RESEARCH ARTICLE

STUDY ON THE EFFECT OF ANTHROPOGENIC ACTIVITIES ON FRESHWATER BIRDS IN HUMAN-DOMINATED LANDSCAPES: INSIGHTS FROM SHENDRI RESERVOIR, GADHINGLAJ

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Abstract:

Human activities have significantly impacted freshwater ecosystems worldwide, posing severe threats to dependent bird species. Shendri Reservoir, Gadhinglaj, is no exception. Rapid Urbanization, Agricultural Intensification, and growing Industrial Development in the surrounding region may degrade the reservoir's habitats, leading to declines in Waterfowl, Wading Birds, and Piscivorous bird species. This paper explores the multifaceted challenges confronting freshwater bird species at Shendri Reservoir, focusing on Land-Use Changes, Urbanization, and Agriculture Practices. To address these issues, conservation strategies are proposed. These include habitat restoration, sustainable water management, pollution mitigation, and climate adaptation. By implementing a comprehensive approach, Shendri Reservoir can be preserved as a vital habitat for freshwater birds in the face of increasing anthropogenic pressures.

Keyword: Shendri Reservoir, Urbanization, Conservation Strategies, Freshwater Birds.

Introduction:

Anthropocene is a period when mankind has made a significant impact on Earth's biodiversity and climate. Urbanization worldwide has an impact on animal ecology through habitat loss and the splitting up of environments that disrupt migration and breeding patterns in animals living in these areas. The rise in pollution levels is also a consequence of urbanization, affecting air quality and water resources while also posing a threat to biodiversity. The water quality across rivers and bodies like lakes and streams throughout Asia has significantly degraded due to pollution from municipal sources as well as agricultural activities such as the runoff from fertilizers and pesticides (Liu and Diamond, 2005; Prasad *et al.,* 2002). Additionally, urban environments tend to support communities that have a greater abundance of invasive species, which can overcome native wildlife, leading to changes in biodiversity and ecosystem balance (Alberti *et al.,* 2003). Urbanization is taking the place of natural habitats and

has a considerable effect on ecosystems, mostly on urban freshwater systems. These manmade processes have adversely impacted the bird populations. It requires conservation strategies in the growing urbanization regions. (Angel *et al.,* 2005; Vincze *et al.,* 2017; Hassall, 2014; Rosin *et al.,* 2020; and Shilin Xie *et al.,* 2022) Many of the cultural functions that lakes offer may also be lost as a result of eutrophication (Verhoeven *et al.,* 2006). Global freshwater ecosystems are under stress from human population increase and economic development, which diminishes their capacity to sustain biodiversity and deliver ecosystem services. However, because conservation research tends to favor mostly terrestrial or charismatic taxonomic groupings, our understanding of freshwater biodiversity is fragmented (Darwall *et al.,* 2011).

Common species are essential to maintaining ecological harmony. They serve vital functions like pollination, seed dispersion, and pest control, which makes them the foundation of many ecosystems. Other species and the ecosystem's overall health may be adversely affected by their decline (Whelan *et al.,* 2008). Considering that the function of waterfowl in dispersing seeds became recognized decades ago (Ridley, 1930). Remarkably, waterfowl spread aquatic invertebrates in addition to plant seeds. (Figuerola and Green, 2002; Charalambidou and Santamaria, 2005).

Climate change has a profound impact on ecosystems, causing a myriad of direct ecological consequences. One of the most noticeable effects is the alteration of phenological patterns (Cohen *et al.,* 2018). Due to the complexity of these processes, little is known about how climate change and habitat loss together affect biological populations, although it is recognized that both provide significant hazards to biodiversity globally (Mantyka-Pringle *et al.,* 2011). The natural environment of water birds may be adversely affected by climate change triggered by the activities of humans upstream (Maleki *et al.,* 2021). Bird communities are migrating to warmer areas as an outcome of increasing global temperatures, which is causing declines in habitat and a decline in biodiversity in their native areas (Stephens *et al.,* 2016). Birds that travel over long distances and depend on certain seasonal habitats are particularly vulnerable to the impacts of climate change. They are susceptible to disturbances from fluctuating weather patterns and changes in the availability of resources because of their intricate migratory patterns and dependence on exact timing for mating and eating (Both *et al.,* 2010). Climate change is accelerating the rate at which species are going extinct. As temperatures rise and weather patterns change, many species are finding it harder to adapt, which ultimately leads to population declines and extinction (Urban, 2015).

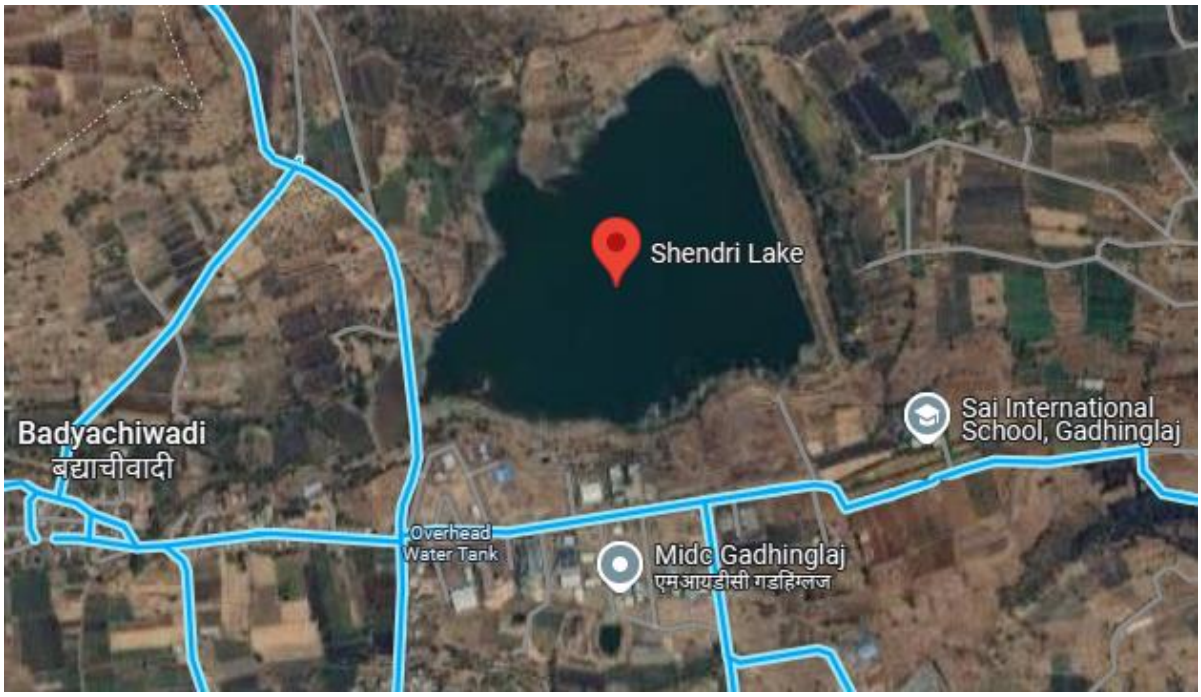
Increasing human population and urbanization, coupled with overexploitation of land, deforestation, and unsustainable agricultural practices, pose significant threats to avian populations. (Jerrentrup *et al.,* 2017, Heldbjerg *et al.,* 2018). Increasing agricultural practices have led to a significant decrease in insect populations. For insectivorous birds, who depend upon insects for food, this "double whammy" effect can be particularly disastrous as they struggle to find enough to sustain themselves and rear their young (Bowler *et al.,* 2019). It has been reported that current agricultural practices have contributed to a 75% decline in the biomass of flying insects in protected areas over the past 27 years (Hallmann *et al.,* 2017). Fallow land provides vital habitat for many farmland birds. Its loss, driven by intensive agricultural practices, has led to significant declines in populations of these birds. These losses

reduce the availability of food sources, nesting sites, and cover for these species, making it difficult for them to survive and reproduce (Traba *et al.,* 2019). Disturbances in natural forests, such as deforestation and habitat fragmentation, can lead to a decline in avian diversity. As forest land diminishes, suitable habitats for birds become scarce, further impacting avian communities (Schelhaas *et al.,* 2003; Seibold *et al.,* 2019).

Material and Methods:

Birds were observed with the help of a pair of binoculars (07 × 50) at Shendri Reserve. With the help of a Canon EOS 1300D with a 55-250 mm zoom lens, photographs were captured. Throughout the study period (January 2023 to December 2023), observations were made on every Sunday. Over time, the activities around the lake were meticulously monitored and documented in order to evaluate their environmental impact. The impact of human-induced activities on the environment of the lake was specifically examined, including Urbanization, Agriculture, and Public Transport. According to the study, these anthropogenic activities were essential for a thorough examination and record. Amongst the most significant investigations into wetland birds and their habitat were those conducted by Czech and Parsons (2002), Grimmett *et al.* (1998), Rahmani (2002), Vijayan *et al.* (2004), Kazmierczak and Perlo (2010), and others.

Study Area



Shendri Reservoir, Nipani Gadhinglaj Rd, Gadhinglaj, Maharashtra

https://maps.app.goo.gl/fahzftxbvfsn7j9p8

The Shendri Lake is an isolated earthen dam built at 16°16'0" latitude and 74° 21'0" longitude. It has an annual rainfall of about 933 millimeters and covers a catchment area of 2.56 square kilometers. The dam's overall length is 575 meters, and its highest point is 22.3 meters. This elevation is important for preserving the reservoir's operation and guaranteeing sufficient water storage. A vital resource for local irrigation, the Shendri Reservoir can hold 66.5 million cubic feet at full capacity. With a total area

of about 255 hectares set aside for irrigation, the command area is crucial to upholding the region's agricultural activity. The lake's nature is categorized as shallow, which is common for tiny reservoirs. Furthermore, the reservoir's 40-meter outflow capacity enables the controlled discharge of water as needed.

East Side of Shendri Reservoir Showing Dam Wall

West Side of Shendri Reservoir Showing Gadhinglaj Kolhapur Road

South Side of Shendri Reservoir Showing Construction Activities

North Side of Shendri Reservoir Showing Agriculture Practices

Results and Discussion:

The dam wall on the eastern side of the Shendri Reservoir was constructed specially to store water. Here, little bushes have developed over time, giving waterfowl cover. But a road runs along the wall, disrupting the birds' nesting operations regularly. A public road, with a rising volume of traffic, links Gadhinglaj and Kolhapur on the dam's western side. In addition, this road goes to the 'Kalbhairi Temple', which is north of the dam and receives daily car and foot traffic. Water birds hardly ever nest on the western side because of these frequent human activities.

Spot Billed Duck

Ruddy Shelduck

Common Coot

Grey Heron

Little Egret

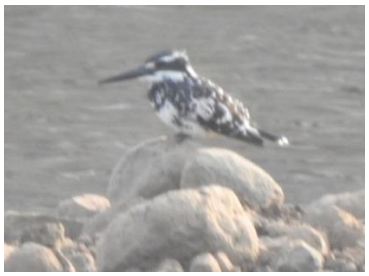
Wooly – Nacked Stork

Green Sandpiper

Little Ringed Plover

River Tern

Common Kingfisher



Pied Kingfisher

White - Throated Kingfisher

Freshwater birds at Shendri Reservoir, Gadhinglaj

Agricultural land under the management of local landowners now makes up the majority of the reservoir's northern shore. The use of technology and chemical fertilizers, among other modern farming practices, significantly interferes with and deters water birds from nesting in this area. The southern

side of the dam, which is located in the Maharashtra Industrial Development Corporation (MIDC) zone for Gadhinglaj, is seeing rapid development. Gadhinglaj, an urban region that is growing quickly, is becoming more and more associated with Karnataka and Goa. Many construction projects are currently underway along the dam's southern length, where a jack well and water supply well have already been installed. The breeding habits of aquatic birds in this area are severely disturbed by these continuous efforts.

Numerous studies have shown that a variety of habitats within a wetland ecosystem is crucial for maintaining high levels of bird species richness and population numbers. (Svingen and Anderson 1998; Edwards and Otis 1999; Fairbairn and Dinsmore; Riffell *et al.,* 2001; Zarate *et al.,* 2008; Datta, 2011). Human disturbances on water birds need proper management strategies (Borgmann, 2011). Industrialization. Urbanization and pollution are the major threats to the habitat loss of breeding water birds. (Onmus *et al.,* 2013). Human activities are the major factors responsible for the depletion of habitat and loss of water birds in shallow lakes (Wang *et al.,* 2020). Waterbird nesting habits are probably going to be drastically impacted by the human activities that have been witnessed around the Shendri Reservoir in Gadhinglaj, including Road Traffic, Farming, Industrial Development, and Construction. Particularly on the eastern, western, northern, and southern reservoir peripheries, these changes affect the birds' native habitat and interfere with crucial nesting locations.

Targeted conservation measures are desperately needed to lessen these impacts. Possible steps include limiting construction in vulnerable areas, encouraging sustainable farming methods that use fewer chemicals, and establishing buffer zones to decrease human interference close to important nesting locations. By putting these precautions in place, the Shendri Reservoir ecosystem's general ecological health would be supported, and waterbird nesting places would be protected.

Conclusion:

Shendri Reservoir in Gadhinglaj and most of the freshwater ecosystems are facing growing challenges in the Anthropocene, particularly for avian species that depend on the aquatic habitats. Man-made activities such as modern agricultural practice, water supply schemes, and industrial development, along with broader environmental changes like climate alteration, will put an immense burden on the delicate balance of the Shendri reservoir’s ecosystem. These changes will lead to habitat loss, alter water quality, and affect migratory patterns. These activities will threaten the survival of freshwater-dependent bird species in the area.

A diversified strategy is required for conservation at Shendri Reservoir in order to guarantee the preservation of these birds and the ecosystem's health. This entails dealing with both short-term issues like pollution and habitat loss as well as long-term ones like climate change and unsustainable water use. It will be crucial to restore degraded areas, preserve the natural water flow, and protect important wetlands and other habitats.

For sustainable practices to be established that strike a balance between ecological preservation and human needs, cooperation between local communities, legislators, and environmentalists will be essential. We can lessen the effects of human activity on the reservoir's bird populations and preserve

biodiversity for future generations by combining scientific research, local knowledge, and proactive management techniques.

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