



Conservation Challenges and Ecological Importance of the Ganges River Dolphin in Indian River Ecosystems

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Abstract

The Ganges River Dolphin (*Platanista gangetica gangetica*) is one of the most significant freshwater mammals inhabiting the river systems of the Indian subcontinent. As a top predator and an ecological indicator species, it plays an important role in maintaining the balance of freshwater ecosystems. However, the population of this species has declined considerably due to habitat degradation, water pollution, river fragmentation, and increasing anthropogenic pressure on river systems. The present study reviews the ecological significance of the Ganges River Dolphin and examines the major conservation challenges affecting its survival in Indian river ecosystems. The study also discusses the importance of environmental management, community participation, and conservation policies in protecting this endangered species. The

findings suggest that sustainable river management practices, habitat restoration, and effective conservation strategies are essential for ensuring the long-term survival of the Ganges River Dolphin and maintaining biodiversity in freshwater ecosystems.

Keywords: Ganges River Dolphin, Freshwater Biodiversity, River Ecosystems, Aquatic Ecology, Conservation Biology, Habitat Fragmentation.

ARTICLE INFO

Article history: Received 02 March- 2026, Revised 18 Apr 2026, Accepted 26 Apr 2026, Published: May- 2026.

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Publisher: Curevita Research Pvt Ltd

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Citation: Thakre Nisha 2026. Conservation Challenges and Ecological Importance of the Ganges River Dolphin in Indian River Ecosystems. Curevita Research International Nexus. 2,2.9-19.

Infographic abstract



Research Highlights

Ecological Sentinel Status: Identifies the Ganges River Dolphin as a **top predator** and a critical **bio-indicator**, where its population health directly reflects the functional integrity of the Indo-Gangetic river systems.

Anthropogenic Drivers of Decline: Evaluates the synergistic impact of **habitat fragmentation** (due to dams and barrages), escalating **water pollution**, and direct human interference on the species' dwindling numbers.

Assessment of Conservation

Barriers: Critically examines the major hurdles in current preservation efforts, emphasizing the disconnect between policy and the ground-level reality of river ecosystems.

Holistic Management Paradigm: Proposes a shift toward **sustainable river management**, integrating habitat restoration with scientific environmental monitoring to reverse population decline.

Community-Centric Conservation: Highlights the indispensable role of

local community participation and robust policy frameworks as the backbone for long-term survival and biodiversity maintenance.

1. Introduction

Freshwater ecosystems represent some of the most productive and biologically diverse habitats on Earth. Rivers support a wide variety of organisms including fish, amphibians, reptiles, birds, and mammals. Among freshwater mammals, the Ganges River Dolphin (*Platanista gangetica gangetica*) is one of the most distinctive and ecologically significant species found in South Asia (Sinha & Kannan, 2014).

The species is mainly distributed in the river systems of the Ganga, Brahmaputra, and their tributaries across India, Nepal, and Bangladesh. The dolphin is well adapted to life in turbid freshwater environments and uses echolocation for navigation and prey detection (Smith & Reeves,

2012). Due to its sensitivity to environmental changes, the species is widely recognized as an indicator of river ecosystem health.

Historically, the Ganges River Dolphin had a wide distribution throughout the major river systems of the Indian subcontinent. However, rapid industrialization, urbanization, and increasing human activities have caused significant degradation of river habitats (Kelkar et al., 2010). Additionally, the construction of dams and barrages has fragmented river habitats, restricting the natural movement of dolphin populations.

Recognizing its ecological and cultural importance, the Government of India declared the Ganges River Dolphin as the **National Aquatic Animal of India in 2009**. Several conservation initiatives have since been implemented to promote awareness and protect its habitat (MoEFCC,

2020). Despite these efforts, the species continues to face numerous conservation challenges.

Therefore, the present study aims to evaluate the ecological importance of the Ganges River Dolphin and identify the major conservation challenges affecting its survival in Indian river ecosystems.

2. Objectives of the Study

The present study was conducted with the following objectives:

1. To understand the ecological role of the Ganges River Dolphin in freshwater ecosystems.
2. To identify the major threats affecting the survival of the species.
3. To evaluate conservation challenges related to river ecosystem management.
4. To suggest strategies for effective conservation and

sustainable river management.

3. Distribution and Habitat

The Ganges River Dolphin inhabits large river systems characterized by deep pools, meandering channels, and river confluences. These habitats provide suitable conditions for feeding, breeding, and movement (Sinha & Sharma, 2003).

Major populations are found in the **Ganga–Brahmaputra–Meghna river system**, which supports a diverse aquatic ecosystem. Habitat suitability for dolphins depends on several factors including water depth, prey availability, and minimal human disturbance (Sinha & Behera, 2004).

Seasonal changes in water flow significantly influence dolphin distribution. During the monsoon season, increased water levels expand available habitats, whereas

in the dry season dolphins tend to concentrate in deeper channels and confluence zones.

River confluences are particularly important habitats because they support high fish diversity and provide productive feeding grounds. However, large-scale human modifications such as dam construction, water diversion, and river channelization have altered these natural habitats and disrupted ecological processes (Kelkar & Krishnaswamy, 2013).

4. Ecological Importance

The Ganges River Dolphin plays an important ecological role in maintaining the health of freshwater ecosystems. As a top predator, it regulates fish populations and helps

maintain balanced aquatic food webs (Reeves et al., 2000).

The presence of dolphins in river systems often indicates relatively good water quality and ecological stability. Because the species is sensitive to pollution and habitat disturbance, its population status reflects the overall environmental condition of river ecosystems (Sinha & Kannan, 2015).

Dolphins also contribute to ecological processes such as nutrient cycling and energy flow within aquatic ecosystems. Their feeding behavior influences prey distribution and supports balanced trophic interactions. Therefore, conserving dolphin populations indirectly supports the conservation of other aquatic species and freshwater biodiversity.

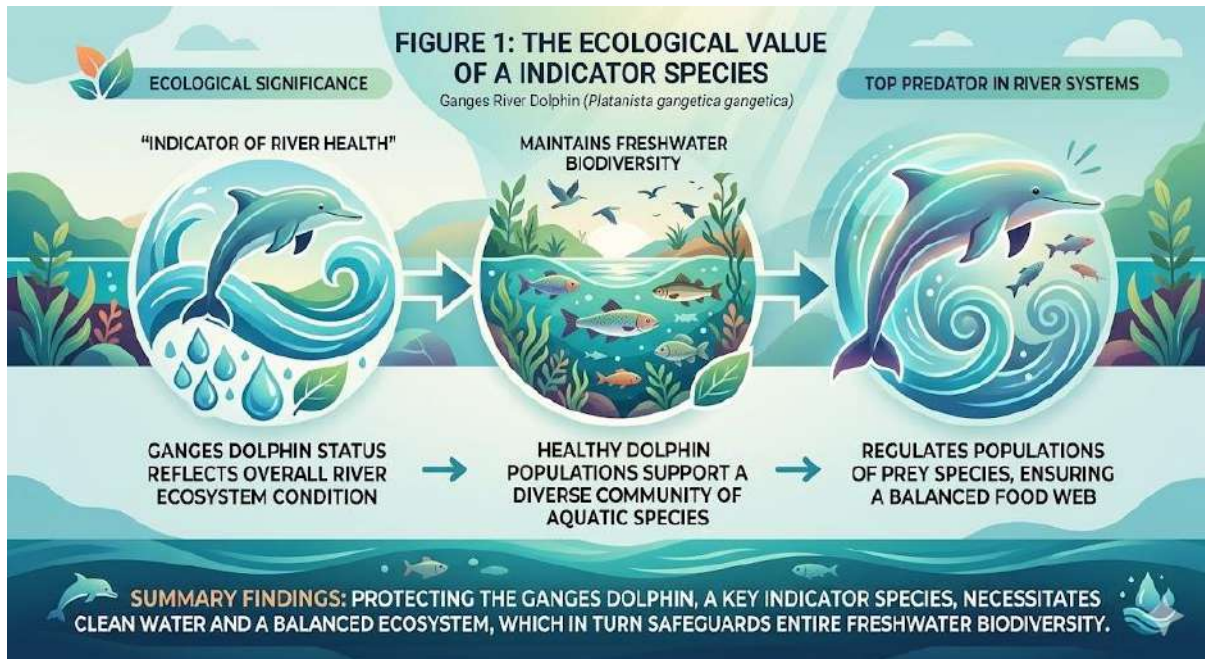


Figure 1: The Ecological Value of a Indicator Species

5. Major Conservation Challenges

Despite its ecological importance, the Ganges River Dolphin faces several serious threats that have contributed to its population decline.

5.1 Water Pollution

Industrial discharge, agricultural runoff, and untreated domestic sewage have severely polluted many river systems in India. Chemical contaminants and heavy metals reduce water quality and

negatively affect fish populations that serve as the primary prey for dolphins (Dey & Sinha, 2015).

5.2 Habitat Fragmentation

The construction of dams, barrages, and irrigation structures disrupts natural river flow and divides dolphin populations into isolated groups. Habitat fragmentation restricts migration and reduces genetic diversity within populations (Kelkar & Krishnaswamy, 2013).

5.3 Overfishing and Decline of Prey

Intensive fishing activities reduce fish availability for dolphins. Additionally, dolphins often become accidentally entangled in fishing nets, leading to injury or mortality (Choudhary et al., 2006).

5.4 Boat Traffic and Noise Pollution

Increasing boat traffic generates underwater noise that interferes with dolphin echolocation and

communication systems. Continuous disturbance may affect feeding efficiency and reproductive behavior.

5.5 Climate Change

Climate change may alter rainfall patterns, river discharge, and water temperature. These changes can influence habitat quality, prey distribution, and overall ecosystem stability in freshwater environments.



Figure 2: The Four Major Conservation Challenges

6. Conservation Efforts

Various conservation initiatives have been implemented to protect the

Ganges River Dolphin and its habitat. Government policies, protected river stretches, and awareness programs play an important role in safeguarding this endangered species.

The declaration of the dolphin as the **National Aquatic Animal of India** significantly increased public awareness regarding its conservation. Several protected areas and dolphin conservation zones have also been established to protect critical habitats (WWF-India, 2017).

Community participation is essential for the success of conservation programs. Local fishermen and riverine communities can contribute to conservation by adopting sustainable fishing practices and reducing harmful activities.

Environmental education and awareness campaigns have also improved public understanding of

freshwater biodiversity conservation.

7. Conservation Strategies and Recommendations

To ensure the long-term survival of the Ganges River Dolphin, integrated conservation strategies are required. The following measures are recommended:

1. Improvement of river water quality through strict pollution control policies.
2. Protection of critical dolphin habitats such as deep pools and river confluences.
3. Regulation of fishing activities to reduce accidental dolphin entanglement.
4. Promotion of community-based conservation programs involving local stakeholders.
5. Implementation of long-term ecological monitoring and research programs.

Sustainable river management that balances ecological conservation with human development is

essential for protecting freshwater biodiversity.

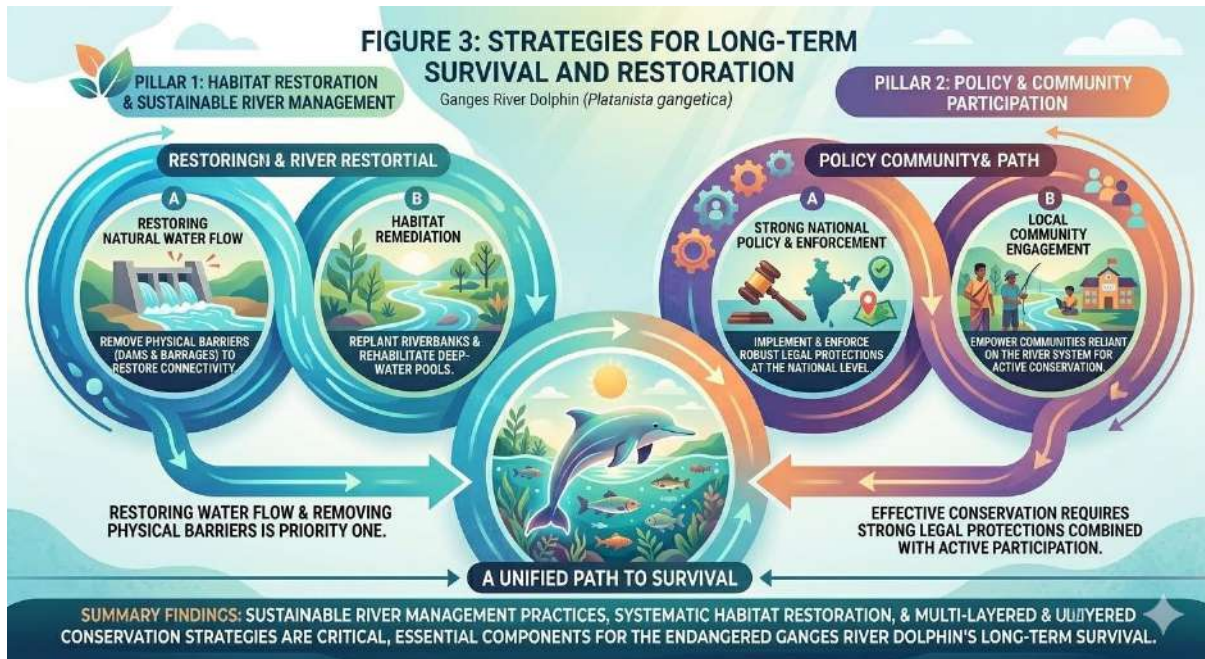


Figure 3: Strategies for Long-Term Survival and Restoration

8. Conclusion

The Ganges River Dolphin is an ecologically significant species that plays a vital role in maintaining the health and stability of freshwater ecosystems. However, increasing human pressure on river systems has created serious conservation

challenges for this endangered species.

Effective conservation requires a comprehensive approach that includes habitat protection, pollution control, community participation, and strong environmental policies. Strengthening scientific research

and ecological monitoring will improve our understanding of dolphin ecology and support evidence-based conservation planning.

Protecting the Ganges River Dolphin will not only conserve an iconic species but will also contribute to the preservation of freshwater biodiversity and sustainable management of river ecosystems.

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