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Threatened Fishes of the World, *Ailia coila* (Hamilton 1822): Recommendations for Sustainable Conservation

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ABSTRACT

Gangetic Ailia, *Ailia coila* (Hamilton, 1822) is a vulnerable tropical freshwater catfish of the family Ailiidae, native to Asia, whose riverine habitats are rapidly declining due to increasing natural and anthropogenic pressures. The study provides a comprehensive overview of its biology, ecology and conservation status. The paper reviewed the present conservation status of *A. coila*, emphasizing its ecological and economical importance along with the challenges that it facing in its native habitats throughout the Southeast Asia. The findings seek the urgent need for conservation strategies including habitat restoration, sustainable fishing practices, conservation of genetic information for captive breeding programs. Understanding the threats and implementing effective conservation measures can heighten the survival of this valuable small indigenous species. Additionally, raising awareness of its ecological importance and native demands will safeguard its persistence for future generations. Future research should concentrate on assessing population dynamics of *A. coila* over time, considering the success of suggested conservation measures, and investigating additional possible threats and solutions.

Introduction

The Gangetic catfish *Ailia coila* (Hamilton, 1822) locally referred as 'Kajuli' or 'Baspata', belonging to family schilbeidae of the order siluriformes, is one of the most important fish species, have high local demand, found in Ganga and Brahmaputra River and its tributaries and is extensively distributed throughout Asian region (Das et al., 2023; Saha et al., 2023). According to Talwar and Jhingran (1991) and Menon (1999) this species is confined to Jamuna, Ganga, Bramhaputra and Mahanadi in India, Indus plains in Pakistan, Bangladesh and Nepal. This Asian schilbeids are found in large rivers and connected rivers (Gogoi et al., 2021, 2023; Ray et al., 2022; Saha et al., 2023). According to Talwar and Jhingran (1991) and Menon (1999) this species is confined to Jamuna, Ganga, Bramhaputra and Mahanadi in India, Indus plains in Pakistan, Bangladesh and Nepal. This Asian schilbeids are found in large rivers and connected rivers (Gogoi et al., 2021, 2023; Ray et al., 2022; Saha et al., 2023). This synchronous breeder (Breder & Rosen, 1966; Saha et al., 2023) stays in shoals from the surface to the middle of the waters (Talwar & Jhingran, 1991) and lays eggs in shallow water. This small fish is predominantly rich in proteins, fats, carbohydrates, and various minerals needed for both all aged human nutrition (Bogard et al., 2015; Mazumder

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et al., 2008), made it a vital diet for the local people of Bangladesh and India, commanding high price as well. Since, this high priced cat fish contributes a substantial amount in the total catch, Gangetic Ailia forms an important fishery for the artisanal fishers because of its local demand (Ray et al., 2022). This dual importance along with local emotion for the fish contribute significantly in raising its economic value.

The popularity of the fish is further enhanced by their notable ability to survive longer outside of water, which helps in maintaining freshness and attract both fishers and consumers, thus often results overexploitation. Moreover, freshwater fish are the most threatened taxonomic group because of their high sensitivity to qualitative and quantitative alteration to their habitats (Sengupta & Homechaudhuri, 2015). In this consequence, stressors such as pollution, habitat degradation, flow modification and introduction of exotic fish species in the riverine ecosystem (Argent et al., 2003; Sarkar et al., 2017) employ extra pressure on this fish stock, retarding their revival and the species have been categorized as near threatened according to IUCN, (2010) and threatened (Chini et al. 2025; Gogoi et al., 2021, 2023; Hanif et al., 2015; Ray et al., 2022; Saha et al., 2023).

However, to nourish sustainability, recent research has concentrated on issues such as gonadal development, spawning grounds, spawning behaviour, feeding ecology, and genetic information conservation as a part of conservational approach.

Various studies have been carried out across the Asian countries on morphology, growth pattern, diet composition, reproduction, and genetics as shown in Table 1. In comparison to other countries, in Bangladesh, there is a lack of comprehensive research and documentation on *A. coila* which deters the effective conservation measures. Therefore, the purpose of this document is to form a foundation which would implies the prioritization of habitat restoration, pollution mitigation, and replenishment of natural populations of *A. coila* in Bangladesh as pollution from industrial effluents, agricultural runoff, and domestic waste degrades water quality, interrupts spawning and feeding grounds, and directly threatens the survival and reproductive success of this species.

Taxonomy

Kingdom: Animalia
Phylum: Chordata
Class: Actinopterygii
Order: Siluriformes
Family: Ailiidae
Genus: *Ailia*
Species:*Ailia coila* (Hamilton 1822)

Fig. 1: *Ailia coila* collected from Gobindaganj, Sunamganj in Bangladesh on 02 January, 2025

Synonyms

Acanthonotus hardwickii (Gray, 1830)
Ailia affinis (Günther, 1864)
Ailia bengalensis (Gray, 1830)
Malapterurus coila (Hamilton, 1822)
Malapterus bengalensis (Gray, 1830)
Malapterus cuvieri (Gray, 1830)
Silurus cuvieri (Gray, 1830)

Identification

The fish has a deeply compressed elongated body with sub-inferior mouth. The species reaches a maximum recorded length of 300 mm, with individuals usually measuring around 180 mm in commercial landings (Talwar & Jhingran, 1991). According to Rahman (2005) it attains maximum length reported, 15.0 cm. Upper jaw of the species longer than lower jaw. The species exhibits a scale less silvery or whitish body coloration and possesses four pairs of well-developed barbels, a small adipose fin, well-developed pectoral fins, reduced pelvic fins, and a prominent anal fin. The caudal fin of the species is forked and lower lobe is longer than the upper. Dorsal fin is absent in this species. The head length constitutes 13% of the standard

length (SL) and 11.5% of the total length (TL), while the body height

Table-1: Available studies on *Ailia coila* from different countries

Country/region	Aspects	Reference
India	Biometric study	Gogoi et al. (2019)
Bangladesh	Proximate composition	Mozumder et al. (2008)
India	Biology, Distribution and conservation concern	Pal et. al. (2025)
India	Diet Composition, Feeding habit	Gogoi et al. (2023)
Atrai and Jamuna River Bangladesh	Aspects of Reproductive Biology	Das et al. (2023)
Sylhet, Bangladesh	Characterization of the complete mitochondrial genome	Alam et al. (2019)
West Bengal, India	Multivariate ecological assessment	Chini et al. (2025)
Tetulia River, Southern Bangladesh	Life History Traits	Saha et al. (2023)
Jharkhand, India	Growth Pattern Indices	Sandhya et al. (2020)
India	Investigation of age, growth, moretality	Gogoi et al. (2021)
Ganga and Brahmaputra River system, India.	Stock Structure Assesment	Bhutia et al. (2019)
Ganga river, India.	Relationship between fish length and otolith size and weight	Khan et al. (2022)

denotes 26.1% of SL and 23.1% of TL. The eye diameter measures 33.3% of the head length (HL) (Rahman, 2005) (Fig. 1). Fin formula:

D. 0; P1. 1/14; P2. 6; A. 67-75 (Rahman, 1989).

D. 0; P_1. I/14; P_2. 6; A. 58–75; V. i5 (Talwar & Jhingran 1991)

D. 0; P. 12–15; A. 61–75; C. 14–18; V. 5-6 (Gogoi et al., 2019)

Common names

The fish *A. coila* referred to as Kajuli in India (Bogard et al., 2015; Gogoi et al., 2019, 2021, 2023; Mazumder et al., 2008; Sengupta & Homechaudhuri, 2015), Kajuli, Baspata in Bangladesh (Gogoi et al., 2019, 2021, 2023; Rahman et al., 2005; Ray et al., 2022; Saha et al., 2023), Patenga, Patasi, Patsi, Sutara in Nepal (Yadav, 2017), Mun-glee-ah-nec in Pakistan (Hafiz et al., 2024).

Distribution and Abundance

A. coila dispersed across the rivers of India, Bangladesh, Nepal, Pakistan, and Myanmar. In India, it thrives in rivers like the Ganga, Brahmaputra, Mahanadi, Krisna and Godavari (Bogard et al., 2015; Gogoi et al., 2019, 2021, 2023; Mazumder et al., 2008; Sengupta & Homechaudhuri, 2015). It is also prevalent in the Padma, Jamuna, and Meghna river systems and floodplains in Bangladesh, for example flood plains like Chalan *beel* of Natore district, rivers like Atrai, Choto Jamuna of Naogaon, Kushiara of Sylhet which support haors and floodplains, Tetulia river of and in the Terai rivers of Barshal (Alam et al., 2019; Das et al., 2023; Rahman et al., 2005; Saha et al., 2023).

Habitat and Ecology

The *A. coila* is a tropical freshwater catfish fish species found in in large rivers, floodplains, and connected waters across Asia. This species prefers slow-flowing, oxygen-rich freshwater habitats such as large rivers and floodplain wetlands sand or mud created turbid water (Ahmed, 2002; Talwar & Jhingran, 1991) and migrate to connected water bodies
during monsoon and even moves to estuarine waters in the south of Bangladesh (Chandra, 2009; Rahman, 2005). This social, shoaling species occupies littoral zones makes the key part of the riverine food web. Its ecology is closely tied to the seasonal cycles of the rivers it inhabits (Gogoi et al., 2021 and Saha et al., 2023).

Food and Feeding Habit

A. coila is primarily insectivorous as the index of preponderance (IP) values, forms 93.87% of major food components, while zooplankton and eggs (cladoceran and copepod) are 2.28% and 1.62%, respectively (Gogoi et al., 2023). It also Consume detritus, and trace amounts of plankton. Key dietary items include chironomid larvae, beetle larvae, and caddisflies. Insect *Potamanthus sp.* comprises 90–97% of gut contents

across all the length groups and, hence, can be attributed as indicator species for *A. coila* in river Brahmaputra (Gogoi et al., 2023). Its ability to feed at surface and mid-water levels supports its ecological role in turbid and eutrophic water bodies (Pal et al., 2025). Research interpret that feeding activity remains at its peak on September in females and on April in males. Furthermore, higher feeding intensity found in lower length groups due to high food requirements in young and fast-growing fish (Armstrong et al., 1992). In general, fishes show less feeding intensity (low GaSI) during spawning season (Borah et al., 2022). In 2023, Gogoi and his fellow researcher found low feeding intensity during November–January which was inversely related to the spawning season of this species.

Nutritional Profile

Mazumder et al. (2008) reported that *A. coila* is highly nutritious rich in protein, omega-3 fatty acids, vitamins, and minerals where percentage of protein, Fat, Moisture content Protein was 16.99%, 3.53% and 65.88% respectively. The fish is a great source of trace elements like selenium, calcium, iron, zinc and vitamin A (Bogard et al., 2015; Shaheen et al., 2013; Wheal et al., 2016). A comparative nutritional profile of *A. coila* is present on (Table 2). Proximate composition of fish flesh varies with species variation, season, age and the feeding habit of fish and the chemical composition of flesh differ largely between and within species (Jacquot, 1961).

Table-2: Nutritional profile of *Ailia coila*

Nutrient	Sample form	Values	
		Bogard et al. (2015)	**Wheal et al. (2016)**
Calcium (mg/100g)	Whole part	110.000	313.000
Iron (mg/100g)	Whole part	0.820	0.680-0.900
Selenium (µg/100g)	Whole part	27.000	29.500
Zinc (mg/100g)	Whole part	1.2000	1.414
Protien (mg/100g)	Whole part	17.1	15.3
Total Omega-3 PUFA (g/100g)	Whole part	1.006	-
Vitamin A (µg/100g)	Whole part	37.000	-

Growth Pattern

Froese (2014) calculated the Bayesian length-weight for this species, with a = 0.0066 (0.0079 - 0.08) and b = 3.20 (3.01 - 3.13) cm total length, based on LWR estimates, which indicates a positive allometric growth pattern. Similar findings were also reported by some other researchers including Bhutia et al., 2019; Das et al., 2023; Gogoi et al., 2021; Khan et al., 2022; Rahman et al., 2024; Ray et al., 2022; Saha et al., 2023. However, a negative allometric growth pattern was also reported by Chini et al. (2025) in West Bengal, India; Das et al. (2023); Mia et al. (2024) in Kaptai lake, Rangamati, Bangladesh (Table 3).

Positive allometric growth happens when weight increases faster than length, while negative allometry happens when weight increases slower than length (Chini et al., 2025). Differences in growth patterns of *A. coila*, whether positive allometry or negative, are mainly due to adaptation efficiency with the environmental conditions, specifically water quality and nutrient availability (Kumar et al., 2022), food availability and the general condition of the fish (Juwel et al., 2012). In addition, according to Chini et al. (2025), the growth pattern of fish may also be influenced by population density, physical form, age or size of sampled fish, sampling period, sampling sites, whether a river has any riverine constructions such as dams, reservoirs, and bandhs and reproductive factors.

Form factor

The form factor is calculated using the formula $a_{3.0} = 10^{\log a - s(b-3)}$ (Froese, 2006), where a and b denotes the LWRs' regression parameters and s represents the slope of log a *vs.* b. A mean slope (s) of -1.358 was used for the regression analysis of log a *vs.* b. According to Table 3, the calculated form factor ($a_{3.0}$) was to vary between 0.0053 and 0.0089, which interprets a moderately elongated body shape.

Reproductive Biology

The reproductive aspects of *A. coila* was studied by Das et al. (2023) in Atrai River and Jamuna River, Bangladesh. The study examines the gonadal developmental stages in both males and females to identify when the species matures, spawns, and rests (Table 4), which is essential for understanding its breeding biology and management. The study revealed that the gonadosomatic index (GSI) of *A. coila* increased as the fish matured, reaching its peak during the breeding season, and declined sharply after spawning, attaining its lowest level during the resting phase. Specifically, female GSI values varied seasonally, ranging from 0.15 ± 0.09% in December to 8.78 ± 1.95% in July, which indicates that July is the peak spawning month. This species spawns once in a year. Notably, GSI values began to rise in March, reached their maximum in July with yolk laden ripe eggs when the highest fecundity observed (2,450 ± 570 eggs) and then subsequently declined from August through January. But, generally, fecundity ranged from 715 eggs in smaller individuals (7.36 cm, 4.99 g) to 3,020 eggs in larger fish (13.11 cm, 7.33 g), suggesting that *A. coila* is a species with relatively low fecundity (Table 5). The bottom line from that is the big sized fish have more energy and a larger body cavity for egg production, which agrees with the finding of Rheman et al. (2002). The variation in fecundity is common in fish Month Fecundity range (Reddy & Rao, 1991) because of its dependency on many factors including fish stock, nutritional condition and other characteristics (Das, 1977), such as size, age, sex, environmental conditions, availability of space and food (Hunter, 1992). Some findings of the researchers about the spawning season of this species shown in (Table 5).

Table-3: Growth pattern of *Ailia coila* from different water bodies

Habitat locality	TL (cm)	*a*	*b*	Sex	r^2	References	$a_{3.0}$
Ganga basin, Jharkhand, India	7.2– 15.80	0.0012	3.43	Mixed	0.96	Sandhya et al. (2019)	0.005
Brahmaputra River, Assam, India	6.6- 15.40	0.0028	3.19	Male	0.98	Gogoi et al. (2019)	0.005
	6.3-16.10	0.0058	2.86	Female	0.95	Gogoi et al. (2019)	0.004
Ganga River, Bangladesh	6.6 – 13.00	0.0080	3.01	Mixed	0.98	Hossain et al. (2009)	0.008
Padma River, Northwestern, Bangladesh	8.1 – 15.60	0.0890	3.07	unsexed	0.98	Hossain et al. (2010)	0.114
Ganga River, Varanasi, India	14.4-17.50	0.0009	3.65	Mixed	0.81	Mahapatra et al. (2018)	0.007
Tetulia River, Southern Bangladesh	5.6 – 15.20	0.0027	3.18	Mixed	0.98	Saha et al. (2023)	0.0057
Southwestern Region, India	7.0–13.6	0.021 2.863	0.021 2.863	-	0.96	Chini et al. (2025)	-

TL, total length; *a*, intercept; *b*, slope; r^2, coefficient of determination; $a_{3.0}$, form factor.

From several water bodies, the minimal size at sexual maturity (L_m) was calculated using the maximum length-based model formulated by Binohlan and Froese (2009) as log (L_m) = -0.1189 +0.9157 ∗log (L_{max}) (Table 6). However, several studies observed that in lotic waterbodies in the minimum size of sexual maturity was 10.54 cm total length (TL) where another study in the Tetulia River estimated it at 9.19 cm TL, 7.36 cm TL respectively (Das et al. 2023; Saha et al., 2023 (Table 6).

Genetics

National Bureau of Fish Genetic Resources (NBFGR), 1998 reported that *A. coila* exhibit haploid (gametic) chromosome number is 29, and the diploid (zygotic) chromosome number is 58, indicating that it is a diploid species with two complete sets of chromosomes. The complete mitochondrial genome of *A. coila* from Bangladesh, assembled from next-generation sequencing (NGS) data by Alam et al. in 2019, was found to be 16,565 bp long, containing 13 protein-coding genes**,** 22 tRNAs**,** 2 rRNAs**,** and two conserved

non-coding regions (the control region/D-loop and the origin of light strand replication). Phylogenetic analysis revealed that *A. coila* is most closely related to *Eutropiichthys vacha* with 85.63% sequence identity.

Table 4. Monthly variation of ova diameter and gonadal developmental stages of *Ailia coila* (Das *et al.*, 2025)

Month	Ova diameter (mm) (Mean ± SD)	Gonadal Stage	Maturity level	Description (Male)	Description (Female)
April	0.12 ± 0.03	Stage I	Immature	Testis transparent and thread-like	Ovary strip-like and transparent
May	0.15 ± 0.05	Stage II	Maturing	Testis pinkish white, strip-like and about 1/2 of body cavity	Ovary dull greyish, granular and about 1/2 of the body cavity
June	0.25 ± 0.06	Stage III	Mature	Testis whitish and band-like	Ovary greyish and about the size of the entire body cavity. Transparent ova visible
July	0.38 ± 0.07	Stage III	Mature	Testis whitish and band-like	Ovary greyish and about the size of the entire body cavity. Transparent ova visible
August	0.27 ± 0.05	Stage IV	Spent	Testis shrink	Ovary pinkish brown and sunken to about 1/2 of the body cavity
September	0.15 ± 0.02	Stage I	Immature	Testis transparent and thread-like	Ovary strip-like and transparent

Table-5: Spawning season on *Ailia coila* from different water bodies

Water bodies	Period	References
Atrai River & Jamuna River (northern Bangladesh)	June–August	Das et al. (2023)
Brahmaputra River (Assam, India)	April- September	Gogoi et al. (2019)
Ganges basin / Varanasi	Monsoon	Mahapatra et al. (2018)
India and Bangladesh	June -September	FishBase species summary
Ganga basin, India		

Conservation status

IUCN Red List (2010) of Threatened Species designated *A. coila* as a "Near Threatened" species globally (Chini et al., 2025; Gogoi et al., 2021, 2023; Khan et al., 2022; Ng et al., 2010; Saha et al., 2023). Acording to Abu et al., 2015; Alam et al., 2019; Hanif et al., 2015; Khan et al., 2000; Mijkherjee et al., 2002 *A. coila* categorized as vulnerable species in Bangladesh and India categorized it as near threatened. In addition, organizations like the ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI) and the Bangladesh Fisheries Research Institute (BFRI) are

taking the initiatives of conservation by considering it as Near Threatened species.

Threats

Due to constant anthropogenic stressors brought on by urbanization, the rising demands for fish as food, global climate changes, pollution, and construction activity, connectivity, increase nutrient availability, and provide favorable feeding and nursery grounds, supporting juvenile survival and growth. Despite these occasional benefits, the cumulative climate-driven pressures—combined with anthropogenic disturbances—pose long-term threats to the sustainability of A. coila,

Table-6: List of minimum size at sexual maturity (L_m) of *Ailia coila* from different waterbodies

Water bodies	Sex	L_{max} (cm)	L_m	References	Estimated L_m (cm)
Atrai River and Jamuna River, Bangladesh	Female	*13.11*	*7.36*	Das et al. (2023)	8.42
Panchet Reservoir, Jharkhand, India	Mixed	15.80	9.52	Sandhya et al. (2019)	9.96
Brahmaputra River, Assam, India	Male	15.40	9.30	Gogoi et al. (2019)	9.72
	Female	6.10	9.69		10.17
Ganga River, Bangladesh	Mixed	13.00	7.96	Hossain et al. (2009)	8.11
Padma River, Northwestern, Bangladesh	unsexed	15.60	9.41	Hossain et al. (2010)	9.84
Ganga River, Varanasi, India	Mixed	17.50	10.46	Mahapatra et al. (2018)	10.92
Tetulia River, Southern Bangladesh	Mixed	15.20	9.19	Saha et al. (2023)	9.58
Southwestern Region, India	-	13.6	7.0	Chini et al. (2025)	8.48

L_{max}, maximum length; TL, total length; L_m, minimum size at sexual maturity

the stock structure of the species sharply declining (Chini et al. 2025). Moreover, the captive breeding of this species is not yet standardized, so the market demand for this species is met only through the wild populations from the rivers (Bhutia et al., 2019).

Impact of Climate and Environmental Change

Climate and environmental changes exert both adverse and occasionally favorable influences on the ecology and population dynamics of Ailia coila across South Asian river systems. Rising water temperature, irregular monsoon patterns, reduced dissolved oxygen, and altered river hydrology negatively affect spawning cues, migration routes, and feeding intensity, ultimately reducing recruitment success (Ficke et al., 2007; Perry et al., 2005). Increased sedimentation, pollution load, and extreme hydrological events such as intensified floods and prolonged low-flow periods further deteriorate habitat structure and disrupt connectivity between rivers and floodplain wetlands that the species relies upon (Mirza, 2011; Dudgeon, 2019). However, in certain years, enhanced monsoon rainfall and extended floodplain inundation may temporarily improve habitat emphasizing the need for adaptive and climate-resilient conservation strategies (Allan, 2004; Carpenter et al., 2011).

Conservation action

Captive breeding has been suggested by experts as one of the most successful strategies for advancing the conservation of any fish species to date. Since there are currently no such extensive, specialized conservation programs for *A. coila*, conservation efforts have mostly confined on biometric research and habitat evaluation. Monitoring its numbers in important habitats such as the Chalan *beel*, floodplain areas and River Meghna, promoting for general measures to safeguard its freshwater environment from overfishing and hydrological disturbances, and knowing its life history and biometric information to gather baseline data for future tactics are the main goals of current conservation efforts.

Recommendations for conservation

The conservation of *A. coila* in Bangladesh requires a comprehensive strategy to ensure the long-term survival

of the species and the health of its ecosystem. Research on population dynamics and stock assessment is crucial to evaluate the current status of wild populations (Hossain, 2014; Hossain & Alam, 2015; Saha et al., 2023). Establishing sanctuaries in rivers, streams, lakes, and floodplains, along with prohibiting fishing during the spawning season, is recommended to safeguard spawning activities (Hossain et al., 2015). Implementing a fishing ban from July to August can further support conservation efforts.

Understanding the gonadal developmental stages shown in Table 4 can aid in determining the spawning season for conservation and aquaculture planning, identifying closed seasons for sustainable fishing, and supporting brood-stock management in hatcheries.

However, uninterrupted natural habitats are critical to provide adequate breeding grounds, food resources, and maintain water quality. Knowledge of the species' life history and biology is vital for hatchery managers and researchers to develop effective captive breeding programs and aquaculture practices, which can reduce pressure on wild populations while supporting local livelihoods (Biswas et al., 2023). Conservation can also be strengthened through community participation, public awareness, and education programs. Regulating fishing practices, including size limits and seasonal closures, helps prevent overfishing and allows populations to recover during key reproductive periods. Continuous research and monitoring of population trends, habitat conditions, and environmental changes are essential to provide adaptive management strategies which can uplift the threatened stocks.

In connection with the Sustainable Development Goals

The conservation strategies of *A. coila* support a number of Sustainable Developmental Goals. For example, conservation approach includes protection of freshwater ecosystems, aquatic biodiversity and promoting sustainable fisheries management can prevent overexploitation and maintain ecological balance which fulfil the motto of SDG-14 (Life Below Water). Additionally, approaches of the species' conservation contribute to SDG 2 (Zero Hunger) and SDG 1 (No Poverty) by ensuring a continuous source of protein for local communities and sustaining livelihoods of those people who depend on freshwater fisheries by protecting the breeding grounds of the freshwater fishes. Promotion of responsible fishing practices and regulating harvests, encouraging ethical and sustainable use of aquatic resources as conservational strategy, aligns with the theme of SDG 12 (Responsible Consumption and Production). Moreover, enhanced coordinated conservation efforts such as fostering partnerships among government agencies, local communities, and other stakeholders can advance the plans under SDG 17 (Partnerships for the Goals), which advances SDG 17, the ultimate result of protecting of freshwater ecosystems through sustainable conservation measures can mitigate environmental degradation and support SDG 13 (Climate Action) by maintaining ecosystem services that buffer against climate impacts.

Conflict of Interest

There is no conflict of interests exist that could sway the research.

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References

Ahmed M S (2002). The biological basis of fisheries management in the floodplain of the River Titas, Brahmanbaria. Final Project Report, Support for Fisheries Education and Research (SUFER) Project, DFID, UK and UGC, Bangladesh, 137 pp.

Alam MJ, Andriyono S, Lee SR, Hossain MA, Eunus ATM, Hassan MT & Kim HW (2019). Characterization of the complete mitochondrial genome of Gangetic ailia, *Ailia coila* (Siluriformes: Ailiidae). Mitochondrial DNA Part B, 4(2), 2258-2259.

Armstrong MP, Musick JA & Colvocoresses JA (1992). Age, growth, and reproduction of the goosefish, *Lophius americanus* (Pisces: Lophiformes). Fishery Bulletin, U.S., 90, 217–230.

Bhutia RN, Hari SM, Srinivasan NT, Deshmukhe G, Ramteke K, Bhushan S & Landge AT (2019). Stock structure of small indigenous and near threatened *Ailia coila* (Hamilton, 1822) from Ganga and Brahmaputra river systems. Journal of Entomology and Zoology Studies, 7(3), 1600–1605.

Binohlan C & Froese R (2009). Empirical equations for estimating maximum length from length at first

maturity. Journal of Applied Ichthyology, 25(5), 611-613.

Biswas P, Jena AK & Singh SK (2023). Conservation aquaculture of *Ompok bimaculatus* (Butter catfish), a near threatened catfish in India. Aquaculture and Fisheries, 8(1), 1-17.

Bogard, JR, Thilsted SH, Marks GC, Wahab MA, Hossain MAR, Jakobsen J & Stangoulis J (2015). Nutrient composition of important fish species in Bangladesh and potential contribution to recommended nutrient intakes. *Journal of Food Composition and Analysis, 42*, 120–133.

Borah S, Jaiswar AK, Bhattacharjya BK, Deshmukhe G, Sahoo AK, Gogoi P, Meena DK, Mohanty D & Das BK (2022). Food spectrum dynamics of anadromous Hilsa, *Tenualosa ilisha* (*Hamilton, 1822*) inhabiting River Brahmaputra, India, curtailing apprehension of food selectivity: An insight into its domestication. Indian Journal of Marine Sciences, 51(1), 67–77.

Breder CM, Rosen DE (1966): Modes of reproduction in fishes. TFH Publications, 941, 624-625.

Chandra KJ (2009). Availability of fish fauna in some selected districts in Bangladesh. Bangladesh Journal of Animal Science, 38(1&2), 151–163.

Chini DS, Mondal N, Singh S, Ghosh P, Patra P, Mandal B, ... & Patra BC (2025). Multivariate ecological assessment of ten Indigenous IUCN threatened and near threatened freshwater fishes from South-West Regions of West Bengal, India. Journal of Applied Biology & Biotechnology, 13(3), 170-178.

Das DR, Mithun MH, Moniruzzaman M & Mahmud Y (2023). Some aspects of reproductive biology of gangetic ailia, *Ailia coila* (Hamilton, 1822) in Bangladesh. Academia Journal of Biology, 45(3), 1-11.

Das HP (1977). The fecundity of grey mullet (*Mugil cephalus*) along Goa coast. Mahasagar – Bulletin of the National Institute of Oceanography, 11(1–2), 63–71.

Froese R (2006). Cube law, condition factor and weight–length relationships: history, meta-analysis and recommendations. Journal of applied ichthyology, 22(4), 241-253.

Froese R & Binohlan C (2000). Empirical relationships to estimate asymptotic length, length at first maturity and length at maximum yield per recruit in fishes. Fishbyte, 21(2), 11–13.

Gogoi P, Ahirwal SK, Chakraborty SK, Jaiswar AK, Borah S, Bhattacharjya BK & Das BK (2023). Diet Composition of Cat Fish *Ailia coila* (Hamilton, 1822) from a Large Himalayan River Brahmaputra, Assam, India. National Academy Science Letters, 46(2), 91-94.

Hafiz MA, Shakir HA & Qazi JI (2024). Fish abundance and diversity during low and high flow seasons of River Ravi, Punjab, Pakistan. Pakistan Journal of Zoology, 56(5), 2143.

Hanif MA, Siddik MAB, Chaklader MR, Mahmud S, Nahar A, Hoque MS & Munilkumar S (2015). Biodiversity and conservation of threatened freshwater fishes in Sandha River, South West Bangladesh. World Applied Sciences Journal, 33(9), 1497-1510.

Hossain MY (2010). Length–weight, length–length relationships and condition factors of three Schilbeid catfishes from the Padma River, north-western Bangladesh. Asian Fisheries Science, 23, 329–339. https://doi.org/10.1111/j.14390426.2012.01954.x

Hossain MY, Jasmine S, Ibrahim AHM, Ahmed ZF, Rahman MM & Ohtami J (2009). Length–weight and length–length relationships of 10 small fish species from the Ganges, Bangladesh. Journal of Applied Ichthyology, 25(2),117–119. https://doi.org/10.22034/iji.v6i1.334

Hossain MY & Alam MJ (2015). Threatened fishes of the world: *Plotosus canius* Hamilton, 1822 (Siluriformes: Plotosidae). Croatian Journal of Fisheries, 73(1), 35-36.

Hunter JR, Macewicz N & Kimbrell CA (1992). Fecundity, spawning, and maturity of female Dover sole (*Microstomus pacificus*) with an evaluation of assumptions and precision. Fishery Bulletin, 90, 101–128.

IUCN (2010). *Ailia coila*. The IUCN Red List of Threatened Species 2010: e.T166451A6212182. Retrieved November 12, 2025, from https://www.iucnredlist.org/species/166451/6212182

Jacquot R (1961). Organic constituents of fish and other aquatic animals. In G. Borgstrom (Ed.), Fish as food. Academic Press, 1, 145–209.

Khan S, Jawad LA, Khan MA & Ankita A (2022). The relationship between fish length and otolith size

and weight of the two nearly threatened siluriformes species *Ailia coila* (Ailiidae) and *Ompok pabda* (Siluridae) collected from the Ganga River at Narora, India. Proceedings of the Zoological Institute RAS, 326(2), 78-85.

Mazumder MSA, Rahman MM, Ahmed ATA, Begum M & Hossain MA (2008). Proximate composition of some small indigenous fish species (sis) in Bangladesh.

Mazumder MSA, Rahman MM, Ahmed ATA, Begum M & Hossain MA (2008). Proximate composition of some small indigenous fish species (SIS) in Bangladesh. International Journal of Sustainable Crop Production, 3(4), 18–23.

Menon AGK (1999). Check list—Fresh water fishes of India (No. 175). Zoological Survey of India.

Mia AR, Sarker MR & Alam MS (2024). Quantitative Assessment of *Ailia coila* (Hamilton, 1822) Fish Population in Kaptai Lake: A Length-Based Approach. Lakes & Reservoirs: Research & Management, 29(1), e12460.

National Bureau of Fish Genetic Resources (NBFGR). (1998). *Fish chromosome atlas* (Special Publication No. 1). NBFGR, Lucknow, India.

Ng HH & Dahanukar N (2011). *Ailia coila*. In The IUCN Red List of Threatened Species (2011: e.T166451A6212182). https://doi.org/10.2305/IUCN.UK.2011-1.RLTS.T166451A6212182.en

Pal V, Kumar J & Dwivedi A (2025). Biology, distribution, and conservation concerns of the Gangetic catfish *Ailia coila* (*Hamilton, 1822*). Agri-India TODAY, *5*, 337–338.

Rahman AKA (2005). Freshwater fishes of Bangladesh, 2nd ed. Dhaka, Bangladesh: Zoological Society of Bangladesh, xviii + 394 pp.

Rahman MK, Rahman BS, Lima RA, Ali A & Mahmud Y (2024). Biometric indices of eight fish species from the catchment area of Kaptai lake, Bangladesh. Ecological Frontiers, 44(5), 1061-1068.

Ray A, Kumar L, Swain HS & Das BK (2022). Growth, mortality and stock status of three commercially important catfishes from the River Ganga, India. Indian Journal of Fisheries, 69(2), 30-38.

Reddy YS & Rao MB (1991). Gonadosomatic index and fecundity of *Heteropneustes fossilis* (Bloch) (Pisces: Heteropneustidae) from Hussain Sagar, Hyderabad. Indian Journal of Fisheries, 38(2), 93–96.

Rheman S, Islam ML, Shah MMR, Mondal S & Alam MJ (2002). Observation on the fecundity and gonadosomatic index (GSI) of grey mullet *Liza parsia* (Ham.). Journal of Biological Sciences, 2(10), 690–693.

Saha N, Roy P, Utsha TS, Nag SK, Kaushik G & Hossain MY (2023). Life history traits of Gangetic ailia, *Ailia coila* (Hamilton 1822) in the Tetulia River, Southern Bangladesh. Croatian Journal of Fisheries: Ribarstvo, 81(3), 115-126.

SenGupta S & Homechaudhuri S (2015). Taxonomic and functional diversity of fish assemblage in three interconnected tropical rivers in India in accordance with limiting similarity hypothesis. Journal of Global Biosciences, 4(7), 2842-2858.

Shaheen N, Rahim ATMA, Mohiduzzaman M, Banu CP, Bari ML, Tukun AB, Mannan MA, Bhattacharjee L & Stadlmayr B (2013). Food composition table for Bangladesh (1st ed)

Wheal MS, DeCourcy-Ireland E, Bogard JR, Thilsted SH & Stangoulis JCR (2016). Measurement of haem and total iron in fish, shrimp, and prawn using ICP-MS: Implications for dietary iron intake in Bangladesh. Food Chemistry, 201, 222–229.

Yadav NS (2017). Fish diversity of Bagmati River, Sarlahi, Nepal (Doctoral dissertation, Central Department of Zoology Institute of Science and Technology Tribhuvan University Kirtipur, Kathmandu).

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