



Occurrence of *Gavialis gangeticus* in the Lower Ganges of Bangladesh: urgent need for conservation initiatives


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Abstract

The gharial, *Gavialis gangeticus*, a Critically Endangered fish-eating crocodilian native to the Indian subcontinent, has long been considered nearly extirpated from Bangladesh, with records largely limited to incidental captures in fishing gear. This study documents recent occurrences of *G. gangeticus* along a 100-km stretch of the Lower Ganges (Padma River) in northwest Bangladesh based on local ecological knowledge collected through a participatory monitoring approach conducted between 2018 and 2025. Eight individuals, including six yearlings, one hatchling and one adult, were recorded as accidental captures. An additional four individuals, including two yearlings, one hatchling and one adult, were directly observed on riverine chars. Occurrence records were spatially clustered around sandbar-associated habitats in the Godagari region, suggesting the presence of suitable microhabitats. The repeated detection of individuals indicates the possible persistence of the species in the region, either through localised recruitment or dispersal from upstream populations. However, the absence of systematic monitoring and the prevalence of fisheries interactions highlight significant threats and knowledge gaps.

Keywords: bycatch; conservation; critically endangered; crocodilian; gharial; Lower Ganges; megafauna; threatened species

1 | INTRODUCTION

The gharial (*Gavialis gangeticus*) is a Critically Endangered crocodilian historically distributed across major river systems of the Indian subcontinent, including the Indus, Ganges, Brahmaputra, and Irrawaddy basins (Maskey 1989; Lang *et al.* 2019). Unlike many other crocodilians, the species is highly specialised for riverine habitats and is strongly associated with deep, flowing freshwater channels, exposed sandbars and sandy riverbanks used for basking and nesting (Hussain 1999; Stevenson and Whitaker 2010). During the past century, gharial populations

have declined dramatically across their range because of habitat degradation, river regulation, dam and barrage construction, sand mining, pollution, egg collection and fisheries-related mortality, particularly entanglement in fishing nets (Hussain 1999; Choudhury *et al.* 2007; Katdare *et al.* 2011; Lang *et al.* 2019).

In Bangladesh, *G. gangeticus* historically occurred in the Padma River, the lower course of the Ganges, and the Jamuna River system, but it has disappeared from several former range areas, including the Teesta, Atrai and Karotoa rivers (Khan 1982; IUCN Bangladesh 2016). Until the

late 1980s, gharial nesting was reported from several sites, including Char Khidirpur on the Padma River and Pechakhola and Baladuba Char on the Jamuna River (Rashid et al. 2014; IUCN Bangladesh 2016). However, confirmed nesting records have not been reported from Bangladesh in recent decades, and the current status of the species in the wild remains poorly understood (Rabbe et al. 2023).

Despite this apparent decline, some sections of the Lower Ganges still contain deep channels, strong currents, and seasonally exposed sandbars, which may provide suitable habitat for occasional occurrence of gharials (Whitaker and Basu 1983; Hussain 1999; Lang et al. 2019). The species is capable of long-distance movements through connected river systems (Lang et al. 2019), suggesting that individuals recorded in Bangladesh may represent either remnant animals, local recruitment from undetected nesting sites, or dispersing individuals from upstream populations in India. However, the lack of systematic surveys has limited the ability to assess whether gharials still regularly use the Lower Ganges.

In data-deficient regions, local ecological knowledge from fishers and riverside communities can provide valuable information on rare aquatic species, particularly when direct field detection is difficult (Huntington 2000; Brook and McLachlan 2008). Such information must be interpreted cautiously, but it can help identify occurrence hotspots, potential threats, and priority areas for future surveys. This study uses local ecological knowledge to document recent occurrence records of *G. gangeticus* in the Lower Ganges of Bangladesh, identify major threats, and highlight urgent conservation needs.

2 | METHODOLOGY

The study was conducted along a 100-km stretch of the Lower Ganges in northwestern Bangladesh, between Godagari (24°27'46.3"N, 88°13'33.0"E) and Ishwardi (24°03'38.6"N, 89°01'46.1"E) (Parvez et al. 2023). Data were collected from 2018 to 2025 to document the occurrence of gharials and gather local ecological knowledge regarding the species. Data were collected through a participatory monitoring approach involving local fishers, riverside residents, and personnel associated with Rajshahi Zoo. A total of 50 respondents were selected purposively from different locations within the study area based on their long-term association with the river and knowledge of local wildlife. The respondents included 22 fishers, 25 riverside residents and 3 zoo personnel.

Respondents remained in periodic contact with the research team and were interviewed through field visits and personal communication. They were requested to report sightings or encounters with gharials observed during fishing activities or routine movement along the river. For each reported encounter, information was recorded on the number of individuals, estimated life stage,

method of encounter, fate of individuals, and location. Encounters included accidental capture in fishing nets, direct observations in the river channel, and sightings on sandbars or riverbanks.

Individuals were categorised into size classes as follows: hatchlings, 0–60 cm; yearlings, 60–120 cm; juveniles, 120–180 cm; sub-adults, 180–270 cm; and adults, ≥270 cm (Whitaker and Basu 1983; Hussain 1999). Reported locations were georeferenced using respondent descriptions, field knowledge, and available locality information and were mapped to visualise spatial patterns of occurrence. Although interview-based approaches may involve uncertainties such as recall bias, they are widely used in data-deficient regions to provide preliminary insights into species occurrence and associated threats (Turvey et al. 2015).

3 | RESULTS AND DISCUSSION

Twelve occurrence records of *G. gangeticus* were documented from the study area between 2018 and 2025, comprising eight yearlings, two hatchlings, and two adults. Eight individuals were reported as accidental captures, mainly in fishing nets, while four were recorded as direct sightings on riverine chars. Among the accidental captures, six were yearlings, one was a hatchling, and one was an adult; direct sightings included two yearlings, one hatchling, and one adult.

Most records were concentrated in the Godagari region of Rajshahi District, particularly along sandbar-associated sections on or near the southern bank of the river (Figure 1). This spatial clustering suggests that parts of the Lower Ganges may still retain habitat features suitable for gharials, including exposed sandbars adjacent to deeper flowing channels. Such habitats are important for basking, resting, and nesting in the species' natural range (Stevenson and Whitaker 2010; Hussain 1999). However, no active nesting sites, nests, eggs, or breeding females were confirmed during this study. Therefore, although the presence of hatchlings and yearlings is notable, the current evidence is insufficient to confirm local breeding. These young individuals may represent either undetected recruitment within Bangladesh or dispersal from upstream sections of the Ganges in India.

Fisheries interaction emerged as the most immediate threat. Most accidental captures were associated with fishing nets, indicating that entanglement remains a serious risk to gharials using this river stretch. Net entanglement is widely recognized as a major source of mortality for *G. gangeticus* across its range, especially where intensive fishing overlaps with gharial habitats (Choudhury et al. 2007; Stevenson and Whitaker 2010; Lang et al. 2019). Although most captured individuals in this study were reportedly released, local fear and misunderstanding remain important concerns. Interviews indicated that some gharials may have been killed in the past after accidental capture or direct encounters, suggesting that mortality

risk may also arise from persecution, lack of awareness, and uncertainty about safe handling.

Interviews with personnel associated with Rajshahi Zoo provided additional contextual information. Two gharials of approximately 140 cm total length were reportedly captured from the Godagari area in 2018 and transferred to Rajshahi Zoo, although they later reportedly

escaped. Zoo personnel also reported that captive gharials at Rajshahi Zoo have laid eggs, although successful hatching has not been achieved. In 2025, a gharial breeding centre was established in Rajshahi with the aim of supporting captive breeding and future reintroduction; however, no successful breeding, head-starting, or release programme has yet been reported.

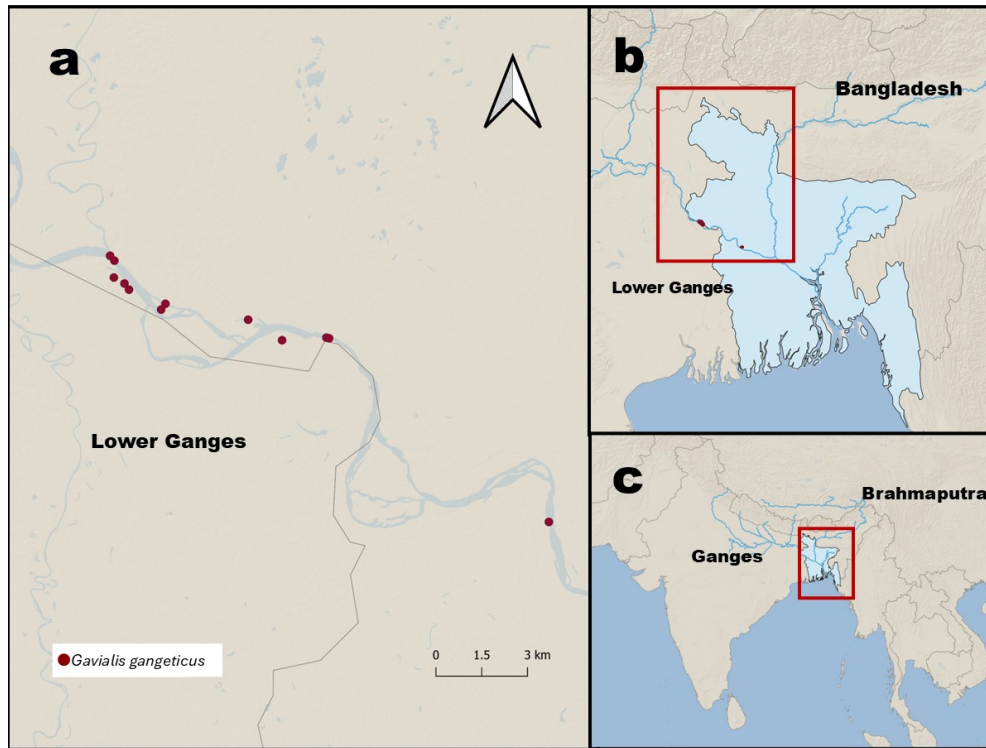


FIGURE 2 Accidentally captured individuals of *Gavialis gangeticus* in May 2024 (left) and October 2025 (right) in the Godagari area of the Lower Ganges, Bangladesh.

4 | CONSERVATION IMPLICATIONS

The present records indicate that *G. gangeticus* continues to occur in the Lower Ganges of Bangladesh, although its current population status remains uncertain due to the absence of systematic monitoring. The clustering of records in the Godagari region suggests that selected river sections should be prioritised for targeted field surveys to confirm distribution, assess threats, and identify potential basking, refuge, or breeding habitats. This particular stretch of the river also harbours other megafauna, such as the Endangered Ganges River dolphin (*Platanista gangetica*) (Kelkar et al. 2022) and the Endangered Indian narrow-headed softshell turtle (*Chitra indica*) (Asian Turtle Trade Working Group 2000), and should therefore be prioritised for conservation.

Fisheries interactions, particularly accidental entanglement in fishing nets, appear to be the most immediate conservation concern and should be addressed through bycatch mitigation, community awareness, and safe-release training for fishers. Bangladesh currently lacks dedicated protected river areas for gharials despite evidence of the species' continued occurrence, representing an important gap in national conservation planning. Although the Bangladesh Gharial Conservation Management and Action Plan 2016–2025 provides an important national framework (IUCN Bangladesh 2016), its effectiveness in wild river systems remains unclear. Because the Ganges is a transboundary river system, coordinated conservation between Bangladesh and India will be essential for understanding gharial movement, reducing threats, and improving the long-term viability of the species in the region.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

AUTHORS' CONTRIBUTION

Nadia S. Kashmi: Conceptualization, Data curation, Investigation, Methodology, Writing - original draft. Md. Taskin Parvez: Conceptualization, Methodology & Data collection. Shams M. Galib: Conceptualization, Supervision and Critical review of the manuscript.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available within the article [and/or] its supplementary materials.

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