

Wetland Conservation and Its Importance – An Overview

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Abstract

Wetlands cover an estimated 4 to 6% of the world's land and are critical ecosystems that support life on Earth. In India, wetlands span approximately 58.2 million hectares and are vital reservoirs of aquatic biodiversity. The country's diverse ecoclimatic conditions have given rise to a wide range of wetland systems, from the high-altitude cold-desert wetlands of the Himalayas to the hot and humid coastal wetlands, each supporting rich and unique flora and fauna. Wetlands are not only essential for sustaining biodiversity but also among the most productive ecosystems on Earth, offering numerous services to human society. These ecosystems provide critical functions such as carbon storage, flood control, biodiversity conservation, fish production, and groundwater recharge. Their services have far-reaching global implications, earning wetlands recognition as biodiversity hotspots and essential components of frontier forests.

Keywords: Productive ecosystem, Anthropogenic impacts, ecosystem service, wetland conservation

Introduction

The Ramsar Convention Secretariat (2013:1) defines wetlands as "a wide variety of habitats, including marshes, peatlands, floodplains, rivers, lakes, and coastal areas such as salt marshes, mangroves, and seagrass beds. They also encompass coral reefs and other marine areas no deeper than six meters at low tide, as well as human-made wetlands like wastewater treatment ponds and reservoirs" (Demissie et al., 2015).

According to Mitsch and Gosselink (2000), wetlands are estimated to cover about 4 to 6% of the world's surface. These ecosystems are typically found in flat terrains, such as river basins, ranging from headwaters to floodplains and coastal zones. However, wetlands can also develop in steeper landscapes as groundwater discharge points. Groundwater-fed wetlands in hilly areas create valuable and unique habitats within otherwise upland environments.



A significant portion of the freshwater used by humans is derived from groundwater and surface water sources, including lakes, rivers, and wetlands. As such, wetlands play a critical role in determining both the quantity and quality of freshwater available for human use (Shewaye, 2008).

Importance of wetlands

Wetlands provide numerous benefits to human society, which can be grouped into four main categories: provisioning, regulating, supporting, and cultural services, as defined by the Millennium Ecosystem Assessment (MEA, 2005). These benefits encompass a wide range of ecological, economic, and cultural functions:

1. Wetlands deliver essential ecosystem services such as carbon storage, flood control, biodiversity conservation, fish production, and aquifer recharge, all of which have significant global implications (Keddy et al., 2009).
2. They stabilize shorelines by retaining sediment and reducing erosion.
3. Acting as natural filters, wetlands help improve water quality.
4. Wetlands function as carbon sinks, with profound importance for mitigating climate change. For instance, global peatlands are estimated to store between 400 and 500 gigatons (Gt) of carbon (Roulet, 2000).
5. As critical components of watersheds, wetlands are essential for ecosystem sustainability. The destruction or degradation of headwater wetlands can severely impact the health and productivity of downstream streams, lakes, and rivers (Keddy et al., 2009).
6. Wetlands play a key role in flood control by storing large volumes of water. For example, restoring wetlands in the upper Mississippi River Basin could have reduced the impact of the 1993 floods in the US Midwest (Hey and Philippi, 1995).
7. Wetlands sustain biodiversity by providing habitats for numerous plant and animal species. The Amazon alone supports over 2,000 fish species, and wetlands are vital for African savanna mammals during dry periods (Keddy, 2000).
8. Wetlands are integral to the landscape, functioning independently of human presence. Unlike human-based systems such as modern agriculture or industrial activity—which are often resource-depleting and short-lived—wetlands have the potential to provide sustainable ecosystem functions over a very long time (Mitsch and Gosselink, 2000).



9. While the importance of wetlands for fish and wildlife protection has been recognized for over a century, other benefits, such as their role in global ecosystem productivity, have been identified more recently. Wetlands are among the most vital and productive ecosystems on Earth (Turner et al., 2000; Mitsch and Gosselink, 2007). However, they are under increasing pressure globally.
10. Wetlands also produce valuable consumer goods, including fish, shellfish, cranberries, blueberries, rice, timber, and medicinal plants. For example, shrimp production in the Gulf of Mexico is closely linked to the area of salt marshes (Turner, 1977).

Collectively, these functions highlight the immense ecological and economic importance of wetlands, emphasizing the urgent need for their conservation and sustainable management.

Major Threats

1. Anthropogenic impacts on wetlands

- The growing human population and the shift from subsistence use to commercial exploitation of wetland resources have placed increasing pressure on these limited ecosystems. This has led to a decline in the quality and quantity of wetland-derived services and products (Ramachandra, 2001). In recent years, the commercially driven and economically exploitative attitudes of society have further stressed wetlands, often resulting in the disruption of their natural functions and, in some cases, their alteration, destruction, or complete disappearance (Adams, 1993; Ramachandra, 2001).
- The loss of wetland systems, often due to urbanization or other human activities, typically degrades the quality of nearby water bodies, such as lakes. Wetlands are also critical feeding and breeding grounds for wildlife and serve as stopover sites and refuges for waterfowl. Like all natural habitats, wetlands play a vital role in supporting species diversity and encompass a wide range of ecological and societal values.

2. Human development and degradation of wetland resources

- The increasing population, along with rapid urbanization and industrialization, has exerted significant environmental pressure on wetlands, leading to a sharp decline in the benefits they provide. Wetlands are among the most productive ecosystems on Earth, far surpassing many of the alternative uses they are often subjected to (Ramsar Convention Secretariat, 2013; Abebe and Gebeh, 2003). However, wetland destruction

and alteration continue to be viewed, even at governmental levels, as a sign of progress and development. This misunderstanding of their true value has made wetland loss an escalating environmental crisis (Abebe and Gebeh, 2003).

- Infertile wetlands, in particular, are likely to be more vulnerable to human disturbances (Moore, 1989). Additionally, human populations continue to cluster in coastal regions and along shorelines, putting coastal wetlands at increasing risk. As population growth and settlement intensify in these areas, the future of coastal wetlands becomes ever more precarious. Many coastal wetlands in the Western Hemisphere have already been lost due to human activity. In regions like Latin America and the Caribbean Basin, pressures on the coastal zone represent some of the most critical challenges for natural resource management.
- Urban flooding further compounds these issues, resulting from the rapid accumulation or runoff of water, leading to property damage and the loss of both human and ecological life (Ramachandra, 2012).

3. Other factors

- The loss and degradation of wetlands are driven by several factors, including the diversion and damming of river flows, which disconnect floodplain wetlands from natural flood cycles. Other contributing factors include eutrophication, contamination, overgrazing, harvesting of plants and animals, global warming, invasive species, and practices such as filling, diking, and draining.
- In arid regions, irrigated agriculture competes directly with wetlands for water resources. Eutrophication is widespread, and when combined with the impact of invasive species, it significantly reduces biological diversity and ecosystem complexity.

Why we wish to protect nature

Wetlands are often referred to as the “kidneys of the landscape” due to their critical role in filtering and maintaining ecosystem health. In India, wetlands cover approximately 58.2 million hectares, including areas used for wet paddy cultivation (Directory of Indian Wetlands). Most inland wetlands are directly or indirectly connected to major river systems, such as the Ganga, Brahmaputra, Narmada, Godavari, Krishna, Kaveri, and Tapti.

Like any natural habitat, wetlands play a vital role in supporting species diversity and possess a wide range of ecological values (Prasad et al., 2002). Interestingly, infertile wetlands tend to have greater species richness and support many more rare species compared to fertile wetlands. Furthermore, due to the greater variation in vegetation types, infertile wetlands require larger ecological reserves to adequately capture and represent their ecological diversity (Moore, 1989).

Conservation of Wetlands

- A.** Conserving wetlands remains particularly challenging due to the growing demand for freshwater by human communities, industries, and agriculture. Without effective conservation actions, threat mitigation, rigorous risk assessments, and a greater recognition of the value of wetland ecosystem services, wetland conservation will continue to fall behind other conservation efforts in protecting Earth's biodiversity (Kingsford et al., 2016).
- B.** Wetland conservation must prioritize identifying key areas for biodiversity protection and securing legal safeguards, such as Ramsar listings. Recognizing and conserving wetland biodiversity hotspots should be a priority, with a focus on protecting natural flow regimes. Additionally, addressing threats such as pollution, overharvesting, invasive species, and disease is crucial for effective conservation.
- C.** Wetlands are among the most valuable ecosystems on Earth. With their diverse array of plants, animals, and microorganisms, wetlands play a vital role in conserving global biodiversity. Sustainable conservation and management of wetlands can significantly contribute to achieving the 17 Sustainable Development Goals (SDGs) outlined by the United Nations, directly or indirectly supporting 75 out of 230 SDG indicators (Naser et al., 2021).
- D.** Wetlands continue to face widespread destruction, largely due to a lack of understanding about their importance. Research shows that maintaining healthy and visually appealing ecological landscapes can increase public awareness about the need to protect natural resources, thereby fostering wetland conservation (Lee-Hsueh Lee, 2017).
- E.** Coastal wetlands serve as “natural and nature-based” solutions, reducing the impacts of natural disasters by protecting coastal communities from storms and erosion and

absorbing floodwaters. These wetlands should be integral to strategies for disaster risk reduction and recovery. Research priorities and the inclusion of wetlands in coastal community planning for disaster response and recovery are essential for maximizing their protective benefits (Grier and Sandifer, 2019).

- F. Despite growing awareness of the need to conserve wetlands, their loss continues unabated (Abebe and Gebeh, 2003). In addition to fishing, wetlands support agriculture, transhumance herding of livestock, and the hunting of wild herbivores that migrate in response to seasonal flooding patterns.

Conclusion

The value of the world's wetlands is gaining more recognition due to their significant contribution to a healthy environment. Wetlands are valuable because their functions are beneficial to humans. In some cases, the value of wetlands increases with human development, such as agriculture and urbanization, due to greater use and/or increased scarcity. To improve wetland areas and their condition, it is essential to both reduce the rate of wetland loss and increase restoration efforts.

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