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Perspective

Overview of the Importance of Wetlands in Sustainable Development Goals (SDGs)

Mohd Yusuf[1]*, *Shafat Ahmad Khan*[2], *Waseem Ahmed*[3], *Sandeep Kumar Chaurasiya*[1]

[1]*School of Science, The Glocal University, Mirzapur Pole, Saharanpur, Uttar Pradesh 247121 India*
[2]*Department of Basic Sciences, Galgotias University, Greater Noida, Uttar Pradesh 203201 India*
[3]*Glocal Law School, The Glocal University, Mirzapur Pole, Saharanpur, Uttar Pradesh 247121 India*

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ABSTRACT

Wetlands are among the most productive and valuable ecosystems on the planet, playing a vital role in sustaining biodiversity, regulating climate, and supporting human livelihoods. In the context of the 17 Sustainable Development Goals (SDGs), wetlands hold strategic significance as they contribute directly or indirectly to every goal. From enhancing food and water security to supporting climate mitigation, disaster risk reduction, and sustainable economic growth, wetlands provide essential ecosystem services that strengthen global sustainability efforts. As countries strive to meet their SDG commitments, the conservation, restoration, and wise use of wetlands emerge as cost-effective investments with far-reaching environmental and socio-economic benefits. This work highlights the significance of Wetlands in the Sustainable Development Goals (SDGs), which is a necessity for global progress to achieve sustainability targets.

1. Introduction

Wetlands are areas where water covers the land permanently or for part of the year. They include rivers, lakes, ponds, marshes, peatlands, mangroves, estuaries, and coastal lagoons (Fig. 1). Wetlands are among the most productive ecosystems because they support rich biodiversity, store water, filter pollutants, and help communities with food, income, and protection from disasters. Their conservation is important for global sustainability. Wetlands, which support nearly 40% of the world's species and function as natural water purifiers, are among the most productive and valuable ecosystems on the planet [1-3].

The Environmental Performance Index (EPI), developed by the World Economic Forum in 2002, serves as a global benchmarking tool that evaluates how well countries manage their environmental responsibilities. It measures environmental health, ecosystem vitality, and policy effectiveness, offering insight into how nations balance development with ecological protection [4]. Countries with strong EPI scores typically demonstrate responsible growth practices, including the protection of sensitive ecosystems such as wetlands. Healthy wetlands contribute significantly to environmental quality by supporting biodiversity, regulating water cycles, mitigating floods, and storing carbon [5].

Parallel to the EPI, the United Nations' Sustainable Development Goals (SDGs) provide a comprehensive framework for advancing global well-being and environmental sustainability by 2030. These goals address a spectrum of urgent challenges, including poverty, hunger, inequality, climate change, and environmental degradation. Wetlands play a vital role in achieving several SDGs. For instance, SDG 1 (No Poverty) and SDG 2 (Zero Hunger) are supported by wetlands through fisheries, agriculture, and livelihood opportunities. SDG 6 (Clean Water and Sanitation) is directly linked to wetlands' natural ability to filter pollutants and maintain water quality. Urban wetland conservation contributes to SDG 11 (Sustainable Cities and Communities) by reducing disaster risks and improving urban resilience [3-7]. Likewise, wetlands are central to SDG 13 (Climate Action) because of their capacity to store carbon and buffer climate impacts, and to SDG 14 (Life Below Water) through their influence on aquatic habitats and species survival. Despite their ecological significance, they are disappearing at a rate three times faster than global forests. Much of the existing scientific literature focuses on the biophysical degradation of wetlands and the environmental pressures driving their decline [8-11]. However, a substantial research gap remains regarding how this ecological loss affects human livelihoods, community resilience, and progress toward the Sustainable Development Goals (SDGs). Understanding these socio-economic implications is essential, as wetlands contribute directly to food security, clean water availability, climate regulation, disaster risk reduction, and sustainable economic development. Their degradation thus not only undermines biodiversity but also threatens the global agenda for sustainable and inclusive growth.

2. Functions of Wetlands

As global awareness of sustainable development increases, many countries are working to improve their SDG performance and align national policies with global environmental

* ***Corresponding Author***:
Email: yusuf1020@gmail.com (*M. Yusuf*)
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commitments. Strengthening SDG implementation naturally supports wetland conservation, as sustainable land use, climate adaptation, water management, and biodiversity protection become key policy priorities [9-11]. Thus, progress toward higher SDG scores not only reflects national development but also contributes to the long-term preservation and wise use of wetland ecosystems. Wetlands perform many important functions that benefit both the environment and human society. One of their key roles is water purification. Acting as natural filters, wetlands remove excess nutrients, break down organic waste, and reduce suspended materials, thereby improving water quality. They also play a crucial role in the hydrologic cycle by receiving, storing, and releasing water throughout the year, which helps regulate natural water flow. In addition, wetlands are central to the cycling of carbon and other nutrients, transforming and storing essential elements through biological, chemical, and physical processes. Wetlands also stabilize shorelines, as the vegetation found along lakes, rivers, seas, and bays helps prevent erosion by holding soil with its roots and slowing the force of waves and currents. Their ability to store carbon in plant biomass contributes to climate regulation by reducing the amount of carbon dioxide released into the atmosphere. Wetlands further help control environmental issues such as algal blooms, dead zones, and fish kills by limiting excessive nutrient entry into water bodies. Figure 2 presents a schematic illustration of the major functions of wetlands.

Fig. 1: Some examples of Wetland diversity.

Economically, wetlands hold significant value. They support medicinal plants, provide timber, and serve as natural sources of food such as wild rice, blueberries, and mints. Many fishing and shell-fishing related industries depend on healthy wetlands, and several commercially important wildlife species thrive in these habitats. Wetlands are also vital for maintaining the water supply by sustaining streamflow during dry periods and recharging groundwater. As habitats for a wide variety of plants, animals, and microorganisms, they play a critical role in preserving biodiversity [12-14]. Their capacity to store large volumes of water reduces the impact of floods and prevents waterlogging in agricultural areas. Moreover, wetlands offer valuable opportunities for recreation, education, scientific research, and aesthetic enjoyment. Birdwatchers, nature enthusiasts, students, and researchers frequently visit these rich and dynamic ecosystems to observe wildlife and study natural processes.

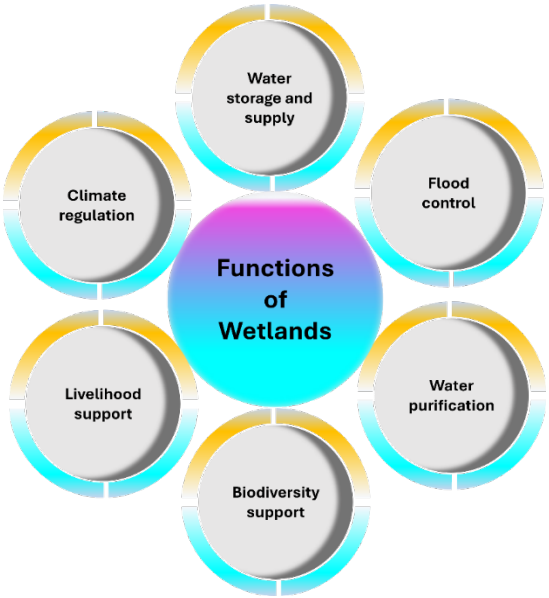

Fig. 2: Schematic representation of the chief functions of Wetlands.

3. Aspects of Sustainable Development Goals (SDGs)

All major global policy agreements conclude: wetlands are vital ecosystems in the landscape and are indispensable to achieve a sustainable and secure world. This policy brief sets out the link between the Sustainable Development Goals (SDGs) – and, in particular, the Goals on Zero Hunger, Clean Water and Sanitation, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water, and Life on Land – and the conservation and restoration of wetlands (Fig. 3). It also includes recommended approaches for implementation of the SDGs and a series of case studies showing the innovative approaches we use to transform the world [13].

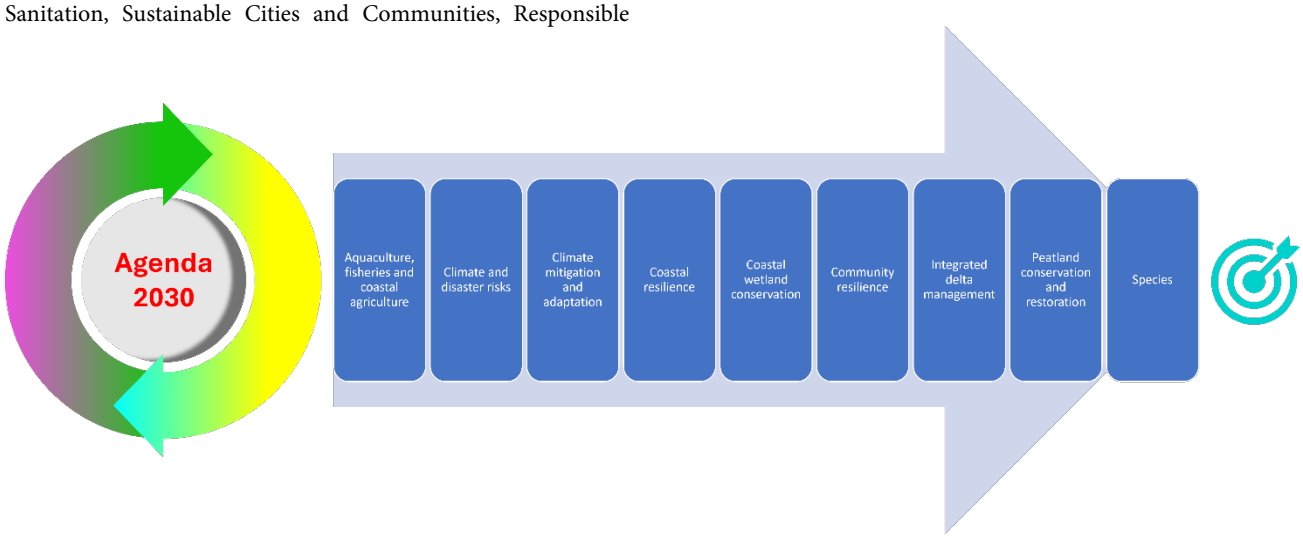

Fig. 3: Agenda 2030 described by Wetlands International NGO.

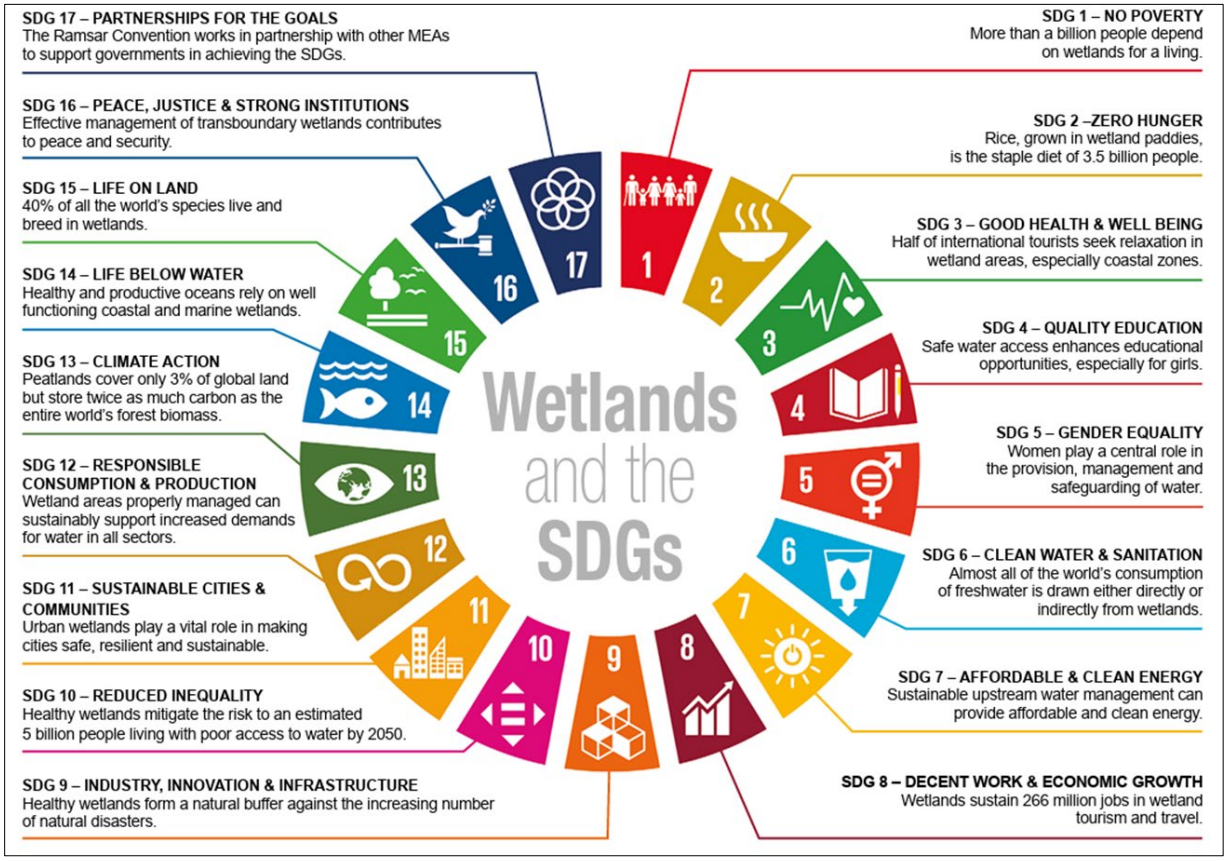

Fig. 4: Wetlands connected to all 17 Sustainable Development Goals (SDGs) [11].

Wetlands are frequently regarded as barren areas, and this mistaken belief causes people to treat them improperly. As a result, numerous wetlands get contaminated by waste coming from residences, industries and agricultural operations. Excessive amounts of chemicals and fertilizers entering the water lead, to growth of plants and algae, which decreases oxygen levels and damages fish and other wildlife. Additionally, people exploit wetland resources excessively, like withdrawing much water or overfishing. Conversely, sometimes, new or foreign plant and animal species are introduced, which push out the local species and disturb the natural balance. Wetlands are connected to all 17 Sustainable Development Goals (SDGs) described herein:

SDG 1 – No Poverty

More than one billion people depend directly on wetlands for their daily survival. Fishing communities rely on rivers, lakes, and floodplains for food and income. Farmers use wetlands for

irrigation and fertile soils that increase crop yields. Wetland-based tourism (such as birdwatching and boat tourism) creates employment for guides, transport workers, and small businesses. When wetlands are degraded, these livelihoods collapse, which increases poverty. Therefore, protecting wetlands helps secure jobs, food, and income sources for vulnerable communities and reduces poverty in the long term.

SDG 2 – Zero Hunger

Wetlands play a major role in global food production. Rice paddies—one of the most important wetland types, produce the staple food for 3.5 billion people. Wetlands also provide fish, which are a major source of protein for millions. Floodplain wetlands are among the richest fishing grounds in the world. Wetland soils are naturally nutrient-rich, reducing the need for fertilizers. By providing sustainable conditions for crops, livestock fodder, and aquatic food sources, wetlands play a critical role in achieving zero hunger.

SDG 3 – Good Health and Well-being

Wetlands support human health in multiple ways. They provide clean water, which reduces diseases such as diarrhea, cholera, and typhoid. Many wetlands supply medicinal plants used in traditional and modern medicine. For example, mangrove plants contain compounds used for treating infections and inflammation. Wetland landscapes (coastal zones, lakes, rivers) also support mental health and tourism-based relaxation. When wetlands are degraded, polluted water and loss of vegetation cause many health risks. Therefore, restoring wetlands improves overall health and well-being.

SDG 4 – Quality Education

Clean water availability improves school attendance, especially in rural regions where girls often spend hours collecting water. Wetlands located near schools and communities serve as natural classrooms where students can learn about biodiversity, ecosystems, and climate change. Many universities and research institutes use wetlands for scientific studies, helping build knowledge and awareness about environmental sustainability. By enhancing water access and environmental education, wetlands support quality education.

SDG 5 – Gender Equality

Women play a central role in collecting, managing, and using water for household tasks, farming, and small-scale businesses. Wetlands provide resources like fish, reeds, and vegetables that women use to earn income. Community-based wetland management also creates leadership opportunities for women. When wetlands become healthy and accessible, women have more time for education, skill development, and income-generating work, helping promote gender equality.

SDG 6 – Clean Water and Sanitation

Wetlands naturally filter water by trapping sediments, absorbing pollutants, and breaking down harmful chemicals through wetland plants and microorganisms. Because of this, almost all freshwater supplies are connected to wetlands—either directly or indirectly. Wetlands recharge groundwater, regulate river flow, and maintain water cycles. Without wetlands, clean water becomes scarce, treatment becomes expensive, and waterborne diseases increase. Wetland conservation is essential to secure clean water for all.

SDG 7 – Affordable and Clean Energy

Many countries rely on hydropower dams, which depend on rivers and freshwater systems supported by wetlands. Healthy wetlands maintain water flow and reduce sedimentation, which helps hydropower systems function efficiently. Wetlands also provide biomass and plant-based fuels used by local communities. In coastal regions, mangroves supply renewable firewood. By maintaining stable water systems, wetlands support access to affordable and clean energy.

SDG 8 – Decent Work and Economic Growth

Wetlands generate employment for millions of people in sectors such as fisheries, agriculture, transportation, handicrafts, and ecotourism. Ramsar estimates that 266 million jobs depend on wetland-oriented tourism alone. Fish processing, weaving, boat transport, and guiding services create steady income for families [12-14]. Healthy wetlands contribute to regional economies by supporting multiple industries and reducing disaster-related economic losses, and there are a lot of commercially available natural products that are being obtained from the wetlands or relevant ecological systems, such as active biomolecules, natural colorants, gums etc [12,15-20]. Therefore, they are directly capable to the commercial as well as sustainable economics.

SDG 9 – Industry, Innovation, and Infrastructure

Wetlands act as natural infrastructure by reducing the impact of storms, heavy rainfall, flooding, and erosion. They protect roads, buildings, and industrial sites by absorbing excess water and reducing wave energy. Wetlands also inspire technological innovations in water treatment, flood management, and ecosystem-based engineering. By strengthening resilience and informing sustainable urban planning, wetlands support modern, safe, and innovative infrastructure systems [20].

SDG 10 – Reduced Inequality

Access to wetland resources can reduce inequalities between rural and urban regions. Many poor communities depend on wetlands for fishing, water supply, and natural products. When wetlands are managed fairly, they support equal access to water and livelihood opportunities. Wetlands also reduce the risk of water security challenges for billions of people expected to face water shortages by 2050. Ensuring fair distribution of water resources helps reduce social and economic inequalities.

SDG 11 – Sustainable Cities and Communities

Urban wetlands absorb stormwater, reduce flooding, and filter polluted runoff from cities. They improve air quality, promote cooling in hot urban areas, and provide green spaces for recreation. In rapidly growing cities, wetlands act as a buffer against extreme weather and infrastructure damage. When city planning protects wetlands, the entire urban environment becomes safer, more resilient, and more sustainable.

SDG 12 – Responsible Consumption and Production

Wetlands encourage sustainable resource use. Communities harvest fish, reeds, medicinal plants, and building materials from wetlands without harming the ecosystem—when managed correctly. Sustainable fisheries, rotational harvesting, and community conservation ensure long-term productivity while preventing overuse. Protecting wetlands aligns with responsible consumption and supports ecosystem-based production practices.

SDG 13 – Climate Action

Wetlands such as peatlands, salt marshes, and mangroves are among the world's largest natural carbon sinks. Although peatlands cover only about 3% of global land, they store more

carbon than all forests combined. Mangroves capture and store carbon at rates four times higher than tropical forests. Wetlands also protect coastlines from storms, typhoons, cyclones, and erosion. By preserving wetlands, countries can reduce emissions, enhance carbon sequestration, and build climate resilience.

SDG 14 – Life Below Water

Coastal wetlands, including mangroves, estuaries, coral-supporting lagoons, and seagrass beds-are essential for healthy oceans. They serve as nurseries for fish, breeding sites for marine animals, and feeding grounds for birds. Wetlands improve water quality by trapping sediments, reducing pollution, and maintaining nutrient balance in marine environments. Their protection supports sustainable fisheries and preserves marine biodiversity.

SDG 15 – Life on Land

Wetlands are home to 40% of all species on Earth. They support amphibians, reptiles, mammals, insects, birds, and rare plant species. Many migratory birds depend on wetlands as resting and breeding sites. Wetland destruction leads to species extinction, habitat fragmentation, and ecological imbalance. Conservation efforts help protect biodiversity, restore degraded ecosystems, and prevent further loss of species.

SDG 16 – Peace, Justice, and Strong Institutions

Many wetland systems, such as rivers and lakes, shared by multiple countries. Managing these transboundary wetlands requires cooperation between governments and communities. Joint planning reduces conflict, improves water sharing, and creates fair governance systems. Transparent, science-based decision-making also strengthens institutions and promotes environmental justice.

SDG 17 – Partnerships for the Goals

The Ramsar Convention on Wetlands works globally with governments, NGOs, scientists, and local communities. These partnerships support wetland conservation projects, data sharing, policy development, and technical training. International cooperation accelerates progress toward all SDGs, especially those related to the environment, water, climate, and community well-being.

4. Conclusion

Wetlands hold a role in the worldwide sustainability framework providing essential benefits that aid in fulfilling all 17 SDGs. Their distinct ecological roles—like filtering water, storing carbon, controlling floods and preserving biodiversity—are crucial, for health, climate adaptation and sustainable progress. The broad acknowledgement of these advantages gives governments reasons to focus on wetland protection, rehabilitation and responsible management. By coordinating wetland-focused efforts with SDG goals nations can progress development aims concurrently highlighting the strong synergies generated through integrated ecosystem-based strategies. Thus, conserving and rehabilitating wetlands is both an imperative and a strategic move that fosters inclusive development, sustainable resource management and enduring environmental stability. Strengthening policy coordination, enhancing community participation, and expanding scientific understanding will be essential for maximizing the role of wetlands in achieving the SDGs by 2030 and beyond.

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Declaration

Author contribution

Mohd Yusuf: Concept, data collection, visual interpretation, editing manuscript and submission.

Shafat A. Khan: Data interpretation, revising writing, drafting manuscript.

Waseem Ahmed: Data interpretation, revising writing, revising manuscript.

Sandeep K. Chaurasiya: Data interpretation, visual editing, drafting manuscript.

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