Uttar Pradesh Journal of Zoology

Volume 45, Issue 12, Page 89-101, 2024; Article no.UPJOZ.3517
ISSN: 0256-971X (P)

Annotated Check List of Ichthyofaunal Diversity in the Freshwater Tidal Stretch Along the Gosthani Estuary, Bheemunipatnam, East Coast of India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.56557/upjoz/2024/v45i124108

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://prh.mbimph.com/review-history/3517

Original Research Article

Received: 07/04/2024
Accepted: 14/05/2024
Published: 21/05/2024

ABSTRACT

The present study found 60 fish species belonging to 20 orders, 38 families, and 54 genera in the Gosthani estuary between May 2023 and April 2024. The fishes were brought to the lab and placed in glass jars before being preserved in a 9-10% formalin solution. The fish were identified at the species level using keys specific to the Indian subcontinent fish. Perciformes accounted for 35% of highest was observed in the total population. The recorded piscine species was met by the following orders: Clupeiformes (10%), Siluriformes (83.3%), Beloniformes, Tetraodontiformes, and Cypriniformes (each with 5.00%). Anguilliformes, Carangiformes, Mugiliformes, Cichiliformes, and Scombriformes each had 3.33%, while Anabantiformes, Moroniformes, Acanthuriformes,

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Cite as: *Jaya, P., Rao, K. R., Surya, N., Rao, M. B., Balaji, M., & Ramakrishna, M. (2024). Annotated Check List of Ichthyofaunal Diversity in the Freshwater Tidal Stretch Along the Gosthani Estuary, Bheemunipatnam, East Coast of India. UTTAR PRADESH JOURNAL OF ZOOLOGY, 45(12), 89–101. https://doi.org/10.56557/upjoz/2024/v45i124108*

Elopiformes, Gonorynchiformes, Synbranchiformes, Gobiiformes, Istiophoriformes, and Spariformes each had 1.66%. According to the IUCN (2024) threatened taxa in the current investigation, 65.00% of the 60 species are least concerned (LC), followed by 23.33% that are not evaluated (NE), 5.00% that are data deficient (DD), and 3.33% that are near threatened (NT) or vulnerable (VU).In the current study, ichthyofaunal diversity reported to habitation environment was observed in marine and brackish water fish species (76.66%), while brackish water and freshwater were inhabited (55.00%) in the Gosthani estuary.

Keywords: Ichthyofauna; trophic level; habitat; threatened taxa; IUCN.

1. INTRODUCTION

India's east and west coasts are rich in estuaries and brackish water. According to the Government of India (2000), “total brackish water resources are expected to reach 1.44 million hectares. Andhra Pradesh is divided into nine districts and has a 974-kilometer-long coastline and a continental shelf size of 33,227 square kilometers”. “The majority of India's large estuaries are located along the east coast, with fewer estuaries on the west coast. The nation has 14 large, 44 medium, and 162 small rivers that flow into the sea through several estuaries. Major estuaries are mostly found in the Bay of Bengal, where some of the country's most important seaports are located. The state has over 2.0 lakh hectares of brackish water and 27,500 hectares of mangrove swamps. Pulicat Lake, which covers 77,000 hectares, is the region's most important brackish water lake. The Godavari estuary system spans 330 km2. Estuaries support freshwater life forms, marine life forms, and eventually brackish water species that can exist in water of varied salinity. Furthermore, in the upper reaches, this ecosystem will support pure freshwater forms, euryhaline forms in the middle parts, and stenohaline forms at the mouth”. (www.wikipedia.com).

The National Bureau of Fish Genetic Resources (NBFGR) database in Lucknow lists 2,508 native finfish species, with 1,518 from the marine environment, 113 from brackish water, and 877 from freshwater settings. Clupeids, mullets, catfish, perches, and prawns. *Mugil cephalus* makes up a substantial portion of the estuary fisheries. Fishing reduces the abundance of a dominant consumer (Consumer 4), increases the amount of its prey (Consumer 3), and decreases the abundance of Consumer 3's prey. Depending on the complexity of the food web, organisms in a feeding chain are divided into three or more trophic levels. A trophic level in a food chain denotes an organism's position in its environment. Primary producers, consumers, and detritivores are all instances of these roles. The most evident relationship between body size and food web structure is the trophic interaction hierarchy, which predicts that a predator's trophic rank would increase with size. Georgios Vagenas et al. [1]. investigated “the trophic patterns of the Balkan biodiversity hotspot's freshwater fish fauna and compared the nutritional requirements of different species. The trophic level of the analyzed fish species ranged from 2.0 to 4.5, which is within the expected range for freshwater ecosystems, demonstrating the presence of both top predators and primary consumers. The fish species in the current study are classed as herbivorous (2.0-2.5), omnivore (2.5-3.5), and carnivorous (3.5-4.5) according to their trophic level”.

“The different contributions of dominant species in each habitat resulted in variances in assemblage structures. The fish assemblage in the freshwater zone was dominated by common freshwater species, whereas marine juveniles were closely linked to the estuarine ecology. Estuary weirs have a unique impact on fish assemblages because they disturb the link between freshwater and estuarine fish populations, as well as the migratory success of regional fish fauna”. Joo Myun et al. [2]. “The estuary may be classified into three hydrogeomorphic zones based on the period of year in which it is inundated by tidal fluctuations: subtidal, intertidal, and supratidal. Tidal freshwater environments vary from riverine regions largely due to tidally induced physical phenomena such as extended water residence durations, variable water levels, and altering current velocities and directions. variations in a mixohaline setting are mostly induced by variations in salinity and particle suspended matter concentration. Tidal freshwater reaches are important locations for physical, chemical, and biological processes that can drastically alter riverine intake before it reaches the freshwater-seawater interface” [3]. The present study

thoroughly investigated the entire number of fish that are biologically synonymous with the Gosthani estuary. This report provides firsthand information on ichthyofaunal diversity.

2. METHODOLOGY

Fish samples were taken from the Gosthani estuary (17.8961° N, 83.4545° E) between April 2023 and March 2024 (Fig. 1). The samples were obtained by fishermen using a seine net, bag net, cast net, gill net, scoop net, drag net, stake net, trap net of varied mesh size, hooks, and line while fishing. Freshly caught fish were properly cleaned and photographed. These fish were transported to the laboratory and placed in glass jars before being preserved in a 9-10% formalin solution [4]. The fish were identified at the species level using keys for Indian subcontinent fish. The species were identified largely using morphometric and meristematic features. Talwar, P. K. & Kacker, R. [5] Barman, R.P. [6] Day, F [7] Jayaram K.C. [8] Munro, I. S. R [9] Nath, P. and Dey, S.C [10] Talwar P.K. and Jhingran A.G. [11] Froese, R. and D. Pauly [12]. Fischer, W. and G. Bianchi [13]. The IUCN [14] conservation status of the fish species has been listed.

3. RESULTS AND DISCUSSIONS

The current study identified the presence of 60 fish species belonging to 20 orders, 38 families, and 54 genera collected from the Gosthani estuary from April 2023 to March 2024. A list of fishes were compiled in the current study, including their order, family, genus, species, environment, trophic level, and IUCN status. The species that have been listed are displayed in Table 1, together with the number and percentage composition of families, genera, and species in each order under consideration in the current study. The order Perciformes represented the majority of the observed species, with 35%. This was complied with by the following orders: Clupeiformes (10%), Siluriformes (83.3%), Beloniformes, Tetraodontiformes, and Cypriniformes (each with 5.00%). Anguilliformes, Carangiformes, Mugiliformes, Cichiliformes, Scombriformes each with 3.33%, and Anabantiformes, Moroniformes, Acanthuriformes, Elopiformes, Gonorynchiformes, Synbranchiformes, Gobiiformes, Istiophoriformes, Spariformes each with 1.66%. In the present investigation recorded genera out of 54, the percentage was observed of Perciformes was highest with 33.33%, followed by Clupeiformes 9.25%, Siluriformes 7.40%, Beloniformes, Tetraodontiformes, Cypriniformes with 5.55%, Carangiformes, Mugiliformes, Cichiliformes, Scombriformes with 3.70% and Anguilliformes, Anabantiformes, Moroniformes, Acanthuriformes, Elopiformes, Gonorynchiformes, Synbranchiformes, Gobiiformes, Istiophoriformes, Spariformes each with 1.85%. The recorded 38 families, Perciformes was highest with 26.31%, followed by the homogeneous percentage was recorded in Siluriformes and Tetraodontiformes each with 7.89%, Clupeiformes and Beloniformes with 5.26%, Anguilliformes, Anabantiformes, Acanthuriformes, Carangiformes, Elopiformes, Gonorynchiformes, Mugiliformes, Cypriniformes, Synbranchiformes, Cichiliformes, Gobiiformes, Istiophoriformes, Scombriformes and Spariformes each with 2.63% Table 2, Fig. 2, 3 and 4. The similar study was observed by Harati and Rama Rao [15] conducted “a detailed analysis of piscine diversity revealed a total of 97 species of fresh water, estuary and marine fish belonging to 26 orders, 53 families, and 85 genera, collected three landing locations for the first time. In the present investigation, recorded genera out of 85, the homogeneous percentage was observed of Perciformes and Siluriformes had the highest with 11.76%, followed by Acanthuriformes, Cypriniformes”. Abhishek et al., [16] a detailed study “analysed of piscine diversity revealed a total of 63 species of fresh water, estuary andmarine fish belonging to 13 orders and 37 families in Sasihithlu Estuary”. Fullontona et al., [17] recorded “a total of 87fish species belonging to 51 families inside the estuarine part of the Panchupada River during the survey period”. Bassoucalingam et al., [18] identified 36 species, with Actinopterygii dominating in this estuary. Clupeiformes was the highest-ranking of the five orders found at Giriyampeta Estuary. Ghosh et al., [19] constituted the percentage of Perciformes were more than 45% of the total fish species recorded, while the contributions of Cypriniformes,Clupeiformes, Siluriformes and Pleuronectifor in Subarnarekha Estuary. Bijukumar, and Sushama. [20] recorded 112 ichthyofaunal species belonging of 14 orders, 53 families and 80 genera. The estuary characterised by high saline water almost throughout the year was dominated by marine species. The commercial fisheries was supported mainly by marine and estuarine forms. The reported family and genus under order Perciformes of ichthyofaunal diversity is highest taxonomic number and percentages recorded

from the Gosthani estuary. Ramanujam et al., [21] studied ichthyofaunal diversityof the Adyar Wetland complex, Tamil Nadu, southernIndia. Mukherjee et al. [22] a total of 64 fish species belonging to 11 orders, 38 families and 53 genera were iden-tified in estuarine River of Indian Sundarbans.

In the current study ichthyofaunal diversity reported to the habitation locations were observed in marine and brackish water fish species (76.66%), and brackish water and freshwater occupied (55.00%) in the Gosthani estuary Table 3, Fig. 5. The similar study was observed by Harati and Rama Rao (2023) in marine and brackish water, and brackish water and freshwater occupied equal numbers (34.02%) and marine, brackish water, and freshwater (30.92%) it is deviated to present observation. In the present study ichthyofaunal diversity are classified as herbivorous (2.0-2.5), omnivore (2.5-3.5), and carnivorous (3.5-4.5) based on their trophic level. The omnivores have a highest percentage of 33 (55.00%), followed by the carnivorous 23 (38.33%), and the herbivorous 4 (6.66%) Table 3, Fig. 6. A similar study was observed by Harati and Rama Rao [15] reported the highest number of omnivores are 50.51%, followed by the carnivorous 39.17%, and the herbivorous 10.30% at Kalingapatnam estuary. In the current study, the most documented consumption of fish species was commercial (66.6%), followed by minor commercial (28.3%), aquarium and game fish (18.3%), highly commercial (16.6%), public aquarium (8.3%), and bait fish (6.6%) Rama Rao et al., [23] reported the omnivores have a highest percentage of 22 (46.81%), followed by the carnivorous 16 (34.04%), and the herbivorous 09 (19.14%) in Gosthani River. Chicharo et al. [24] investigated the increased salinity in the upper estuary, which allowed marine species to colonize a region that was formerly freshwater, further reducing habitat for indigenous freshwater species in the Guadiana River's downstream basin. During the low-inflow year, planktivorous and omnivorous fish populations decreased while carnivorous fish populations increased.

Fig. 1. Sampling places at Gosthani estuary (17.8961° N, 83.4545° E)

Table 1. Taxa of ichthyofauna at Gosthani estuary

Sl. no	Order/Family	Scientific name	Common name	Habitat	Trophic level	Human usage	IUCN status
1	Anguillidae/ Anguilliformes	*Anguilla bengalensis*	Indian mottled eel	Marine; freshwater; brackish;	3.8 ±0.7	Fisheries: commercial; aquaculture: game fish	NT
2	Anguillidae/ Anguilliformes	*Anguilla bicolor*	Indonesian shortfin eel	Marine; freshwater; brackish	3.6 ±0.50	Fisheries: minor commercial	NT
3	Chanidae/ Anabantiformes	*Channa punctata*	Spotted snakehead	Freshwater; brackish;	3.8 ±0.70	Fisheries: commercial; aquaculture: commercial; aquarium	LC
4	Belonidae /Beloniformes	*Strongylura strongylura*	Spottail needlefish	Marine; Brackish;	4.2 ±0.73	Fisheries: commercial	NE
5	Belonidae/ Beloniformes	*Xenentodon cancila*	Freshwater garfish	Freshwater; Brackish;	3.9 ±0.62	Fisheries: minor commercial; aquarium	LC
6	Drepaneidae/ Moroniformes	*Drepane longimana*	Concertina fish	Marine; Brackish	3.7 ±0.34	Fisheries: minor commercial; aquarium: commercial	NE
7	Hemiramphidae/ Beloniformes	*Hyporhamphus limbatus*	Congaturi halfbeak	Marine; Freshwater; Brackish	3.1 ±0.1	Fisheries: minor commercial	LC
8	Leiognathidae/ Perciformes	*Deveximentum insidiator*	Pugnose ponyfish	Marine; Brackish;	2.8 ±0.27	Fisheries: commercial	NE
9	Leiognathidae/ Perciformes	*Eubleekeria splendens*	Splendid ponyfish	Marine; Brackish	2.9 ±0.38	Fisheries: commercial	LC
10	Leiognathidae/ Perciformes	*Gazza minuta*	Toothpony	Marine; Brackish	4.2 ±0.0	Fisheries: commercial	LC
11	Scatophagidae/ Perciformes	*Scatophagus argus*	Spotted scat	Marine; Freshwater; Brackish	3.0 ±0.35	Fisheries: aquaculture: commercial; aquarium	LC
12	Carangidae/ Carangiformes	*Caranx ignobilis*	Giant trevally	Marine; brackish	4.2 ±0.4	Fisheries: commercial; aquaculture: game fish	LC
13	Carangidae/ Carangiformes	*Trachinotus carolinus*	Florida pompano	Marine; brackish	3.5 ±0.6	Fisheries: highly commercial; aquaculture: game fish:	LC
14	Cichlidae/ Cichliformes	*Oreochromis mossambicus*	Mozambique tilapia	Freshwater; brackish	2.2 ±0.0	Fisheries: highly commercial; aquaculture: game fish:	VU
15	Cichlidae/ Cichliformes	*Etroplus suratensis*	Pearlspot	Freshwater; Brackish	2.9 ±0.26	Fisheries: commercial; aquaculture: aquarium:	LC
16	Dorosomatidae/ Clupeiformes	*Konosirus punctatus*	Dotted gizzard shad	Marine; brackish	2.9 ±0.24	Fisheries: minor commercial	LC

Sl. no	Order/Family	Scientific name	Common name	Habitat	Trophic level	Human usage	IUCN status
17	Dorosomatidae/ Clupeiformes	*Hilsa kelee*	Keele shad	Marine, freshwater, brackish.	2.9 ±0.33	Fisheries: highly commercial; bait:	LC
18	Dorosomatidae/ Clupeiformes	*Sardinella fimbriata*	Fringescale sardinella	Marine, Brackish	2.7 ±0.30	Fisheries: commercial	DD
19	Engraulidae/ Clupeiformes	*Stolephorus indicus*	Indian anchovy	Marine, Brackish	3.6 ±0.0	Fisheries: minor commercial; bait	LC
20	Engraulidae/ Clupeiformes	*Stolephorus commersonnii*	Devis anchovy	Marine, Brackish	3.1 ±0.20	Fisheries: commercial	DD
21	Megalopidae/ Elopiforms	*Megalops cyprinoides*	Indo-pecific tarpon	Marine, Freshwater, Brackish water	3.5 ±0.1	Fisheries: minor commercial; Aquaculture	LC
22	Gobiidae/ Gobiiforms	*Glossogobius giuris*	Tank gobi	Marine, Brackish, Freshwater,	3.7 ±0.2	Fisheries: minor commercial; aquaculture	LC
23	Chanidae/ Gonorynchiformes	*Chanos chanos*	Milk fish	Marine, Brackish Freshwater,	2.4 ±0.20	Fisheries: highly commercial; aquaculture	LC
24	shyraenidae/ Istiophoriforms	*Sphyraena obtusata*	Obtuse barracuda	Marine, Brackish	4.5 ±0.4	Fisheries: commercial; gamefish	NE
25	Mugilidae/ Mugiliforms	*Mugil cephalus*	Grey mullet	Marine ,fresh water, brackish water	2.5 ±0.17	Fisheries: highly commercial; aquaculture	LC
26	Mugilidae/ Mugiliforms	*Planiliza macrolepis*	Large scale mullet	Marine, Brackish, fresh water	2.6 ±0.26	Fisheries: commercial; aquaculture	LC
27	Mullidae/ Perciformes	*Parupeneus indicus*	Indian goat fish	Marine, Brackish.	3.5 ±0.37	Fisheries: commercial; gamefish	LC
28	Ambassidae/ Perciformes	*Ambassis nalua*	Scalloped perchlet	Marine, Brackish, fresh water	3.4 ±0.4	_	LC
29	Ambassidae/ Perciformes	*Parambassis ranga*	Indian glassy fish	fresh water, brackish	3.5 ±0.32	Fisheries: subsistence fisheries; aquarium: commercial	LC
30	Gerreidae/ Perciformes	*Gerres filamentous*	Whip fin silver biddy	Marine, fresh water, brackish	3.3 ±0.2	Fisheries: minor commercial	LC
31	Gerreidae/ Perciformes	*Gerres subfasciatus*	Common silver bell	Marine, Brackish	3.3 ±0.3	Minor commercial	LC
32	Lutjanidae/ Perciformes	*Lutjanus argentimaculatus*	Mangrove red snapper	Marine; freshwater; brackish	3.6 ±0.5	Fisheries: commercial; aquaculture: commercial; game fish	LC
33	Ambassidae/ Perciformes	*Chanda nama*	Elongate glass-perchlet	Freshwater; brackish	3.6 ±0.54	Fisheries: minor commercial; aquarium: public aquariums	LC
34	Latidae/	*Lates calcarifer*	Barramundi	Marine; freshwater; brackish	3.8 ±0.60	Fisheries: highly commercial;	LC

Sl. no	Order/Family	Scientific name	Common name	Habitat	Trophic level	Human usage	IUCN status
	Perciformes					aquaculture: game fish; aquarium	
35	Lutjanidae/ Perciformes	*Lutjanus indicus*	Striped snapper	Marine; freshwater; brackish	3.8 ±0.6	_	NE
36	polynemidae/ Perciformes	*Eleutheronema tetradactylum*	Fourfinger threadfin	Marine; freshwater; brackish	4.1 ±0.5	Fisheries: highly commercial; aquaculture:	NE
37	polynemidae/ Perciformes	*Leptomelanosoma indicus*	Indian threadfin	Marine; brackish	3.9 ±0.67	Fisheries: commercial; game fish	NE
38	Leiognathidae/ Perciformes	*Karalla dussumieri*	Dussumieri ponyfish	Marine, Brackish	3.2 ±0.38	Fisheries: commercial	NE
39	Leiognathidae/ Perciformes	*Leiognathus equulus*	common ponyfish	Marine, Freshwater, Brackish Water	3.0 ±0.40	Fisheries: minor commercial; aquaculture: commercial	LC
40	Leiognathidae/ Perciformes	*Nuchequula nuchalis*	Spotanape ponyfish	Marine, Brackish	3.0 ±0.25	Gamefish: yes	NE
41	Terapontidae/ Perciformes	*Terapon jarbua*	Jarabua terapon	Marine, Freshwater, Brackish Water	3.9 ±0.5	Fisheries: minor commercial; aquaculture:	LC
42	Muliidae/ Perciformes	*Upeneus vitlatus*	yellow stripped goat fish	Marine, Brackish	3.6 ±0.0	Fisheries: minor commercial	LC
43	Sciaenidae/ Perciformes	*Johnius coitor*	coiter crocker	Marine, Brackish, Freshwater	3.4 ±0.4	Fisheries: commercial	LC
44	Trachiuridae/ Scombriformes	*Trichiurus lepturus*	Largehead hairtail	Marine; brackish	4.4 ±0.4	Fisheries: highly commercial; gamefish	LC
45	Ariidae/ siluriformes	*Arius arius*	Threadfin sea catfish	Marine; brackish	3.5 ±0.37	Fisheries: commercial	NE
46	Ariidae/ siluriformes	*Arius maculatus*	Spotted catfish	Marine; freshwater; brackish; demersal;	3.4 ±0.46	Fisheries: commercial	NE
47	Heteropneustidae/Siluriformes	*Heteropneustes fossilis*	signing cat fish	Freshwater, Brackish water	3.6 ±0.3	highly commercial; aquaculture: commercial	LC
48	sparidae/ spariformes	*Acanthopagrus latus*	Yellowfin seabream	Marine; freshwater; brackish	3.8 ±0.43	Aquaculture: commercial	DD
49	Terapontidae/ Tetradontiformes	*Chelonodon patoca*	Milkspotted puffer	Marine; freshwater; brackish	3.1 ±0.40	Fisheries: minor commercial	LC
50	Tetradontidae/ Tetradontiformes	*Leiodon cutcutia*	Ocellated pufferfish	Freshwater; brackish	3.3 ±0.2	Fisheries: of no interest	LC
51	Tricanthidae/ Tetradontiformes	*Triacanthus biaculeatus*	Short-nosed tripodfishTripod fish	Marine, Brackish	2.8 ±0.29	Fisheries: minor commercial	NE

Sl. no	Order/Family	Scientific name	Common name	Habitat	Trophic level	Human usage	IUCN status
52	Sciaenidae/ Acanthuriformes	*Leiostomus xanthurus*	Spot crocker	Marine, Brackish	3.2 ±0.1	Fisheries: commercial; bait: occasionally	LC
53	Cyprinidae/ Cypriniformes	*Cyprinus carpio*	common carp	Freshwater, Brackish	3.1 ±0.0	Fisheries: highly commercial; aquaculture: commercial;	VU
54	Cyprinidae/ Cypriniformes	*Puntius sophore*	pool barb	Freshwater, Brackish	2.6 ±0.1	Aquarium: public aquariums	LC
55	Cyprinidae/ Cypriniformes	*Systomus sarana*	olive barb	Freshwater, Brackish	2.9 ±0.2	Fisheries: commercial; aquarium	LC
56	Trichiuridae/ Scombriformes	*Lepturacanthus savala*	Savalai heirtail	Marine, Brackish	4.3 ±0.76	Fisheries: commercial	NE
57	Aridae/ siluriformes	*Arius jella*	Blockfin sea cat fish	Marine, Brackish	3.5 ±0.37	Fisheries: commercial	NE
58	Bagridae/ siluriformes	*Mystus cavasius*	Gangetic mystus	Freshwater, Brackish	3.4 ±0.4	Fisheries: commercial	LC
59	Dorosomatidae/ Clupeiformes	*Tenualosa ilisha*	Hilsa shad	Marine, Freshwater, Brackish water	2.9 ±0.29	Fisheries: minor commercial; aquaculture: experimental	LC
60	Mastacembelidae/ Synbranchiformes	*Mastacembelus armatus*	Zig-zag eel	Freshwater, Brackish water	2.8 ±0.27	Fisheries: commercial; aquarium	LC

Table 2. Taxa percentage composition of families, genera and species of fishes under various orders

S.No	Orders	% of families in an order	% of genera in an order	% of species in an order
1	Anguilliformes	2.63	1.85	3.33
2	Anabantiformes	2.63	1.85	1.66
3	Beloniformes	5.26	5.55	5.00
4	Moroniformes	2.63	1.85	1.66
5	Perciformes	26.31	33.33	35.00
6	Acanthuriformes	2.63	1.85	1.66
7	Carangiformes	2.63	3.70	3.33
8	Elopiformes	2.63	1.85	1.66
9	Gonorynchiformes	2.63	1.85	1.66
10	Mugiliformes	2.63	3.70	3.33
11	Siluriformes	7.89	7.40	8.33
12	Tetraodontiformes	7.89	5.55	5.00
13	Cypriniformes	2.63	5.55	5.00
14	Synbranchiformes	2.63	1.85	1.66
15	Cichiliformes	2.63	3.70	3.33
6	Clupeiformes	5.26	9.25	10.00
17	Gobiiformes	2.63	1.85	1.66
8	Istiophoriformes	2.63	1.85	1.66
19	Scombriformes	2.63	3.70	3.33
20	Spariformes	2.63	1.85	1.66

Table 3. Trophic levels and habitat of ichthyofaunal species at Gosthani estuary

Trophic level			Habitat	
Herbivorous (2.0–2.5)	Omnivorous (2.6–3.5)	Carnivorous (3.6–4.50	Brackish water & Marine	Brackish water & Freshwater
6.66	55.00	38.33	76.66	55.00

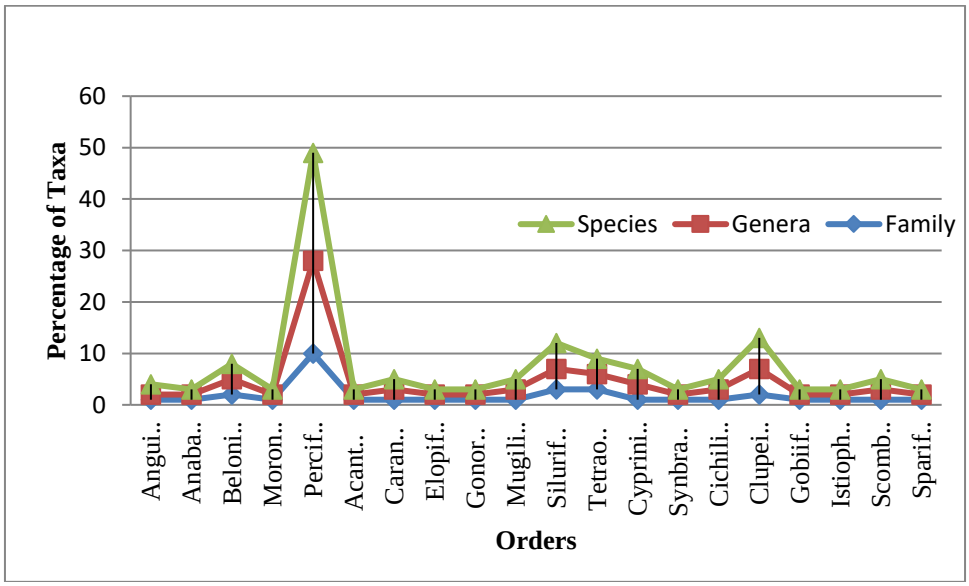

Fig. 2. Taxa of various orders

According to IUCN [14] status in the present investigation, out of 60 species contributed to 65.00% are least concern (LC), followed by 23.33% not evaluated (NE), 5.00% are data deficient (DD), 3.33% are near threaten (NT) and vulnerable (VU) Table 4. Fig 7. Harati and Rama

Rao [15] reported to majority of the species are under Least Concerned species IUCN [14] status the ichthyofaunal diversity were recorded in the current investigation at Kalingapatnam estuary. Abhishek et al. [16] reported 48 species belonged to Least Concern (LC) category, two species be -longed Data Deficient (DD) and 10 species belonged to Not Evaluated (NE) category in Sasihithlu Estuary. Mohanty et al., [25] accounted of faunal characteristics for 129 commercially important species is provided. The checklist also documents 48 threatened species and 103 species under different categories of conservation status in Chilika Lake, Odisha. Fullontona et al. [17] Out of 87 species that are reported to Least Concerned species (37) category, followed by Not Assessed (32).Two species reported here are found to be in Vulnerable, while 04 species be long to Near Threatened category, according to IUCN Red list status at Panchupada estuary, Odisha. The threatened piscine species position were mentioned by Rama Rao [26] Gotta Barrage at Hiramandalam, Rama Rao, and Ramachandra Rao. [27] Narayanapuram Anicut at Nagavali River [28].

Table 4. Percentage composition of IUCN (2024) threatened species status

IUCN (2024)	NT	LC	DD	NE	VU
No. of species	2	39	3	14	2
% contribution	3.33	65.00	5.00	23.33	3.33

Table 5. The percentage composition of fishery usage at various levels

Human usage	commercial	minor commercial	highly commercial	aquarium bait		game fish	public aquarium
% composition	66.6	28.3	16.6	18.3	6.6	18.3	8.3

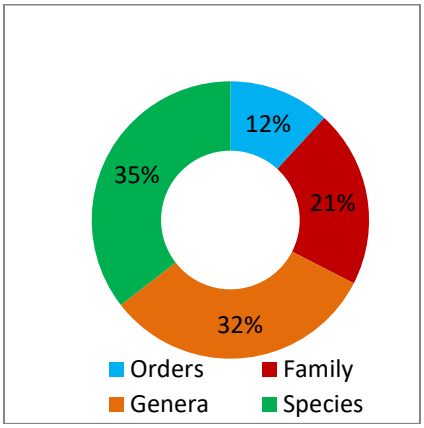

Fig. 3. Taxa composition

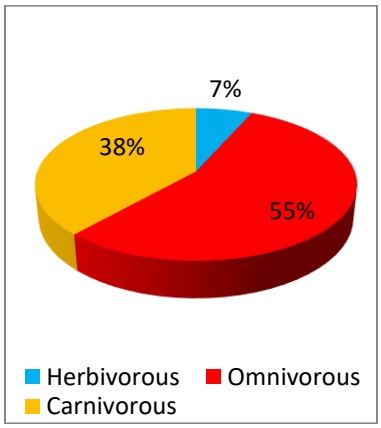

Fig. 4. Trophic levels

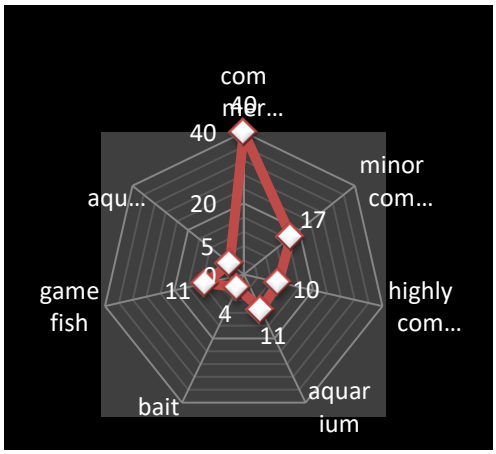

Fig. 5. Fishery usage

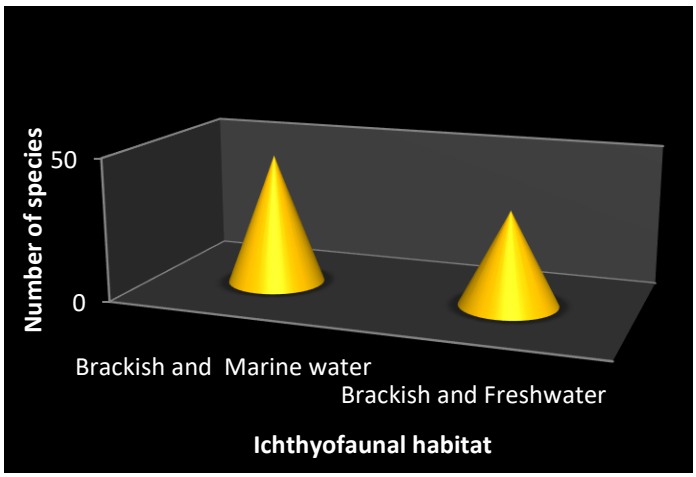

Fig. 6. Habitat

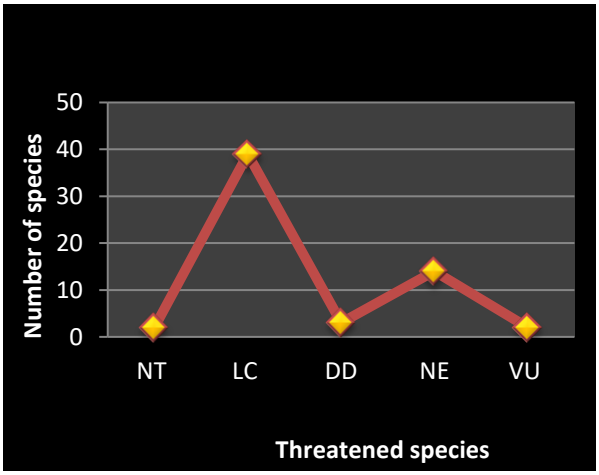

Fig. 7. IUCN status (2024)

4. CONCLUSION

The study thoroughly investigated the entire number of fish that are biologically synonymous with the Gosthani estuary. This report provides firsthand information on ichthyofaunal diversity. The different contributions of dominant species in each habitat resulted in variances in assemblage

structures. The fish assemblage in the freshwater zone was dominated by common freshwater species, whereas marine juveniles were closely linked to the estuarine ecology.

DECLARATION

The methodology was collaboration between both authors, KRR and VH, who contributed to the completion of this work and also carried out the morphometric, meristic, trophic level, and IUCN status analyses of the wild fish. The final manuscript was read and approved by both writers.

ETHICAL APPROVAL

This study was conducted according to international ethical standards set by the Institutional Animal Care and Use Committee.

ACKNOWLEDGEMENTS

The author would like to thank to the Commissioner, Commissionerate of Collegiate Education, Andhra Pradesh, Dean, Andhra University, TDR-HUB and Principal Dr. I. Vijaya Babu, Dr. V. S. Krishna Govt. Degree college, Visakhapatnam for providing necessary facilities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://prh.mbimph.com/review-history/3517