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Wetlands: Nature's Lifeline for a Sustainable Earth

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Abstract

Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. "Wetland" comes from wetness or humidity, a term that does not necessarily refer to a body of water that floods a particular piece of land. It means something more subtle, referring to the link between water and land. This link is not always visible but is critical to balance various terrestrial ecosystems. Water saturation largely determines how the soil develops and the types of plant and animal communities living in and on the soil. Wetlands may support both aquatic and terrestrial species. The prolonged presence of water creates conditions that favour the growth of specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils.

Wetlands are essential for key municipal functions, naturally purifying water, controlling floods and supplying sustainable fresh water. They foster economic and livelihood activities like tourism, fisheries, and agriculture, contributing to the overall prosperity of communities around the globe. Based on their central life-sustaining role for so many communities, wetlands are cherished by communities worldwide, enhancing social well-being, offering recreational opportunities, holding deep cultural and spiritual significance, and fostering community well-being and resilience.

Keywords: Terrestrial, ecosystem, hydrophytes, wetland, sustainable.

Introduction

"Wetland" comes from wetness or humidity, a term that does not necessarily refer to a body of water that floods a particular piece of land. It means something more subtle, referring to the link between water and land. This link is not always visible but is critical to balance various terrestrial ecosystems.

Historically, wetlands have been crucial ecosystems in the development of human civilizations. Their tradition of use dates back thousands of years to before the Neolithic when hunter-gatherers living around them obtained water and food from their diverse fauna and flora.

Wetlands play a significant role in supporting ecosystems and biodiversity, and they are deeply connected to human well-being. Although they cover only around 6 percent of the earth's land surface, 40 percent of all plant and animal species live or breed in wetlands; and about one in eight people on earth depend on wetlands for their livelihoods (United Nations, 2024). Despite the benefits for both the environment and communities, wetlands face critical threats due to anthropogenic influences and are the planet's most threatened ecosystem.

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their central life-sustaining role for so many communities, wetlands are cherished by communities worldwide, enhancing social well-being, offering recreational opportunities, holding deep cultural and spiritual significance, and fostering community well-being and resilience.

Critical to environmental sustainability, wetlands sequester more carbon than any other ecosystem (NOAA, 2023), thereby mitigating climate change. They also buffer against climate change impacts and provide resilience against extreme weather events such as storm surges and flooding. Furthermore, they serve as vital habitats for diverse species, supporting fish, reptiles, migratory birds, and mammals.

Despite their multiple benefits, these valuable ecosystems are under siege from pollution and habitat loss from land use change. In the last five decades, over 37% of wetlands have been lost, significantly jeopardizing the ecosystem services and benefits for plants, animals, and human communities. With urban populations expected to grow from 55% (current) to 68% by

Wetlands are essential for humans to live and prosper. Wetlands are some of the most important biodiverse areas in the world. More than one billion people depend on wetlands for their living. Wetlands provide freshwater and ensure our food supply. They help sustain the wide variety of life on our planet, protect our coastlines, provide natural sponges against river flooding, and store carbon dioxide to regulate climate

change 2050, wetland ecosystems are considered the most threatened ecosystem (Ramsar, 2021). Livelihoods from fishing, rice farming, travel, tourism and water provision all depend on wetlands. Importance of wetlands for sustainable livelihoods featuring some of the most important biodiverse areas in the world, the importance of wetlands for sustainable livelihoods cannot be overstated:

Rice Farming: Paddy fields are a type of temporary wetland, crucial for rice cultivation and offering numerous ecological benefits. They are man-made, flooded areas where rice is grown, supporting diverse plant and animal life. Approximately one billion households in Asia, Africa and the Americas depend on rice growing and processing for their main livelihoods. Rice grown in wetland paddies is the staple diet of 3.5 billion people, accounting for 20% of all calories consumed by humans.

Fishing: Wetlands provide a variety of habitats for fish, including shallow areas for spawning. Wetlands support a rich food web, including invertebrates, shellfish, and forage fish that serve as food for larger predatory fish. Vegetation for shelter and food, and fluctuating water levels that can create diverse niches. Many fish species rely on wetlands for spawning and raising their young. Wetlands provide an essential source of income and food for many fishing communities, particularly in developing countries. Over 660 million people depend on fishing and aquaculture for a living. The average human consumes 19 kg of fish every year. Most commercial fish breed and raise their young in coastal marshes and estuaries. In addition, about 40% of fish production is now through aquaculture.

Tourism and Leisure: Wetlands are increasingly recognized for their potential to support tourism, offering opportunities for nature-based experiences and economic benefits for local communities. Sustainable wetland tourism can provide income, promote conservation efforts, and foster community-based development. Wetlands provide essential ecosystem services like water purification, flood control, and biodiversity support, which are valuable for tourism. Wetlands offer a range of recreational activities such as birdwatching, kayaking, hiking, and wildlife viewing.

International tourists spent US \$ 1.3 trillion worldwide in 2013, and an estimated half of them seek relaxation in wetland areas, especially coastal zones. The travel and tourism sectors support 266 million jobs, and account for 8.9% of the world's employment.

Transport: Rivers and inland waterways play a vital role in transporting goods and people in many parts of the world. In the Amazon basin, rivers carry 12 million passengers and 50 million tons of freight each year, sustaining 41 shipping companies. Traditional wetland product-based livelihoods: Medicinal plants, dyes, fruits, reeds and grasses are just a few of the wetland products that provide jobs, especially in developing countries.

In 2023, Cities with Nature partnered with the Ramsar Convention, the UN Decade on Ecosystem Restoration and ICLEI CBC to develop a poster and fact sheet on the value of wetlands for cities. These resources shed light on the functional benefits of wetlands in terms of water resources, climate regulation, livelihoods and poverty reduction, healthy ecosystems and biodiversity, job creation and upskilling, and culture, recreation and education. It will illustrate how wetlands support urban heat mitigation by cooling surrounding areas and providing valuable spaces that bolster a region's ability to adapt and withstand the adverse impacts of a changing climate. The fact sheet provides useful

recommendations on how cities can enhance and protect the benefits supplied by these vital ecosystems, like current wetlands management, allocating appropriate budgets, and regulating land-use and development and developing integrated development plans

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Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation and other factors, including human disturbance. Indeed, wetlands are found from the tundra to the tropics and on every continent except Antarctica.

Two general categories of wetlands are recognized: coastal or tidal wetlands and inland or non-tidal wetlands.

Coastal/Tidal Wetlands

Coastal/tidal wetlands in the United States, are found along the Atlantic, Pacific, Alaskan and Gulf coasts. They are closely linked to our nation's estuaries where sea water mixes with fresh water to form an environment of varying salinities. The salt water and the fluctuating water levels (due to tidal action) combine to create a rather difficult environment for most plants. Consequently, many shallow coastal areas are unvegetated mud flats or sand flats. Some plants, however, have successfully adapted to this environment. Certain grasses and grass like plants that adapt to the saline conditions form the tidal salt marshes that are found along the Atlantic, Gulf, and Pacific coasts. Mangrove swamps, with salt-loving shrubs or trees, are common in tropical climates, such as in southern Florida and Puerto Rico. Some tidal freshwater wetlands form beyond the upper edges of tidal salt marshes where the influence of salt water ends.

Inland/Non-tidal Wetlands

Inland/non-tidal wetlands are most common on floodplains along rivers and streams (riparian wetlands), in isolated depressions surrounded by dry land (for example, playas, basins and "potholes"), along the margins of lakes and ponds, and in other low-lying areas where the groundwater intercepts the soil surface or where precipitation sufficiently saturates the soil (vernal pools and bogs). Inland wetlands include marshes and wet meadows dominated by herbaceous plants, swamps dominated by shrubs, and wooded swamps dominated by trees. Certain types of inland wetlands are common to particular regions of the country.

Many of these wetlands are seasonal particularly in the arid and semiarid West, may be wet only periodically. The quantity of water present and the timing of its presence in part determine the functions of a wetland and its role in the environment. Even wetlands that appear dry at times for significant parts of the year - such as vernal pools- often provide critical habitat for wildlife adapted to breeding exclusively in these areas.

Wetlands provide a multitude of services that are essential for human and natural systems. They act as natural filters, purifying water and removing pollutants, thus improving water quality for both aquatic life and human

consumption. Furthermore, they are critical for biodiversity, supporting a vast array of plant and animal species, including many that are found nowhere else. Their ability to store water and retain excess floodwater helps to mitigate the impacts of floods and droughts, protecting communities and infrastructure. Additionally, coastal wetlands like mangroves and salt marshes are "blue carbon" sinks, effectively absorbing and storing atmospheric carbon dioxide, thus helping to mitigate climate change.

Wetlands are vital for the health of our planet and the well-being of humanity. By recognizing their importance and taking proactive measures to protect and restore them, we can ensure their continued contribution to a sustainable future. The interconnectedness of wetlands and sustainability underscores the need for a holistic approach that considers the social, economic, and environmental dimensions of wetland management. The future of our planet depends on our ability to protect these precious ecosystems.

Wetlands play an integral role in the ecology of the watershed. The combination of shallow water, high levels of nutrients and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of fish, amphibians, shellfish and insects. Many species of birds and mammals rely on wetlands for food, water and shelter, especially during migration and breeding.

Wetlands' microbes, plants and wildlife are part of global cycles for water, nitrogen and sulfur. Furthermore, scientists are beginning to realize that atmospheric maintenance may be an additional wetlands function. Wetlands store carbon within their plant communities and soil instead of releasing it to the atmosphere as carbon dioxide. Thus, wetlands help to moderate global climate conditions.

Wetlands are crucial for ecological balance and human well-being. However, they face increasing threats from human activities. Urgent conservation efforts, like those under the Ramsar Convention, are needed to protect these ecosystems and the services they provide for future generations.

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