

*Original Research Article*

**DIVERSITY SPECIES COMPOSITION AND CONSERVATION STATUS OF  
ORNAMENTAL FISHES OF KHAMBRENGA BEEL, A FLOOD PLAIN WETLAND,  
OF KAMRUP DISTRICT, ASSAM, INDIA.**

**ABSTRACT**

**Introduction.** Ornamental fish culture, also known as aquaculture, is a significant industry globally, contributing to foreign exchange earnings and employment generation. India, particularly the northeastern region, is endowed with diverse indigenous ornamental fish species. However, the ornamental fish trade in India remains relatively underdeveloped. This study aimed to document the ornamental fish diversity in Khambrenga Beel, a freshwater wetland located near Guwahati City, Assam, India.

**Methods.** From December 2022 to April 2023, fish samples were collected and photographed in the study area. Local knowledge and identification literature were utilized to identify the fish species, while the IUCN Red List was referenced to determine their conservation status.

**Results.** A total of 48 species belonging to 30 genera, 20 families, and 10 orders of ornamental fishes were recorded in Khambrenga Beel. The Cypriniformes and Perciformes orders were the most diverse, comprising 16 species each. The majority of the recorded species were categorized as least concern (LRLc), indicating a relatively stable conservation status. However, three species were categorized as near threatened (NT), one species as vulnerable (VU), and one species as endangered (EN). The abundance of ornamental fishes varied across different sampling sites and seasons, reflecting the influence of habitat heterogeneity and seasonal dynamics.

**Conclusion.** The findings highlight the importance of conserving Khambrenga Beel's unique ecosystem and its diverse ornamental fish species. Conservation measures such as habitat

protection and sustainable fishing practices are crucial for ensuring the long-term survival of these species. This study provides valuable information for the development of conservation strategies to protect the ornamental fish populations in Khambrengea Beel, thereby contributing to the overall conservation of indigenous ornamental fishes in India.

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**Keywords:** *Ornamental fish, Wetland, Fish Diversity, Conservation, Assam*

## INTRODUCTION

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Ornamental fish culture also known as aquaculture, is the culture of attractive, colorful fishes of peaceful nature in confined aquatic systems. Ornamental fishes are also called as "living jewels". The ornamental fisheries are a source of foreign exchange, in addition to being a source of employment. It has an important role in economies of developed and developing countries. The entire ornamental fish industry, including accessories are estimated to be worth more than \$5.88 billion in 2022.

Ornamental fishes are the world's most popular pets and fish keeping happens to be a popular hobby next only to photography. The fantastic shapes and brilliant colours of ornamental fishes made them a popular choice as pets, they can be aptly called as "Living Jewels".

India is still in a marginal position just contributing 1% of total ornamental fish trade. North eastern states, West Bengal, Kerala and Tamil Nādu are blessed with highly potential indigenous ornamental fishes. Around 85% of native fishes are from North eastern states. 90% of native ornamental species are collected and reared to meet export demand. In India, the Western Ghats and the north-eastern region are considered as the hotspot for indigenous ornamental fishes[1]. In the north-eastern area, there 422 fish species have been recorded[2], Mahapatra

documented 250 species of ornamental fishes from the northeastern states[3] 311 fish species have been recorded in Assam, of which 180 has ornamental value[2].

Number of researchers are engaged in studying ichthyofaunal diversity of Assam in various regions of the state. A total of 81 fish species were studied having ornamental value across the Brahmaputra basin [4]. Numbers of tributaries from the northern and southern side of Assam join the Brahmaputra River and develop numbers of flood plain wetlands and rain fed Beels which create feeding and breeding ground for indigenous fish fauna. The present study has been conducted to record the ornamental fish diversity in the Khambrenge Beel which is a wetland in the outskirts of the Guwahati City.

## MATERIALS AND METHODS

### 1.1. Study Area

The study area, Khambrenge beel also known as Khambrenge Wetland or Khambrenge Lake, is a freshwater wetland located in Chandrapur area of Kamrup, Assam, India, around 15 kms from Guwahati City. It is a prominent water body that is known for its ecological significance and supports a diverse range of flora and fauna, including several indigenous species of fish. Khambrenge Beel is a large, shallow wetland that spans across an area of approximately 160 hectares (1.6 sq kms) during the monsoon season and decreases in size during the dry season. The lake is surrounded by marshy grasslands, agricultural fields, and wetland vegetation, creating a unique habitat for various aquatic and avian species (Figure 1).

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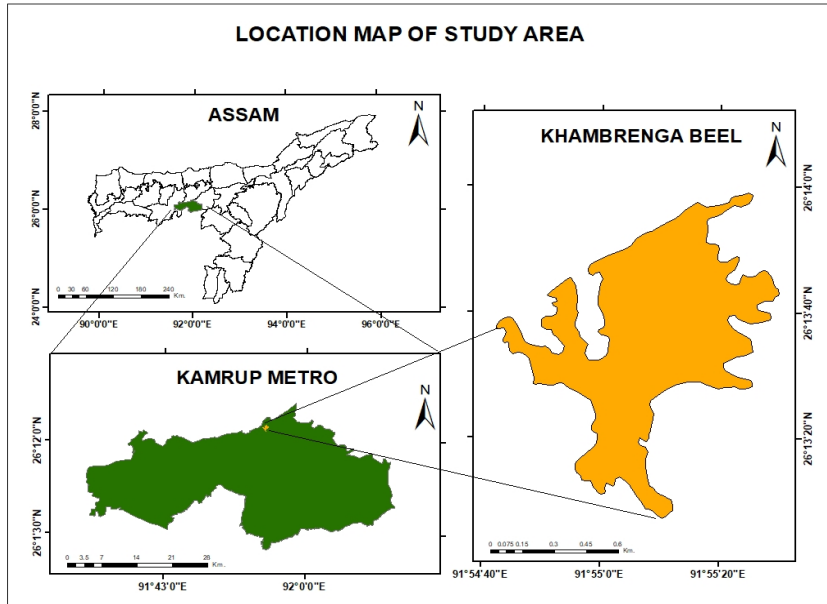


Figure- 1. Map of Study Area with Location

**1.2 Geography:** The beel is a polygonal riverine wetland situated 26° 13'15" North and 91° 54'03" East. To the North it has the river Brahmaputra at a distance of 1200 mts. from the beel and to the south it is lined by the hills of Amchang Wildlife Sanctuary. The beel has an average altitude of 70 meters above sea level.

**1.3 Climate:** Khambrengea Beel have a tropical or subtropical climate, depending on its location. It experiences high temperatures and high humidity throughout the year, with significant rainfall and occasional flooding.

Annual temperature range in the Chandrapur area varies from 10°C to 33°C. Average humidity is 75%. During the hot season, temperatures in wetland areas may rise significantly,

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with average highs ranging from 30 to 40 degrees Celsius. The humidity levels may also be high, resulting in a hot and muggy climate [5].

In the rainy season, Khambrenge Beel would likely receive ample rainfall, resulting in waterlogging and inundation of the wetland area. The region may experience heavy monsoonal rainfall, leading to flooded marshes and increased water levels in the beel. The moonson season starts lasts from May till September. Average annual rainfall received in the district ranges from 1500 mm to 2600 mm [6] This creates a unique ecosystem with diverse flora and fauna, including various water birds, fish, and aquatic plants.

### Sampling**MATERIALS AND METHODS**

The study was conducted from December 2022 to April 2023. Fish samples were collected and photographed throughout these months from the wetland. The fish were collected using various fishing gears like Langi net, Fasi net, Cast net (Khewali), Puthilangi, Goroilangi, Kawoilangi, Bamboo traps (sepa), Jakoi and other hooks with the help of local fishermen. Fishing operations were done in the early morning hours almost every day.

To study the ornamental fish species of Khambrenge beel, the area was studied from December, 2022 to April, 2023. Fish samples were collected and photographed throughout these months from the wetland. The fishes were collected with the help of local fishermen. Fishes are captured by local people by using various fishing gears like Langi net, Fasi net, Cast net (Khewali), Puthilangi, Goroilangi, Kawoilangi, Bamboo traps (sepa), Jakoi and other hooks. Fishing operations are done at the early morning hours almost every day.

### Identification

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\_\_\_\_\_ Peoples were also interrogated and surveyed about different fish species found in the wetland now and before. Detailed photographs were taken along with some fishes were sampled for lab study.

Photograph search engines, the Fishbase database, and local knowledge were used to identify the obtained fish samples. Identification literatures such as The Fishes of Assam [7] were also used [8]. In the meantime, its conservation status was ascertained using the IUCN Red list [9] and the IUCN conservation status. Pictures were shot at the research laboratory. In addition, interviews were conducted to acquire local fish expertise. The fish species were identified with the help of local knowledge and identification literatures like The Fishes of Assam [7] and Photograph search engines. For nomenclature, Fishbase database [8] and for IUCN conservation status, IUCN Red list [9] was referred respectively.

## RESULTS AND DISCUSSION

### 2: *Species Composition*

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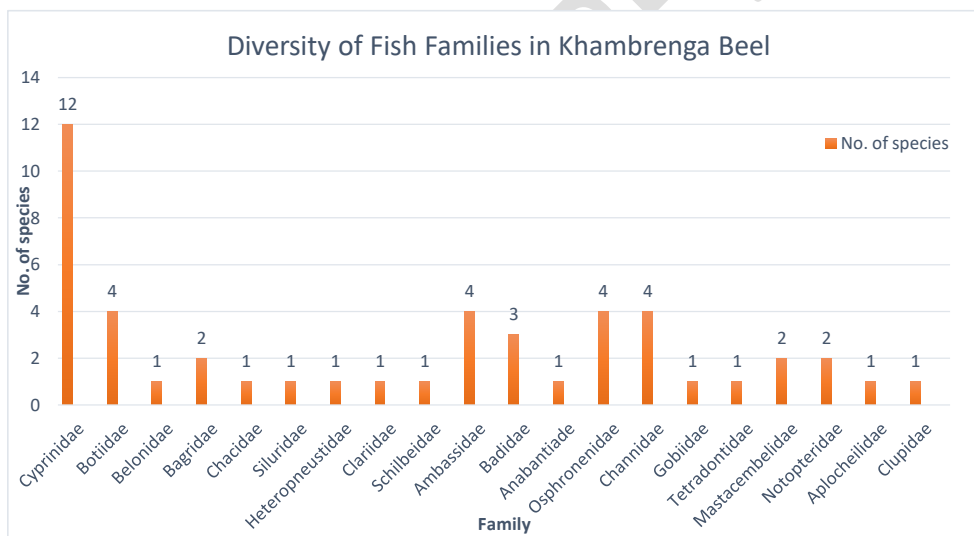
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It is found that the Khambrenge beel harbours a great diversity of ornamental fishes. A total of 48 species belonging to 30 genera, 20 families and 10 orders of ornamental fishes were recorded. Out of which 16 species belongs to Cypriniformes order, 16 species belong to Perciformes order, 7 species belongs to Siluriformes order, 2 species belong to Ostioglossiformes order, 2 species belongs to Synbranchiformes order and 1 species each belonging to orders Beloniformes, Gobiiformes, Tetradontiformes, Cyprinodontiformes, Clupiformes respectively. The 47 species belongs to the following families

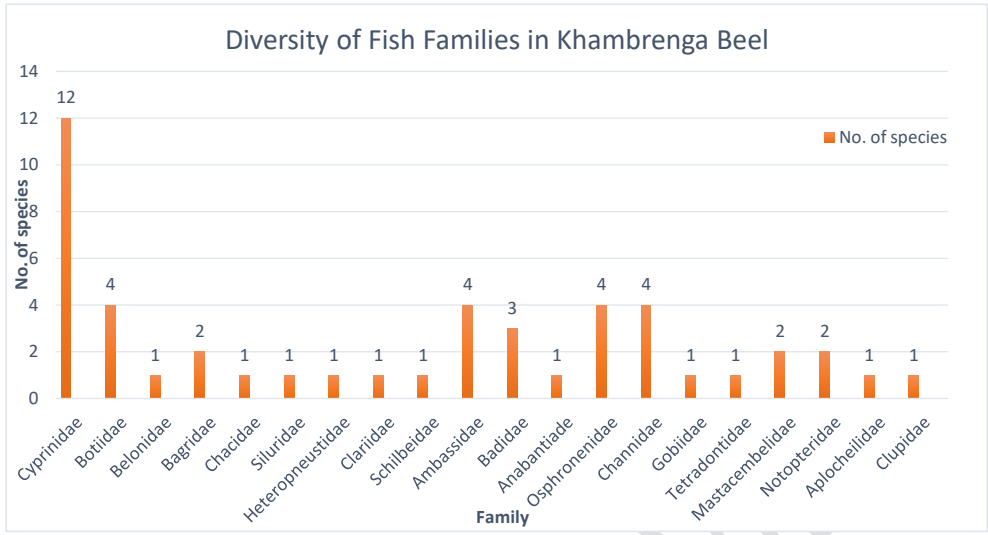
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**Figure.2:** Diversity of Fish Families in Khambrenge Beel



All the recorded species from Khambrennga Beel are documented in Table 1 along with their IUCN status, Availability in the beel and their Ornamental potential.

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UNDER PEER REVIEW

Table 1. List of recorded ornamental fish species with their status, occurrence & local name

Order	Family	Species Names	IUC Status	Occurrence	Local name	Ornamental Potential	
1	Cypriniformes	Cyprinidae	1. <i>Amblypharyngo don mola</i> (Hamilton, 1822)	LRlc	+++	Moa	Excellent
			2. <i>Esomus danricus</i>	LRlc	+++	Dorikona	Excellent
			3. <i>Pethia conchonius</i>	LRlc	+++	Puthi	Excellent
			4. <i>Pethia gelius</i>	LRlc	++	Puthi	Excellent
			5. <i>Puntius chola</i>	LRlc	++	Puthi	Excellent
			6. <i>Puntius sophore</i>	LRlc	+++	Puthi	Excellent
			7. <i>Puntius terio</i>	LRlc	+	Puthi	Excellent
			8. <i>Pethia ticto</i>	LRlc	+	Kanee Puthi/ Kenipothia	Excellent
			9. <i>Pethia phutunio</i>	LRlc	+++	Puthi	Excellent

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			<i>10. Rasbora daniconius</i>	LRlc	++	Dorikona	Excellent
			<i>11. Rasbora rasbora</i>	LRlc	+++	Eleng/Dorikona	Excellent
			<i>12. Salmostoma bacaila</i>	LRlc	+	Selkona	Excellent
		Botiidae	<i>13. Botia dario</i>	LRlc	+	Rani-botia	Excellent
			<i>14. Botia lohachata</i>	LRlc	+	Botia	Excellent
			<i>15. Lepidocephalichthys guntea</i>	LRlc	++	Guntel botia	Excellent
			<i>16. Acanthocobitis pavonacea</i>	VU	+	Botia	High potential
2	Beloniformes	Belonidae	<i>17. Xenentodon cancila</i>	LRlc	+++	Kokila	Excellent
3	Siluriformes	Bagridae	<i>18. Mystus tengara</i>	LRlc	++	Singarah	Excellent
			<i>19. Mystus bleekeri</i>	LRlc	++	Singarah	Excellent
		Chacidae	<i>20. Chaca chaca</i>	LRlc	+	Kurkuri	High potential
		Siluridae	<i>21. Ompok bimaculatus</i>	NT	+	Pabhoh	Moderate
		Heteropneustidae	<i>22. Heteropneustus fossilis</i>	LRlc	+++	Singi	High potential
		Clariidae	<i>23. Clarias magur</i>	EN	+++	Magur	High potential

		Schilbeidae	24. <i>Pachypterus atherinoides</i>	LRlc	++	Bohduah/ Bordia	Moderate
4	Perciformes	Ambassidae	25. <i>Parambassis baculis</i>	LRlc	+	Chanda	Excellent
			26. <i>Parambassis lala</i>	NT	++	Chanda	Excellent
			27. <i>Parambassis ranga</i>	LRlc	++	Chanda	Excellent
			28. <i>Chanda nama</i>	LRlc	+++	Chanda	Excellent
		Badidae	29. <i>Nandus nandus</i>	LRlc	++	Gedgedi/ Bhetki/ Veheri	Excellent
			30. <i>Badis assamensis</i>	DD	+	Vacheli	High potential
			31. <i>Badis badis</i>	LRlc	++	Randhanee maas	Excellent
		Anabantidae	32. <i>Anabas testudineus</i>	LRlc	+++	Kawoi	Excellent
		Osphronidae	33. <i>Trichogaster fasciata</i>	LRlc	+++	Kholihona	Excellent
			34. <i>Trichogaster lalius</i>	LRlc	+	Lal- kholihona	Excellent
			35. <i>Trichogaster labiosa</i>	LRlc	+++	Kholihona	Excellent
			36. <i>Trichogaster chuna</i>	LRlc	++	Bahsaylee	

		Channidae	37. <i>Channa striatus</i>	LRlc	++	Khol	High potential
			38. <i>Channa punctatus</i>	LRlc	+++	Goroi	Moderate
			39. <i>Channa stewarti</i>	LRlc	+	Chengeli	High potential
			40. <i>Channa gachua</i>	LRlc	+++	Cheng	
5	Gobiiformes	Gobiidae	41. <i>Glossogobius giuris</i>	LRlc	++	Panimutura	High potential
6	Tetraodontiformes	Tetraodontidae	42. <i>Leiodon cutcutia</i>	LRlc	+	Gangatope	Excellent
7	Synbranchiformes	Mastacembelidae	43. <i>Macragnathus aral</i>	LRlc	++	Tora/ Turi	Excellent
			44. <i>Macragnathus pancalus</i>	LRlc	++	Tora/ Turi	Excellent
8	Ostioglossiformes	Notopteridae	45. <i>Notopterus notopterus</i>	LRlc	+	Kandhuli	Excellent
			46. <i>Chitala chitala</i>	NT	+	Chital	Excellent
9	Cyprinodontiformes	Aplocheilidae	47. <i>Aplocheilus panchax</i>	LRlc	+	Kanpona S	Moderate
10	Clupiformes	Clupidae	48. <i>Gudusia chapra</i>	LRlc	++	Koroti	Excellent

**Comment [MOU8]:** *Channa striata* (Bloch, 1793)

**Comment [MOU9]:** Please revise your table. Order-Family-Species-Local Name-IUCN-Occ-Orna. Potential

**LRlc**-Lower Risk Least Concern; **EN**-Endangered; **VU**-Vulnerable; **NT**-Near Threatened; **DD**-Data Deficient  
 +++: High Occurrence; ++: Moderate Occurrence; +: Rare Occurrence

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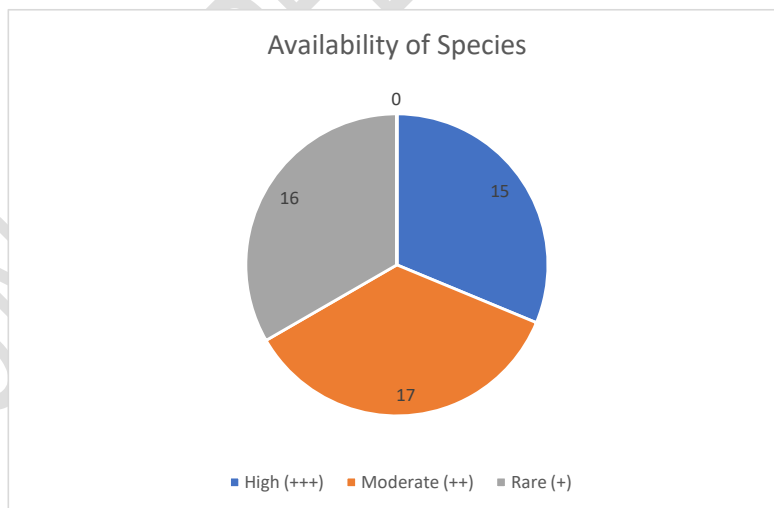
### Conservation Status

Out of the 48 species recorded, 42 species enlisted as least concern species (LRlc), 3 species as near threatened (NT), 1 species as vulnerable (VU), 1 species as endangered (EN) and 1 species as data deficient (DD). The overall abundance of ornamental fishes varied across different sampling sites and seasons, indicating the influence of habitat heterogeneity and seasonal dynamics.

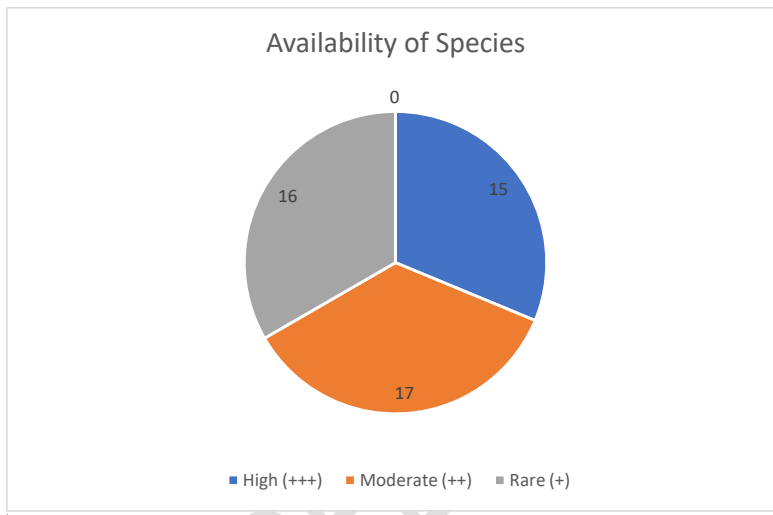
*Figure.3: Occurrence of Fish species in Khambrenga Beel*

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Among all the reported species, 15 species showed high occurrence, 17 species showed



moderate occurrence and 16 species showed rare occurrence.



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Figure 3. Occurrence of Fish species in Khambrennga Beel

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The findings of this study provide valuable information for the conservation and management of Khambrennga Beel's ornamental fish diversity. The presence of diverse species, including popular ornamental fish species, underscores the need to protect this ecosystem from anthropogenic activities such as overfishing, habitat degradation, and pollution. Implementing appropriate conservation measures, including the establishment of protected areas and sustainable fishing practices, is crucial to maintain the long-term viability of ornamental fish populations in Khambrennga Beel.

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### 3.1 CONCLUSION

The present study demonstrates the diverse assemblage of ornamental fishes in Khambrengea Beel, Assam despite having a small area of the lake. It is the first ever documentation of potential ornamental species from Khambrengea Beel (wetland) in Kamrup District, Assam. The results contribute to the understanding of the fish diversity in this unique wetland ecosystem. Effective conservation strategies, including habitat protection and sustainable management practices, are essential to safeguard the ornamental fish species in Khambrengea Beel and ensure their long-term survival.

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### REFERENCES

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- [3] Biswas SP, Santosh Kumar, and Das JN, "Conservation and Management of Ornamental Fish Resources of North East India," J Aquac Res Dev, vol. 06, no. 03, 2015, doi: 10.4172/2155-9546.1000310.
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