WETLAND WISE USE

An implementation framework

Ministry of Environment, Forest and Climate Change
Government of India

Prepared within the framework of *Amrit Dharohar,* an initiative of the Ministry of Environment, Forest and Climate Change to promote unique conservation values of Ramsar Sites, under the aegis of Global Environment Facility-Ministry of Environment, Forest and Climate Change-UN Environment Programme funded Integrated Management of Wetland Biodiversity and Ecosystem Services Project.

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MESSAGE

Wetlands are often referred to as nature's 'life support systems'. These ecosystems play a critical role in regulating water cycles, sequestering carbon, and supporting biodiversity, all while providing essential resources for human well-being. Their ability to mitigate the effects of climate change and enhance ecological resilience makes them invaluable in our journey toward a sustainable future.

In line with India's commitment to preserving its rich natural heritage and ensuring sustainable development, a document on 'Wetland Wise Use: An Implementation Framework' has been prepared within the framework of Amrit Dharohar. The document clarifies the term 'wetland-wise use' and provides an implementation framework for achieving wetland-wise use in India. Promoting wise use of wetlands will ensure that these ecosystems continue to thrive while supporting the national goals of climate resilience, food security, and water management. The document is an essential step toward achieving the targets of the Amrit Dharohar initiative, ensuring that the wetlands continue to provide invaluable ecosystem services for generations to come.

I commend the Wetlands Division of MoEFCC and Wetlands International South Asia for their dedicated efforts in preparing these vital guidelines. Their commitment to sustainable wetland management is key to preserving our environmental resources and achieving India's ecological goals.

(Bhupender Yadav)

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MESSAGE

The wetlands serve as invaluable ecological treasures, offering a wide range of essential services, from flood control to carbon storage. Embracing the wise use of wetlands is essential for preserving their rich biodiversity and fortifying our defences against climate change while promoting community resilience.

India has long recognised the importance of conserving and managing its diverse wetland ecosystems. Throughout the country, there are inspiring examples of communities and authorities demonstrating the sustainable utilisation of wetlands to ensure the continuity of essential services while supporting local livelihoods. The document on 'Wetland Wise Use: An Implementation Framework' prepared under Amrit Dharohar initiative aims to build upon these successful examples by providing clarity on the term 'Wetland wise' and offering a comprehensive framework for the sustainable management of wetlands across India. By embracing these lessons and strategies, the continued functioning of these ecosystems can be ensured while promoting community resilience and sustainable development.

I would like to extend my sincerest appreciation to the dedicated efforts of the Wetlands Division of MoEFCC and Wetlands International South Asia for their commendable work in crafting this publication. It is truly an invaluable contribution to the goal of wetland conservation and wise use.

(Kirti Vardhan Singh)

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MESSAGE

India's diverse wetlands, spanning 15.98 million hectares, are essential reservoirs of life and resilience. These ecosystems play a vital role in addressing many of the environmental challenges faced by the world today. Protecting these invaluable ecological assets by promoting the wise use of wetlands is essential for ensuring their capacity to sustain biodiversity, manage water resources, and mitigate the adverse impacts of climate change.

Wetland wise-use serves as the central tenet for wetland conservation and management. It is important to ensure correct interpretation of the term 'wise use' and its application in wetland management. Hence this publication on 'Wetland Wise Use: An Implementation Framework', developed by the Wetlands Division of the Ministry in collaboration with Wetlands International South Asia under the Amrit Dharohar initiative, will be a useful document for operationalising the wetlands wise use concept. It offers a comprehensive overview of the building blocks of wise use - ecological character and ecosystem approach – and presents case studies to enhance understanding of the same.

As India continues to play a leading role in wetland conservation, with 85 designated Ramsar Sites as of 2024, this implementation framework for sustainable wetland management will be a relevant compilation that is anchored in lessons learned from sites across the country.

(Leena Nandan)

New Delhi
October 9, 2024.

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MESSAGE

Wetlands, with their intricate ecosystems and rich biodiversity, play a pivotal role in sustaining human well-being. In an era where environmental sustainability and climate change are major worldwide concerns, understanding and managing wetlands has become crucial to our existence.

Wetland conservation and sustainable management are deeply ingrained in the Indian conservation ethos as part of her culture and heritage. There has been a rich and long history of wetlands conservation in India. Rapidly upscaling wetlands conservation with stakeholder engagement and mainstreaming wetlands in development planning are core to India's approach to wetlands conservation. These programmatic elements conform to the 'all-of-society' and 'all-of-government' approach to wetlands conservation.

The wise use of wetlands forms the core of wetlands conservation. The Ministry's flagship programme on wetlands, the National Plan for Conservation of Aquatic Ecosystems (NPCA), recommends that the management of each wetland is guided by an Integrated Management Plan (IMP), which describes strategies and actions for achieving wise use.

I am pleased to present the 'Wetland Wise Use: An Implementation Framework' publication that clarifies the term wise use and provides an implementation framework for achieving wetland wise use for wetlands in India. I congratulate the Wetlands Division of the MoEFCC and Wetlands International South Asia for bringing out this comprehensive document. I trust that this publication will serve as a key resource in advancing the effective conservation and sustainable management of wetlands in India.

(Amandeep Garg)

New Delhi
October 14, 2024

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FOREWORD

Wetlands are ecological powerhouses and cultural pillars, providing essential services while supporting human communities for centuries. These ecosystems are deeply intertwined with local traditions, festivals, and livelihoods in India, making their conservation vital for biodiversity and cultural preservation.

The Government of India is committed to the conservation and wise use of the wetlands. India has expanded its network of Ramsar Sites to 85 and launched the Amrit Dharohar initiative to promote wise use. This three-year initiative focuses on species and habitat conservation, wetland livelihoods, nature tourism, and wetland carbon assessments, driving impactful conservation efforts nationwide.

With immense pleasure, I am proud to present the discussion paper 'Wetland Wise Use: An Implementation Framework,' developed by the Wetlands Division of MoEFCC in collaboration with Wetlands International South Asia. This paper clarifies the concept of 'wise use,' focusing on the three building blocks: ecological character, ecosystem approaches, and sustainable development. It addresses the distinction between wise and unwise use, providing a framework for sustainable wetland management with actionable steps for policy, implementation, and creating an enabling environment.

As India strives towards effective wetlands conservation and management, this discussion paper will serve as a vital guide for policymakers and stakeholders. I commend the Wetlands Division of MoEFCC and Wetlands International South Asia for their dedication to safeguarding these ecosystems, ensuring that India's wetlands thrive as hubs of biodiversity, livelihoods, and cultural heritage.

September 12, 2024

(Dr. Sujit Kumar Bajpayee)

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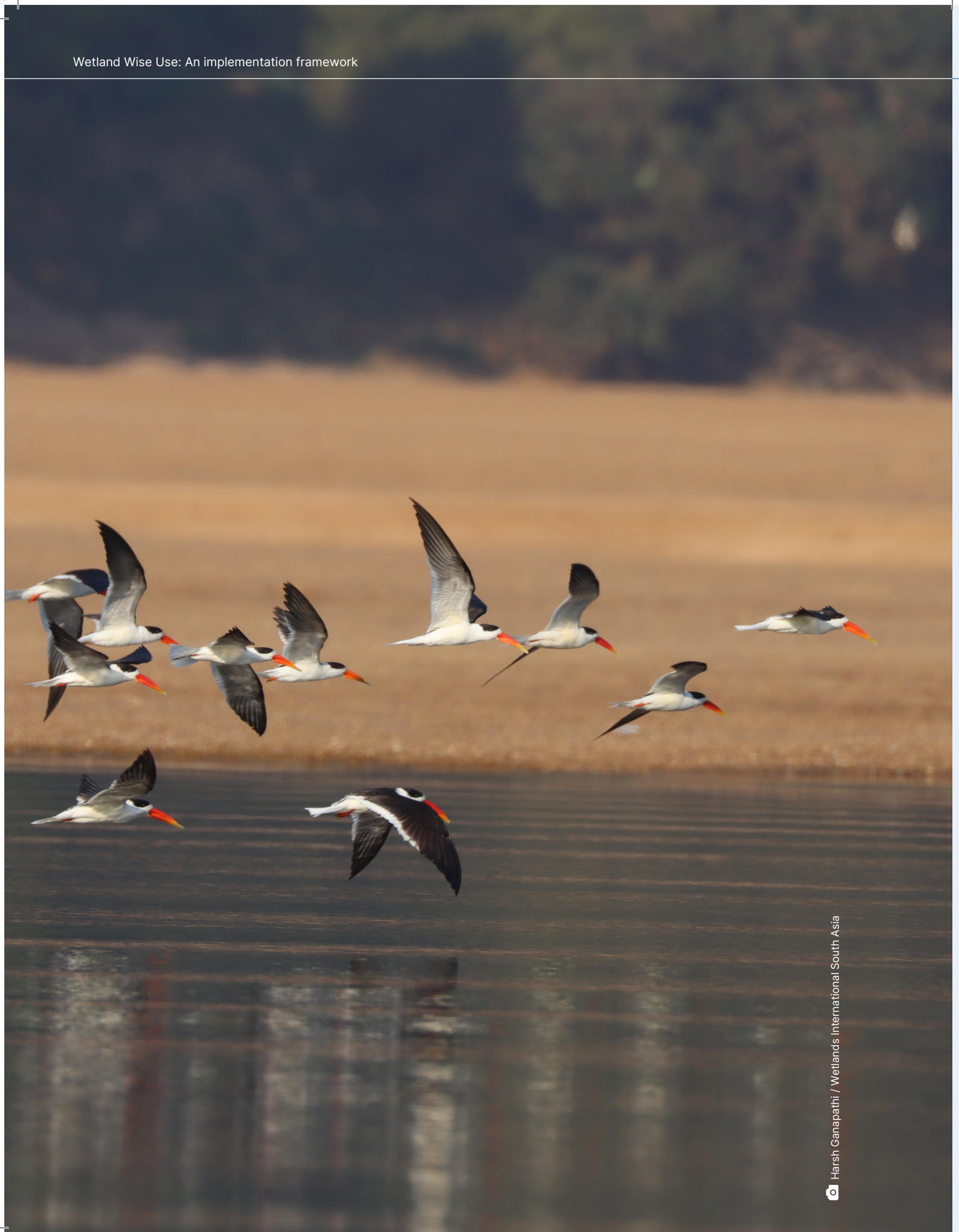

Harsh Ganapathi / Wetlands International South Asia

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Background

Wise use is the central tenet of wetlands conservation and management[1]. As a signatory to the Ramsar Convention, India is committed to ensuring the wise use of all wetlands in her territory[2].

India's National Environment Policy of 2006 identifies wetlands as components of 'freshwater resources' and recommends integration in developmental planning, management based on prudent use strategies, promotion of ecotourism and implementation of a regulatory framework[3].

The Ministry of Environment, Forest and Climate Change's (MoEF&CC) flagship programme on wetlands, the National Plan for Conservation of Aquatic Ecosystems (NPCA), recommends that the management of each wetland is guided by an Integrated Management Plan (IMP), which describes strategies and actions for achieving wise use[4]. The Wetlands (Conservation and Management) Rules, 2017, require the State/UT Wetland Authorities to define strategies for the conservation and wise use of wetlands within their jurisdiction. Further, these authorities have also been tasked to prepare brief documents which include ecological character descriptions of the sites to be regulated[5].

The wetland wise use stands out as the longest-established example among intergovernmental processes of the application of the ecosystem approaches for the conservation and sustainable development of natural resources[6]. The concept identifies the critical linkages between people and the sustainable development of natural resources and encourages community engagement and transparency in negotiating conservation-development trade-offs between different sectors and stakeholders and determining equitable outcomes for conservation.

Despite the centrality of the wise-use concept, vagueness remains in the meaning of the wise use term and its application in wetland management. This document aims to clarify the term and provides an implementation framework for achieving wetland wise use for wetlands in India[7].

1. C. Max Finlayson, Nick Davidson, Dave Pritchard, G. Randy Milton & Heather MacKay (2011). The Ramsar Convention and Ecosystem-Based Approaches to the Wise Use and Sustainable Development of Wetlands, Journal of International Wildlife Law & Policy, 14:3-4, 176-198, DOI: 10.1080/13880292.2011.626704
2. Ramsar Convention Secretariat (2010). Wise use of wetlands: Concepts and approaches for the wise use of wetlands. Ramsar handbooks for the wise use of wetlands, 4th edition, vol. 1. Ramsar Convention Secretariat, Gland, Switzerland.
3. Government of India (2006). The National Environment Policy, 2006. Ministry of Environment and Forest.
4. Government of India (2024). National Plan for Conservation of Aquatic Ecosystems (NPCA). Ministry of Environment, Forest and Climate Change.
5. Wetlands (Conservation and Management) Rules, 2017. Gazette of India. REGD. NO. D. L.-33004/99. SEPTEMBER 26, 2017.
6. C. Max Finlayson, Nick Davidson, Dave Pritchard, G. Randy Milton & Heather MacKay (2011). The Ramsar Convention and Ecosystem-Based Approaches to the Wise Use and Sustainable Development of Wetlands, Journal of International Wildlife Law & Policy, 14:3-4, 176-198, DOI: 10.1080/13880292.2011.626704
7. Dave Pritchard (2018). Wise Use Concept of the Ramsar Convention. In: C. Max Finlayson et al. The Wetland Book. Springer, Dordrecht. https://doi.org/10.1007/978-90-481-9659-3_106

Key Definitions

Definitions of key Ramsar Convention concepts of 'wise use' and 'ecological character' were adopted by COP 3 (1987[8]) and COP 7 (1999[9]), respectively. These definitions were subsequently amended in 2005[10] to ensure harmonisation with the Millennium Ecosystem Assessment terminology.

The Ramsar Convention defines wise use of wetlands as ***"the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development"***.

Ecological character is defined by the Convention as *"the combination of ecosystem components, processes and services that characterise the wetland at a given point in time"*. Ecosystem components (the living and non-living constituents) and processes (interactions within and between the living and non-living constituents and the environment) enable wetlands to sustain diverse lifeforms, perform functions (such as water flow regulation, lifecycle maintenance of migratory species, climate regulation and others) and acquire attributes (such as unique and aesthetic landscape of cultural, historical and spiritual meaning), including those of benefit to humans, also called ecosystem services (such as provisioning of fish and water, buffering floods and others).

The definition has two footnotes. The first clarifies that ecosystem approaches include, among others, those elaborated by the Convention on Biological Diversity and by the Helsinki and OSPAR Commission. The second footnote explains that the phrase in the context of sustainable development recognises that while some wetland development is inevitable and that many developments have important benefits to society, developments can be facilitated in sustainable ways by approaches elaborated under the Convention, and it is not appropriate to imply that 'development' is an objective for every wetland[11].

8. The Ramsar Convention on Wetlands (1987). Recommendation 3.3: Wise use of wetlands, adopted at the 3rd Meeting of the Conference of the Contracting Parties held between May 27 and June 5, 1987 in Regina, Canada
9. Dave Pritchard (2018). Wise Use Concept of the Ramsar Convention. In: C. Max Finlayson et al. The Wetland Book. Springer, Dordrecht. https://doi.org/10.1007/978-90-481-9659-3_106.
10. The Ramsar Convention on Wetlands (2005). Resolution IX. 1 Annex A: A conceptual framework for the wise use of wetlands and the maintenance of their ecological character. In: The ninth meeting of the conference of parties. The Ramsar Convention on Wetlands, Kampala. http://www.ramsar.org/sites/default/files/documents/pdf/ res/key_res_ix_01_annexa_e.pdf
11. Ramsar Convention Secretariat (2010a). Wise use of wetlands: concepts and approaches for the wise use of wetlands. Ramsar handbooks for the wise use of wetlands, vol 1, 4th edition, vol. 1. Ramsar Convention Secretariat, Gland

Three Building Blocks of Wise Use Concept

The wetland wise use concept has the following three building blocks:

- Ecological character
- Ecosystem approach
- Sustainable development

Managing wetlands wisely should ultimately lead to maintaining their ecological character. The Ecosystem Approach provides the framework within which wetland management for wise use operates. Sustainable development provides the sociopolitical guardrails when development in and around wetlands has to be facilitated for inevitable reasons.

Maintaining Wetland Ecological Character

Ecological character represents the distinctiveness of the wetland. Defining wetland ecological character and agreeing to what constitutes an adverse change to this character are fundamental to wetland management. It is a summative concept which describes the wetland ecosystem as a whole and not merely as a sum of its individual parts (that is, ecosystem components, processes and services).

The starting point for describing ecological character is to understand how the wetland ecosystem functions. Ecosystem components and processes enable the wetland to provide ecosystem services. Yet, the wetland ecosystem services are not attributable just to ecosystem components and processes but also to how these integrate with livelihood systems and how informal and formal institutions govern access to these benefits. For example, wetland fisheries are supported by the ability of the ecosystem to serve as habitats for fish and human enterprise in terms of boats, nets, indigenous knowledge related to fishing, and the norms society sets for regulating this activity. This, in turn, also shapes the ecosystem components and processes. A social-ecological system framing of wetlands provides a nuanced understanding of the relationship between human society and nature, including wetlands, as well as an understanding of the human context in which management decisions are made and implemented. In particular, this framing allows social components and social interactions to be included in ecological character description at various levels.

The wetland social-ecological system can be understood as being comprised of the following three entities[12] (referred to as wetland

12. Ritesh Kumar, Pierre Horwitz & C. Max Finlayson (2023). Wetlands as social–ecological systems: Bridging nature and society. In Ramsar Wetlands, 525-553. Elsevier. https://doi.org/10.1016/B978-0-12-817803-4.00021-8.

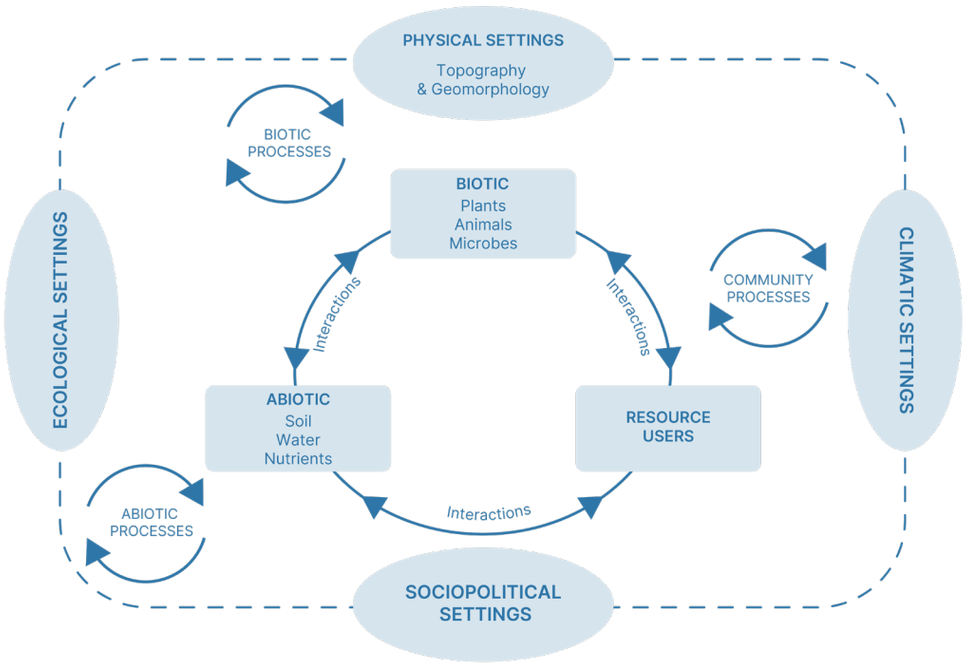


Figure 1: Internal features and governing factors in a wetland social-ecological system

features) which interact to render the system its ecological character:

- biotic entities (such as plant, animal, and microbial communities)
- abiotic entities (such as soil, water, nutrients, and others)
- resource users entities (wetland-dependent communities, resource harvest technologies, knowledge systems, and others)[13]

These system entities are linked by interactions that can be ecological, social, and social-ecological. Ecosystem processes mediate ecological interactions between biotic and abiotic components (such as water stratification, energy-nutrient dynamics, species interactions, and others); the social interactions are shaped by human actors and their political decisions (such as social practices, assigning roles and responsibilities of different communities, conflict resolution mechanism related to wetland); and the social-ecological interactions emerge from interactions between biotic, abiotic components and resource user entities (such as harvesting of wetland products, rules to govern access to wetlands).

The wetland social-ecological system does not operate in a vacuum but in an environment that shapes its features and interactions between features. These usually operate at multiple scales larger than the wetland itself and may include:

- physical settings (such as topographical features, geological features, geomorphological features and others)

13. Michael D. McGinnis & Elinor Ostrom (2014). Social-ecological system framework: initial changes and continuing challenges. Ecology and society, 19(2).

- climatic settings (such as the pattern of precipitation and temperature)
- ecological settings (position along a migratory flyway, niche capability to support diverse faunal and floral communities and their interactions, and others).
- sociopolitical settings (such as social integration, level of economy, sense of security, developmental planning around wetland and others)

Wetland ecosystems change over time due to internal factors (such as changes in species population growth rate) and external factors (such as physical disturbances). To assess whether the ecological character of the

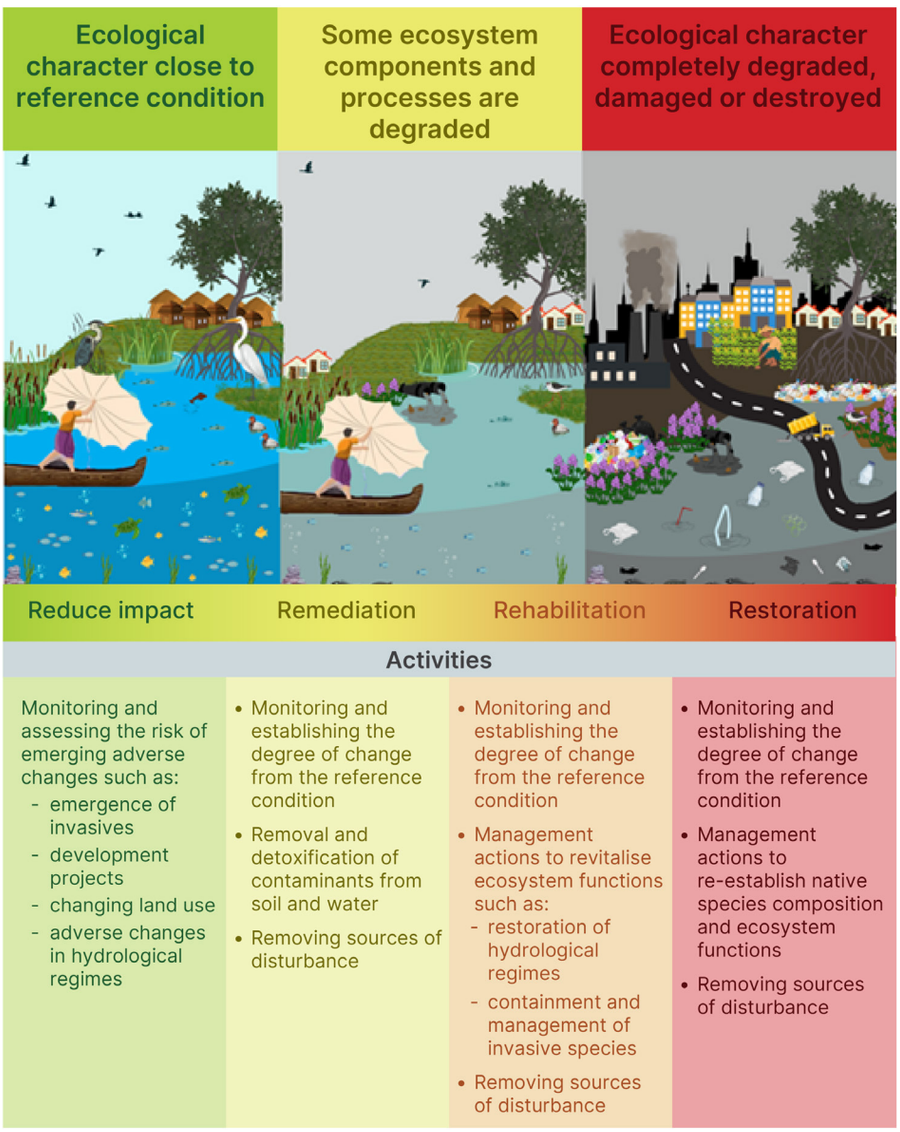


Figure 2: Nature of wetland restoration interventions based on the degradation gradient

wetland is being maintained, a reference condition has to be established, based on which change can be determined. Secondly, it needs to be established whether the change is within the natural variation or exceeds acceptable change limits, thereby warranting a management response.

A reference condition for a wetland can be described by values of various wetland features and interactions that existed with no or minor disturbance from human activity. The reference condition for a wetland is not just a historical condition but represents the expected condition should the wetland not have been subject to significant human-induced disturbances[14]. The reference condition may be inferred from the least disturbed portions of a wetland or a wetland located in similar settings, accounting for successional changes in vegetation, species composition and other relevant changes. An important consideration should be the achievability of the reference regime through management interventions. For example, setting a reference regime based on paleo records may not be meaningful due to long-term changes in climate, geological, and socio-economic systems, most of which are irreversible.

Most wetland features undergo a natural variation. For example, in an inland wetland, during a normal rainfall year, the water inundation may be maximum post-monsoon and minimum during summers. The description of the reference condition must take into account the natural variability. For example, the long-term inter-annual variation in inundation regime, population and abundance of native species, age-structure of mammals, fish catch, the quantity of vegetation harvested, and proportion of wetland under emergent macrophytes can be used to describe natural variation in wetland features.

When a particular wetland feature or a set of features breaches such variations, there is a risk of fundamental changes in the wetland system and its capability to sustain biodiversity and provide benefits to society. A change which alters the wetland to an alternate state (such as a freshwater wetland becoming permanently saline, absence of keystone species, and others), wherein the ecosystem's capability to recover is undermined, is considered adverse. Wetland management should aim to address human-induced adverse changes in wetland features. The nature of management intervention needed depends on the extent of deviation of ecological character from its reference regime.

The goal of maintenance of ecological character may seem to convey a preference for stationarity and a presumption that the wetland ecosystem exists in an equilibrium condition, disturbances from which need to be addressed by wetland management.

The concept of stationarity has been challenged on various counts, especially given the rapid anthropogenic and climate-induced modifications in wetlands and their surroundings. A social-ecological system perspective calls for a focus on system resilience—which can be

14. Peter R. Newall & Greg Fisk (2023). Trajectories in wetland condition: Setting limits of acceptable change. In Ramsar Wetlands, 335-355. Elsevier. https://doi.org/10.1016/B978-0-12-817803-4.00010-3.

built by creating the ability to absorb shocks and stresses, self-organise, learn and adapt, and transform in cases where change is overwhelmingly large[15].

Depending on the degree of variation from a reference condition, wetland management may enable the maintenance of ecological character through a range of interventions such as:

- Providing enabling ecological and social conditions for wetland functioning (such as hydrological connectivity, species and habitat conservation, maintenance of migration corridors, promoting wetland positive behaviour or sustainable livelihood interactions)
- Reducing threats on wetland ecological character (such as physical regime alteration, structural modification, introduction of alien material and species, unsustainable extraction and local climate change impacts)
- Remediation aimed at the removal or detoxification of contaminants, including the sources of degradation
- Rehabilitation actions that aim to reinstate a level of ecosystem functioning at degraded sites.
- Restoration to assist the recovery of an ecosystem that has been degraded, damaged or destroyed.

The section on implementing wise use discusses the actions needed at multiple levels and involving multiple sectors and stakeholders.

Ecosystem Approach

Wise use of wetlands is to be achieved through the application of Ecosystem Approach. Ecosystem Approach emerged as an effort to move the focus of conservation action from only on a few species to a higher level of organisation (such as ecosystems and landscapes) and addressing the issues of development, underpinning several drivers of adverse change.

The Convention on Biological Diversity (CBD) defines the Ecosystem Approach as the ***"strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way"***[16].

In 2000, the CBD adopted 12 complementary and interlinked principles to implement the Ecosystem Approach[17]. These principles, when read within the context of wise use definition, describe the ways in which wetlands

15. Brian Walker, C. S. Holling, Stephen R. Carpenter & Ann Kinzig (2004). Resilience, adaptability and transformability in social-ecological systems. Ecology and Society 9 (2), art5. https://doi.org/10.5751/ES-00650-090205.
16. The Convention on Biological Diversity (2000). Decision V/6. Ecosystem Approach, adopted at the 5th Meeting of the Conference of the Contracting Parties held between May 15 and 26, 2000 in Nairobi, Kenya. https://www.cbd.int/decision/cop?id=7148.
17. Id.

management for wise use should be designed and implemented along the following three central ideas:

- Adopting systems thinking for wetland management (Principles 3, 7, 8 and 9 of the CBD Ecosystem Approach)
- Managing for maintenance of wetland ecological character (Principles 5, 6 and 10 of the CBD Ecosystem Approach)
- Promoting decentralised and inclusive management within the economic context (Principles 1, 2, 4, 11, and 12 of CBD Ecosystem Approach)

PRINCIPLES OF ECOSYSTEM APPROACH

Principle 1: The objectives of management of land, water and living resources are a matter of societal choices.

Principle 2: Management should be decentralized to the lowest appropriate level.

Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context.

Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.

Principle 6: Ecosystem must be managed within the limits of their functioning.

Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.

Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.

Principle 9: Management must recognize the change is inevitable.

Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous, and local knowledge, innovations and practices.

Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Adopting Systems Thinking for Wetland Management

Systems thinking for wetland management requires taking into account interactions with adjacent and other ecosystems (Principle 3 of Ecosystem Approach), undertaking management at appropriate spatial and temporal scales (Principle 7 of Ecosystem Approach), and setting management objectives for the long term (Principle 8 of Ecosystem Approach), with a sound understanding that ecological change is inevitable (Principle 9 of Ecosystem Approach).

The condition of wetlands is closely linked to the land, water and resource management practices prevailing in their catchments and ecological corridors (such as flyways and swimways). Management practices in the catchment and coastal zones (such as the use of chemical fertilisers in agricultural fields) have a bearing on the condition of the wetland, and thereby, the two cannot be seen in isolation. Similarly, alteration in river flows can change the timing of water, sediment, and nutrient introduction to downstream wetlands, resulting in changes in biotic communities within the wetlands and their surrounding areas. Moreover, management interventions in transition zones between two or more ecosystem types may trigger spill-over or edge effects wherein both ecosystems are adversely impacted (such as a forest clearing activity within a wetland catchment may induce increased parasitism among wetland flora, thereby impacting the composition of native species). It is thereby pertinent to consider the interaction of wetland components with components of their adjoining and other ecosystems (Principle 3 of Ecosystem Approach).

Management for wise use should be undertaken at appropriate spatial and temporal scales (Principle 7 of Ecosystem Approach). The choice of these scales is often related to a particular wetland ecosystem component, process, and service, which is the focus of management. For example, managing the hydrological regimes of a wetland may require consideration of the river basin. Similarly, maintaining populations of migratory birds may require a consideration of the adjoining wetlands used as satellite wetlands for feeding, foraging, and nesting purposes within the migratory flyways. The impact of several management interventions, such as implementing environmental flows or managing invasive species, may not be immediate and only observable after a lag, thus requiring the adoption of a longer time frame.

Ecosystem processes in wetlands demonstrate considerable variations in temporal scales and lag effects (such as shifts in community dynamics governed by the loss, creation, or modification of new or existing habitat types). It is imperative that management objectives are set for the long term (Principle 8 of the Ecosystem Approach). This inherently conflicts with the tendency to favour short-term gains and immediate benefits over future benefits.

Wetland ecosystems are dynamic and undergo changes over time, including changes in species composition and population abundance. The

complex interactions between biotic components, abiotic components and resource users beset these ecosystems with potential surprises. The Ecosystem Approach must utilize adaptive management in order to anticipate and cater for such changes and events, and should be cautious in making any decision that may foreclose options, but, at the same time, consider mitigating actions to cope with long-term changes such as climate change. Any management intervention, at best, remains an experiment, monitoring and evaluation of which gives insight into the way ecosystems behave and respond to different drivers of change. The adaptive management principle encourages wetland managers to be open to assessment of the effectiveness of management interventions and practices and revise management when the desired objectives are not achieved (Principle 9 of the Ecosystem Approach).

Managing For Maintenance of Wetland Ecological Character

Wetland management must be targeted at the maintenance of ecological character (Principle 5 of Ecosystem Approach), by managing wetlands within the limits of their functioning (Principle 6 of Ecosystem Approach), and seeking an appropriate balance between, and integration of, conservation and use of wetlands (Principle 10 of Ecosystem Approach).

The ecological character of wetlands is underpinned by several dynamic relationships among biotic components, abiotic components, and resource users, such as:

- interactions within species (such as competition)
- interactions among species (such as predation)
- interactions between species and their abiotic environment (such as nutrient cycling)
- physical and chemical interactions within the environment (such as sedimentation, carbon cycling)
- interactions between people and species (such as resource harvest)
- interactions between people and abiotic environment (such as nutrient enrichment from agro practices)
- interactions within people for wetland ecosystems (such as community norms and practices related to wetland access and use)

Management of wetlands should strive to conserve and, where needed, reestablish these interactions guided by the reference condition rather than focus on a few or solitary ecological character elements (such as species population, water quality and others) (Principle 5 of Ecosystem Approach).

The limits of ecosystem functioning define conditions beyond which significant modifications in ecosystem components, processes and services lead to the breakdown of the ecosystem structure, causing the wetland to shift to a disturbed condition (such as a coastal wetland with

a natural salinity gradient shifting to freshwater conditions with reduced fish catch and high propensity of species invasion). Management should not jeopardise this limit (Principle 6 of the Ecosystem Approach). Wetland interventions should consider natural variability in ecosystem components and processes to preserve their standard structure, enabling normal functioning at all stages.

Wetlands are critical for their intrinsic value as well as a source of ecosystem services upon which society depends. Management must be flexible to acknowledge wetlands conservation and use in a societal context and apply full range of management interventions in a continuum from strictly protected (to provide options for wetland use in the future) to sustainably managed production systems (such as the use of wetland for culture fisheries) (Principle 10 of Ecosystem Approach).

Promoting a Decentralised and Inclusive Management Within the Economic Context

The objectives of wetland management are a matter of societal choice (Principle 1 of Ecosystem Approach). Wetland management should, therefore, strive to be decentralised (Principle 2 of Ecosystem Approach), incorporating all sorts of knowledge, innovation and practices (Principle 11 of the Ecosystem approach), involving all sectors of society (Principle 12 of ecosystem Approach) and based on the understanding of the economic context and recognition of potential gains from the management (Principle 4 of Ecosystem Approach).

Different sectors of society view wetlands in terms of their own economic, cultural, and social needs. Management should consider the views, values, and interests of local communities and other indigenous people, identifying them as essential stakeholders. Wetland management should factor in wetlands' intrinsic values, relational values, and instrumental values in a fair and equitable way (Principle 1 of Ecosystem Approach).

Wetland management is a multi-sectoral endeavour with many interactions, trade-offs, and implications. Therefore, it should involve all relevant sectors and stakeholders at local, national, regional, and international levels, factoring in their expertise while framing management objectives and actions (Principle 12 of the Ecosystem Approach).

Wetland management should be all-inclusive with equitable shares of responsibility, ownership, accountability, participation and use of local knowledge. Decentralised wetland management may thus lead to greater efficiency, effectiveness, and equity while providing opportunities for stakeholder involvement and balancing local interest with broader public interest (Principle 2 of Ecosystem Approach). A sound knowledge of ecosystem function and the impact of human use on wetlands functions is implicit in arriving at effective wetland management based on information from all sources. It is thereby recommended that all relevant information related to wetlands are shared with all stakeholders and taken into account in management decisions, and assumptions behind proposed

management are made explicit and checked against the available knowledge and views of the stakeholders (Principle 11 of Ecosystem Approach).

The greatest threat to wetlands lies in their conversion to alternate land use. This is often underpinned by market distortions that undervalue the role of wetland ecosystems and provide perverse incentives and subsidies to favour their conversion to alternate land use. Those who benefit from wetlands conservation often do not pay the cost associated with conservation. Similarly, those who generate environmental costs through environmental degradation escape responsibility (such as industries discharging effluents into wetlands). Wetland management must, therefore, strive to reduce market distortions that adversely impact wetlands (such as conversion to alternate land use), align incentives to promote wetlands-wise use (such as Green Credits) and internalise costs and benefits to the extent feasible (such as robust ESG reporting mechanism) (Principle 4 of Ecosystem Approach).

Sustainable Development

The phrase 'within the context of sustainable development' was included in the wise use definition to recognise that development, where inevitable, should be facilitated in sustainable ways. The definition clarifies that development is not or should not be the objective for every wetland.

> The United Nations World Commission on Environment and Development defines sustainable development as ***"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"***[18]***.***

In 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development as a blueprint for eliminating extreme poverty, reducing inequality, and protecting the planet[19]. At the heart of the 2030 Agenda are the five critical dimensions: people, prosperity, planet, partnership, and peace.

Development in and around wetlands (which may involve alteration in wetland ecological character) to fulfill a societal need (such as augmenting water supply, enhancing connectivity, or livelihood generation) has to be examined from the lens of maintenance of ecological character and the elements of sustainable development. For example, when a wetland hydrological regime regulation is inevitable for any reason, the operational rules of the infrastructure may be aligned with the natural hydrological regime of the wetland.

18. United Nations (1985). Our Common Future. Report of the World Commission on Environment and Development.
19. United Nations (2015). Transforming our world: the 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly on 25 September 2015.

THE 5Ps OF SUSTAINABLE DEVELOPMENT AGENDA 2030

People: A determination to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfill their potential in dignity and equality and in a healthy environment.

Planet: A determination to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations.

Prosperity: A determination to ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature.

Peace: A determination to foster peaceful, just and inclusive societies which are free from fear and violence.

Partnership: A determination to mobilize the means required to implement this Agenda through a revitalized Global Partnership for Sustainable Development, based on a spirit of strengthened global solidarity, focused in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.

Suchita Awasthi / Wetlands International South Asia

Distinguishing Between Wise and Unwise Use of Wetlands

The issue of distinguishing between wise and unwise use of wetlands often arises in the context of development projects. The wise use framework provides at least three sieves to be considered while examining such projects. These are:

- impacts on ecological character
- impacts on wetlands communities
- institutional basis of intervention design

A development intervention in and around wetlands will adversely impact the ecological character if:

A. a wetland ecosystem component and process is adversely impacted, such as:
   - water flowing into the wetlands is reduced
   - area under inundation or changes in inundation regime is reduced
   - natural shoreline is reduced or altered, wetlands are fragmented into small patches of water
   - water holding capacity is reduced
   - water quality is degraded
   - diversity of native species is reduced
   - invasive species are introduced
   - wetlands resources, such as fish, aquatic plants, and water, are harvested beyond their regenerative limits

B. natural ecosystem functioning is compromised, and limits of acceptable change are violated (such as a freshwater wetland is converted into a brackish water wetland, a wetland with pulsating water level is converted into a reservoir with stable water levels, or a shallow marsh is deepened into a water reservoir)

C. some ecosystem services (such as food production values) are enhanced while other ecosystem services (such as the ability of wetlands to moderate wetlands regime) are diminished

A development intervention in and around wetlands will stand to adversely impact the wetland communities if:

- poverty and hunger in wetland communities are exacerbated
- wetland degrading consumption and production practices are promoted
- harmonious relationship communities have with wetlands is disrupted
- justice and inclusivity among and of the wetland communities is not ensured

- the needs of poor and vulnerable are adversely impacted

The institutional design of the developmental project will not contribute towards wise use if:

- effects of interventions on wetland and other adjacent ecosystems are not factored in
- all relevant sectors and stakeholders are not consulted in the planning and implementation
- multiple sources of information and knowledge are not incorporated in decision-making
- management is not organised at appropriate spatial and temporal scales
- management objectives are not set for the long-term

Examples of Wetlands Wise Use

Wetland Agriculture in Kol Lands

Kol lands, spanning nearly 13,600 ha in Thrissur and Mallapuram Districts of Kerala are shallow agricultural wetlands formed on the floodplains of the Rivers Kechery, Puzakkal, Chalakudy, and Karuvannur. These shallow wetlands, located 0.5 to 1 m below mean sea level remain submerged for nearly six months in a year. Kol lands are a part of the Vembanad-Kol Wetland Complex designated as a Ramsar Site in 2002.

The alternate wetting and drying cycles enable Kol lands to act as a freshwater store and a flood buffer in the landscape. These wetlands have been used for rice cultivation and fish farming since the 18th century. Around 50,000 individual farmers organised into about 130 joint-farming

cooperative societies (*padasekharam* in Malayalam) own these wetlands. Rice cultivation in these wetlands starts with dewatering low-lying fields using pumps to channels around the farm embankments. Water regimes for multiple uses are ensured by coordinated lowering of water levels done in coordination by farming cooperatives using a traditional practice known as *Kootaima reeti*. Some cooperative societies follow a crop rotation in which fields are used for aquaculture when water levels are high (June to October) and later for rice cultivation. Fish is cultivated after paddy harvest when the fields are inundated. The productivity of agriculture is maintained by recycling of crop residues.

The diversity of habitats in Kol lands enables it to support as many as 167 species of birds, of which 81 are wetland-dependent and 53 are migratory. Surveys have also indicated the presence of 40 rotifers and 64 phytoplankton species.

Thus, traditional farming practices maintain the steady functioning of the Kol lands, which to date generate an annual income of INR 120 million in the form of 4.2 million working days. The wetland continues to be a biodiversity hot spot and an important flood buffer in the landscape.

The natural regimes of Kol lands have been modified over three decades through extensive channelisation. The current ecological character of Kol lands is defined by a water regime influenced by channels and surface inundation, agro-practices, and habitats suited for a range of species particularly, migratory waterbirds. Kol lands are a wetland wise use example as the agro-practices have not compromised the regulatory function of these wetlands as flood buffer and habitat provisioning services. The land use has largely remained stable over the last three decades. The behaviour of the Kol farmers is pro-nature and aligned with the maintenance of the wetland regime rather than seeking its conversion to short-term profitable options, such as housing.

Community Tourism In Mangalajodi

Mangalajodi is a small picturesque village located on the north-western fringe of Chilika, a Ramsar site in Odisha. Mangalajodi, once deriving livelihood from illegal waterbird hunting, presently sustains on community-managed wetland ecotourism venture.

A sharp decline in the number of waterbirds in the area, primarily due to poaching, stimulated various agencies to initiate a concerted effort to reverse the trend. Efforts were made to sensitise and engage people in conservation efforts, including promoting nature tourism as an additional livelihood.

The hydrological restoration of Chilika in 2000 also contributed to a rise in tourist footfall to Mangalajodi. The community has since been generating steady incomes from nature-tourism activities. Presently, the area is visited by 5,000 tourists each year and stands out as one of the popular destinations for watching migratory waterbirds. Apart from economic benefits, the initiative also improved habitat for migratory waterbirds. Mangalajodi now hosts more than 300,000 birds in the peak season

of November -December. It has been designated as an 'Important Bird Area' by Birdlife International as a significant global waterfowl habitat. The communities monitor the bird population, protect nests and eggs, coordinate with the Forest Department in management planning and implementation, assist in research, and take tourists around on birding trips.

Mangalajodi conforms to wetlands wise use, as the ecological character of the site is preserved through community-led action. Tourism here is conscious of the wetland regime and uses nature-friendly and almost noiseless country boats. It maintains a safe distance from bird habitats, keeps pollutants such as plastics at bay, and equitably distributes the revenues to the fisher groups.

Community-led Conservation in Vedanthangal Bird Sanctuary

Vedanthangal Bird Sanctuary, located in Chengalpattu District of Tamil Nadu, is a community-protected tank known for its large bird population. For nearly three centuries, the residents of the Vedanthangal Bird Sanctuary have protected and guarded the birds that visit the area. Vedanthangal was designated a Ramsar Site in 2022.

Vedanthangal form a part of the extensive network of tanks built in South India to harvest rainwater and sustain agriculture. Spanning about 40 ha, the Ramsar Site supports a rich waterbird population, both resident and migratory. During the 18th century, the local villagers obtained a prohibition on shooting rights from the first collector of the district, recognising their right to protect the nesting colony of the birds from hunters. The efforts have been underpinned by the benefits that farmers of the area receive, not only for water for irrigation but also in terms of enhanced agricultural yields contributed by the nutrient-rich bird droppings in the wetland. The realisation of this symbiotic relationship between a healthy wetland, bird population, and agriculture is the basis of wise use in this Ramsar Site.

Examples of Unwise Use of Wetlands

Aquaculture in Kolleru

Kolleru, a Ramsar Site in Andhra Pradesh, located between the deltas of Rivers Krishna and Godavari accommodates flood waters of the two rivers, while sustaining agriculture and fisheries. The wetland was once famous for having the country's largest breeding population of Spot-billed Pelicans. The core area of the Ramsar Site was declared as a wildlife Sanctuary in 1999, while the Ramsar Site designation took place in 2002.

Situated amidst the deltaic floodplains, this wetland benefits from nutrient-rich sediments that sustain both fisheries and agriculture. Throughout history, the Vaddi and Dalit communities have relied on Kolleru for capture fisheries and traditional farming practices. However, the introduction of pisciculture in the 1970s aimed to support livelihoods dependent on the wetland. Unfortunately, this move limited the ability of

local communities to afford necessary resources and manage fish ponds with their limited means. Consequently, private aquaculture entrepreneurs entered the scene. As a result, the wetland transformed into the country's hub for freshwater aquaculture. This shift led to increased encroachment for aquaculture purposes, meeting the growing demand for fish and shrimp products.

Kolleru was further adversely impacted by the dumping of contaminated water containing pesticides, fertilizers, and sewage from nearby towns, construction of fish tanks, unauthorized bridges and embankments, encroachments, and silt deposition, including the construction of 140 km of roads within the wetland. These actions deprive the original owners of their traditional rights, reducing them to mere labourers within the aquaculture ponds. The consequences include a significant reduction in water-holding capacity and habitat deterioration for pelicans.

In 2005, the Supreme Court of India, acting on a petition filed on illegal aquaculture in Kolleru, ordered the complete demolition of fish farms. By this time, the annual aquaculture economy was estimated worth INR 7,000 million. The cost of ecological restoration in 2008 was estimated to be more than INR 10,000 million. After a brief lull in aquaculture within the sanctuary post-demolition, the activity has again intensified both within and in the peripheral regions of the Sanctuary. The aquaculture farmers have contested the current boundaries of the sanctuary and moved petitions to reduce the sanctuary area so that more areas could be used for agriculture.

The case of Kolleru exemplifies unwise use of wetland as the natural hydrological regime were transformed to support aquaculture, thus compromising the wetland's ability to perform other ecosystem services and support biodiversity habitats. The wetland transformation has also led to conflicts between traditional fishers and aquaculture farmers.

Regulation of Loktak for Hydropower

The floodplain wetlands of River Manipur, known as the Loktak Lake Complex (including Loktak, Pumlen, Ikop, and Kharung), are the lifeline of Manipur. The ecological and livelihood security of the communities is inextricably linked to the ecosystem services derived from the wetland system, which is spread over 469 km^2 within a basin of 6,872 km^2. These are the largest source of fish, edible plants and freshwater for the state. Loktak Lake, the largest wetland of the complex, provides water for 105 MW hydropower generation, the single largest source for the power deficit in the northeastern region. *Phumdi*, floating heterogeneous masses of over 70 species of plants, soil and organic matter at various stages of decomposition, are a characteristic feature of the lake. The southern portion of Loktak forms the Keibul Lamjao National Park (KLNP). It comprises a continuous mass of floating *phumdis* occupying an area of 40 km^2 and the natural habitat of globally endangered ungulate *Rucervus eldii*, locally called Sangai Deer. Based on its high ecological and socio-economic importance, Loktak was designated as a Ramsar Site in 1990.

In 1984, the waters of Loktak Lake were regulated by constructing the Ithai barrage downstream of the wetland to enable hydropower generation. The barrage converted a naturally fluctuating wetland into a reservoir, leading to inundation of peripheral areas, loss of migratory fisheries, reduction and degradation of national park habitat, and decline in water quality. Rapid population growth in the hills has led to expansion in areas under shifting cultivation, enhancing lake siltation and loss of flood attenuation capacity. High levels of urbanisation within the upstream reaches with inadequate sewerage systems have led to the dumping of untreated sewage and sewerage into the lake, leading to a decline in water quality. Inundation of peripheral areas due to constant water levels forced an occupation shift from traditional agriculture-fisheries based livelihood systems to fisheries. Declining resource base with increasing population pressure forced the propagation of harmful fishing practices,

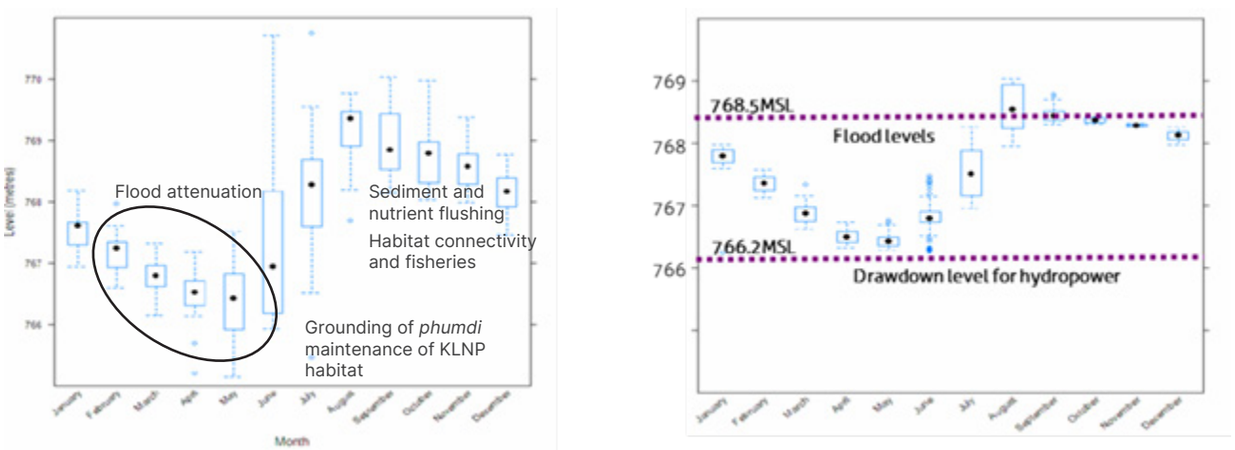


Figure 4: Changes in water level before (1955–56) and after operationalization of Ithai Barrage (2000–2003)

ultimately leading to *phumdi* proliferation and choking of the central sector of the lake.

The use of Loktak for hydropower generation represents unwise use as it modified the wetland's ecological character and led to the inclusion of the Ramsar Site in the Montreux Record. Substantive changes in livelihood systems induced by changes in the inundation regime have been iniquitous, adversely impacting local livelihoods. The habitat of Sangai has also been adversely affected by this development. Recently, concerned about the declining health of the Ramsar Site, the MoEF&CC has approved the implementation of an alternate water allocation plan for Loktak, which would allow mimicking the natural hydrological regime of the wetland, benefitting KLNP habitats.

An Implementation Framework for Wetland Wise Use

Maintaining wetlands ecological character hinges on the alignment of developmental activities taking place within the wetlands and the river basin and coastal zone wherein the wetland is located. Thus, achieving wetland wise use requires multi-level (such as wetland site, river basin/ coastal zone, district, state and national) and multi-sectoral (such as wetlands, infrastructure, disaster, tourism, among others) actions. These actions can range from:

- Direct implementation involving interventions within the wetland and its river basin and coastal zone
- Policy and regulations related to wetlands and different sectors that have a bearing on wetland functioning
- Enabling environment, which supports effective implementation of policy and regulation such as science, knowledge, capacity, participation, planning processes, awareness, and outreach

An illustrative list of actions at different levels for wetland-wise use is presented in Table 1.

Table 1: Suggested list of actions for wetlands wise use at various levels

Type of Actions		
Management Actions	**Policy and Regulations**	**Enablers (Science, Knowledge, Capacity, Participation, Awareness, Outreach)**
Wetland/ Wetland Complex		
Zonation to account for multiple land and resource use within wetland and its zone of influence Actions to enable wetland functioning (such as maintaining hydrological connectivity with rivers, associated wetlands and coastal zones, conserving species and habitat, conserving species migration corridors) Harmonising livelihood practices with wetlands functions (such as capture fisheries practices, nature tourism, wetland biomass extraction within regenerative limits, and sustainable agro-practices) Actions to address threats on wetlands (such as alteration of physical regime, structural modification, Introduction of non-native and external material, unsustainable extraction) Actions to create opportunities to incentivise wetland stewardship (such as promoting nature tourism, and promoting local enterprises linked with wetlands)	Notification of Wetlands under extant Rules Constitution of Wetland Mitra network Creation of multi-stakeholder platform to support wetland management	Developing a management plan with stakeholder participation Communication, education, and outreach programmes for stakeholders to promote wetland positive behaviour Design and implement research programmes to support wetland management (such as research on key ecosystem processes and multiple values of wetlands) Actions to support adaptive management (such as monitoring of wetland health, and management effectiveness evaluation) Capacity development of stakeholders to manage wetlands for wise use Support developing/ strengthening informal community conventions and norms
Basin/Coastal Zone		
Actions to enable wetland functioning (such as ensuring environmental flows, maintenance of migration corridors, and aligning catchment land and water use with wetland functioning)	Including wetlands within regulations for coastal zone, river floodplains and others Including wetland managers in basin-level planning and management organisations	Integrating wetlands within river basin and coastal zone management plans Developing basin scale inventory of wetlands and prioritisation for management

Type of Actions		
Management Actions	**Policy and Regulations**	**Enablers (Science, Knowledge, Capacity, Participation, Awareness, Outreach)**
Actions to address threats on wetlands (such as changes to natural hydrological regimes, and pollution)	Environmental Impact Assessments of river basin and coastal zone development projects on wetlands	Developing knowledge systems to support the integration of wetlands in the management of river basins and coastal zones (such as wetland functions with reference to river basin/coastal zone management) Capacity development of river basin and coastal zone managers on wetland management Communication, education, and outreach programmes for stakeholders to promote wetland positive behaviour Support development/ strengthening informal community conventions and norms
	District	
	Constitution of District Wetland Committees as a mechanism for inter-sectoral coordination and resource convergence Integrating wetlands within district level revenue records	Integrating wetlands in district development and sectoral plans, programmes and investments (such as district disaster management plans, district-level tourism and developmental plans)
	Environmental Impact Assessments of river basin and coastal zone development projects on wetlands	Developing district-level inventory of wetlands Capacity development of district-level sector managers on integration of wetlands in development and sectoral plans Communication, education, and outreach programmes for stakeholders to promote wetland positive behaviour

Type of Actions		
Management Actions	**Policy and Regulations**	**Enablers (Science, Knowledge, Capacity, Participation, Awareness, Outreach)**
State		
	Constitution of State/UT Wetlands Authority as nodal agency for planning and implementation of wetland management and conservation in coordination with line departments Ensuring availability of funds for wetlands conservation and management through sectoral plans and programmes Integrating wetlands within land records	Integrating wetlands in state development and sectoral plans, programmes and investments (such as disaster management plans, tourism and environmental plans) Developing state-level inventory of wetlands Capacity development of line department officials on the integration of wetlands in development and sectoral plans Communication, education, and outreach programmes for stakeholders to promote wetland positive behaviour
National		
	Ensure implementation of Wetlands (Conservation & Management) Rules, 2017 Embedding wetland targets within National Policies (such as climate change, biodiversity, wildlife, forest, water, tourism, disaster management, rural development) Fulfilling national wetlands related commitments under various MEAs (such as Ramsar Convention, CBD, CMS, UNCCD)	Building capacities of stakeholders entrusted with the preparation of development and action plans on integrated wetlands management

In Summation

The three building blocks of wise use concept clarify the overall purpose (maintaining ecological character) and management approaches needed. The management approaches provide guidance on human interactions, ecosystem components and processes, institutions, and governance arrangements. These are illustrated in the figure below.

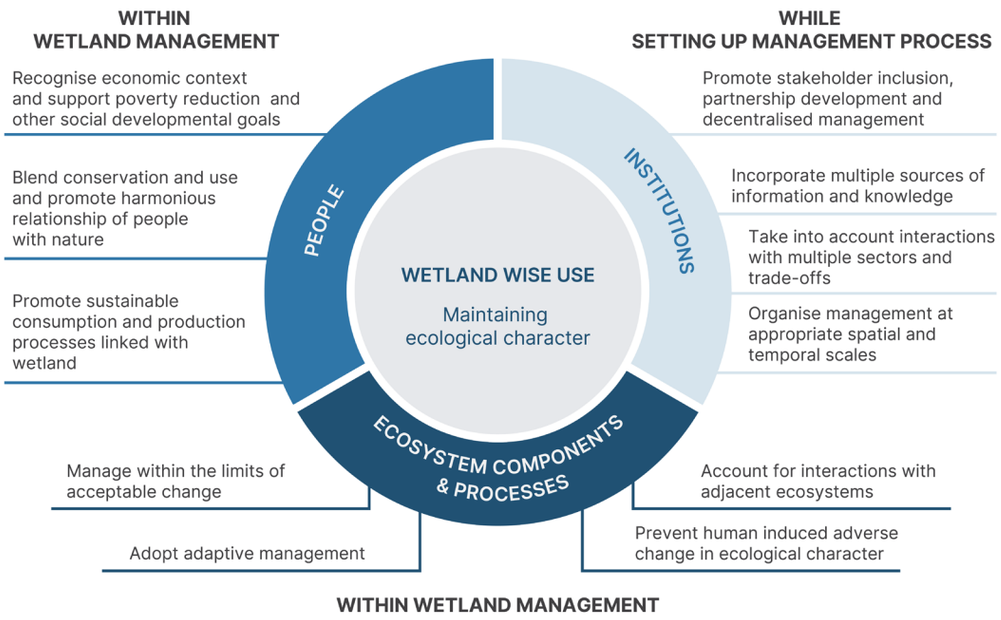


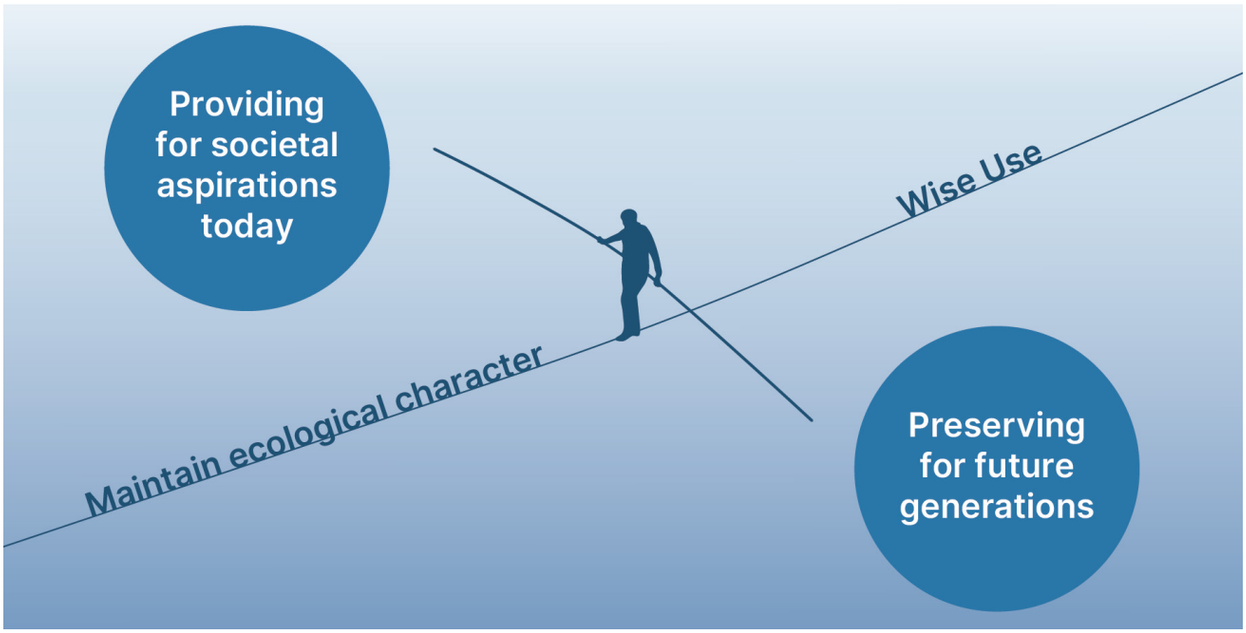
Figure 3: The three building blocks of wetland wise use

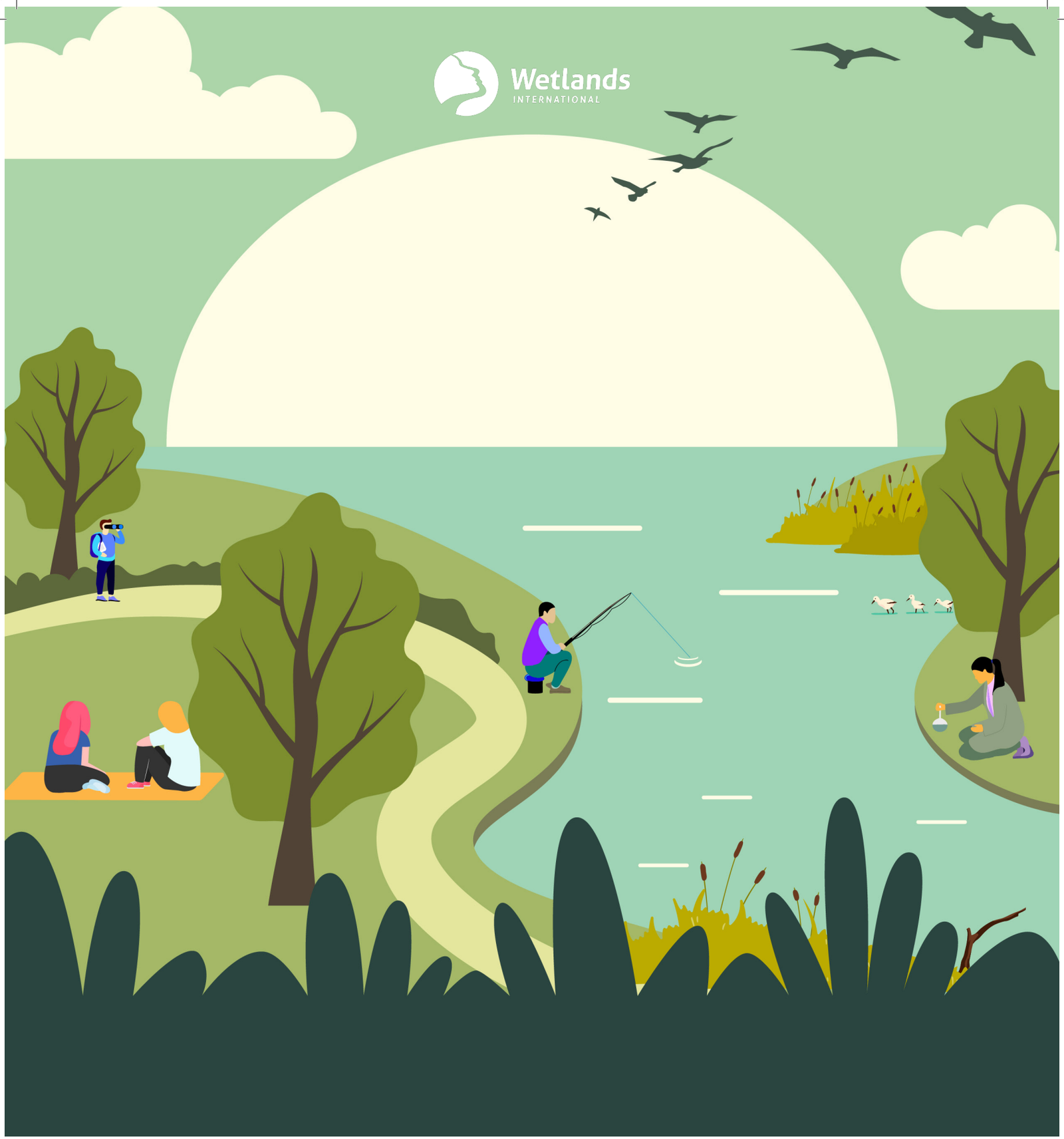
Wise use is not just about the use of wetlands at present. When seen from the lens of Sustainable Development, wise use is also about maintaining the potential use of wetlands in the future. The pathways to wise use may, thus, include a continuum of strategies, at one end of which is complete protection and prohibition of any current use, the other end being sustainable use that does not adversely impact biodiversity or provision of ecosystem services now or in the future.

Wise use is context-dependent. What is wise use in one setting may be unwise in others. Thereby, a general prescription cannot be applicable to all wetlands; rather wise use should be applied based on high-level approaches and guidance.

Wetlands are dynamic and require a range of natural variations or disturbances to maintain resilience (for example, seasonal and inter-annual variability of inflows influence the production and persistence

of many wetland species). Traditional human uses of wetlands (such as subsistence-level fishing, navigation, or harvest of wetlands plants) may thus act as a source of disturbance needed to maintain wetland ecosystem resilience. The wise use concept, thus allows for integrating human use of wetlands in the wetland management, within the frame of ecosystem approaches and sustainable development.





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