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STUDY OF ECONOMIC AND ECOLOGICAL IMPORTANCE OF WETLANDS ALONGSIDE NATHSAGAR RESERVOIR IN MAHARASHTRA.

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Abstract:

Nathsagar, located on the Godavari River in Maharashtra, India, is an ecologically diverse region covering around 350 sq. km. The study took place over a three-year period from 2020 to 2023, during which ten different wetlands were examined to evaluate their waterbird population dynamics, local activities, and socioeconomic significance. It is home to various freshwater organisms and serves as a primary habitat for numerous species of waterfowl and fish, including migratory birds from Siberia, Northern Europe, and Central Asia during winter. The studied area involves ten wetlands, providing ample cover, secure roosting locations, and feeding grounds for many resident and migratory birds; these wetlands are also ideal breeding places for local and seasonal avian visitors. Wetlands offer vital benefits to humans and the environment, and they support Agriculture, provide habitats for fish, and supply timber, fuelwood, and reeds for mats and thatching roofs. Additionally, wetlands are used for recreation, such as bird watching, sailing, and scientific study. Beyond direct use, wetlands perform essential functions like erosion control, flood water storage, groundwater recharge, and water purification. They also offer economic benefits through hiking, bird watching, and wildlife photography. Wetlands benefit downstream riparian dwellers by storing floodwaters and delaying peak river levels, showcasing their critical role in human and ecological systems.

Keywords: Wetlands, Nathsagar, Jayakwadi Dam, Economic Importance, Ecology.

Introduction:

Wetlands, those precious ecosystems, are not just about maintaining ecological balance and providing numerous benefits to wildlife and human populations. They are about the unique beauty that unfolds in places like the Nathsagar reservoir, nestled along the Godavari River in Maharashtra, India. This is where Jayakwadi, a vast area of around 350 square kilometres, stands, renowned for its diverse wildlife and critical habitats for various freshwater organisms. It is the place where diverse waterfowl and fish find their home, creating an essential habitat for hundreds of species. Every winter, Jayakwadi transforms into a sanctuary for migratory birds from distant areas such as Siberia, Northern Europe, and Central Asia, painting a picture of its global ecological importance. We have carefully selected ten distinct sites, *viz*. Galnimb (S-1), Warkhed (S-2), Ramdoha (S-3), Khamgaon-1 (S-4), Bhave Nimgaon (S-5), Jayakwadi-South (S-6), Jayakwadi-North (S-7), Khanapur-Tajnapur Lift (S-8), Erandgaon (S-9) and Lakhefal (S-10), each with unique environmental conditions that support a diverse range of avifauna. These wetlands are a vital resource for the local population, providing various ecosystem services, such as water purification, flood control, and groundwater recharge (Chauhan *et al*., 2021). These wetlands offer abundant cover, secure roosting sites, and rich feeding grounds, making them ideal habitats for resident and migratory bird species. The ecological diversity within these wetlands fosters optimal

breeding conditions for numerous local and seasonal bird visitors, thereby supporting a vibrant and dynamic avian population. This diversity is crucial for maintaining ecological balance and promoting regional biodiversity. Beyond their environmental importance, the Jayakwadi wetlands are a lifeline for the local communities. They support agriculture by ensuring fertile soils and a reliable supply of water resources, which are essential for crop cultivation. The wetlands are home to diverse plant and animal life, including migratory birds, fish, and other aquatic organisms (Chauhan et al., 2021).The wetlands also provide a source of livelihood for the communities, with timber, fuelwood, and reeds being harvested for various purposes, such as constructing mats and thatching roofs. These economic activities are not just vital, but they are the backbone of many residents' lives. The Jayakwadi wetlands are critical recreational sites and a source of pride that attracts bird watchers, sailors, and scientific researchers. These activities promote tourism and education and foster a greater appreciation and understanding of wetland ecosystems. The recreational and educational opportunities these wetlands provide contribute to the overall well-being of the local and broader communities, making them an integral part of the ecosystem. Wetlands like those in Jayakwadi play critical roles in environmental protection and sustainability. They act as natural flood control systems by temporarily storing excess floodwaters and reducing peak river levels, which helps mitigate downstream flooding and protects riparian communities. This flood mitigation capability is significant in regions prone to seasonal flooding. Additionally, the Jayakwadi wetlands contribute to groundwater recharge, ensuring the sustainability of water supplies for both human and ecological use. Furthermore, these wetlands enhance water purification by filtering pollutants and improving water quality. The vegetation in wetlands acts as a natural filtration system, removing contaminants from the water and contributing to overall ecosystem health. Wetlands also play a significant role in erosion control by stabilising soil with their extensive root systems, which help prevent soil loss and maintain landscape integrity. Economically, the Jayakwadi wetlands support various activities that benefit local communities. They provide hiking, wildlife photography, and transportation opportunities, contributing to the region's economic development. The financial value of these ecosystems extends beyond direct uses, as the ecosystem services they provide are vital for human well-being and environmental health. This research aims to underscore their value and advocate for their protection and sustainable management by exploring the diverse functions and services these wetlands provide. Preserving such ecosystems is crucial for maintaining ecological integrity and supporting their myriad benefits to people and nature.

Research Area:

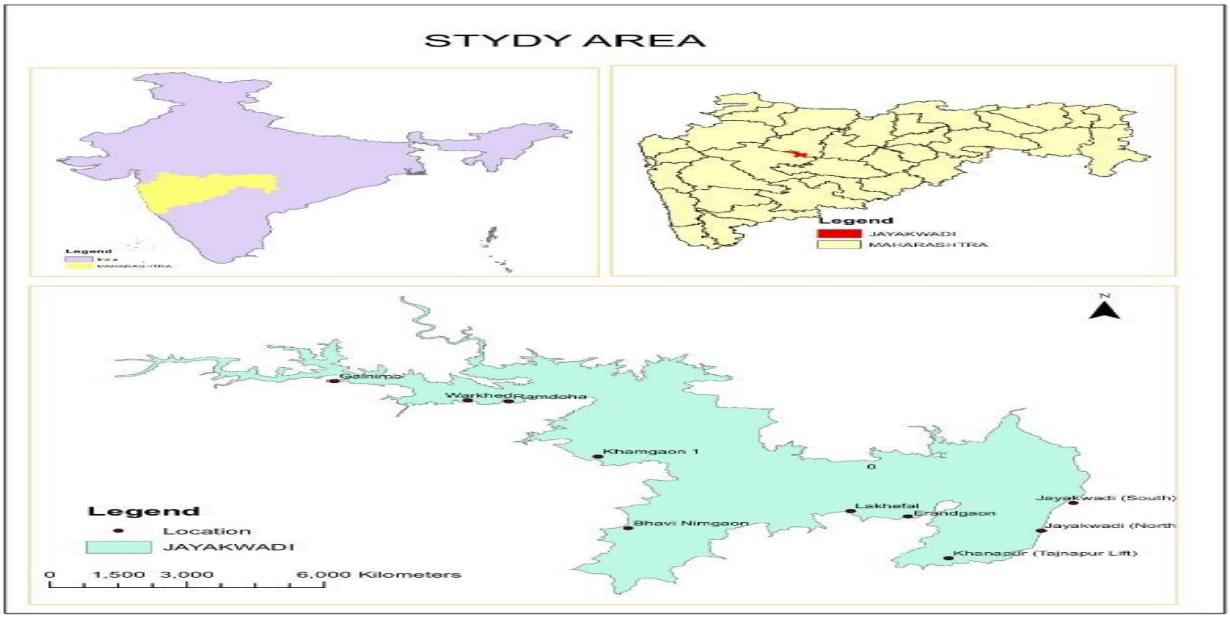

Fig1: Map outline locating research Area includes India, Maharashtra and Nathasgaar reservoir.

Fig2: Map Toposheet locating the location of the ten selected wetlands for study.

ECONOMIC IMPORTANCE:

Wetlands are vital for ecological balance and also hold great economic importance. Their environments provide a wide range of essential benefits that greatly enhance the health and prosperity of people and the economy. This comprehensive analysis will investigate wetlands' significant economic role, diverse ecosystem services, and how they support various economic activities and livelihoods.

Agricultural Importance:

Wetlands have been extensively utilised for agricultural purposes for centuries. The fertile floodplain soils and expansive rice fields are prime examples of wetlands that have played a pivotal role in sustaining agricultural activities. The ability of

wetlands to support crop production, such as rice cultivation, has been instrumental in ensuring food security for numerous communities worldwide. Additionally, wetlands' nutrient-rich soils and water resources contribute to increased agricultural productivity, benefiting local economies and livelihoods.

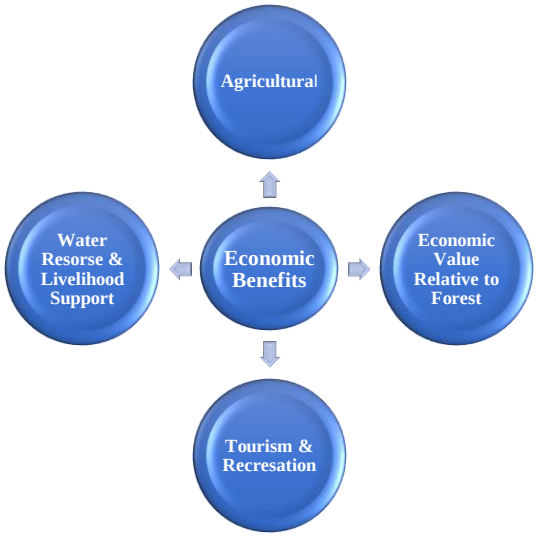

Fig3: Showing Economic Benefits of Wetlands.

Water Resource and Livelihood Support:
The Nathsagar Reservoir and its surrounding wetlands serve as a crucial water resource for irrigation and other uses, underpinning agricultural activities and ensuring continued regional productivity. Furthermore, these wetlands are a source of livelihood for individuals engaged in fishing, agriculture, and other wetland-related activities. The diverse ecosystems in these wetlands foster the growth of various plant and animal species, providing sustenance and economic opportunities for local communities. The interdependent relationship between wetlands and local livelihoods highlights their indispensable economic value.

Economic Value Relative to Forests:
It is fascinating to note that the economic worth of wetlands' ecosystem services can be up to seven times higher than that of rainforests. This striking comparison underscores the substantial economic significance of wetlands and emphasises the need for their preservation and sustainable management. The diverse services wetlands provide, including water purification, flood control, and climate regulation, directly and indirectly contribute to economic activities and human well-being, underlining their unparalleled economic value.

Tourism and Recreation:
Wetlands' aesthetic appeal and biodiversity make them attractive destinations for ecotourism and recreational activities. Wetland tourism generates revenue for local economies through birdwatching, nature trails, and guided tours, fostering job creation and driving economic development within the area. The preservation of wetlands safeguards their ecological integrity and sustains their economic potential as prime tourist attractions.

ECOLOGICAL IMPORTANCE OF WETLANDS:

Wetlands' ecological importance cannot be overstated due to their remarkable contributions to the environment and human well-being.

High Productivity:
Wetlands are incredibly productive ecosystems, surpassing even rainforests and coral reefs in productivity (Jajere *et al*., 2021). This high productivity makes them crucial to the overall health of the environment.

Ecosystem Services:
Wetlands provide many crucial ecosystem services for human well-being and environmental sustainability (Millennium et al., 2005). These services include water

purification, flood control, carbon sequestration, groundwater recharge, and nutrient cycling (Zedler & Kercher, 2005).

Climate Regulation:
Wetlands contribute to climate regulation through carbon sequestration and storage (Bridgham *et al*., 2006), which helps mitigate climate change impacts.

Water Filtration:
Wetlands serve as natural filters, purifying water by trapping sediments and removing pollutants (Kadlec & Knight, 1996). This is essential for maintaining water quality.

Flood Control:
Wetlands help control floods by absorbing and storing excess water in heavy rain or storms (Mitsch & Gosselink, 2015).

Biodiversity:
Wetlands are essential habitats for various plant and animal species, including several at risk of extinction (Brinson & Malvárez, 2002). The preservation of wetlands is crucial for the conservation of biodiversity. Wetlands offer multiple microhabitats for diverse aquatic fauna and flora, *viz.*, open water, marshy, shallow water (fringe area), mudflats, and dry sandy banks (Kumbhar & Mhaske, 2021).

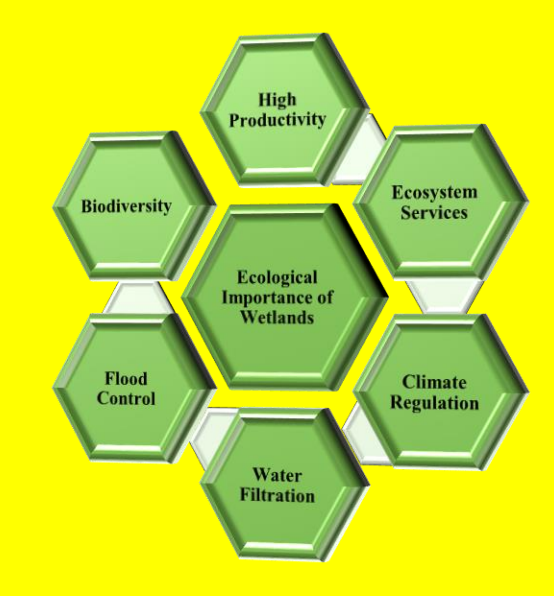

Fig 4: Highlighting Ecological importance of wetlands.

Specific Examples:
The wetlands surrounding the Nathsagar Reservoir in Maharashtra provide a critical haven for migratory birds, fish, and other wildlife (Ramsar Convention, 1971). Additionally, it further highlights the remarkable ecological significance of these wetland ecosystems. Wetlands' ecological importance cannot be overstated due to their remarkable contributions to the environment and human well-being.

CONCLUSION:
In conclusion, wetlands are ecologically essential and hold immense economic importance. Their role in supporting agricultural activities, providing vital water resources, and fostering diverse economic opportunities highlights their indispensable economic value. Recognising and conserving the economic importance of wetlands is vital for preserving the environment and the livelihoods of dependent communities. Therefore, it is imperative to implement policies and practices that prioritise the Conservation and sustainable use of wetlands, ensuring the continuation of their economic contributions and ecological services for future generations. Let us take action to ensure the future of our wetlands and the communities they support.

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