

Wetland Restoration, Conservation and Management Strategies

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Wetland are defined as "Lands transitional between terrestrial and aquatic ecosystem where the water table is usually at or near the surface of the land it's covered by shallow water. Depending on the climate, soil, vegetation, hydrology, chemistry, and human disturbance they vary widely.

Wetlands are frequently called as "nurseries of life". And thus thousands of species of aquatic and terrestrial plants and animals find their habitat in wetlands. Although they also provide important habitat for waterfowl, fish, and mammals, wetlands are best known for being home to water lilies, turtles, frogs, snakes, alligators, and crocodiles. Wetlands are used by migratory birds as both breeding locations and places to stop and eat when traveling across continents. Therefore, the loss of wetlands has a significant effect on these species. Approximately 6% of the world's geographical surface is made up of wetland habitats (Turner, 1991). They are regarded as one of the most endangered of all the significant natural habitats, and it is suggested that their conservation should be given top priority. The main issues affecting wetlands are alien species invasion, unsustainable harvesting of wetlands and associated ecosystem products, overgrazing, water and industrial pollution, excessive pesticide usage draining into nearby streams, and discharge of industrial effluents. Through land reclamation, pollution, and hydrological changes, 30% to 90% of all wetlands worldwide are in danger of being destroyed, severely altered, or both (Abramovitz, 1996; Moser et al., 1996). Invasions of exotic species and extinctions of native or endemic species are both consequences of the consequent losses of habitat variability, biodiversity, and ecosystem services

(Batzer & Sharitz, 2014; Moser et al., 1996; Ramsar, 2013).

Wetlands are essential for ecosystem function, human survival and economic prosperity, as well as the support of life on Earth. Because they provide food, fuel, fodder, and water for home, irrigational, and industrial uses, wetlands are among the most productive life support systems on earth and are of enormous socioeconomic value (Kaul, 2003). If regulated and utilized effectively, they are essential for reducing poverty. Wetlands serve as sinks for, and converters of, a wide range of chemical, biological, and genetic elements. Because of the roles they play in the hydrologic and chemical cycles and as downstream recipients of wastes from both natural and human sources, wetlands are frequently referred to as "the kidneys of the landscapes." They clean polluted waters, prevent floods and recharge ground water aquifers (Anon, 2005).

Characteristics of wetland

- ✓ Present and predominance of hydraulic soils.
- ✓ Area inundated are unsaturated by surface or ground water for a considerable period.
- ✓ Prevalence of hydrophilic Vegetation

Values of wetland

- ✓ The biosphere's most prolific ecosystem, wetland ecosystems are the equivalent of tropical evergreen forests and play a big part in the region's ecology's sustainability today.
- ✓ They are a vital component of human civilization and help to meet many important needs for life on earth, including the production of protein, drinking water, energy,

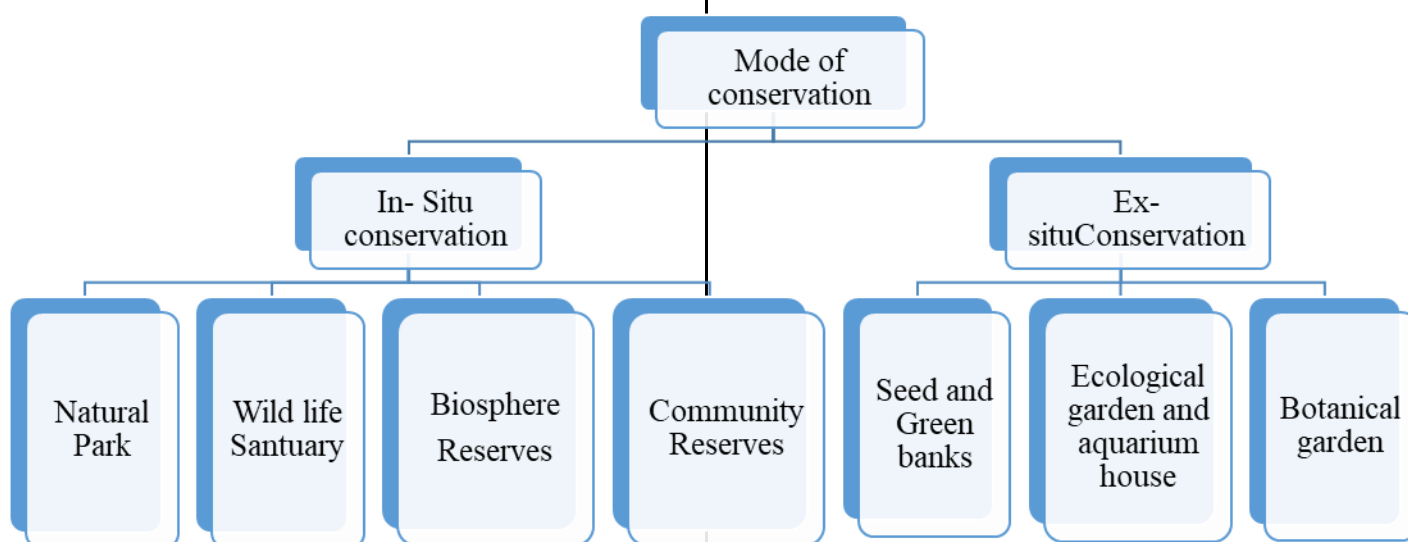
biodiversity, flood control, transportation, recreation, research, and education.

- ✓ Water supply, fisheries, agricultural goods, energy sources, transportation of wildlife resources, recreation, and tourism are just a few of the direct economic advantages that support a wide variety of flora, fauna, and cultural legacy.
- ✓ Wetland ecosystems can not only provide indirect services for humans but also play an indispensable role in controlling the global temperature, managing global hydrological cycles, safeguarding ecosystem diversity, and promoting global wellbeing.

disappeared wetland through ecological technology and ecological engineering.

In order for the primitive wetland to benefit from its own self-recovery activity, it is important to respect the natural characteristics of the wetland ecosystem during the restoration process and avoid interfering too much with it.

Restoration is a process that helps to transform an area that has been impacted by human or natural activity to an area that can sustain native habitats. It takes time and knowledge to restore a region, which is an extensive procedure. Understanding a place's past and how it changed over time will aid in deciding how to repair it. If the



Restoration

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Why we need to do Restoration?

Wetland restoration mainly include the restoration or reconstruction of degraded or

ecology can regain its natural dynamics, that is progress. Ecosystems cannot be exactly restored because change occurs naturally. There are different types of wetlands that require different strategies.

Wetland restoration involves taking efforts to restore a former or degraded wetland's physical, chemical, or biological characteristics to return its natural functions.

To carry out this restoration, there are four basic steps:

Step 1: Treatment of invasive species

Step 2: Placement of clean sand and sediment

Step 3: Seeding and planting

Step 4: Maintenance and monitoring

Principle of the restoration

- ✓ Preserve and protect aquatic resources
- ✓ Restore ecological integrity
- ✓ Restore natural structure
- ✓ Design for self-sustainability
- ✓ Restore native species and avoid non-native species.
- ✓ Monitor and adopt where changes are necessary
- ✓ Involve a multi-disciplinary team
- ✓ Develop clear, achievable and measurable goal
- ✓ Address on going causes of degradation
- ✓ Understand the potential of the watershed.

Conservation and Management of Wetlands:

The protection, preservation, propagation, and wise population control of rare plant and animal species in their natural habitats are the main goals of conservation, which can be accomplished by intelligent explosion of nature while preserving all of its biological and physical components in their purest forms as well as Particulate.

Objectives of conservation

- ✓ To study the interrelationship of animals and plants in their natural habitat.
- ✓ For protecting and preserving the rare species of plants and animals from extinction.
- ✓ To preserve the breeding stock of wildlife.
- ✓ To prevent deforestation and water loss.
- ✓ To maintain the balance of nature and their biodiversity.

- ✓ For maintaining the Food Chain and food web of animals.

Mode of conservation

The conservation of wetland can be carried out in following five aspects

Management and Policy

- ✓ Wetland area limits can be set up to limit the impact on wetland area, in order to control the total area of wetland strictly.
- ✓ Protected area are the most effective way to protect the wetlands e.g. Ramsar Sites.
- ✓ Nature reserves can be set up in the region where national wetland protected or distributed rare and endangered species are concentrated.
- ✓ Wetland Park can be built in the area where wetland with resource need to be both protected and rationally utilized.

Monitoring

- ✓ Dynamic monitoring system is essential to wetland management and conservation.
- ✓ Remote sensing and field observation can be used to conduct monitoring.

Restoration

- ✓ The measurement that can be put into place is to scientifically forbid the harvesting of biological processes or resources, and emphasis should be given to the restoration of wetlands with ecological protection objectives like migratory bird habitat and habitat for rare and endangered birds.

Knowledge

- ✓ The public's understanding of wetland resources and resource distress must be strengthened via education, and wetland protection must be expanded to encompass all of the world's residents.

- ✓ It can be carried out in the following manner:
Launch wetland Protection celebrated on world wetland day, Birds week, and wildlife protection month etc.

Funding

- ✓ The prerequisite for the above-mentioned effort to succeed is ensuring the source of funds. The funding source may include public donations, government or nonprofit support, ecological compensation from the influence of wetlands on the local environment, etc.

Policy interventions required in order to conservation ecosystems – wetlands are:

- Carrying capacity studies of all macrocities
- Boundary demarcation of water bodies
- Bathymetry of water-bodies
- Holistic and Integrated Approaches – Conservation and Management
- Biodiversity Documentation
- Floods mitigation
- Preparation of management plans for individual water bodies
- Implementation of sanitation facilities
- Restoration of lakes
- Riparian and buffer zone vegetation's protection
- Restoration of linkages between water bodies
- Harvesting of rainwater
- Environmental Education

Management of wetland

Wetland status is not defined by any one administrative jurisdiction. The "Ministry of the Environment and Forest" is in charge of managing these ecosystems on a primary basis.

The management strategies should protect wetlands by controlling inputs, use water quality standards (WQS) to promote normal functioning of wetlands and other inland surface waters from an ecosystem perspective, and still derive economic benefits from sustainable use.

When dealing with such common resources, some of the important factors to be considered for developing a management strategy are described below.

- ✓ This makes it critical to compile a database of information on the different types of wetlands, their morphology, hydrology, and biodiversity, as well as information on land use, hydrogeology, surface water quality, and socioeconomic reliance. Such a database would show the load that these systems are under in the specific situation.
- ✓ Involve institutions, colleges, and regulatory organizations in routinely monitoring the water quality of biological, groundwater, and surface water samples. Such initiatives assist in giving technical assistance and information that improves our understanding of these systems and helps us create all-encompassing restoration, conservation, and management plans.

Development of a water quality database, accessible to all users, for analysing and disseminating information. This can be achieved through:

- ✓ Providing spatial, temporal, and non-spatial water quality database systems;
- ✓ Updating technical guidance and water quality maps at regular intervals and indicating quality determinant parameters;

- ✓ Analyzing and discussing case studies of water quality issues.

Wetland function could be restored by establishing buffer zones to safeguard them and restricting human activity along the wetland's designated corridor. The following factors determine what constitutes an appropriate buffer zone size to safeguard wetlands and other aquatic resources:

- ✓ Identifying the functional values by evaluating resources generated by wetlands in terms of their economic costs
- ✓ Identifying the magnitude and the source of disturbance, adjacent land use, and project the possible impact of such stress in the long term,
- ✓ Identifying catchment characteristics-vegetation density and structural complexity, soil condition and factors.

Reference

Abramovitz, J. N. (1996). Imperiled waters impoverished future: The decline of freshwater ecosystems. Paper 128. Worldwatch Institute.

Anon. 2005. Introduction to Wetlands. In Selected Readings on Wetlands and Coastal Habitat Management. Wildlife Institute of India, Dehradun, India.

Batzer, D. P., & Sharitz, R. R. (2014). Ecology of freshwater and estuarine wetlands (2nd ed.). University of California Press.

Casazza, M. L., McDuie, F., Jones, S., Lorenz, A. A., Overton, C. T., Yee, J., Thorne, K. M. (2021). Waterfowl use of wetland habitats informs wetland restoration designs for multi-species benefits. *Journal of Applied Ecology*, 58(9), 1910–1920.

Kaul, S. 2003. Wetland Conservation and Management: A National Perspective. In Chilika Vol. 4. Chilika Development Authority and Wetland International South Asia. Orissa, India.

Moser, M., Prentice, C., & Frazier, S. (1996). A global overview of wetland loss and degradation. In Proceedings of the 6th Meeting of the Conference of Contracting Parties (pp. 21–31). Ramsar Convention Bureau.

Poudel, B. S. (2009). Wetland conservation in Nepal: policies, practices, problems and possibilities. *Banko Janakari*, 5-9.

Turner, K. 1991. Economics and Wetland Management. *Ambio* 20, 59-63.

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