**Integrated Management Plan**

**Sarsai Nawar Wetland**

**Introduction**

The Sarsai Nawar wetland is located along 26˚57’54.64’’ North latitude and 79˚14’52.40” East longitude, in Sarsai Nawar village of Takha tehsil in Etawah district of the state of Uttar Pradesh. The wetland comprises of a system of small pool-marshes and is famous for being roosting area of largest flock of Indian Sarus Crane in the region. More than 250 species of resident and migratory birds; several species of reptiles including Flap-shell Turtle *Lissemys punctata* and water snake; Invertebrates such as molluscs (*Pila globose; Limex sp.)* and butterflies like *Graphium Sarpedon* and *Princep sp.* and 46 species of fish are reported from here. The wetland also supports a good population of Blue bull. The region is considered as *usar* land which is characterized by saline- alkaline or sodic soils that affect the growth of plants and hence the vegetation is sparse. 246 plant species have been recorded from here.

**Threats**

1. **Change in land use pattern**

Intensive cultivation of water chestnut, unabated water abstraction to neighboring crop fields and irrigation and agricultural expansion in the close proximity of the wetland renders it dry for 3-4 months resulting in the deterioration of the habitat.

1. **Water pollution**

The chemical inputs used in farming have affected the water quality of the wetland, an increase in nutrient and phosphate concentrations have been reported. Solid waste is also dumped that further adds to the pollution load in the wetland.

1. **Spread of water hyacinth**

The spread of exotic species like water hyacinth (*Eichhornia crassipes)* in the wetland has led to the non-availability of open water areas, and hence very little area remains available to wintering water birds.

**Management objectives**

The management of a wetland are based on an integrated understanding of its hydrological, biological, geomorphological and social processes involved. This also involves a combination of interventions which increase the ecosystem resilience, particularly the ability to adapt to human-induced adverse changes to wetland ecological character**.**

The integrated management of Sarsai Nawar wetland requires interventions in five major thematic areas, namely a) institutional development; b) water management; c) biodiversity conservation; d) sustainable fisheries; and, e) sustainable livelihoods. Specific objectives intended to be achieved within each of these components are as under:

**Component 1:** Institutional development

* An effective arrangement for cross-sectoral coordination and multi-stakeholder engagement in wetland management established and operationalized.
* Capacity of concerned state government departments and agencies, civil society organizations and local communities for integrated wetland management enhanced.
* Existing regulatory frameworks implemented for the improvement of wetland ecosystem health.
* Systematic wetland inventory, assessment and monitoring system established to support decision making and management.
* Involvement of local communities in the management of Sarsai Nawar wetland is encouraged through planned strategies and actions.
* Systematic wetland inventory, assessment and monitoring system established to support decision making and management.

**Component 2:** Catchment conservation

* Pollution from anthropogenic sources within the catchment of wetland to be restricted through enforcement of existing regulations and use of improved waste management technologies.
* Water and sediment requirements for maintaining the ecological integrity of Sarsai Nawar wetland is assessed and integrated within river basin scale water allocation planning.

**Component 3:** Biodiversity conservation

* Habitat conditions for resident and migratory water birds are improved.
* Pathways for migratory fish species are maintained.
* Habitat for Sarus Crane is improved.

**Component 4:** Fisheries management

* Policy for responsible fisheries implemented.
* Fish and other biomass harvest regulated within sustainable yield levels.
* Fisher Cooperatives strengthened for the improved well-being of fishers and enhanced role in wetland management.
* Fisheries infrastructure improved for enhanced access to safe catch storage, handling and marketing facilities.

**Component 5:** Sustainable livelihoods

* Pressure on wetland resources reduced and communities incentivized for resource stewardship through alternate livelihoods.
* Responsible nature tourism developed around Sarsai Nawar wetland.
* Risk of pathogenic contamination reduced through improved access of communities to water, sanitation and hygiene infrastructure.

**Expected benefits**

Following are the expected benefits from the implementation of themanagement plan:

* Maintenance of habitat diversity enabling sustenance of biodiversity of Sarsai Nawar wetland.
* Enhanced aesthetics of the wetland, leading to sustained income from nature-based tourism benefitting 1,100 households employed in the sector.
* Maintenance of freshwater fish species catch within a proportion of 20%.
* Reduced pollution load from Etawah City.

**Institutional arrangements**

Sarsai Nawar wetland management unit constituted within the Uttar Pradesh State Wetlands Authority (UPSWA) will be responsible for coordinating and implementation of activities. UPSWA will liaise with the Department of Science Technology & Environment, Tourism, Fisheries, Forest & Environment, Pollution Control Board, Biodiversity board, Etawah Municipal Corporation and the local district administration for implementation of the management action plan. Wetlands International South Asia will provide technical and capacity development support.

**Management, Components and Activities**

**Component 1:** Institutions and Governance

1. Establishment of Sarsai Nawar management unit to coordinate management plan implementation

Sarsai Nawar management unit will be established as a dedicated unit within the Uttar Pradesh State Wetland Authority (UPSWA) for facilitating coordination and implementation of the management plan with various line departments of the state, research organizations and civil society.

1. Wetland boundary delineation

The regulation zone boundary will be adopted as the wetland boundary for implementation of provisions of wetlands (Conservation and Management) Rules, 2017 and other central and state regulatory frameworks.

1. Wetland inventory, assessment and monitoring system

An integrated wetland inventory, assessment and monitoring system will be set up to address the overall data requirements needed for wetland management and to provide a robust decision support system. Systematic monitoring of wetlands will be undertaken, the information will be managed as a database system set up in a GIS environment. An Ecosystem Health Report card summarizing information on key indicators is envisaged to be published every two years as a means of communicating wetland monitoring information to decision-makers and stakeholders.

1. Capacity development

Training workshops for wetland managers from the state forest department and other concerned state government departments will be conducted. These workshops will focus training on integrated wetland management, wetlands and water management, wetlands and livelihoods and, conserving wetland biodiversity. Also, other needs-based trainings will be conducted as per the recommendation of the implementing agency.

1. Communication and outreach

A wetlands interpretation center at Sarsai Nawar village will be established, with facilities of viewing gallery, exhibits, auditorium, monitoring laboratory, conference hall and information kiosk. Also, awareness materials such as newsletters, brochures and, fact sheets will be published for public distribution. A dedicated webpage for Sarsai Nawar wetland will be created, as an electronic interface for stakeholders to connect with wetland managers. Public outreach events will be organized to mark World Wetlands Day (Feb 2), World Environment Day (June 5) and, International Day for Biological Diversity (May 22). Supporting Community campaigns highlighting wetlands conservation will be supported.

1. Research

In addition to systematic monitoring, specific studies are proposed to be conducted; (a) Climate vulnerability assessment; (b) Sediment flux patterns; (c) Fish stock and yield assessment, and; (d) Migratory bird pathway. The outcome of these studies would be used to improvise management plan implementation.

1. Management review and adaptation

Outcome-based monitoring system would form the basis of the management plan review. Performance indicators and benchmarks would be established at the beginning of implementation of the management plan. A mid-term review would be carried out at the end of 2.5 years by engaging an external agency. The review would assess the degree of change in adverse trends in ecological character, and as well as the management effectiveness achieved. The outcomes would be used to revise the management strategy as appropriate.

1. Wetland Authority Uttar Pradesh

An end-term review would be held to assess the degree to which the intended outcomes have been achieved, and to chalk out the course of actions for the next five years. Wetlands International South Asia shall support in the review of the management plan.

**Component 2:** Management

1. Allocation of water for ecosystem functioning

Environmental water requirements for Sarsai Nawar wetland will be assessed to determine its freshwater needs for sustaining ecosystem processes and maintaining the ecological character. The assessment will define freshwater requirements regarding key species, such as fish and water birds.

1. Waste management system for Etawah City

Improvement of waste management infrastructure within Etawah City as envisaged in City Development Plan (two STP units of cumulative treatment capacity of 66 mid and 305 km of branch sewers) will be put in place. The solid waste dumping site for Etawah City will be treated and subsequently waste dumping will be phased out. Interventions for proper waste segregation at the household level, collection, and recycling through technologies as bio methanation and energy production needs to be implemented in collaboration with Etawah Municipal Corporation.

**Component 3:** Biodiversity conservation

1. Water bird census and animal disease surveillance

Comprehensive mid-winter census of the Sarsai Nawar wetland and adjoining waterbodies (where waterbirds congregate) will be conducted by engaging Uttar Pradesh Agricultural University. Panchayat members, villagers and volunteers will also be involved and imparted training on bird identification and census. An assessment of distribution and breeding concentration of all water bird species within the wetland and adjoining wetlands will be taken up to determine baseline population of breeding birds, and ensure that such breeding groundsare not disturbed. Panchayat members will also be provided training in identifying traits of common diseases as well as avian influenza.

1. Ecotourism master plan

A community-managed ecotourism master plan for Sarsai Nawar wetland will be prepared through expert consultations. The plan would assess carrying capacity, identify areas and features of ecotourism potential, identify infrastructure development needs (e.g., interpretation center, boardwalk and nature trails), assess institutional development needs, analyze strength, weakness, opportunities and threats; and recommend integration with regional ecotourism plan.

1. Budget, phasing and financing

Implementation of management plan during the first year will focus on putting in place institutional and governance mechanisms, as well as integrated inventory, assessment, and monitoring system. In the second year, implementation will focus on ensuring water quality improvement and as well as enhancing fish stock. Interventions for livelihoods are proposed to be taken up in parallel. Evaluation of implementation of management plan will take place in the fourth year.

The management plan implementation entails a budget of Rs. 170.34 Crore (Table 1). Of this, the component of water management is allocated 72% (Rs.122.9 Crore), component on livelihoods is allocated 16% (Rs. 26.68 Crore), while components on institutions and governance, biodiversity conservation and sustainable fisheries have been allocated 6% (Rs. 9.85 Crore), 3% (Rs. 5.17 Crore) and 3% (Rs. 5,73 Crore) respectively.

**Table 1.** Management plan budget

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Component** | **Total** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** |
| **1** | **Institutions and governance** | 72.19 | 25.6 | 13.20 | 11.65 | 11.23 | 10.51 |
| **2** | **Water management** | 580.31 | 138.3 | 134.56 | 129.58 | 125.34 | 52.53 |
| **3** | **Biodiversity Conservation** | 162.36 | 36.56 | 34.89 | 32.56 | 29.57 | 28.78 |
| **4**  **5** | **Sustainable fisheries** | 160.55 | 51.5 | 45.98 | 20.7 | 25.5 | 16.87 |
| **5** | **Livelihoods** | 297.05 | 21.25 | 73.40 | 95.62 | 95.86 | 10.87 |
|  | **Grand Total** | **1272.46** | **273.21** | **302.08** | **290.11** | **287.5** | **119.56** |