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Evidence of Opportunistic Macro-Predatory Attempts by the Endangered Ganga River Dolphin (Platanista gangetica) on Mega-Prey Biomass

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Short Report

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Abstract

The endangered Ganga River dolphin (Platanista gangetica) is widely recognized as a small-prey specialist, restricting its foraging niche to fish under 20 cm due to mechanical and anatomical limitations of its slender rostrum. By integrating Local Ecological Knowledge (LEK) with field-based catch assessments at the Ganga–Ghaghara confluence (Bihar, India), we document physical and social-ecological evidence challenging this absolute small-prey dependency. We report a macro-predation attempt on an adult Wallago attu catfish measuring 105 cm (8.0–9.0 kg), which displayed a fully epithelial, smooth, concave amputation scar matching the interlocking dental configuration of P. gangetica. Semi-quantitative structured fisher surveys corroborated this behaviour, revealing a 98% consensus that dolphins actively target fish escaping deployed artisanal nets, while 90% reported confluences as primary hotspots. Independent eyewitness accounts verified a separate predatory strike on a 30–35 cm carp (Catla catla). These findings demonstrate that while P. gangetica is anatomically constrained from successfully ingesting mega-prey due to a lack of crushing jaw mechanics and strong prey counter-force, it exhibits opportunistic macro-predatory behaviours. This alters our understanding of its bioenergetic drivers and highlights a critical foraging risk interface with regional artisanal gillnet fisheries.

Introduction

The Ganga River dolphin (*Platanista gangetica*) is an endangered freshwater cetacean endemic to the heavily modified Ganga–Brahmaputra–Meghna and Karnaphuli river systems of South Asia (Sinha et al. 2010a). Current ecological consensus frameworks classify *P. gangetica* as an obligate micro-predator whose dietary niche is limited to small-bodied teleost fish and crustaceans ranging strictly between 3.5 cm and 20 cm in total length (Bashir et al. 2010; Kelkar et al. 2010). This specialized foraging range reflects evolutionary trade-offs: the elongated, slender rostrum and narrow interlocking dentition are highly optimized for capturing small prey via multi-modal sensing (echolocation, passive listening, and electroreception) but lack the crushing mechanics needed for larger biomass. (Choudhary et al. 2006; Kelkar et al. 2018).

While occasional records have noted the ingestion of intermediate-sized catfishes exceeding 20 cm, empirical evidence demonstrating predatory attempts on apex mega-prey species (>100 cm) is missing from the literature (Bashir et al. 2010; Paudel et al. 2020). This gap is largely due to the cryptic underwater habits of this species and the extreme difficulty of direct behavioural observation in highly turbid riverine ecosystems (Bhattacharyya and Bhowmick 2023). Consequently, reconstructing rare or non-lethal trophic interactions requires opportunistic field examinations and alternative social-ecological methodologies (Chowdhury et al. 2016).

In anthropogenically altered river channels, low-water seasonal conditions compress space, forcing wild populations and intensive artisanal fisheries into close contact (Paudel et al. 2020). This overlap induces high bioenergetic stress and acute localized prey scarcity (Dey et al. 2019). Under such extreme

nutritional demands, river dolphins may shift their risk-reward calculations toward opportunistic macro-predation (Kelkar et al. 2010). Localized foraging strategies are heavily shaped by regional river geomorphology, biological productivity, and shifting biomass (McGuire and Winemiller 1998; Santos et al. 2013). This study evaluates the trophic boundaries of *P. gangetica* near a critical river confluence hotspot. Here, we present physical and testimonial evidence that challenges the paradigm of absolute small-prey dependency, providing new insights into the bioenergetic drivers and morphological constraints of this endangered cetacean (Campbell et al. 2022; Das et al. 2025).

Materials and Methods

Field sampling was conducted along a ~30 km river stretches between Manjhi (25.831665°N, 84.574960°E) and Doriganj (25.727440°N, 84.836851°E) in the Saran district of Bihar, India. This dynamic river segment encompasses the confluence of the Ganga and Ghaghara rivers, a known ecological hotspot for *P. gangetica* (Sinha et al. 2010a). To overcome the challenges of observing cetaceans in turbid waters, we utilized a dual methodological framework combining Local Ecological Knowledge (LEK) with standardized ecological fish catch assessments (Chowdhury et al. 2016; Deb et al. 2025).

Qualitative and semi-quantitative social-ecological data regarding rare foraging events, dolphin-fishery interactions, and prey variations were gathered through structured interviews and focus group discussions with a sample of artisanal fishers (n = 50) operating inside known dolphin habitats (Chowdhury et al. 2016). The interview questionnaire explicitly captured spatial-temporal dolphin behaviours, gear types, prey abundance, and net interactions. Concurrently, randomized fish assemblage sampling was conducted across diverse river macrohabitats (deep pools, confluences, and shallow runs) using local artisanal gears (monofilament gillnets, drag nets, and cast nets) to characterize available prey spectrums (Deb et al. 2025). Captured fish were identified to the species level to establish the baseline prey structure and maximum body dimensions by referring to local taxonomic keys (Talwar and Jhingran 1991; Srivastava 2014).

Results and Discussion

Standardized field sampling across the river confluence confirmed a structurally diverse fish community, yielding 29 species across 16 distinct families (Table 1). The community included mega-prey classes capable of reaching substantial historical limits of 90–200 cm (e.g., *Wallago attu*, *Sperata seenghala*, *Rita rita*, *Mastacembelus armatus*), alongside major riverine carps such as *Catla catla* (182 cm) and *Labeo rohita* (200 cm). Intermediate biomass predators (30–75 cm; e.g., *Channa striatus*, *Xenentodon cancila*, *Eutropiichthys vacha*), and a high-density baseline of small clupeids and cyprinids under 20 cm comprise the remaining multi-layered structural baseline (Talwar and Jhingran 1991; Srivastava 2014).

Table 1 Common fishes of catch and historical maximum sizes recorded within the *Platanista gangetica* habitat range near the Ganga–Ghaghara confluence.

Family	Scientific Name	Common Name	Max Size Reported in Literature
Ailiidae	*Ailia coila*	Sutari	18 cm
	Clupisoma garua	Sugawa	30 cm
	Eutropiichthys vacha	Bachawa	30 cm
Ambassidae	*Chanda nama*	Chanda	11.0 cm
Bagridae	*Mystus bleekeri*	Palwa tengra	17.7 cm
	Rita rita	Rita	150 cm
	Sperata seenghala	Singhala	150 cm
Belonidae	*Xenentodon cancila*	Kauwa	40 cm
Channidae	*Channa striatus*	Saura	75 cm
Clupeidae	*Gonalosa manmina*	Suhia	14 cm
	Gudusia chapra	Suhia / Suhiya	15 cm
Cobitidae	*Lepidocephalichthys guntea*	Nakati	15 cm
Cyprinidae	*Aspidoparia morar*	Harda	20 cm
	Catla catla	Catla	182 cm
	Labeo rohita	Rohu	200 cm
	Osteobrama cotio cotio	Gurda	15 cm
	Puntius sophore	Pothiya	18 cm
	Puntius ticto	Pothiya	10 cm
	Puntius chola	Sidhari / Pothiya	12 cm
	Securicula gora	Chelhua	24 cm
Gobiidae	*Glossogobius giuris*	Bula	30 cm
Heteropneustidae	*Heteropneustes fossilis*	Singhi	30 cm
Mastacembelidae	*Macrognathus pancalus*	Gainchi	18 cm
	Mastacembelus armatus	Baam	90 cm
Mugilidae	*Rhinomugil corsula*	Aruwari	24 cm
Pangasiidae	*Pangasius pangasius*	Piyasi	150 cm

Penaeidae	*Fenneropenaeus indicus*	Jhinga	23 cm
Sciaenidae	*Johnius gangetica*	Bhola	12 cm
Siluridae	*Wallago attu*	Barari / Boari	200 cm

Physical Evidence and Socio-Ecological Triangulation

During a routine field catch assessment, we discovered an adult Boal catfish (*Wallago attu*; 105 cm, 8.0–9.0 kg) exhibiting a completely amputated caudal fin (Fig. 1). The terminal amputation site displayed a smooth, concave U-shaped line of healed scar tissue, geometrically matching the narrow, interlocking dental arch of an adult *P. gangetica* rostrum (Kelkar et al. 2018). The absence of inflammation confirmed that this interaction was fully epithelialized, indicating survival after a major non-lethal predation attempt.

Structured surveys with local artisanal fishers (n = 50) provided compelling semi-quantitative evidence of these macro-predatory behaviours (Table 3). A sweeping 98% consensus established that *P. gangetica* actively exploits deployed gillnets, drag nets, and cast nets by seizing large fish attempting to escape the mesh walls (Chowdhury et al. 2016). Spatial mapping via LEK indicated that 90% of fishers locate dolphins predominantly at river confluences (Kelkar et al. 2010), while 96% reported that 1–2 dolphins regularly follow their boats, confirming high habituation. Interestingly, 92% of respondents stated that accidental entanglement has not occurred here, suggesting these interactions reflect calculated, active foraging rather than random accidental collisions (Paudel et al. 2020).

This behavioural pattern was further validated by a documented eyewitness event where an adult *P. gangetica* seized a large major carp (*Catla catla*, 30–35 cm). Following a violent struggle, the carp slipped from the rostrum and was immediately entangled in a nearby gillnet. Physical examination revealed fresh, deep, linear lacerations and puncture wounds directly corresponding to the interdental spacing of *P. gangetica* (Kelkar et al. 2018).

Table 2 Documented prey taxa of *Platanista gangetica* from historical stomach content and fecal analyses.

Reported Prey Taxa in literature	Reference
Wallago attu, *Bagarius* sp., *Mystus* sp., *Puntius chola*, *Nangra* sp., and various crustaceans	Sinha et al. 2010a
Setipinna brevifilis (Phasa), *Osteobrama cotio cotio* (Gurda), *Puntius sophore* (Pothiya), *Crossocheilus latius* (Munhted), *Mystus cavasius* (Palwa), *Heteropneustes fossilis* (Singhi), *Macrognathus pancalus* (Baam), and *Sperata seenghala* (Singhala).	Choudhary et al. 2006; Sinha et al. 2010b; Paudel et al. 2020; Tare 2021

Table 3 Semi-quantitative responses from structured Local Ecological Knowledge (LEK) interviews with regional artisanal fishers (n = 50).

Survey Question	Primary Documented Response Category	Consensus Weighting (%)
What type of gear do you primarily use for fishing?	Gill net, drag net, and cast net	Baseline Gear Array
In which specific area of the river do you sight dolphins most frequently?	Near river macrohabitat confluences	90%
How do dolphins usually behave when they encounter deployed gill nets?	Actively target and catch fish escaping from the net walls	98%
Has any dolphin become accidentally entangled or trapped in a fishing net?	No, zero observed net entanglements in this specific stretch	92%
How many dolphins do you see during a typical fishing trip?	High relative abundance (at least 1–2 individuals actively following the vessel)	96%

Comparative Synthesis of Historical Diet Records

Our findings reveal that *Platanista gangetica* exhibits a highly opportunistic foraging range, targeting mega-prey outside its typical micro-predatory bounds. This aligns with Paudel et al. (2020) and Kelkar et al. (2018), who noted that high-energy confluences force river dolphins into an active interface with artisanal fisheries. Our socio-ecological triangulation showing a 98% consensus on net-depredation behaviors (Table 3) further corroborates plastic foraging adaptations observed under acute bioenergetic stress (McGuire and Winemiller 1998).

A systematic comparison with historical literature highlights the importance of our findings (Table 2). Previous carcass examinations and stomach analyses occasionally documented large-bodied siluriform and cyprinid genera like *Wallago attu*, *Sperata seenghala*, and *Bagarius* sp. (Choudhary et al. 2006; Sinha et al. 2010a; Paudel et al. 2020). However, because gut analyses are biased toward fully ingested items, historical records were limited to juveniles under 20 cm (Bashir et al. 2010).

Conversely, our documentation of predatory attempts on a 105 cm *W. attu* and a 30–35 cm *C. catla* stands in stark contrast to the absolute 20 cm biological ceiling proposed by Bashir et al. (2010) and Sinha et al. (2010a). While stranded carcasses and faecal evaluations confirm a micro-prey baseline (Choudhary et al. 2006; Sinha et al. 2010b), such methods suffer from structural ingestion bias. Because dolphins cannot swallow a 105 cm fish whole, these interactions terminate in grip slippage or tissue amputation (Fig. 2). Consequently, traditional gut assessments miss this non-lethal, high-risk predatory drive. This hidden ecological dimension can only be identified by monitoring epidermal scarring across sympatric mega-fish communities.

Our findings reveal that *Platanista gangetica* exhibits a significantly more flexible and opportunistic foraging range than previously recognized, targeting mega-prey items well outside its typical micro-predatory dietary bounds. **This observation is in accordance with** Paudel et al. (2020) and Kelkar et al.

(2018), who emphasized that high-energy river confluences compress spatial barriers, forcing wild river dolphins into a dynamic, highly active interface with localized artisanal fisheries. Our socio-ecological triangulation showing a 98% consensus on net-depredation behaviours (Table 3) further corroborates patterns of plastic foraging adaptations observed in other river systems under acute bioenergetic stress (McGuire and Winemiller 1998).

Ecological Implications and Foraging Risks

These empirical observations indicate that the standard 20 cm limit reflects a preference or functional baseline rather than an absolute biological boundary (Bashir et al. 2010). When large prey biomass is accessible, *P. gangetica* acts as an opportunistic macro-predator. However, because its slender rostrum lacks crushing force, successful consumption is rarely achieved, leading to grip slippage and non-lethal scarring.

Crucially, in anthropogenically altered river systems, this drive creates a dangerous foraging interface (Campbell et al. 2022). Intensive size-selective overfishing depletes the free-swimming small prey baseline (Das et al. 2025), driving dolphins to target large, struggling, net-bound fish as high-reward food (Paudel et al. 2020). While low entanglement rates suggest refined echolocation capabilities around nets, this persistent proximity to artisanal gears elevates bioenergetic conflict and entanglement risks during high-visibility or turbid flood seasons (Dey et al. 2019).

Conclusion

This study establishes that the endangered Ganga River dolphin (*P. gangetica*) is an opportunistic predator capable of targeting mega-prey classes well outside its documented 20 cm dietary range. While its slender rostrum lacks the crushing mechanics to consistently exploit this large biomass, its predatory drive remains flexible. To protect this species, conservation frameworks must maintain multi-layered fish diversity throughout the water column and enforce strict spatial-temporal restrictions on artisanal gillnets within critical river confluences and deep-pool refugia.

Declarations

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Competing Interests / Conflicts of Interest

The authors have no relevant financial or non-financial interests to disclose.

Author Contributions

All authors contributed to the study conception and design. Data collection, data analysis and manuscript drafting done by Tanu Singh. Data analysis, manuscript review and supervision by Rana Vikram Singh. All authors read and approved the final manuscript.

Data Availability Statement

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval

This study relied on fish specimens obtained directly from commercial artisanal fish landing catches and non-invasive Local Ecological Knowledge (LEK) interviews with local fishing communities. No live marine mammals were captured, handled, or harmed during this research. Informants participated voluntarily and all interviews were conducted in accordance with national ethical guidelines for social-ecological research.

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Figures



Fig. 1

Figure 1

An adult Boal catfish (*Wallago attu*) specimen captured during standardized field surveys along the highly modified riverine study stretch. The individual measured 105 cm in total length (excluding the caudal fin) and weighed approximately 8.0–9.0 kg. The photograph documents mega-prey fish that far exceed the traditional 20-cm size threshold documented for *Platanista gangetica*.



Fig.2

Figure 2

Detailed photograph of the posterior body segment of the *Wallago attu* specimen shown in Fig. 1. The terminal amputation site exhibits a smooth, fully epithelial, concave scar tissue line. The structural geometry of this injury directly matches the narrow, interlocking anterior dental arch characteristic of Ganga river dolphin (*Platanista gangetica*). The complete absence of active hemorrhaging, open lesions, or epidermal inflammation demonstrates long-term survival and complete tissue healing following a high-energy, non-lethal macro-predation attempt.