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Fish Diversity and Physico-chemical Characteristics of Rivers of Ganjam district, Odisha

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ABSTRACT: A systematic checklist of fishes of Ganjam district of Odisha, India was provided. A total of 97 species of fishes under 58 genera, 31 families and 9 orders has been recorded. Highest species diversity was observed in the Cyprinidae (36%) followed by Bagridae (9.2%). The fish fauna includes 2 Endangered (EN), 1 vulnerable (VU), 7 near threatened (NT), 60 least concern (LC), 2 data deficient (DD) and 25 not assessed as per IUCN. The fish fauna is a composite of primary freshwater fishes, estuarine fishes and widely distributed forms. The present finding indicates that Ganjam district is blessed with diverse fish fauna including numerous economically important food fishes and ornamental fishes. The water quality of the rivers and streams of the district are not contaminated as the value of pH and DO are within the tolerance limit of class 'D'. The water quality of the river is considered suitable for fish culture and wildlife propagation.

Key Words: Fish diversity, Physico-chemical characteristics, Ganjam, Odisha.

INTRODUCTION

The Ganjam, one of the coastal district of Odisha. It is situated within the latitude 19° 0' to 20° 17' N and longitude 84° 9" to 85° 11" E. Area of Ganjam district is longitude 8,706 $(km)^2$. (Map-1). Total rain fall is 1542.6mm (avg) and elevation from the sea levels is 5 to 159m. The Rushikulya is the major River passes through the district. A number of deltaic rivers viz. Nagabali, Indrabati, Saberi, Mahendratanaya, Bahuda, Hati, Tel nadi, pass through and around the District. Some of the dams like Harabhangi, Baghalati, Bhalughai, Maharani sagar, Soroda, Dhanei, Gania nala and Jharanei dam are present in this district.

The first ever study on fishes of Odisha was put forth by Day (1869) which included both marine and fresh water fishes. Later, the rich and varied fish fauna of Chilika lake comprising fresh, brackish and marine element has been studied mainly by Chaudury (1916a,1916b,1917,1923), Hora (1923), Menon (1961), Rao (1995). Venkateswarlu *et al*. (1998) studied the fishes of the Mahanadi estuary. Fish fauna of similipal biosphere reserve was studied by Ramakrishna *et al.*, (2006). However, no detail investigation has been so far taken up on the fresh water fish diversity of Ganjam district of Odisha.

In the present study an attempt has been made to study diversity and ecology of fish fauna of the district.

MATERIALS AND METHODS

Fishes and water samples were collected from 6 stations namely Ganjam, Taptapani, Gazalabarhi, Aska, Tumbagard, Soroda dam during 2008-2009 (Fig. 1). Fishes were preserved in 10% formalin and identified following Jayaram (1999), Talwar and Jingran (1991) and by consulting relevant literatures. The families have been arranged phylogenetically and species under a genus followed alphabetic sequence.

The correct scientific name with local name, abundance and conservation status based on IUCN (2010) are shown against each species.

The Physico-chemical parameters were analyzed following standard methods of APHA(1989) and Trivedy and Goel (1986). The average of four samples for each parameters studied was considered as one reading. The water temperature, dissolved oxygen, pH, were determined in the field and inorganic Phosphorus, was analyzed in the research laboratory of Central Institute of Freshwater Aquaculture, Bhubaneswar within 48 hours of collection.

Fig. 1. Drainage map of ganjam district of Odisha showing collection sites.

RESULTS AND DISCUSSIONS

A list of the fish fauna of the Ganjam district of Odisha recorded during the present survey is represented in Table 1. A total of 97 species of fish belonging to 58 genera and 31 families were identified. Highest diversity was observed in Cypriniformes (44 species, 20 genus and 4 families), followed by Perciformes (23 species, 16 genus and 13 families), Siluriformes (22 species, 14 genus and 8 families), Beloniformes, Osteoglossiformes (2 species, 2 genera and 1 family) Synbranchiformes, Syprinidontiformes, Pluronectiformes and Clupeiformes (1 species, 1 genus and 1 families, (Fig. 2). Out of the 97 species 21 species namely *Notopterus notopterus, Chitala chitala, Gudusia chapra, Cirrhinus reba, Labeo bata, Labeo calbasu, Labeo dero, Labeo rohita, Osteobrama vigorsii, Sperata aor, Sperata seenghala, Rita rita, Wallago attu, Pangassius pangassius, Bagarius bagarius, Clarias batrachus, Heteropneustes fossilis, Anabas testudineus, Etroplus suratensis, Liza tade and Channa striata*, are identified as commercially important food fishes which potential of culturing within the rivers. In the same time 23 species namely *Barilius barna, Barilius bendelisis, Barilius vagra, Danio rerio, Danio dangila, Esomus danricus, Garra gotyla, Garra mullya, Puntius ticto, Puntius sophore, Rasbora daniconius, Acanthocobitis botia, Schistura dayi, Lepidocephalichythyes guntia, Chaca chaca, Apolocheilus panchax, Chanda nama, Terapon jarbua, Badis badis, Etroplus suratensis, Scatophagus argus, Nandus nandus, Trichogaster fasciata* are identified as ornamental fishes. As per IUCN (2010) the fish fauna of the study area includes 2 Endangered, 1 Vulnerable, 7 near threatened, 60 Least concern, 2 Data Deficient and 25 not assessed (Fig. 3).

Table 1: A checklist of fishes known from the Ganjam district of Odisha with their local name and IUCN status. LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered; DD = Data Deficient, NA = Not assessed.

Scientific Name	**Local name**	**IUCN Status**	**Remarks**
Order: Osteoglossiformes , Family: **Notopteridae**			
1. *Notopterus notopterus* (Pallas)	Flai	LC	**Rare**
2. *Chitala chitala* (Hamilton)	Chitala	NT	**Rare**
Order: Clupeiformes, Family: **Clupeidae**			
3. *Gudusia chapra* (Hamilton)	Patara	LC	**Abundant**
Order : Cypriniformes, Family : **Cyprinidae**			
4. *Amblypharyngodon mola* (Hamilton)	Pathari	LC	**Abundant**
5. *Barilius barna* (Hamilton)	Bahari	LC	**Abundant**
6. *Barilius bendelisis* (Hamilton)	Bahari	LC	**Abundant**
7. *Barilius vagra* (Hamilton)	Jhalli	LC	**Abundant**
8. *Chela fasciata* Silas	Jaradi	VU	**Rare**
9. *Danio dangila* (Hamilton)	Bankuaso	LC	**Abundant**
10. *Danio rerio* (Hamilton)	Dumala	LC	**Abundant**
11. *Cirhinus fulungee* (Sykes)	Pohala	LC	**Abundant**
12. *Cirrhinus reba* (Hamilton)	Pohala	LC	**Abundant**
13. *Crossocheilus latius* (Hamilton)	Mirkha	LC	**Abundant**
14. *Devario aequipinnatus* (McClelland)	Hubaland	LC	**Rare**
15. *Esomus danricus* (Hamilton)	Kulia	LC	**Rare**
16. *Garra gotyla* (Gray)	Patharachata	LC	**Abundant**
17. *Garra mullya* (Sykes)	Patharachata	LC	**Abundant**
18. *Garra*	-	NA	-
19. *Labeo bata* (Hamilton)	Pohala	LC	**Rare**
20. *Labeo boga* (Hamilton)	Pohala	LC	**Abundant**
21. *Labeo calbasu* (Hamilton)	Kalabanisi	LC	**Most abundant**
22. *Labeo dero* (Hamilton)	Laya	LC	**Abundant**
23. *Labeo fambriatus* (Bloch)	Pedusi	NA	**Abundant**
24. *Labeo rohita* (Hamilton)	Rohi	LC	**Abundant**
25. *Osteobrama vigorsii* (Sykes)	Chilanti	LC	**Abundant**
26. *Parluciosoma daniconius* (Hamilton)	Jodda	NA	**Rare**
27. *Puntius conchonius* (Hamilton)	Karandi	LC	**Abundant**
28. *Puntius punctatus* (Hamilton)	Kuji karandi	LC	**Abundant**
29. *Puntius sarana* (Hamilton)	Sarana	LC	**Rare**
30. *Puntius sophore* (Hamilton)	Sema	LC	**Abundant**
31. *Puntius ticto* (Hamilton)	PatiaKerandi	LC	**Most abundant**
32. *Puntius* sp	-	NA	-
33. *Rasbora daniconius* (Hamilton)	Kerandi	LC	**Most abundant**
34. *Salmostoma orissaensis* Banaresscu	Baunsa patri	NA	**abundant**
35. *Salmostoma bacaila* (Hamilton)	Baunsa patri	LC	**Abundant**
36. *Tor khudree* (Sykes)	Khusra	EN	**Rare**
37. *Tor putitora* (Hamilton)	Mahaseer	EN	**Rare**
38. *Tor tor* (Hamilton)	Mahaseer	N T	**Rare**
Family: **Parapsilorhynchidae**	-		-
39. *Parapsilorhynchus sp.1*	Balichara	NA	**Rare**
40. *Parapsilorhynchus sp.2*		NA	
41. *Parapsilorhynchus sp.3*		NA	
Family: **Balitoridae**			
42. *Acanthocobitis botia* (Hamilton)	Gentu	LC	**Abundant**
43. *Schistura dayi* (Hora)	Bali gentu	NA	**Rare**

44. *Schistura denisony danisony* Day	Bali gentu	NA	**Rare**
45. *Schistura sp.*		NA	
Family: **Cobitidae**			
46. *Lepidocephalichthys guntea* (Hamilton)	Jimani	LC	**Most abundant**
47. *Lepidocephalichthys thermalis* (Valenciennes)	Bali jimani	LC	**Rare**
Order: Siluriformes, Family: **Bagridae**			
48. *Sperata aor* (Hamilton)	Singla	LC	**Rare**
49. *S. seenghala* (Sykes)	Singhi	LC	**Rare**
50. *Mystus bleekeri* (Day)	Kujikantia	LC	**Rare**
51. *M. cavasius* (Hamilton)	Baikantia	LC	**Abundant**
52. *M. gulio* (Hamilton)	Kantia	LC	**Rare**
53. *M. menoda* (Hamilton)	Kantia	LC	**Rare**
54. *M. vittatus* (Bloch)	Guggah	NA	**Rare**
55. *Rita chrysea* Day	Rita	NA	**Abundant**
56. *Rita rita* (Hamilton)	Rita macha	LC	**Abundant**
Family: **Siluridae**			
57. *Ompok bimaculatus* (Bloch)	Pabda	NT	**Rare**
58. *Ompok pabo* (Hamilton)	Pabda	NT	**Rare**
59. *Wallago attu* (Schneider)	Balhia	NT	**Rare**
Family: **Schilbeidae**			
60. *Alia coila* (Hamilton)	Putuli	NT	**Abundant**
61. *Clupisoma garua* (Hamilton)	Gujri	LC	**Rare**
62. *Eutropiichthys murius* (Hamilton)	Mur	LC	**Abundant**
63. *Eutropiichthys vacha* (Hamilton)	Muribacha	LC	**Rare**
64. *Psendeutroplus atherinoides* (Bloch)	Bopatasi	NA	**Abundant**
Family: **Pangasiidae**			
65. Pangassius pangassius (Hamilton)	Pangas	LC	**Abundant**
Family: **Sisoridae**			
66. *Bagarius bagarius* (Hamilton)	Buthia	NT	**Rare**
Family: **Claridae**			
67. *Clarias batrachus* (Linnaeus)	Magur	LC	**Rare**
Family: **Heteropneustidae**			
68. *Heteropneustes fossilis* (Bloch)	Singi	LC	**Rare**
Family: **Chacidae**			
69. *Chaca chaca* (Hamilton)	Chaka	LC	**Abundant**
Order: Beloniformes, Family :**Belonidae**			
70. *Strongylura strongylura* (van Hasselt)	Gania	NA	**Rare**
71. *Xenentodon cancila* (Hamilton)	Bagania	LC	**Rare**
Order: Cyprinidontiformes, Family: **Aplocheilidae**			
72. *Apolocheilus panchax* Hamilton	dandikiri	LC	**Abundant**
Order: Synbranchiformes, Family: **Synbranchidae**	-		
73. *Monopterus cuchia* (Hamilton)	cuchia	LC	**Rare**
Order: Perciformes, Family: **Ambassidae**			
74. *Ambassis gymnocephalus* (Lacepede)	chandu	NA	**Abundant**
75. *Chanda nama* Hamilton	guachopi	LC	**Abundant**
Family :**Teraponidae**			
76. *Terapon jarbua* (Forsskal)	kunkuni	NA	**Abundant**
Family*:* **Haemulidae**			
77. *Pomadasys argenteus* (Valenciennes)	Geminidi	NA	**Abundant**
Family: **Scatophagidae**			
78. *Scatophagus argus* (Linnaeus)	Kalileep	NA	**Rare**
Family :**Nandidae**			
79. *Nandus nandus* (Hamilton)	Khasia	LC	**Rare**
Family: **Badidae**			

80. *Badis badis* (Hamilton)	kalamacha	LC	**Abundant**
Family*:* **Cichlidae**			
81. *Etroplus suratensis* (Bloch)	Kundala	NA	**Rare**
Family: **Mugilidae**			
82. *Liza tade* (Forsskal)	Megi	NA	**Abundant**
Family: **Gobiidae**			
83. *Brachygobius nunus* (Hamilton)	Balichira	NA	**Abundant**
84. *Glossogobius biocellatus* (Valenciennes)	Baligarada	NA	**Rare**
85. *Glossogobius giuris* (Hamilton)	Baligarada	LC	**Abundant**
Family: **Anabantidae**			
86. *Anabas cobojius* (Hamilton)	Kau	DD	**Rare**
87. *Anabas testudineus* (Bloch)	Rajakau	DD	**Rare**
Family: **Belontiidae**			
88. *Trichogaster fasciata* Bloch & Schneider	Khasua	LC	**Abundant**
89. *Trichogaster lalius* (Hamilton)	Khasua	LC	**Rare**
Family: **Channidae**			
90. *Channa marulius* (Hamilton)	Chenga	LC	**Abundant**
91. *Channa punctata* (Bloch)	Sahala	LC	**Rare**
92. *Channa striata* (Bloch)	Gadisa	LC	**Rare**
93. *Channa* sp		NA	
Family: **Mastacembelidae**			
94. *Macrognathus aculeatus* (Bloch)	Balitodi	NA	**Rare**
95. *Mastacembelus pancalus* (Hamilton)	Todi	LC	**Rare**
96. *Mastacembelus armatus* (Lacepede)	Gomitodi	LC	**Rare**
Order: Pleuronectiformes,Family: **Cynoglossidae**			
97. *Cyanoglossus puncticeps* (Richardson)	Patamacha	LC	**Rare**

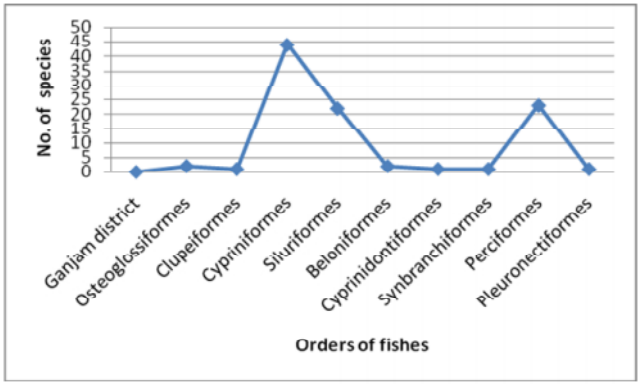

Fig. 2. Graph showing number of fish species belongs to different order in Ganjam district, odisha

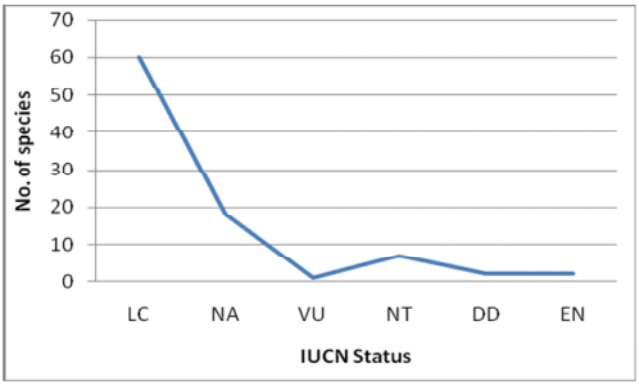

Fig. 3. IUCN Status of fish species in Ganjam district, Odisha.

Ganjam is a coastal district, therefore harbours the brakish water species like, *Scatophagus argus, Terapon Jabua, Strongylura storgylura, Cyanoglossus puncticeps, Rita chrysea.* These fishes are abundantly found in Rambha, Humma and near chilika base. Interestingly, hill stream forms like *Acanthocobitis botia, Barilius vagra, Crossocheilus latius, Garra mullya, Schistura* spp. and Parapsilorhynchua spp. etc. were also recorded from Taptapani, Soroda, and Tumba gard of the study area. Interestingly, *Brachygobius nunus* which is known from brackish water habitat in nature, (Talwar and Jingran 1991), is reported from soroda dam, which is purely fresh water in nature and far away from coastal area. Therefore, fish fauna of the district is a mixture of primary freshwater, estuarine and widely distributed forms.

The water bodies of Ganjam district of Odisha are within the tolerance limits of class 'D' water prescribed by the ISI (1982) for fish culture and wild life propagation. The surface water temperature ranged from 20.4° to 36.0°C with an average value of 28.0°C. The pH value ranged from 7.0 to 7.9 with an average of 7.3. High concentration of dissolved oxygen was observed throughout the study period which ranged from 4.0 to 8.5 mg/l with an average value of 6.4 mg/l, which is within the permissible limit of ISI (1982). However, level of CO_2 was slightly high which ranged from 3.0 to 24.0 mg/l with an average value of 12.2 mg/l. Dissolved inorganic phosphorus varied from 0 to 0.09 mg/l. with an average value of 0.017 mg/l. The eutrophic nature the water bodies may be attributed to inflow of fertilizers from the surrounding agricultural fields and human interferences.

The present finding indicates that Ganjam district is blessed with diverse fish fauna including numerous economically important food fishes. The water quality of the rivers and streams of the district are not contaminated as the value of pH and DO are within the tolerance limit of class 'D' water prescribed for fish culture and wild life propagation. Therefore, attempts may be made to introduce *in situ* fish cultivation techniques for sustainable management of fish resources of the district.

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