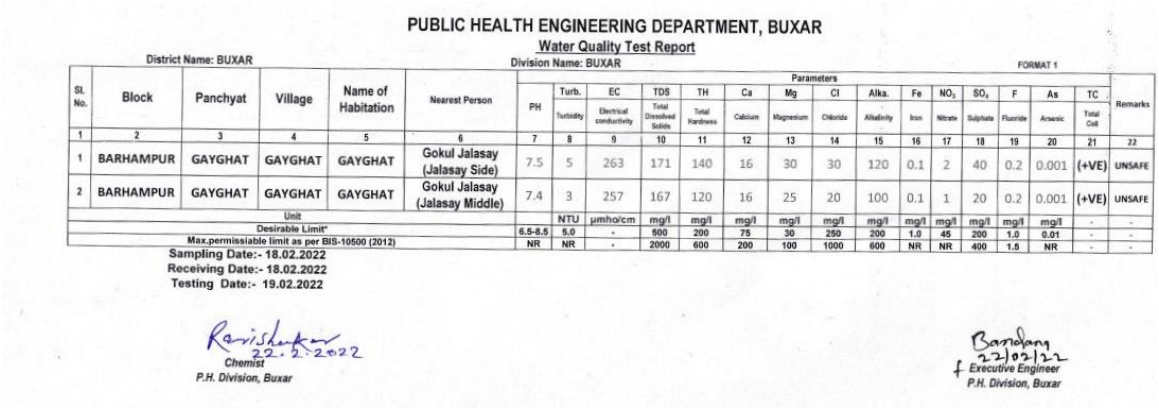
SL	**Common name**	**Scientific Name**	**IUCN Conservation Status(version 15.1)**
Gokul Jalashay			
1	Common Indian frog	*Duttaphrynus melanostictus*	LC
Sunki Suhiya			
1	Common Indian frog	*Duttaphrynus melanostictus*	LC

List of Arthropod

SL	**Common name**	**Scientific Name**	**IUCN Conservation Status(version 15.1)**
Gokul Jalashay			
1	Crab	*Decapod crustaceans*	NE
2	Indian Black Scorpion	*Deccanometrus bengalensis*	NE
3	Indian Red Scorpion	*Hottentotta tamulus*	NE
Sunki Suhiya			
1	Crab	*Decapod crustaceans*	NE
2	Indian Black Scorpion	*Deccanometrus bengalensis*	NE
3	Indian Red Scorpion	*Hottentotta tamulus*	NE

Annex 5

Water quality testing report of Gokul Jalashay



PUBLIC HEALTH ENGINEERING DEPARTMENT, BUXAR

Water Quality Test Report

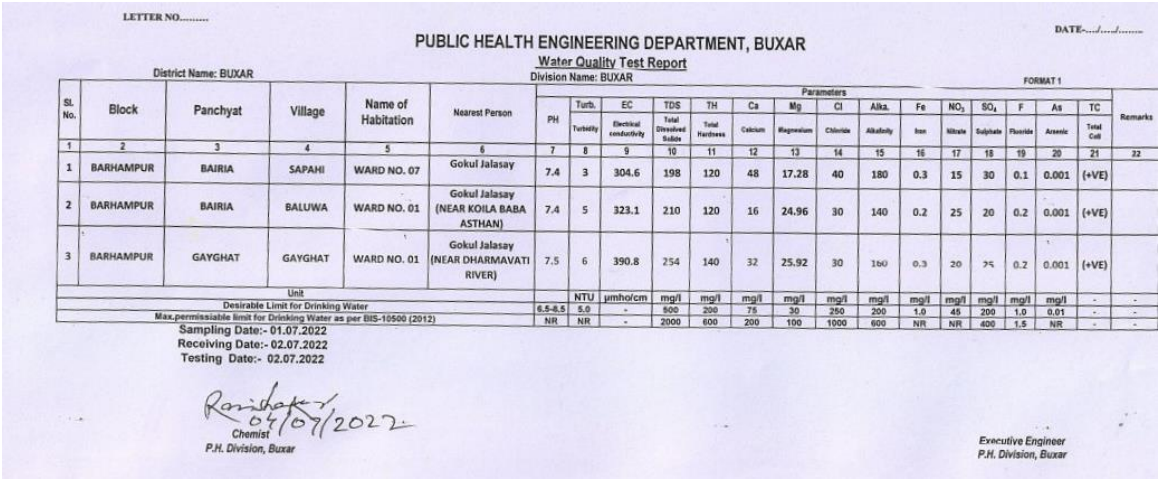
District Name: BUXAR — Division Name: BUXAR — FORMAT 1

Sl. No.	Block	Panchyat	Village	Name of Habitation	Nearest Person	Parameters															Remarks
						PH	Turb. (Turbidity)	EC (Electrical conductivity)	TDS (Total Dissolved Solids)	TH (Total Hardness)	Ca (Calcium)	Mg (Magnesium)	Cl (Chloride)	Alka. (Alkalinity)	Fe (Iron)	NO_3 (Nitrate)	SO_4 (Sulphate)	F (Fluoride)	As (Arsenic)	TC (Total Coli)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	BARHAMPUR	GAYGHAT	GAYGHAT	GAYGHAT	Gokul Jalasay (Jalasay Side)	7.5	5	263	171	140	16	30	30	120	0.1	2	40	0.2	0.001	(+VE)	UNSAFE
2	BARHAMPUR	GAYGHAT	GAYGHAT	GAYGHAT	Gokul Jalasay (Jalasay Middle)	7.4	3	257	167	120	16	25	20	100	0.1	1	20	0.2	0.001	(+VE)	UNSAFE
Unit							NTU	µmho/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	-	-
Desirable Limit*						6.5-8.5	5.0	-	500	200	75	30	250	200	1.0	45	200	1.0	0.01	-	-
Max.permissiable limit as per BIS-10500 (2012)						NR	NR	-	2000	600	200	100	1000	600	NR	NR	400	1.5	NR	-	-

Sampling Date:- 18.02.2022
Receiving Date:- 18.02.2022
Testing Date:- 19.02.2022

22.2.2022
Chemist
P.H. Division, Buxar

22/02/22
Executive Engineer
P.H. Division, Buxar



LETTER NO.....

DATE...../...../.....

PUBLIC HEALTH ENGINEERING DEPARTMENT, BUXAR

Water Quality Test Report

District Name: BUXAR — Division Name: BUXAR — FORMAT 1

Sl. No.	Block	Panchyat	Village	Name of Habitation	Nearest Person	Parameters															Remarks
						PH	Turb. (Turbidity)	EC (Electrical conductivity)	TDS (Total Dissolved Solids)	TH (Total Hardness)	Ca (Calcium)	Mg (Magnesium)	Cl (Chloride)	Alka. (Alkalinity)	Fe (Iron)	NO_3 (Nitrate)	SO_4 (Sulphate)	F (Fluoride)	As (Arsenic)	TC (Total Coli)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	BARHAMPUR	BAIRIA	SAPAHI	WARD NO. 07	Gokul Jalasay	7.4	3	304.6	198	120	48	17.28	40	180	0.3	15	30	0.1	0.001	(+VE)	
2	BARHAMPUR	BAIRIA	BALUWA	WARD NO. 01	Gokul Jalasay (NEAR KOILA BABA ASTHAN)	7.4	5	323.1	210	120	16	24.96	30	140	0.2	25	20	0.2	0.001	(+VE)	
3	BARHAMPUR	GAYGHAT	GAYGHAT	WARD NO. 01	Gokul Jalasay (NEAR DHARMAVATI RIVER)	7.5	6	390.8	254	140	32	25.92	30	160	0.3	20	25	0.2	0.001	(+VE)	
Unit							NTU	µmho/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	-	-
Desirable Limit for Drinking Water						6.5-8.5	5.0	-	500	200	75	30	250	200	1.0	45	200	1.0	0.01	-	-
Max.permissiable limit for Drinking Water as per BIS-10500 (2012)						NR	NR	-	2000	600	200	100	1000	600	NR	NR	400	1.5	NR	-	-

Sampling Date:- 01.07.2022
Receiving Date:- 02.07.2022
Testing Date:- 02.07.2022

04/07/2022
Chemist
P.H. Division, Buxar

Executive Engineer
P.H. Division, Buxar

Stay in touch

Wetlands International South Asia
Module No.003, Ground Floor
NSIC Buisness Park, Okhla Industrial Estate
New Delhi – 110020, INDIA
http://south-asia.wetlands.org

Environment, Forest and Climate Change Department, Government of Bihar
Van Vibhag Rd, Nehru Nagar, Patliputra Colony, Patna, Bihar 800013
https://state.bihar.gov.in/forest/