

Annex 4: Steps and format for developing Integrated Management Plan

1. Wetlands provide wide-ranging ecosystem services that support human well-being in a number of ways. Numerous plant and animal species depend on wetlands during different parts of their life-cycle. In order to ensure that wetlands continue to provide their ecosystem services and support biodiversity, it is essential that a well-defined strategy and actions are identified for their conservation and wise use. An Integrated Management Plan reflects a common understanding between various stakeholders on the management purpose, significant threats and constraints limiting conservation and wise use, opportunities and specific actions for addressing these threats, and mainstreaming wetlands within the wider developmental planning.
2. The Integrated Management Plan is formulated to serve the following purposes:
 - Identify the objectives of wetland management;
 - Identify the factors that affect or may affect the wetland;
 - Resolve conflicts between various stakeholders having an interest in the wetland;
 - Define monitoring requirements and research needs;
 - Help obtain financial resources for managing the wetland;
 - Enable communication between different wetland managers, organizations and stakeholders;
 - Ensure compliance with extant laws and regulation; and,
 - Demonstrate that management is effective and efficient
3. Systematic diagnosis of various wetlands features and factors influencing these features is essential to arrive at management objectives and actions. The following eight steps are recommended for developing an Integrated Management Plan:

Step 1: Preamble

4. The process for management planning must begin with an exercise of setting up an overarching preamble describing the rationale for application of human, technical and financial resources for the wetland. This is a concise policy statement that expresses the commitment of the State Government/ UT Administration for integrated management. The preamble can be developed on the basis of:
 - Importance of the wetland for the state / UT
 - Ways in which the wetlands conservation and wise use will contribute to conservation and developmental goals
 - Alignment with sectoral policies, directives and planning frameworks

Step 2: Description of wetland features

5. This step entails collation and synthesis of existing information on various site features so as to provide a basis for the identification of management objectives. A generic listing of management information needs and data requirements are presented in Table 1.

Table 1: Information Required for Description of Wetlands Features

Wetland feature	Management information needs	Data requirement
Wetland type and extent	<ul style="list-style-type: none"> ▪ Location ▪ Wetland type ▪ Wetland area ▪ Significant inter-annual changes in the wetland ▪ Major changes in the wetland extent in the last 20 – 30 years (if available) 	<ul style="list-style-type: none"> ▪ Geographical coordinates ▪ Land use and land cover data for the wetland (at least for two seasons, pre and post-monsoon) ▪ Historical map of the wetland (can be developed from the Survey of India toposheets) (if available)
Catchment/ Drainage Basin	<ul style="list-style-type: none"> ▪ Direct and indirect catchment of the wetland ▪ Geological and geomorphological characteristics that have led to the formation of the wetland ▪ Present land use and land cover of the catchment and their implication for wetland ▪ Major developmental activities in the catchment and their impacts on the wetland 	<ul style="list-style-type: none"> ▪ Geology and geomorphology ▪ Topography ▪ Drainage pattern ▪ Soil types ▪ Climate setting ▪ Land use and land cover change
Hydrological regimes	<ul style="list-style-type: none"> ▪ Major sources of water inflow and outflow from the wetland ▪ Major sources of sediments into the wetland ▪ Inundation regime ▪ Trends in water holding capacity and factors for the decline ▪ Water quality and pollution status ▪ Water use pattern within the wetland catchment and implication for wetland 	<ul style="list-style-type: none"> ▪ Water inflow, outflow and balance ▪ Inundation pattern ▪ Sedimentation ▪ Groundwater ▪ Water quality ▪ Water use within the basin
Biodiversity	<ul style="list-style-type: none"> ▪ Species richness ▪ Role of the wetland in the life-cycle of migratory species ▪ Invasive species and major contributing factors ▪ Major changes in species richness and habitat and factors thereof 	<ul style="list-style-type: none"> ▪ Species richness and diversity ▪ Biological significance of habitats ▪ Risk of species invasion

Ecosystem Services	<ul style="list-style-type: none"> ▪ Key ecological and hydrological characteristics required for the sustained provision of ecosystem services ▪ Ecosystem services trade-offs 	<ul style="list-style-type: none"> ▪ Provisioning services (direct wetland products, eg: food, fibre, water) ▪ Regulating services (the ability of an ecosystem to regulate hydrological regimes, influence micro-climate, reduce disaster risk, groundwater recharge) ▪ Cultural services (recreational values, cultural and religious norms and beliefs related to wetlands) ▪ Supporting services (Primary production and other ecosystem functions which enable wetlands to deliver all above ecosystem services)
Socioeconomics and livelihoods	<ul style="list-style-type: none"> ▪ Extent of dependence on wetlands for livelihoods ▪ Status of community infrastructure (such as water and sanitation) and implication for wetlands ▪ Livelihood vulnerability and relationship with changes in wetland resources ▪ Resource use conflicts ▪ Major shifts in livelihoods and implications for wetlands 	<ul style="list-style-type: none"> ▪ Demographic features of communities living in and around ▪ The contribution of wetland to income and employment ▪ Community resource use and management practices

6. Attention should be paid to the robustness of data and associated uncertainties thereof. It is recommended that the data on-site features and linked metadata are, to the extent possible, maintained in a spatial format to enable updation at a later stage as more information becomes available through monitoring programmes. The step should also include identification of data gaps.

Step 3: Evaluation of wetland features

7. This step entails an evaluation of information on status and trends on wetlands features (conducted in the previous step) to identify:

- a) Key wetland features that should be a priority for management planning
- b) Natural variability within these features, including describing thresholds, if any
- c) Threats that limit (or potentially limit) maintenance of wetlands features in the desirable state

8. Evaluation of wetland features can be done on the basis of criteria such as:

- Naturalness
- Rarity
- Criticality for ecosystem functioning
- Socioeconomic importance
- Requirement under the extant regulatory regime

9. The evaluation process will lead to narrowing down of the list of wetland features, for which threats may be identified. The management plan is a response to these threats. Through this process, it is

ensured that the plan does not merely focus on symptoms (for example, poor water quality) but on the root causes (in this case, ineffective sewage management in wetland catchments).

Step 4: Defining an institutional arrangement for wetland management

10. The purpose of this step is to evaluate whether existing institutional arrangements are sufficient and effective in addressing the threats to wetlands. Based on the gaps identified, an institutional arrangement for implementation of the management plan is developed.
11. This step includes:
 - a) Enlisting of government departments having programmes which impact (or have the potential to impact) wetlands features or threats on these features;
 - b) An analysis of laws and regulation related to wetland, access and use of wetland resources, biodiversity or any dimension;
 - c) Ownership, rights and privileges pertaining to wetlands;
 - d) Analysis of the role of CSOs and communities in wetlands management, with particular reference to their views, rights and capacities; and,
 - e) Gaps and challenges.
12. Based on the analysis, an institutional arrangement for wetlands management should be developed, clearly stating:
 - a) The nodal agency responsible for managing wetlands
 - b) Role of different government departments and mechanisms for inter-departmental coordination
 - c) Role of CSOs and communities
13. In line with the requirements of Wetlands (Conservation and Management) Rules, 2017, the following should be specified:
 - a) Activities prohibited within the boundary of wetlands;
 - b) Activities to be regulated within wetlands and zone of influence and regulation thresholds; and,
 - c) Activities permitted.

Step 5: Setting management objectives

14. This step involves the identification of site management objectives that need to be met so as to ensure that site features are maintained or improved. The management objectives may address the threats identified in the previous step, and issues relating to maintenance of wetland in a desired healthy state.
15. While defining objectives, the following may be considered:
 - a) **Measurability** – The objectives must be measurable so as to enable reporting on progress towards meeting them (for example, reducing silt load from the wetland catchment by xx %)
 - b) **Achievability** – The objectives must be achievable at least in the medium or long term. An objective that cannot be achieved can lead to an overall loss of sense of direction and misallocation of resources (for example, completely preventing nutrient enrichment in a wetland located in the intensive agricultural landscape is an unachievable objective, a much better proposition would be to reduce the current rate by xx%).

- c) **Indicative of purpose and not the process** – The objectives should not be prescriptively stating the way the objective should be achieved. It should ideally reflect the purpose of management (for example – afforestation in xxx ha is not an objective but a way to reduce siltation. Focusing just on afforestation then limits the use of other options for reducing siltation in a wetland).

Step 6: Developing a monitoring and evaluation plan

16. This section aims at outlining a monitoring and evaluation plan to enable assessment of overall management effectiveness and identify needs for mid-term correction.

Performance indicators

17. For each of management objectives, a set of performance indicators should be identified.

Table 2: Performance Indicators

Wetland feature	Management objective	Performance Indicator	Means of measurement
Area	Maintain wetland area	Wetland area which has not been altered for non-wetland usages	Area estimated from analysis of remote sensing images and ground truthing
Catchments	Reduction in silt load from catchment	Silt load	Monitoring pilot watersheds
Hydrological regimes	Reduce pollution	Biological Oxygen Demand, Chemical Oxygen Demand or any other water quality parameter assessed against a threshold	Water quality monitoring
	Enhance hydrological connectivity within wetlands complex	Area of wetland complex inundated during high floods period	Analysis of remote sensing data, and hydrological surveys
Biodiversity	Maintain and enhance habitat of waterbirds	Area of wetland used by waterbirds	Physical survey
	Reduce area under invasive macrophyte	Area under invasive macrophyte	Analysis of remote sensing images and ground truthing
	Maintain fish species richness	Fish species richness	Sampling

Socioeconomics	Reduce use of harmful fishing practices	Number of destructive fishing gear used in the wetland	Survey
	Reduce direct dependence of communities on capture fisheries	Reduction in % of income derived from wetland	Socioeconomic surveys

18. For each performance indicator, a baseline value at the beginning of management plan implementation may be specified. These values should be tracked over the course of management plan implementation to assess whether management objectives are being met.

Monitoring mechanism

19. Besides setting up performance indicators for the management plan, it is also essential to set up a monitoring system for the wetland to be able to assess changes in ecosystem condition over a period of time.

20. A generic listing of monitoring parameter, method and frequency is presented in the Table 3 below. Parameters marked with a single asterisk (*) sign are relevant for all wetlands and must form a part of the monitoring system. In addition to these, parameters marked with a double asterisk (**) are relevant for wetlands located in urban and peri-urban areas. Other parameters may be included based on the assessment of relevance and wetland contexts.

21. Photographic documentation (before, during and after management intervention) may also be maintained as part of monitoring process. Aquatic drones/ buoy-based sensor induced transmission for online data updating may be used for large wetlands, which will further help in enriching the management practices.

Table 3: Parameters for wetlands monitoring

Wetland feature	Monitoring parameter	Monitoring method	Recommended Frequency
Wetland extent	• Wetland area*	Remote sensing and ground truthing	Once in a year
	• Land use and land cover within the wetland area	Remote sensing and ground truthing	Once in a year
	• Connectivity with other adjoining wetlands, river / streams, coastal zone	Remote sensing and ground truthing	Once in a year

Wetland Catchment	<ul style="list-style-type: none"> • Climate 	Data from the nearest weather station	Monthly
	<ul style="list-style-type: none"> • Land use and Land Cover* 	Remote sensing and ground truthing	Once in 3 years
	<ul style="list-style-type: none"> • Total sediment yield 	Stream gauging station	Monthly
	<ul style="list-style-type: none"> • Total nutrient yield 	Stream gauging station	Monthly
Hydrological regimes	<ul style="list-style-type: none"> • Water inflow and outflow* 	Stream gauging station	Monthly
	<ul style="list-style-type: none"> • Waterholding capacity 	Bathymetric survey	Once in 5 years
	<ul style="list-style-type: none"> • Peak inundation 	Remote sensing and ground truthing	Once in 2 years
	<ul style="list-style-type: none"> • Dissolved Oxygen, Biological Oxygen Demand * 	Data from water quality sampling stations	Atleast monthly
	<ul style="list-style-type: none"> • Chemical Oxygen Demand ** 	Data from water quality sampling stations	Atleast monthly
	<ul style="list-style-type: none"> • Number of point sources discharging untreated sewage into the wetland ** 	Surveys	Once a year
Biodiversity and Habitat	<ul style="list-style-type: none"> • Population of major wetland dependent species groups (such as waterbirds, mammals etc.)* 	Mid-winter counts	Once a year
	<ul style="list-style-type: none"> • Habitat use by key species 	Physical surveys	Once a year
	<ul style="list-style-type: none"> • Number of migratory species using the wetland as a habitat 	Physical surveys	Once a year
	<ul style="list-style-type: none"> • Area under invasive macrophyte ** 	Physical surveys	Once a year
Ecosystem Services	<ul style="list-style-type: none"> • Annual Fish yield 	Sampling	Monthly samples collated into an annual estimate

	• Number of tourists	Surveys	Monthly samples collated into an annual estimate
	• Volume of surface water abstracted from wetland	Hydrographic surveys	Monthly samples collated into an annual estimate
	• Volume of groundwater recharged	Hydrographic surveys	Once a year
	• Proportion of floodwaters stored in the wetland	Hydrographic surveys	Once a year
	• Use of wetland for research and education	Surveys	Annual estimate
Livelihoods	• Population living around the wetland*	Surveys	Once every three years
	• Population depending on wetlands for livelihoods	Surveys	Once every three years
	• Number of households around the wetland using safe sanitation practices	Surveys	Once every three years
	• Participation of communities in wetlands management	Surveys	Once every three years

Note: (i) The frequency, as above, is advisable for wetlands above 100 ha and is indicative in nature. The Wetland Authority may suitably modify based on logistics involved.

(ii) For wetlands less than say 100 ha, the frequency may be appropriately **divided**.

Step 7 - Developing an action plan

22. The last stage of the management planning process includes defining the action plan, or specific interventions that address the identified management objectives. A generic listing of activities is presented in Table 4. The projects need to be defined very clearly to ensure good implementation. While identifying activities for management of wetlands, the following must be kept in mind:

- a) Ecosystem-based interventions should be promoted as far as possible
- b) Engineering interventions in wetlands should be taken up in a limited manner, with impact assessments conducted for all major works
- c) Operations and maintenance of all structural works should be included in project design

- d) Participation of local communities should be included to the extent possible

Table 4: Generic listing of activities for management of wetlands

Management Plan component	Activities	Key considerations
Boundary delineation and demarcation	Boundary mapping and delineation	Site boundaries should be established with reference to inundation regimes, soil conditions and vegetation types. Landscape connectivity should also be taken into account when wetlands exist in patches. All activities should be completed within the first year.
	Removal of encroachments	Boundaries should be notified and legally protected wherever possible. All activities should be completed within the first year.
	Shoreline management	Mostly required for wetlands in urban and peri-urban setting. For stabilizing bunds of wetlands, naturalization of slopes using vegetative measures should be preferred. Development of promenade for urban lakes can be included based on an evaluation of natural drainage and shoreline ecosystem niches.
Catchment conservation	Afforestation and aided regeneration	Catchment conservation plans should be developed at watershed scales and based on Joint Forest Management approaches. Native species should be used for forestry operations. Pilot watershed should be periodically monitored to assess changes in soil moisture regimes. Livelihood interventions for catchment communities aimed at reducing dependence on wood as an energy source should be included as appropriate.
	Small scale engineering measures (gully plugging, check dams, gabion structures etc.)	Community participation in design, implementation and post-project maintenance of structures should be ensured.
Water management	Selective dredging and desilting to improve hydrological connectivity	Dredging to be used only selectively, and be based on assessments of bathymetric profile and species interactions. For inflowing channels, dredging can be used to improve water inflow.
	Interception, diversion and	Mostly recommended for wetlands in the urban and peri-urban setting.

Management Plan component	Activities	Key considerations
	treatment of point sources of pollution	<p>Provision of comprehensive sanitation and safe drinking water coverage to communities living around the wetlands may be ensured.</p> <p>Engineering (STPs) as well as biological options (constructed wetlands) should be evaluated for application. Planning for Operation and Maintenance expenses should be included for all engineering structures.</p>
	Construction and operation of hydraulic structures for maintenance of water regimes and flood control	For each significant structure, environmental impact assessments should be carried out prior to construction.
	Balancing water allocation for human and ecological purposes	Environmental flows for wetlands, hydrological regimes of which are affected by hydraulic structures, should be assessed and implemented in consultation in water managers
Biodiversity conservation	Habitat evaluation and improvement	Until specifically desired, plantation of terrestrial plant species in wetlands should be avoided.
	Improvement and maintenance of migratory routes	Community groups should be involved in habitat monitoring and maintenance of migratory routes
	Maintenance of breeding and spawning grounds for key species	Community groups should be involved in the maintenance of breeding and spawning grounds
	Management of invasive species	<p>A mix of mechanical and biological methods for controlling species invasion should be used.</p> <p>For plant invasives, economic utilization along with physical removal should be included.</p>
Sustainable resource development and livelihood improvement	Microenterprise development for reducing dependence on wetland resources for livelihoods	Identification of micro-enterprise development options should be based on an assessment of community livelihoods, capacities, resources and market linkages.
	Sustainable fisheries development	Only capture based fisheries techniques should be promoted in natural wetlands

Management Plan component	Activities	Key considerations
		Options for improving culture fisheries in areas around wetlands may be included to reduce dependence on capture fisheries
	Sustainable agriculture development	Organic farming practices in immediate catchments should be included to minimize nutrient enrichment in wetland.
Institutional development	Setting regulatory regimes	Site regulation should be harmonized with national and State level regulations. Local customary self-regulation which supports maintenance of conservation values should be promoted
	Development of monitoring and evaluation system	Comprehensive monitoring and evaluation mechanism for hydrological, ecological, socio-economic and institutional features should be made a part of the management system Involvement of stakeholders in monitoring should be encouraged.
	Communication and Outreach	Increasing awareness on values and functions of wetland should be made an integral part of the management plan. The use of television, print, electronic and social media for awareness generation and outreach may be included as appropriate. Developing and disseminating dos and donts in wetlands for general public may also be considered.
	Research	For each site, key research areas to support management needs should be identified and included in the management plan

Step 8: Developing budget and financing plan

23. A complete costing of the Integrated Management Plan item wise may be done for the entire tenure of the plan using the existing norms of the State and central government, as may be the case. Year wise requirement of funds for various items of work/ activities, band PERT charts for the works/activities should be prepared. Summary of Cost Estimates and year-wise breakup of the requirement of funds may be presented in the formats given below:

Table 5: Summary of budget

S. No.	Management Plan component	Budget

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Table 6: Year wise breakup of requirement of funds

S. No.	Activity	Funds Required in Yr I	Funds Required in Yr II	Funds Required in Yr III	Funds Required in Yr IV	Funds Required in Yr V	Total

Table 7: year wise breakup of requirement of funds

S. No.	Total Budget	Funds from Central Government Scheme (Scheme Name)	Funds from State Government (Scheme Name)	Funds from other donors (Project and donor name)	Funds from private sector (Name of the agency)	Funds available from convergence sources	Funds required to be raised
	(a)	(b)	©	(d)	(e)	(f) = (b) + (c) + (d) + (e)	(g) = (a) - (f)

Format for compiling Integrated Management Plan

24. The management plan should have a cover sheet with the following information:

- Wetland Name
- Wetland Area (in ha)
- Location: (District(s), State / UT)
- Area of the direct catchment (in ha)
- Name of the nodal agency for management plan implementation
- Management plan period
- Date on which approval of State / UT Wetland Authority was obtained
- Total budget
- Total funds available from convergence sources

25. The management plan may be compiled in the following eight chapters:

Chapter heading	Sub-headings	Explanation	Reference to Management Planning Steps
1. Introduction	1.1 Rationale for management planning	Describe the importance of wetland, ways in which wetlands conservation and wise use will contribute to state conservation and development goals and alignment with state and central government policies, directives and planning frameworks	Step 1
	1.2 Terms of reference	Enlist the overall terms of reference for the management plan	Step 1
	1.3 Approach and Method	Provide an overview of approach (ways in which the recommended steps have been used) Describe the data sources and research carried out for management planning if any	Step 1
2. Description of wetlands features	Description of wetland features <ul style="list-style-type: none"> • Location and extent • Wetland catchments • Hydrological regimes • Biodiversity • Ecosystem Services • Socioeconomics and livelihoods 	Describe wetland features. As far as possible, present the data in maps.	Step 2
3. Evaluation of wetlands features	Evaluation <ul style="list-style-type: none"> • Priority wetland features that need to be maintained and thresholds thereof • Threats 	From the wetlands features described in the previous section, enlist the priority wetlands features. Describe the threats that adversely affect the priority wetland features.	Step 3

Chapter heading	Sub-headings	Explanation	Reference to Management Planning Steps
4. Institutional arrangements	4.1 Review of existing arrangements <ul style="list-style-type: none"> • Key organizations and programmes • Rules and regulations • Role of civil society and community based organizations 	Provide an overview of the current institutional arrangements in the context of wetlands management	Step 4
	4.2 Gaps	Discuss why the current institutional arrangements are insufficient in ensuring wetlands conservation and wise use.	Step 4
	4.3 Proposed arrangements for wetland management	Propose institutional arrangement for wetland management, which specific focus on a) nodal agency, b) role of various departments and agencies and coordination mechanism, and c) the role of civil society and communities. Develop an organogram for management plan implementation.	Step 4
5. Setting Management Objectives	5.1 Goal and purpose	Provide a statement of the overall goal that the management plan seeks to achieve	Step 5
	5.2 Benefits (ecological as well as societal)	Summarize the ecological and economic benefits that are expected from management plan implementation	
	5.3 Management objectives	Enlist the specific objectives	Step 5
	5.4 Strategies	Describe strategy(ies) for achieving each of the management objectives	Step 5
6. Monitoring and evaluation plan	6.1 Monitoring strategy	Present an overview of monitoring the wetland, and management plan implementation	Step 6
	6.2 Monitoring parameters, frequency and responsibility	Describe the monitoring parameters, the frequency of monitoring and the agency that will be responsible for monitoring	Step 6

Chapter heading	Sub-headings	Explanation	Reference to Management Planning Steps
	6.3 Institutional design	Describe how coordination between different monitoring agencies will be achieved.	Step 6
	6.4 Infrastructure and human resources design	Discuss the infrastructure and human resource requirement for implementing the management plan as far as possible, including local universities, research organizations and NGOs in wetlands monitoring	Step 6
	6.5 Reporting	Discuss the frequency in which reporting shall be done and the responsible agency.	Step 6
	6.6 Review and adaptation	Discuss how the monitoring outcomes will be used to adapt management	Step 6
7. Developing an Action Plan	7.1 Component wise activities linked with management objectives	Generic listing of activities indicating: <ul style="list-style-type: none"> • What will be done? • Where will the activity be done? • What is the priority for the activity? 	Step 7.1
	7.2 Components for consideration for support under National Plan for Conservation of Aquatic Ecosystems (NPCA)	For all activities eligible for support under NPCA indicate: <ul style="list-style-type: none"> • Why is the activity important? • How will the activity be implemented? (include intermediate steps, technical specifications and relevant drawings, as may be the case) • Where will the activity be implemented? • Who will implement the activity? • What are the quantitative targets to be met? 	Step 7.2

Chapter heading	Sub-headings	Explanation	Reference to Management Planning Steps
8. Budget and activity phasing	8.1 Activity linked budget	<p>Present a summary budget in line with Table 5</p> <p>Provide details of funding available from convergence sources in line with Table 6</p> <p>Provide detailed budget for NPCA in line with Table 7</p>	Step 8
	8.2 Time planning	Present a monthly Gantt Chart for management plan implementation	Step 8

Checklist for submission of Integrated Management Plan

- Approved by the State Govt./ UT Administration/ State Wetlands Authority/ UT Wetlands Authority (minutes of meeting to be enclosed)
- Forwarding letter states -commitment of the State Government/ UT for providing their share of budget (supporting document indicating concurrence to be enclosed)
- Integrated Management Plan has a cover sheet providing details on Wetland, catchment area, implementing agency, total budget and fund requested from NPCA
- Brief Document is enclosed with the management plan (as per Annex V)
- Wetlands map is provided in a standard GIS format
- Map of zone of influence is provided in a standard GIS format.
- Management plan is aligned with recommended format of eight chapters
- All activities proposed to be funded by the NPCA fall within the list of core and non-core activities
- Necessary drawings and technical specification for major activities is provided.
- Core activities have been allocated not less than 75% of the budget
- Non-core activities have been allocated not more than 25% of the budget
- Budget has been prepared with reference to an approved Schedule of Rates