

Ichthyofaunal Diversity of Chaugada Taal, a Wetland of Balrampur, Uttar Pradesh, India: Threats and Conservation

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Abstract- The present study evaluated the ichthyofaunal diversity, spatial distribution, and conservation status of fishes inhabiting Chaugada Taal, a freshwater wetland ecosystem in the Tarai region of Uttar Pradesh, India. A total of 29 fish species representing 11 families and 8 orders were documented during the study period. Among the recorded taxa, Cypriniformes was the most dominant order, followed by Siluriformes, whereas Perciformes, Ophiocephaliformes, Osteoglossiformes, Clupeiformes, Belontiiformes, and Mastacembelliformes contributed comparatively fewer species. The predominance of cypriniform fishes indicates the availability of suitable trophic resources and habitat conditions within the wetland. Fish assemblages exhibited considerable spatial variation among sampling stations, with S1 supporting the highest diversity, followed by S2 and S3, suggesting spatial heterogeneity in habitat characteristics. *Mystus vittatus*, *Ompok pabda*, *Pangasius pangasius*, and *Channa punctatus* showed relatively broad distribution, whereas *Clarias batrachus*, *Heteropneustes fossilis*, *Puntius ticto*, and *Mystus tengra* exhibited restricted occurrence. Conservation assessment revealed that most recorded species were categorized as Least Concern, while *Wallago attu* and *Ompok pabda* were assessed as Near Threatened, and *Clarias batrachus* as Endangered. The occurrence of commercially important species, including *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala*, and *Wallago attu*, demonstrates the fisheries significance of the wetland. However, overfishing, habitat degradation, pollution, agrochemical runoff, and destructive fishing practices may threaten fish assemblages. Strengthening habitat protection, regulating fishing activities, controlling pollution, and implementing long-term ichthyofaunal monitoring are recommended for the sustainable conservation and management of Chaugada Taal.

Keywords: Chaugada Taal, Ichthyofaunal Diversity, Freshwater Fishes, Wetland Ecosystem, Conservation Status

I. INTRODUCTION

Fish are an important component of the human diet and provide high-quality protein, essential amino acids, lipids, vitamins, minerals, and omega-3 polyunsaturated fatty acids required for growth, development, and maintenance of human health (Prakash, 2020a; Ali, 2024). Fisheries also contribute substantially to food security, employment, and income, particularly in developing countries. Water resources are therefore fundamental to inland fisheries and aquaculture. Fishes are also widely used in ecological, evolutionary, genetic, and environmental studies because of their close association with aquatic environmental conditions.

Biodiversity encompasses the variety and variability of life at genetic, species, and ecosystem levels (Colwell, 2009). It is essential for ecosystem stability, nutrient cycling, food-web functioning, and the maintenance of ecosystem services. Fish diversity is particularly important because fishes occupy different trophic levels and perform diverse ecological functions in aquatic ecosystems. It also provides valuable opportunities for evolutionary and genetic studies (Bano and Serajuddin, 2016). Globally, more than 36,000 fish species have been described, while India supports nearly 3,500 species and represents one of the major centres of freshwater fish diversity (Banerjee et al., 2022).

Fish diversity and abundance are useful indicators of the ecological condition of aquatic ecosystems. A diverse and stable fish community generally reflects suitable habitat conditions, adequate food resources, and relatively good water quality. Conversely, changes in species composition, abundance, or distribution may indicate pollution, habitat degradation, altered hydrology, or other ecological

disturbances. Consequently, ichthyofaunal studies provide important baseline information for evaluating ecosystem health and developing effective fisheries and biodiversity management programmes.

Freshwater fishes, however, are increasingly threatened by anthropogenic activities. Habitat destruction, pollution, siltation, eutrophication, overfishing, river regulation, dam construction, wetland encroachment, climate change, and biological invasions have contributed to declines in fish populations worldwide. Industrial effluents, domestic sewage, agricultural runoff containing pesticides and fertilizers, and unsustainable exploitation further deteriorate water quality and fish habitats. Modification of natural hydrological regimes and the shrinking of wetlands can also reduce breeding, feeding, nursery, and refuge habitats for native fishes. The introduction of non-native species, including *Oreochromis niloticus*, *Cyprinus carpio*, and *Clarias gariepinus*, may intensify competition, predation, and habitat alteration, thereby threatening indigenous ichthyofauna.

Wetlands, rivers, lakes, ponds, reservoirs, floodplain lakes, and marshes provide essential habitats for freshwater fishes. Wetlands are among the most productive ecosystems and support high biological diversity by providing food, shelter, spawning grounds, nursery habitats, and migration routes (Prakash, 2020b). They also contribute to water purification, nutrient cycling, flood regulation, and maintenance of ecological balance. Because fishes are closely associated with wetland environmental conditions, their diversity is influenced by water depth, temperature, dissolved oxygen, aquatic vegetation, nutrient availability, water quality, and seasonal fluctuations. Healthy wetlands consequently play a dual role in supporting fisheries production and conserving aquatic biodiversity.

India's wetlands are particularly important for inland fisheries, livelihood generation, and food security. They support numerous commercially and ecologically valuable fish species and provide suitable habitats for different stages of their life cycles. However, increasing pollution, wetland conversion, hydrological alteration, overexploitation, and invasive species are placing considerable pressure on these

ecosystems. Conservation of fish biodiversity therefore requires integrated approaches involving habitat restoration, pollution control, sustainable fishing practices, regulation of exotic species, protection of breeding grounds, and community participation.

Uttar Pradesh possesses extensive inland aquatic resources, including rivers and canals, reservoirs, ponds and tanks, floodplain lakes, and wetlands. These resources support diverse fish communities and provide considerable potential for fisheries development (Lakra, 2010). Nevertheless, urbanization, industrialization, domestic sewage, agricultural runoff, sand mining, excessive fishing, and other anthropogenic pressures have adversely affected aquatic habitats and fish diversity in the state (Dwivedi and Nautiyal, 2010; Pathak et al., 2011; Kanoujiya et al., 2023). Habitat degradation and indiscriminate harvesting, particularly of juvenile fishes, may further reduce native fish populations and alter community structure.

In this context, Chaugada Taal represents an important wetland habitat supporting freshwater fish diversity. Increasing anthropogenic pressure and ecological disturbances may, however, threaten its biodiversity and ecological functioning. Therefore, the present study was undertaken to document the diversity, abundance, distribution, and species richness of ichthyofauna in Chaugada Taal, with particular emphasis on the conservation status of recorded species. The study also aims to identify major threats and suggest appropriate conservation and management measures for sustainable utilization and protection of fish resources. The findings are expected to provide baseline information for future ecological investigations and support the scientific management and conservation of freshwater fish biodiversity in the region.

II. MATERIAL AND METHODS

The present study was conducted in Chaugada Taal, a wetland located in Gopiyapur village of Balrampur district on the Balrampur–Bahraich Highway (Fig. 1 & 2). The wetland is situated approximately 5 km from the M.L.K.P.G. College campus. A detailed survey was carried out to assess the fish diversity of the taal.

Fish samples were collected twice a month over a period of nine months, from July 2025 to March 2026. For the study of fish diversity, sampling was conducted at three different sites of the taal (Fig. 2 & 3). Fishes were collected using various fishing gears such as hand nets, gill nets, cast nets, hooks, and drag nets with the assistance of local fishermen and animal

catchers. The collected fish specimens were preserved in 10% formaldehyde solution at the sampling sites. Identification of the fish specimens up to species level was carried out with the help of standard taxonomic literature.



Fig. 1. Map of U.P. showing Location of Balrampur District



Fig. 2. Satellite view of Chaugada Taal showing study sites

Collection of fish and identification:

The different species of fish were collected from from July, 2025 to March, 2026 in every sampling station. Fishes were collected using various methods, including cast nets with a 6 mm × 6 mm mesh size, bamboo fish traps, and mosquito nets, during the hours of 7 am to 4 pm at different stations with the help of local fishermen. Habitat and their local name, and morphological details were noted for taxonomic confirmation at the time of collection with the help of local fishermen. The fishes were photographed before being preserved in 10% formalin solution with their heads positioned upside down to protect their caudal fins. The specimens were then taken to the Department of Zoology M.L.P.G. College, Balrampur, U.P. for identification.

Fishes were identified as

- Fin rays of each fins like Dorsal (D), Pectoral fin (P), Pelvic, or Ventral (V), Anal fin (A), and Caudal fin (C) were counted by the help of forceps and written as formula known as fin formula.
- Numbers of barbels were counted with the forceps with a pointed tip.
- Number of scales along the lateral line (L.l.) and Transverse rows of scales above and below the lateral line (L.tr). In this case an oblique stroke (/) separates the rows of scale above and below the lateral line.



Fig. 3. Chaugada Taal showing S1 & S2 Fishing Station



Fig. 4. Chaugada Taal showing S3 Fishing Station

III. RESULTS AND DISCUSSION

In the present investigation total of 29 fish species belonging to 11 families and 8 orders were recorded from Chaugada Taal, Balrampur, during the study period. Among the recorded orders, Cypriniformes was the dominant order represented by 10 species under the family Cyprinidae, followed by Siluriformes with 8 species belonging to five families namely Bagridae, Siluridae, Schilbeidae, Clariidae and Saccobranchidae. Other important orders recorded were Perciformes (4 species), Ophiocephaliformes (3 species), while Osteoglossiformes, Clupeiformes, Beloniformes and Mastacembelliformes were represented by a single species each. Among the sampling stations, station S1 showed the highest fish diversity with the occurrence of 20 species, followed by S2 with 17 species and S3 with 12 species. Some species such as *Mystus vittatus*, *Ompok pabda*,

Pangasius pangasius and *Channa punctatus* were commonly distributed at all three sampling stations, indicating their wider adaptability in the wetland ecosystem. In contrast, species like *Clarias batrachus*, *Heteropneustes fossilis*, *Puntius ticto* and *Mystus tengara* were restricted to a single station.

The conservation status analysis based on IUCN categories revealed that most of the recorded species belonged to the Least Concern (LC) category. However, two species, *Wallago attu* and *Ompok pabda*, were categorized as Near Threatened (NT), while *Clarias batrachus* was recorded as an Endangered (EN) species. *Channa punctatus* was categorized under Not Evaluated (NE). The presence of economically important fishes such as *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala* and *Wallago attu* indicates the fisheries potential of Chaugada Taal.

Table.1. Fish diversity of Chaugada Taal, a wetland of Balrampur, U.P.

Family	Scientific Name	Common Name	IUCN Status	Status of Occurrence		
				S1	S2	S3
Order: Osteoglossiformes						
Notopteridae (Feather back)	<i>Notopterus notopterus</i> (Pallas 1769)	Patra	LC	+	+	-
Order: Clupeiformes						
Clupeidae (Herrings)	<i>Gudusia chapra</i> (Hamilton 1822)	Suhia	LC	+	-	+
Order: Cypriniformes						
Cyprinidae	<i>Labeo rohita</i> (Hamilton 1822)	Rohu	LC	+	+	-
	<i>Labeo bata</i> (Hamilton 1822)	Bata	LC	-	+	+
	<i>Labeo dero</i> (Hamilton 1822)	Gargi	LC	+	-	+
	<i>Catla catla</i> (Hamilton 1822)	Bhakur	LC	+	-	-
	<i>Cirrhinus mrigala</i> (Hamilton 1822)	Naini	LC	+	+	-
	<i>Cirrhinus reba</i> (Hamilton 1822)	Reba	LC	-	+	-
	<i>Puntius ticto</i> (Hamilton 1822)	Spot barb	LC	-	-	+
	<i>Rasbora daniconius</i> (Hamilton 1822)	Slender rasbora	LC	+	+	-
	<i>Oxygaster gora</i> (Hamilton 1822)	Dariaichalho	LC	+	+	+
Order: Siluriformes						
Bagridae	<i>Mystus tengara</i> (Hamilton 1822)	Tengara	LC	-	-	+
	<i>Mystus vittatus</i> (Bloch 1794)	Tengara	LC	+	+	+
	<i>Rita rita</i> (Hamilton 1822)	Rita	LC	-	+	-
Siluridae	<i>Wallago attu</i> (Schneider 1801)	Pardni	NT	+	-	-
	<i>Ompak pabda</i> (Hamilton 1822)	Pabdah	NT	+	+	+
Schilbeidae	<i>P. pangasius</i> (Valenciennes 1840)	Pangus	LC	+	+	+
Clariidae	<i>Clarias batrachus</i> (Hamilton 1822)	Mangur	EN	-	-	+

Saccobran- nchidae	<i>Heteropneustes fossilis</i> (Bloch 1794)	Singhi	LC	-	-	+
Order: Beloniformes						
Belonidae	<i>Xenontodon cancila</i> (Hamilton 1822)	Kauwa	LC	+	-	-
Order: Ophiocephaliformes						
Channidae	<i>Channa punctatus</i> (Bloch 1793)	Girai	NE	+	+	+
	<i>Channa marulius</i> (Hamilton 1822)	Saura	LC	-	+	-
	<i>Channa striatus</i> (Bloch 1793)	Saura	LC	+	+	-
Order: Perciformes						
Gobiidae	<i>Glossogobius giuris</i> (Hamilton 1822)	Balia	LC	+	-	-
Anabantidae	<i>Anabas testudineus</i> (Bloch 1792)	Kawai	LC	+	-	-
Nandidae	<i>Nandas nandas</i> (Hamilton 1822)	Dhebri	LC	+	+	-
Ambassidae	<i>Chanda nama</i> (Hamilton 1822)	Chanda	LC	+	-	-
Order: Mastacembelliformes						
Mastacemb- eleidae (Spiny eels)	<i>Mastacembelus armatus</i> (Lacepede 1800)	Bam	LC	-	+	-

Abbreviations: LC=Least Concern, NT=Near Threatened, EN=Endangered, NE=Not Evaluated; +: Present; -: Absent

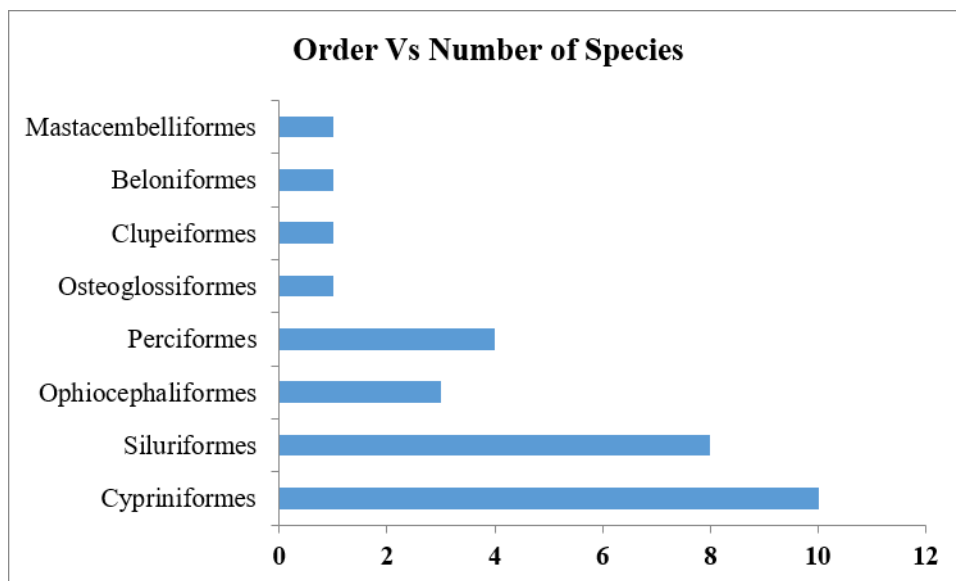


Fig. 1: Order-wise Distribution of Fish Species

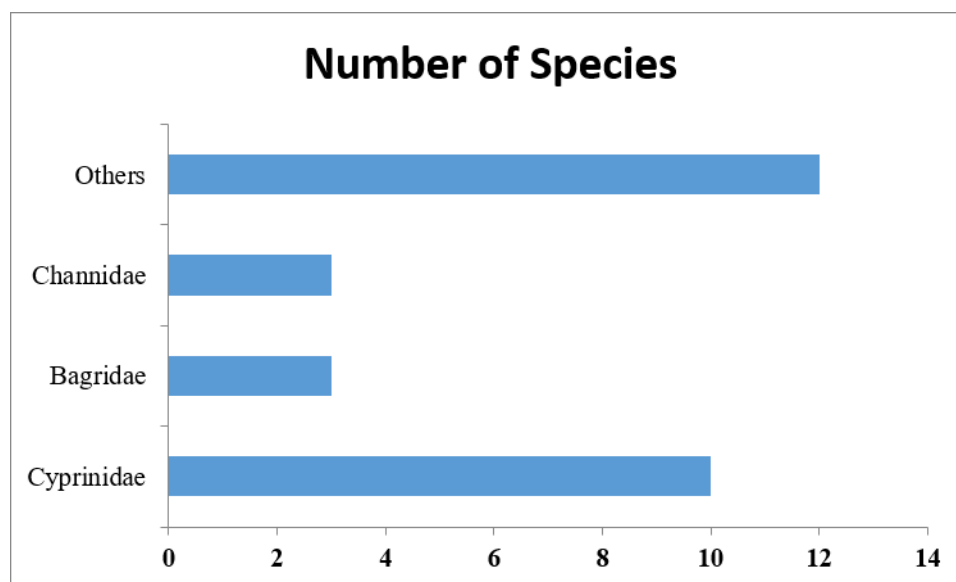


Fig. 2: Family-wise Distribution of Fish Species

The occurrence of threatened species also emphasizes the ecological importance of this wetland and the need for proper conservation and management strategies for sustaining fish diversity.

Wetlands are often subjected to expansion and contraction in an area with changes in the water level due to the fluctuation in the receiving water and rainfall, as a result, the species richness varies depending upon the period of flooding. Physico-chemical condition of water and the entry of chemicals during runoff in the wetland stimulates the biological diversity due to "Spatial Heterogeneity" (Alfred and Ramakrishna, 2002). On account of the fish diversity of The taal, the present study reveals a good diversity with 41 species, which is found to be higher in comparison to some other wetlands of the Tarai region of U.P. (Prakash, 2020a,b; Prakash and Singh, 2020; Prakash and Yadav, 2020).

Regarding the threats, many workers reported that directly or indirectly anthropogenic activities are responsible for decreasing the diversity and density of fish in natural water bodies (Lakra, 2010; Sarkar *et al.*, 2015; Prakash, 2020a; Prakash and Singh, 2020; Pathak and Goswami, 2021; Prakash, 2021; Verma, 2021; Ali, 2025). The threats to Global freshwater biodiversity have been described under some common interacting categories such as overexploitation, water pollution, destruction or degradation of habitat, and

invasion by exotic fishes (Pathak and Goswami, 2021).

In the present investigation total of 29 fish species belonging to 11 families and 8 orders were recorded from Chaugada Taal, during the study period. According to the fish species composition, the orders can be arranged as Cypriniformes > Siluriformes > Perciformes > Ophiocephaliformes > Osteoglossiformes = Mastacembelliformes = Clupiformes = Beloniformes while the families can be arranged as Cyprinidae > Bagridae = Channidae > Siluridae > Notopteridae = Clupidae = Schilbeidae = Clariidae = Saccobanchidae = Belonidae = Gobiidae = Anabantidae = Nandidae = Ambassidae = Mastacembelidae.

Such fish orders, families, genera and species composition were also reported from the wetlands of U.P. Moreover, other studies on fish diversity of various wetlands of this Tarai region revealed that there were more species found in this Chaugada Taal (Verma and Prakash, 2016; Prakash, 2020a, b; Prakash and Singh, 2020; Prakash and Yadav, 2020; Yadav and Sharma, 2021). The order Osteoglossiformes, Clupeiformes, Beloniformes, Ophiocephaliformes, Beloniformes, and Mastacembelliformes with single family were noted during the study period. The dominance of Cyprinids in the population, as seen in the present study, was due to their high adaptive

variability to occupy all possible habitats and the presence of an appropriate physicochemical condition of water and food abundance. Recently, Prakash (2020b) and Prakash and Singh (2020) recorded seven species each of the Cyprinidae family from Semara and Baghel Taals, a wetland in the Tarai region of Uttar Pradesh. Yadav and Sharma (2021) also recorded fourteen species of the Cyprinidae family from Chittaura Jheel, a wetland of eastern U.P. The status of fish species of this wetland included one endangered, two Near Threatened, twenty five Least concern and one not evaluated. The fish diversity and density of fishes of this wetland have been drastically declined in the past two decades as reported by local people.

The present investigation showed that the wetland, Chaugada Taal possesses rich fish biodiversity but proper conservation measures are required to maintain sustainability and richness of the fish species diversity of that wetland of U.P. To use this natural resource sustainably, the ecosystem of the wetland shall be kept untouched and conserved (Prasad 2002).

The occurrence of fish species (Table1) showed noticeable spatial variation among the three sampling stations of Chaugada Taal. Of the 29 recorded species, 18 species (62.1%) were present at S1, 19 species (65.5%) at S2, and 17 species (58.6%) at S3, indicating relatively comparable levels of species occurrence among stations. A chi-square test of independence based on species presence/absence did not indicate a statistically significant association between fish occurrence and sampling station ($\chi^2 \approx 0.19$, $df = 2$, $p > 0.05$). Thus, although certain species exhibited station-specific distributions, the overall ichthyofaunal occurrence did not differ significantly among S1, S2, and S3. The observed spatial differences may therefore reflect localized variation in habitat characteristics, aquatic vegetation, food availability, water depth, and other environmental factors rather than a strong station-level effect. Species such as *Mystus vittatus*, *Ompok pabda*, *Pangasius pangasius*, and *Channa punctatus* occurred at all three stations, suggesting relatively broad habitat tolerance, whereas several species showed restricted occurrence. Overall, the results suggest that Chaugada Taal provides relatively heterogeneous but broadly suitable habitats for its fish assemblage, while continued monitoring of

physicochemical and habitat variables would help identify the environmental factors responsible for species-specific distribution patterns.

It is recommended that fisheries authorities thoroughly investigate and implement sustainable exploitation and management practices for the fisheries resources, adhering to ecological principles. Fishing during the breeding season poses a significant threat and should be strictly prohibited. Regular monitoring is essential to curb illegal fishing methods and the capture of undersized fish. Consequently, it becomes the responsibility of each individual to actively contribute to the conservation of fish diversity, ensuring the preservation of valuable biodiversity for future generations in a healthy state.

Conclusion: The present investigation revealed that Chaugada Taal possesses rich ichthyofaunal diversity and serves as an important wetland ecosystem of the Tarai region of Uttar Pradesh. During the study period, a total of 29 fish species belonging to 11 families and 8 orders were recorded. Ichthyofaunal diversity and serves as an important wetland ecosystem of the Tarai region of Uttar Pradesh. During the study period, a total of 29 fish species belonging to 11 families and 8 orders were recorded. Among them, the order Cypriniformes was dominant, followed by Siluriformes, while other orders such as Perciformes, Ophiocephaliformes, Osteoglossiformes, Clupeiformes, Belontiiformes and Mastacembelliformes were represented by comparatively fewer species. The dominance of Cyprinidae indicates favorable physicochemical conditions, food availability, and habitat suitability in the wetland ecosystem. Among the sampling stations, S1 exhibited the highest fish diversity, followed by S2 and S3, indicating spatial variation in habitat conditions and ecological heterogeneity within the wetland. Several species such as *Mystus vittatus*, *Ompok pabda*, *Pangasius pangasius* and *Channa punctatus* showed wider distribution and adaptability, whereas species like *Clarias batrachus*, *Heteropneustes fossilis*, *Puntius ticto* and *Mystus tengara* were restricted to particular habitats.

The conservation assessment revealed that most species belonged to the Least Concern category, while *Wallago attu* and *Ompok pabda* were categorized as

Near Threatened and *Clarias batrachus* as Endangered. The occurrence of economically important fishes such as *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala* and *Wallago attu* highlights the fisheries potential of the wetland and its importance for local livelihoods.

However, anthropogenic activities such as overexploitation, habitat degradation, water pollution, runoff of agrochemicals and indiscriminate fishing practices are major threats to fish diversity in the wetland. Local observations also suggest a decline in fish abundance and diversity during recent decades. Therefore, immediate conservation and sustainable management practices are essential for maintaining the ecological balance and fish diversity of the wetland. Strict regulation of fishing during breeding seasons, prevention of illegal fishing methods, conservation of habitat quality, and regular biodiversity monitoring are strongly recommended. Sustainable utilization and proper conservation of this valuable wetland resource will help preserve its rich biodiversity for future generations.

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