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A Study Government Policies on Wetland Conservation: with Special Reference to Deepor Beel, Kamrup (Metro) District, Assam.

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ABSTRACT

Wetlands are dynamic ecosystems characterized by the presence of water, either permanently or seasonally, and are crucial for biodiversity, climate regulation, and community livelihoods. Effective conservation of these areas is essential for maintaining ecological balance and supporting local economies. In India, wetlands cover approximately 15.26 million hectares, yet rapid urbanization and pollution have led to significant degradation. In Assam, one such Wetland is Deepor Beel, that has been recognized as a Ramsar site and is particularly significant for local communities, supporting livelihoods and biodiversity. Existing literature has largely concentrated on ecological observations and policy frameworks but has overlooked the socioeconomic dimensions and community involvement in conservation practices. This study aims to fill this gap by analysing the role of local populations in conservation efforts, assessing the effectiveness of government policies, and exploring the socio-economic consequences of wetland conservation in Deepor Beel. Through an examination of the relationship between conservation policies and the dynamics of the local community, this study aims to offer important insights into how good governance can improve community well-being and environmental sustainability. This study adds to the ongoing conversation about community empowerment, environmental concerns, and the sustainable development goals (SDGs) within the context of wetland conservation in Assam. Eventually, the study will help generate a more comprehensive knowledge of wetland conservation strategies that balance socioeconomic development and ecological integrity.

Keywords : *Wetlands, Biodiversity, Community Engagement, Socio-economic Impact, Government Policies, Deepor Beel*

INTRODUCTION

Wetlands are among the most vital ecosystems on Earth, providing crucial ecological, economic, and social benefits. However, they are also one of the most threatened habitats, disappearing at an alarming rate due to human activities such as urbanization, pollution, and climate change. Wetlands play a critical role in maintaining a balanced ecosystem by supporting biodiversity, regulating water cycles, and acting as natural carbon sinks. Yet, they are often undervalued, leading to their degradation and loss.

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India is home to numerous wetlands with immense ecological and cultural significance, including Deepor Beel in Assam. Recognized as a Ramsar site in 2002, *Deepor Beel* serves as a vital habitat for diverse plant and animal species and sustains local communities that rely on it for their livelihoods. However, this wetland faces significant threats from urban expansion, pollution, and other developmental pressures, despite its protected status. These challenges highlight the urgent need for robust conservation strategies and community participation.

This study explores the impact of government policies on the conservation of Deepor Beel in Kamrup Metro District, Assam. The objectives include understanding the role of wetlands in maintaining ecological balance, analyzing the socio-economic impacts and contributions of local communities in conservation efforts, and evaluating the effectiveness of government initiatives in protecting Deepor Beel's ecosystem. Through these objectives, the study aims to provide a comprehensive understanding of the challenges and opportunities achieving sustainable wetland conservation.

Conservation of Wetlands

Article 1 of the Convention on Wetlands (Ramsar, Iran,1971) defines wetlands as regions of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, characterized by static or flowing water, which may be fresh, brackish, or saline, including marine areas where the depth at low tide does not surpass six meters. The Convention's definition of wetlands thus encompasses a broad range of inland habitats, including marshes, peatlands, floodplains, rivers, and lakes; coastal habitats, including saltmarshes, mangroves, intertidal mudflats, and seagrass beds; coral reefs and other marine areas that are no deeper than six meters at low tide; and man-made wetlands, such as reservoirs, dams, rice paddies, wastewater treatment ponds, and lagoons.

Moreover, *Article 2.1* stipulates that wetlands must be listed on the Ramsar List of internationally significant wetlands in order to preserve coherent sites: "may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands."

Wetlands are the most endangered environment on Earth and are disappearing three times faster than forests. Since the 1700s, around 90% of the wetlands on Earth have deteriorated.Thirtyfive percent of the world's wetlands have disappeared since 1970, or fifty years. Wetlands are lost as a result of pollution, overfishing and resource exploitation, invasive species, climate change, draining and infilling for construction and cultivation, and other human activities. Because wetlands are incorrectly viewed as wastelands rather as vital sources of jobs, incomes, and ecological services, a vicious cycle of wetland loss, threatened livelihoods, and growing poverty results. Changing attitudes to motivate communities and governments to prioritize and respect wetlands is a major problem.

Misconceptions about wetlands as wastelands rather than vital ecological services, employment, and incomes have resulted in a vicious cycle of wetland loss, jeopardized livelihoods, and growing poverty. Changing people's perspectives to motivate communities and governments to prioritize and respect wetlands is a significant problem.

Wetlands are vital ecosystems that support freshwater availability, biodiversity, global economies, climate adaptation and mitigation, and more. Raising awareness of wetlands on a national and international level is crucial to halting their rapid destruction and promoting conservation and restoration efforts. The perfect opportunity to raise awareness of these vital ecosystems is during World Wetlands Day.

In an effort to increase awareness of wetlands, February 2nd is designated as World Wetlands Day. The Convention on Wetlands, which was ratified as an international agreement, was also established on this day. Adopted in the Iranian city of Ramsar in 1971, this intergovernmental agreement—known as the Convention on Wetlands—went into effect in 1975. It offers the foundation for protecting wetlands and their resources and using them responsibly. Since then, about 90% of UN member states from every continent have joined as "Contracting Parties."

The Convention gives nations the ability to take action to preserve and responsibly use their wetlands through the creation of protected areas, the application of efficient regulations, and the exchange of information. A total of 172 nations have accepted this. The list of Wetlands of International Importance (Ramsar sites) must include at least one wetland designated by each nation that ratifies the Convention. On August 30, 2021, the UN General Assembly passed Resolution 75/317, designating February 02 as World Wetlands Day. This made the 2022 observance of World Wetlands Day

particularly noteworthy. It also served as a celebration of the Ramsar Convention on Wetlands, which was signed in 1971.

In order to promote sustainable development globally, the Ramsar Convention on Wetlands establishes the framework for the preservation and prudent use of all wetlands through regional, national, and international collaboration.

A number of initiatives that are directly relevant to sustainable development are included in the Convention Strategic Plan 2016–2024, including those that deal with carbon sinks, water, livelihoods, biodiversity, disaster risk reduction, and resilience. A particular framework on water, encompassing groundwater, water allocation, and river basin management, has also been approved by the parties. The Secretariat is involved with the Sustainable Development Goals (SDGs), serving as co-custodian with UNEP of Goals 14 and 15 as well as indicator SDG 6.6.1. It actively attends Inter-Agency and Expert Group on Sustainable Development Goals (IAEG-SDGs) meetings.

Through the preservation of its ecosystem components, processes, and benefits, the Ramsar list seeks to "develop and maintain an international network of wetlands which are important for the conservation of global biological diversity and for sustaining human life." Today, there are more than 2,400 Ramsar Sites worldwide. They are more expansive than Mexico, spanning more than 2.5 million square kilometers. All kinds of inland and coastal wetlands are part of the Ramsar Sites network. Reversing wetland loss and degradation is the goal of the Convention on Wetlands.

Wetland conservation in India

Indian customs and culture are closely linked to wetlands. While Khecheopalri Lake in Sikkim is known as the "wish fulfilling lake," Loktak Lake in Manipur is referred to by the locals as "Ima" (Mother). One of the most distinctive manifestations of the connection between people, culture, water, and wetlands is the Chhath celebration in northern India. Popular tourist destinations include Kodaikanal in Tamil Nadu, Nainital Lake in Uttarakhand, Khajjiar Lake in Himachal Pradesh, and Dal Lake in Kashmir. Wetlands are even mentioned in Chankaya'sArthashastra, where they are revered and referred to as "anupa," or matchless regions.

The legal framework for wetlands found in forests and protected areas is established by provisions of the Indian Forest Act of 1927, the Forest (Conservation) Act of 1980, and the Indian Wildlife (Protection) Act of 1972. India has improved its overall approach to managing its wetlands and has made sustainability a priority for growth. As a result, there are currently 75 Ramsar Sites around the nation. This is the biggest Ramsar Site network of any South Asian nation. A Ramsar Site is a wetland location that has been recognised as having global significance. Wetlands are essential to India's yearly migratory bird migration, which brings millions of birds.

Water drainage, pollution, unsustainable use, invasive species, deforestation, and soil erosion are just a few of the factors threatening wetlands worldwide. On February 1, 1982, the Ramsar convention came into effect in India. There are already 75 Ramsar sites (Wetlands of International Importance) in India, which represent 13,26,677 hectares of land. In South Asia, India is home to the most Ramsar sites. Seven wetlands in India—two in Himachal Pradesh, two in Jammu & Kashmir, one in Tripura, one in Uttar Pradesh, and one in Gujarat—were designated Ramsar Sites between 2004 and 2014. India has designated 49 wetlands as Ramsar Sites between 2014 and August 2022.In the 75th year of its independence, India added 11 wetlands to its list of Ramsar sites on August 13, 2022, bringing the total number of Ramsar sites in the nation to 75. Four (4) sites in Tamil Nadu, three (3) in Odisha, two (2) in Jammu & Kashmir, and one (1) each in Madhya Pradesh and Maharashtra are among the eleven new locations. India already added ten wetlands to the list of Ramsar sites on August 3, 2022. The ten additional locations consist of one (1) each in Goa, Karnataka, Madhya Pradesh, and Odisha, and six (6) in Tamil Nadu.

The majority of issues concerning India's wetlands are caused by the country's population. Despite making up only 2.42% of the Earth's area, India is home to 16% of the world's population. There are fewer natural wetlands in the Indian terrain. Once these locations are used for purposes other than wetlands, it becomes increasingly challenging to restore these converted wetlands. Therefore, as the population grows, so does the demand for wetland products (such as water, fish, timber, fibre, medicinal plants, etc.). Wetland loss is the term used to describe a physical reduction in the wetland's spatial expanse or function. The impact of losing 1 km^2 of wetlands in India will be far greater than that of losing 1 km^2 of wetlands in areas with a high concentration of wetlands but a low population.

Issues of Wetland Conservation in Assam

Assam's Brahmaputra and Barak valleys are endowed with thousands of ponds and tanks to store the state's enormous rainfall, as well as countless freshwater lakes (Beels), oxbow lakes (era-suti), and marshy regions. Both the production of food and our need for water depend on these wetlands. In addition, these provide habitat for thousands of different types of plants and animals. There are 1,400 square km of Assamese wetlands. The entire state is home to about 3000 large and small wetlands. However, there are a number of reasons why wetlands are under danger, including pollution, weed invasion, siltation, unlawful encroachment, and a lack of action by law enforcement.

Wetlands are essential to the preservation of the local ecosystem because they control and purify the climate and surroundings. Water quality protection, habitat for fish and wildlife, natural floodwater storage, and a decrease in surface water erosive potential are all benefits of a healthy wetland. The estimated total size of Assam's wetlands is 7,64,372 hectares, or roughly 9.74% of the state's total land area.

There are around 3513 wetlands in Assam, according to the Assam State Remote Sensing Application Centre. But a large number of these wetlands are rapidly disappearing. The loss of natural wetlands has been the fastest. Recent assessments in the state have shown that there are no more than 50 wetlands, either as a result of the influence of climate change or the conversion of these wetlands for other uses.

A study conducted by the North Eastern Space Application Centre (NESAC) in Assam found that the wetland ecosystem covers more than 5900 square km. In Assam, both the valleys are home to numerous wetlands, including freshwater lakes (beels), oxbow lakes (era-suti), marshy regions, and pukhuris. These wetlands collectively continue to form an incredible and distinctive ecology. Several years ago, the Assam Remote Sensing Application Centre identified more than 3500 wetlands in Assam, excluding the regions that are inhabited by rivers. Eighty-one of these are oxbow lakes of cutoff meanders (era-suits). In addition to the hundreds of marshlands, all of these initially gave the Brahmaputra, Barak, and their roughly 100 tributaries the necessary room to rise during the monsoon season. However, a significant amount of these wetlands have been overrun throughout time.

Rapid and unplanned urbanisation, along with the encroachment of indigenous people, must result in urban areas such as Guwahati, Jorhat, Tinsukia, Bongaigaon, Nalbari, Nagaon, Morigaon, and Silchar, among others, becoming so crowded that there is no room for the rainwater from the residential areas to escape. In Guwahati, one only needs to consider the fast declining condition of Deepor Beel and the imminent demise and disappearance of Bondajan, Borsola Beel, Sarusola Beel, and Silsako Beel.

Every ecosystem is under risk due to climate change. Wetlands are the least protected ecosystem, making them the most vulnerable. Due to habitat destruction and breeding site loss, many migratory birds have had to completely alter their travel routes. Many marshy birds are losing their home due to climate change. Water bodies and swampy areas are drying up due to rising temperatures. As the temperature rises, more evaporation occurs, which lowers the surface water level and thus reduces aquatic life and vegetation cover. Experts warn that several mega-herbivores, including rhinos, elephants, and Asiatic water buffalo, may become critically dependent on their declining habitat due to climate change.

Another significant factor in the disappearance of wetlands is siltation. Wetlands are being filled with silt from heavy floods. A lot of wetlands turn into grasslands and forests as a result of significant siltation. Consequently, the management of wetlands and protected areas has made the majority of land cover its top goal. Mapping wetlands is the first step in keeping an eye on this crucial ecosystem component. With the use of geospatial techniques, it is possible to correctly map wetlands with little expense or labour.

Deepor Beel, Assam

The Deepor Beel Wildlife Sanctuary is a perennial freshwater lake outside of Guwahati, Assam, in the Kamrup (Metro) district of the lower Brahmaputra valley. The Deepor Beel, a popular tourist destination and the only primary storm-water holding basin for Guwahati, was designated as a Ramsar site in 2002. According to the Ramsar Convention, an international agreement signed in Ramsar, Iran, in 1971, a Ramsar site is a wetland of worldwide significance.

The 4.1-square-kilometer Beel, which translates to "lake" in Assamese, is home to both locals and migratory birds. Herds of Asiatic wild elephants may be seen there, drawn by the aquatic flora of the lake. To get to the lake

for their favorite meal, they go from the four elephant corridors in the Rani-Garbhanga Reserve Forests in Kamrup East to the beel.Deepor Beel receives the most birds during the winter, making it an essential staging location on migratory routes. The Deepor wetlands are home to about 200 different species of birds, including 70 migratory species. The spot-billed pelican (Pelicanusphilippensis), Baer's pochard (Aythya baeri), and lesser and greater adjutant storks (Leptoptilos javanicus and dubius) are among the species that are visible. The lake is home to 38 different kinds of amphibians and reptiles, about 50 different types of fish, some of which the locals gather, medicinal plants, nymphaea nuts and flowers, ornamental fish, and the highly valuable seeds of the big water lily Euryale Ferox, also known as makhana.

The lake is on several protected lists and is a Ramsar site. Deepor Beel has been designated as an Important Bird Area (IBA) site by Birdlife International. Even though Deepor Beel was designated under the Guwahati Water Bodies (Preservation and Conservation) Act, 2008, untreated sewage still enters the area from Guwahati city through the Basistha-Bahini and Bharalu rivers. The Khandajan rivulet, the lake's outflow, merges with the Brahmaputra. The lake suffers from excessive siltation from the surrounding deforested hills, municipal trash accumulation, uncontrolled fishing, and invasion of aquatic weeds like water hyacinth or Eichhornia crassipes due to encroachments from industrial growth.

Significant Threats in Deepor Beel

In any waterbody, human activity results in vegetation destruction, pollution inputs, and hydrological changes. One of the water habitats that is most endangered in the entire planet is wetlands. The loss of wetlands lowers biodiversity because animals and plants that are acclimated to wetland ecosystems frequently can't adapt to and compete in new environments. The loss of harvestable resources, deterioration of water quality, and flow control are additional effects that could lead to more severe flooding. In many regions of the world, wetlands are still under a lot of stress and are deteriorating. Deepor Beel is in the same state and situation. is currently experiencing severe social, cultural, artistic, and political pressures after being named a Ramsar Site.

The construction of permanent structures at both the industrial and residential levels, human encroachment, the dumping of urban waste, the inclusion and extension of railway lines, unlawful earth cutting and quarrying, excessive uncontrolled picnicking, and many other issues are all connected to Deepor Beel.All of these actions, whether desired or not, have seriously disrupted the ecosystem's ability to support itself. And as a result, this waterbody has rapidly shrunk and the water quality has gotten worse.

Deepor Beel has encroached due to Guwahati City's rapidly growing population and land expansion. Human settlements and structures from the public and private sectors have heavily encroached upon and occupied its northern and eastern edges. In the end, this has negatively impacted the Beel's natural drainage and spatial water patterns. According to estimates, the permanent lake water area shrank from 7.1 square kilometers in 1991 to 5.2 square kilometers in 2001 and 4.2 square kilometers in 2010. Inappropriate farming methods and the issue of soil erosion have increased the pace of sedimentation in the Beel. The spread of weeds is another growing issue in the Beel.

The construction of the Guwahati Garbage Dump in Boragaon, on the eastern bank of the Beel, is one of the biggest threats to this body of water. The garbage that has accumulated around Guwahati city seeps into the beel's hydrology and contaminates it. Additionally, trash from the Guwahati oil refinery is sent to the beel via the Basistha and Kalmoni rivers. The main sources of water for the wetland are these rivers and monsoon runoff. In addition, the channels transport additional hospital and industrial trash to the Beel.

The 1990 construction of Assam State's southern railroad along the southern boundary is another significant factor influencing the Deepor Beel-Rani Garbhanga terrain. The marsh has been divided into over three subsystems by this railroad. As of right now, it has an impact on the relationships between wetland animals and the safe migration of endangered Asiatic elephants between water bodies and forested areas. Even though Asiatic elephant deaths from rail collisions have decreased recently, the species has developed an odd road avoidance behavior as a result. Additionally, the rail road has made it simple to visit several formerly inaccessible regions.

The areas of vacant land between the railroad and the marsh have also recently seen the emergence of new illegal immigrant population. Illegal fishing practices and the hunting and trapping of wild animals are also having an impact on how well the Beel ecosystem functions.

Role of the Local Communities

The majority of the over 1,200 households that live in the neighborhoods around Deepor Beel are from several ethnic groups, such as the Rabha and the Karbi. The natural elements are intricately interwoven with their culture and economic existence. The Rabha people of Satargaon, which is located very close to Deepor Beel, celebrate Johong Puja, which is based on appreciating the value and beauty of the environment, especially the wetland.

The social, economic, and cultural fabric of the local population around Deepor Beel is significantly influenced by community fishing during such celebrations. In addition to fishing, the beel provides the residents with wood for fuel, fodder, grazing, herbal medicines, and edible herbs and other foods. The majority of the materials used to build their homes, including bamboo and reeds for thatch roofing, come from the nearby forests. These community activities don't seem particularly novel, but the threat of Guwahati's haphazard urbanization and the impending urban trash crisis might be.

In a recent report from *Down to Earth*, it was highlighted that while the tranquillity of Deepor Beel has faced challenges in recent years, the government's development initiatives, including extensive road networks and factories, aim to enhance regional infrastructure and economic growth. However, this progress has also led to pollution, disrupting the delicate balance between development and environmental preservation.

As a result, local fish populations have been significantly affected, leading to a decline in their numbers. Consequently, communities that rely on the beel for their livelihoods are experiencing increased difficulties. Despite these challenges, there is a growing recognition of the need for sustainable practices that can harmonize development with the preservation of this vital ecosystem.

The headman of Keotpara village noted in the same report that nearly 825 people live in the area, many of whom have relied on fishing for their livelihoods for generations. He pointed out that the dumping site in Boragaon has contaminated the water in the beel, further hindering the growth of fish.

A group effort by six ladies from Keotpara, *Simang*means dreams in their native tongue. They have been succeeded in turning water hyacinths, an unwanted weed, into lovely artifacts and yoga mats. Within a week, water hyacinths can grow fast, posing a continuous threat to the ecosystem. This effort has not only improved the beel's health but also given 38 local women jobs and opportunities. Simang's workers, who process raw materials from the Deepor Beel and weave the items on their own handloom, managed to make a living even during the second wave of the COVID-19 pandemic.

Another such project is *KumbhiKagaz*, a creative endeavor that aims to restore Deepor Beel environmentally while also giving the people of Keotpara alternate sources of income. The project turns water hyacinths into handmade, chemical-free, 100% biodegradable papers.

In a report, a member of KumbhiKagaz stated that the initiative has successfully removed 50 tonnes of invasive water hyacinths over the past two years. This effort has greatly enhanced the growth of makhana (prickly water lily) in the wetland, which is commercially valuable.

These projects demonstrate how the community is addressing the declining health of the marsh and managing the commons' property sustainably. A true lifeline woven into the local ecology, the beel is a magnificent example of how humans and environment are interdependent.

The villagers, who have traditionally relied on fishing and selling their catch at Godhuli Bojar, the nearest local market, are facing significant challenges due to the prohibition of fishing in the protected zones of Deepor Beel. While this restriction impacts their livelihoods, there is a desire for a conservation approach that recognizes and integrates their traditional knowledge. By combining this indigenous wisdom with modern scientific insights, the community can reduce dependence on a single resource, fostering a more sustainable future.

Role of Non-Governmental Organisations (NGOs)

Under the Living Lakes Biodiversity and Climate Project, the *Nature Environment and Wildlife Society of*

India (NEWS) is carrying out various initiatives to involve local communities, students, and stakeholders in conservation efforts focused on Deepor Beel, a vital wetland in Assam.NEWS aims to give students and community members a better awareness of environmental issues through its educational initiatives. NEWS promotes the value of protecting wetlands, the harm that pollution causes to the ecosystem, and the necessity of implementing sustainable practices to slow down environmental deterioration by hosting educational events and participatory workshops. Additionally, local communities and other allies gain important knowledge and skills from the capacity-building workshops, which empowers them to support alternative livelihood options and conservation activities. By means of these events and activities, NEWS is cultivating a sense of accountability towards Deepor Beel, a valuable ecosystem that urgently need conservation and restoration efforts.

Mission LiFE (Lifestyle for Environment)

As part of the *"Mission LiFE" (Lifestyle for Environment)* initiative, the Nature Environment & Wildlife Society (NEWS), in collaboration with the Integrated Regional Office in Guwahati under the Union Ministry of Environment, Forest & Climate Change, Government of India, organized a day-long program on June 9, 2023. The event was held at Azara Keotpara Primary School near Deepor Beel, aiming to promote an environmentally responsible lifestyle nationwide. Approximately 140 students and their parents participated in this Government of India-driven effort to foster a movement toward sustainability.

A trash cleanup

On May 13, 2023, the NEWS team joined a trash cleanup drive around Deepor Beel to raise awareness about proper waste management and disposal. The event saw the participation of 50 individuals who, in just one hour, collected approximately 35 kilograms of litter—an alarming indicator of the waste problem in the wetland. Organized by the Guwahati Wildlife Division under the "Mission LiFE" initiative, the event was held in collaboration with the National Centre for Sustainable Coastal Management (NCSCM), Chennai, an autonomous center under the Ministry of Environment, Forest & Climate Change (MoEF&CC).

Increasing awareness on the importance of biodiversity

On May 24, 2023, in observance of International Day of Biodiversity and World Turtle Day, the NEWS team in Guwahati organized awareness programs for students from two schools: 33 No. Primary School Chakardo and Chakardo Desh Bhakta Tarunram Phukan Middle English School. A total of 72 students participated in the events. The team conducted two interactive sessions: one highlighting the significance and role of biodiversity, and the other focusing on the diversity, conservation, and ecological importance of turtles. The students actively engaged with the presentations and discussions, making the event both educational and enjoyable.

Capacity Building for the local community

A collaborative initiative brought together government agencies, local communities, and NGOs. In June 2023, as part of the Living Lakes Biodiversity and Climate Project (funded by the International Climate Initiative, or IKI), the Nature Environment and Wildlife Society (NEWS) organized a stakeholder consultation workshop. The event, themed "Low-cost Bio-mechanical Remediation to Improve Water Quality in the Pamohi River," aimed to implement bioremediation as an affordable solution for treating polluted water flowing into Deepor Beel. The project concentrated on a critical 500-meter segment of the Pamohi canal before it enters the wetland, marking a vital effort to reduce the ecological damage caused by pollution.

To tackle the pressing issue of solid waste management, the Nature Environment and Wildlife Society (NEWS) adopted a proactive stance. On September 26, 2023, NEWS convened a stakeholder consultation workshop titled "Synergies for Sustainable Cities: Identifying Collaborative Actions to Mitigate Waste Management Issues." This event marked the first instance of uniting government representatives, local communities, NGOs, and experts to devise comprehensive strategies, highlighting the importance of collaboration in overcoming waste management challenges.

The comprehensive management of Deepor Beel relies on a coordinated effort among diverse stakeholders, including government agencies, local communities, and NGOs. This collaborative approach reflects a collective dedication to protecting Deepor Beel, with the NGO,

NEWS, serving as a key facilitator, spearheading initiatives that effectively integrate environmental conservation with community participation

Government Policies for the conservation of Deepor Beel

The conservation status of Deepor Beel reflects its ecological importance and the need for continued protection. Recognized for its rich biodiversity, the wetland has been the focus of various conservation efforts over the years.

- In 2002, Deepor Beel was designated as a Ramsar site due to its environmental and biological significance, providing habitat to a wide range of aquatic species and 219 bird species.
- The National Green Tribunal (NGT) further emphasized the urgency of conservation when it instructed the Assam government to declare the surrounding area as an Eco-Sensitive Zone following an RTI petition.
- Additionally, the site was selected as an Important Bird Area (IBA) by Birdlife International, acknowledging its vital role in supporting avian life.
- The Assam government also declared 4.14 square kilometers of Deepor Beel as a Bird Sanctuary in 1989.
- Furthermore, to protect the ecosystem from damage caused by unsustainable practices, community fishing has been prohibited under the Wildlife (Protection) Act, 1972.
- These conservation measures highlight the importance of preserving Deepor Beel as a critical wetland ecosystem

The government of Assam has implemented several initiatives for the development and management of Deepor Beel, focusing on both conservation and community support. Here are the key roles:

- **Wetland Regeneration**: The government has completed the regeneration of approximately one kilometre of the wetland area, creating embankments and fencing toprotect the regenerated zones. This area is being developed for eco-tourism activities, enhancing both conservation and local economic opportunities.
- **Alternate Fishing Grounds**: To reduce pressure on the core area of the wetland, the government is promoting the development of alternate fishing grounds in the fringe areas. This initiative supports local fishing communities by providing them with sustainable livelihoods while minimizing their dependency on the core ecosystem.
- **Erosion and Silt Control**: Measures have been initiated to control incoming silt from the surrounding hills, including the construction of gully controls. This helps maintain the wetland's ecological balance and water quality.
- **Infrastructure Development**: A watchtower designed with indigenous bamboo technology has been constructed to attract visitors and promote bird-watching, supporting eco-tourism.
- **Water Quality Monitoring**: Ongoing water analysis is conducted at various points in the wetland to monitor water quality, ensuring the habitat remains suitable for aquatic species.
- **Weed Management**: The government is actively managing invasive species, particularly water hyacinth, across around 2,000 square meters of the wetland to maintain its ecological integrity.
- **Community Engagement**: Tree plantation initiatives have been launched in collaboration with local communities, enhancing biodiversity and promoting environmental stewardship.
- **Drinking Water Support**: Recognizing the importance of community well-being, the government has provided drinking water facilities at three locations for local villagers, addressing a critical need in the area.

A report from ***The Print***emphasizes the critical role of the Assam government in the conservation of Deepor Beel, a Ramsar site. The government, has proposed eco-tourism plans aimed at enhancing the area's infrastructure and promoting both economic development and environmental awareness. These plans include developments like cycling tracks, boating facilities, and other amenities to attract visitors. However, a Rs 14 crore fund allocated for the wetland's development remains unutilized, raising concerns about effective resource management. Government officials have stressed the importance of finding a balance between eco-tourism and conservation, with figures like

Padmapani Bora of the Assam Tourism Development Corporation emphasizing that development should not harm the wetland's ecological integrity, as it serves as a vital wildlife corridor. Additionally, the government is tasked with ensuring that Deepor Beel retains its protected legal status under the Ramsar Convention and the Wildlife Protection Act. It is also urged to engage local communities in addressing concerns about the ecological impacts of development, ensuring that eco-tourism respects traditional livelihoods and the ecosystem. Furthermore, the government is expected to conduct feasibility studies and environmental impact assessments to inform sustainable decision-making and safeguard the wetland's ecology. In summary, the government's role extends beyond promoting eco-tourism at Deepor Beel to ensuring that development initiatives do not compromise the wetland's ecological health.

Materials and Methods

This research is primarily based on secondary data obtained from pre-existing sources, both published and unpublished. Published sources encompass books, academic journals, articles, government reports, public records, historical and statistical documents, business records, and technical or trade publications. Unpublished materials include theses, dissertations, and other related resources.

Result

- Deepor Beel is a significant riverine wetland in Assam, designated as a Ramsar site in 2002 due to its ecological importance.The wetland supports a rich biodiversity, including 232 bird species, and plays a crucial role in flood management for Guwahati.
- Human activities, including urban encroachment, have severely impacted the wetland, leading to habitat destruction and pollution.The permanent lake area has decreased significantly, from 7.1 km² in 1991 to 4.2 km² in 2010.
- Major pollution sources include industrial waste, urban runoff, and illegal dumping, particularly from a nearby garbage dump.
- Local communities, such as the Rabha and Karbi, rely on Deepor Beel for fishing, agriculture, and cultural practices, but face economic challenges due to urbanization and conservation restrictions.
- Community initiatives, such as "Simang" and "KumbhiKagaz," have emerged to manage invasive species and provide alternative livelihoods, showcasing resilience and innovation.
- With fishing banned in the protected areas of Deepor Beel, the locals, whose lives were as simple as encircling around fishing and selling them in Godhuli Bojar (the nearest local market), are now devastated.
- The establishment of the Guwahati Garbage Dump (GGD) in close proximity to Deepor Beel has significantly degraded the water quality and overall health of the wetland ecosystem, contributing to the decline of both aquatic life and local biodiversity.
- The Nature Environment and Wildlife Society (NEWS) is instrumental in leading initiatives that combine environmental conservation with community involvement, fostering sustainable practices in the area.
- Programs like backyard poultry farming are being introduced as alternative livelihoods for local communities, reducing their reliance on Deepor Beel's natural resources while providing additional income sources.
- NEWS' educational initiatives, such as those focused on biodiversity and turtles, are successfully raising awareness among students and the community about the importance of environmental protection.
- NEWS is contributing to the "Mission LiFE" (Lifestyle for Environment) initiative, encouraging environmentally sustainable lifestyles and promoting eco-friendly practices within the local population.
- There is a critical need to balance infrastructure development with ecological preservation and effective resource management to prevent further degradation of the wetland.

Discussion

Protecting Deepor Beel requires the strict enforcement of regulations to prevent urban encroachment and pollution. Zoning laws should be established to restrict development in sensitive areas. Active participation of local communities is essential, integrating their traditional knowledge into conservation strategies and involving them in decision-making processes. To reduce dependence on the wetland's resources, alternative income opportunities such as eco-tourism and sustainable fishing should be developed.

Improved waste management is vital to control industrial and urban runoff, supported by regular water quality

monitoring to address pollution sources swiftly. Building eco-tourism infrastructure, including guided tours, bird-watching, and educational programs, can promote both conservation and economic development for local communities. Restoration projects aimed at reclaiming degraded areas, removing invasive species, and reintroducing native vegetation are equally important. Community workshops and awareness programs can educate residents about the importance of wetland conservation and sustainable practices, while encouraging farmers to adopt environmentally friendly agricultural methods. Partnering with NGOs and academic institutions can provide the expertise, funding, and resources needed to support these conservation efforts.

Conclusion

Protecting wetlands is crucial for sustainable development since they are among the most valuable ecosystems on Earth and provide vital functions like flood control, water purification, and biodiversity conservation. For the protection of wildlife, ecological balance, and local residents' means of subsistence, Assam's Deepor Beel is an essential wetland. Urbanisation, pollution, and environmental deterioration, however, are becoming more and more of a problem.

Even with major conservation efforts, problems including improper trash management, encroachment, and low community involvement still exist. Achieving equilibrium between ecological sustainability and development is crucial. Government programs like ecotourism and habitat restoration should put the environment first, but community-based efforts that use invasive species demonstrate how traditional knowledge and creative thinking can coexist.

Securing the future of Deepor Beel requires a holistic and collaborative approach. This includes strict enforcement of environmental laws, consistent scientific monitoring, promotion of sustainable livelihood opportunities, and meaningful involvement of local communities in conservation initiatives. Safeguarding Deepor Beel is not merely about preserving an essential wetland but also about supporting the well-being of the communities reliant on its resources, serving as a global model for sustainable wetland management.

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Competing interests

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