Journal of Fisheries
Volume 6 Issue 1 Pages 587–598 April 2018
Peer Reviewed | Open Access | Online First

eISSN 2311-3111
pISSN 2311-729X

DOI: https://doi.org/10.17017/j.fish.27

Review

Freshwater fishes of Orissa, India

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Manuscript history
Received 14 March 2017 | Revised 20 February 2018 | Accepted 27 February 2018 | Published online 24 March 2018

Citation
Mogalekar HS and Canciyal J (2018) Freshwater fishes of Orissa, India. Journal of Fisheries 6(1): 587–598. DOI: https://doi.org/10.17017/j.fish.27

Abstract

Varied freshwater resources of Orissa blessed with diverse fish fauna. In total, 186 species of fishes belonging to 11 orders, 33 families and 96 genera were recorded from various freshwater bodies of Orissa. Cypriniformes was the most dominant order and Cyprinidae was diverse family. The trophic level of fishes of Orissa ranged from 2.0 to 4.5 containing 62.41% of carnivorous species. Fishery status revealed existence of 120 species worth for capture fishery, 101 species worth for ornamental fishery, 37 species worth for culture fishery and 25 species worth for sport fishery. Threat status comprises of one Critically Endangered species, five Endangered species, three Vulnerable species and remaining 177 species were Not Threatened. The findings of present communication may serve as baseline information for planning, conservation and management of fish and fisheries resources of Orissa.

Keywords: Freshwater fishes; trophic level; fishery and conservation; Orissa

1 | INTRODUCTION

The freshwater fish fauna of India is highly diverse in nature and constituting 1027 species (Gopi *et al.* 2017). Orissa constitute about 13.92% to the freshwater fish fauna of India (Dutta *et al.* 1993). The terrain of Orissa is important from a fisheries point of view (Dutta *et al.* 1993; Pathak *et al.* 2007), as it consecrated with a 525248 ha of freshwater resources (Panigrahy *et al.* 2011) useful for capture or culture fisheries (Dutta *et al.* 1993). The major wetland types are reservoir or barrages (189972 ha), tank or ponds (29301 ha), 2582 km rivers or streams (223522 ha; *viz*, Mahanadi, Brahmani, Baitarani, Rushikulya, Vansadhara, Nagavali, Kolab, Indravati, Bahuda, Subarnarekha and Burhabaianga), waterlogged (natural; 13859 ha), riverine wetland (980 ha), oxbow lakes or cut-off meander (728 ha), lakes or ponds (712 ha), wetlands (<2.25 ha in size; 66174 ha) (Panigrahy *et al.* 2011). The faunal compositions of freshwater fishes are strongly dependent on not only on habitats but also on many other factors (e.g. fishing pressure, pollution and habitat degradation etc.) affecting the habitats as well as aquatic biodiversity (Chaki *et al.* 2014; *Galib et al.* 2016a; Parvez *et al.* 2017) and associated stakeholders (e.g. fishermen, fish sellers and consumers; Flowra *et al.* 2009; Samad *et al.* 2010; Islam *et al.* 2013; Galib *et al.* 2016b). In recent years, a considerable portion of total freshwater fish species are facing threat to extinction over the world including South Asian countries (e.g. Galib *et al.* 2010, 2013, 2018; Mohsin *et al.* 2014; Joadder *et al.* 2015; Gopi *et al.* 2017). Henceforth, it is essential to detect the key drivers for aquatic biodiversity loss and to develop a sustainable management technique for both the biota and their habitat (Mohsin *et al.* 2013; Galib 2015).

Day (1878) was the first to describe 89 species of fishes from Orissa state in his famous book 'Fishes of India'. Subsequently, freshwater fishes of India have been studied and described by many others that also include fish species from Odisha. However, the studies on freshwater fishes of Orissa are less and scattered in published literature and so far the only attempt that has been made to document the freshwater fishes of Odisha at one place is by Dutta *et al.* (1993). But complete baseline information of essential to develop appropriate management policies and its implements (Imteazzaman and Galib 2013). In this paper information on freshwater fish fauna occurring at different freshwater habitats in various localities of Orissa has been illustrated in detail based on the available literature.

2 | METHODOLOGY

The updated checklist of freshwater fishes from different localities of Orissa was prepared by compiling, reviewing and analyzing the available literature (Table 1, Figure 1). The relevant literature were collected by both online and offline searching. During online searching different databases (e.g. Google Scholar, Web of Science, Scopus etc.) were considered using different key words like 'freshwater fish fauna of Orissa', 'freshwater fish diversity of Orissa', 'fish diversity of rivers of Orissa', 'fish diversity of reservoirs of Orissa', 'fish fauna of ponds and tanks of Orissa'. Offline search include offline journals, textbooks, reports and gray literature those are not available online.

TABLE 1 Reports on Freshwater fishes of Orissa

Source	*Habitats, collecting stations and locality of Fishes*	*No. of Species*
Chauhan (1947)	Former Ptana state (Jhitri Bundh, Dhubel Bundh, Baijal Sagar, Purni bundh, Ang River, Ckandi Sagar, Naya bundh, Jubilee tank, Gait sarobar, Maharani Sagar, Talpali Katha, Dhamna Sagar, Nimuhi Tank, Patnagarh, Suktel River at Harishanker and Chandanbhati, Budhai Bundh at Jarasingha, De Sar reservoir of the Sungad River near Salepali village, River Tel near Belgaon, Titilagarh and Maharaj Sagar)	58
Jayaram and Majumdar (1976)	Anicut on the Mahanadi, Cuttack; Mahanadi River near Narsinghpur & Sambalpur near Kamli Bazar; Rajsagar Tank, near the market and bus stand, Sambalpur; Pension Para Tank near Circuit House, Salnbalpur; Mahanadi River below and above the Hirakud Dam	42
Dutta *et al.* (1993)	Fishes collected from various localities like Sonepur, Balangir, Cuttack, Paradwip, Nandankanan, Banki, Baghmunda, Tikarapara, Rambha, Berbampur, Bhabanipatna, Madanpur, Rampur, Kesinga, Anandpur, Nowrangpur, Koraput, Jeypore, Pappadahandi, Baripada, Lagung, Puri, Balugaon, Barang, Sambalpur, Suguda, Barkot, Deogarh, Sundargarh, Rourkela, Bonaigarh, Banki, Panposh and Kotagarh	139
Ramakrishna *et al.* (2006)	Freshwater bodies from Similipal Biosphere Reserve, Mayurbhanj district	37
Pathak *et al.* (2007)	River Mahanadi	112
Karmakar *et al.* (2008)	Subamarekha River in Mayurbhanj and Baleswar districts	13
Das (2008)	Ansupa Lake in Cuttack district	23
Baliarsingh *et al.* (2013)	Freshwater bodies from Similipal Biosphere Reserve, Mayurbhanj district	55
Mishra *et al.* (2013)	Baitarani River at Jaipur district	25
Singh *et al.* (2013)	River Mahanadi	96
Behera and Nayak (2014)	Chilika lake in Puri, Khurda and Ganjam districts	14
Satapathy and Misra (2014)	River Pilasalunki at Phulbani district	23
Singh (2014)	River Mahanadi: Hirakud Reservoir, Satakosia, Kantilo, Banki	56
Dandapat (2015)	Samuka River near Sahada Village in Balasore district	10
Mohanty *et al.* (2015)	Chilika lake in Puri, Khurda and Ganjam districts	71
Sarkar *et al.* (2015)	Ansupa Lake in Cuttack district	28
Das *et al.* (2016)	River Brahmani: Vedvyas, Panposh, Timjor, Darjing, Bonaigarh, Bijigol, Sirigida, Kamalanga, Marjidapur, Jenapur, Alapua	57
Samal *et al.* (2016)	Budhabalanga River near Budhabalanga village of Mayurbhanj district	43

Relevant information like habitat, trophic level, maximum size and fishery information of all the fish species were obtained from Fishbase (Froese and Pauly 2013). Classification of all taxa follows Talwar and Jhingran (1991), Jayaram (2010) and Fishbase (Froese and Pauly 2013) and the valid nomenclature of species was adopted as per the Catalogue of Fishes of the California Academy of Sciences (Eschmeyer *et al.* 2017). Orders of fish species in checklist were treated in an alphabetical sequence and within families, genera and species are treated in an alphabetical sequence. The list of cultivable fishes was prepared based on trophic level, growth rate and maximum size of the

species. The list of ornamental fishes was prepared based on coloration pattern, shape and maximum size. Information on the conservation status was retrieved from the International Union for Conservation of Nature and Natural Resources (IUCN) Red List Categories and criteria (IUCN 2018).

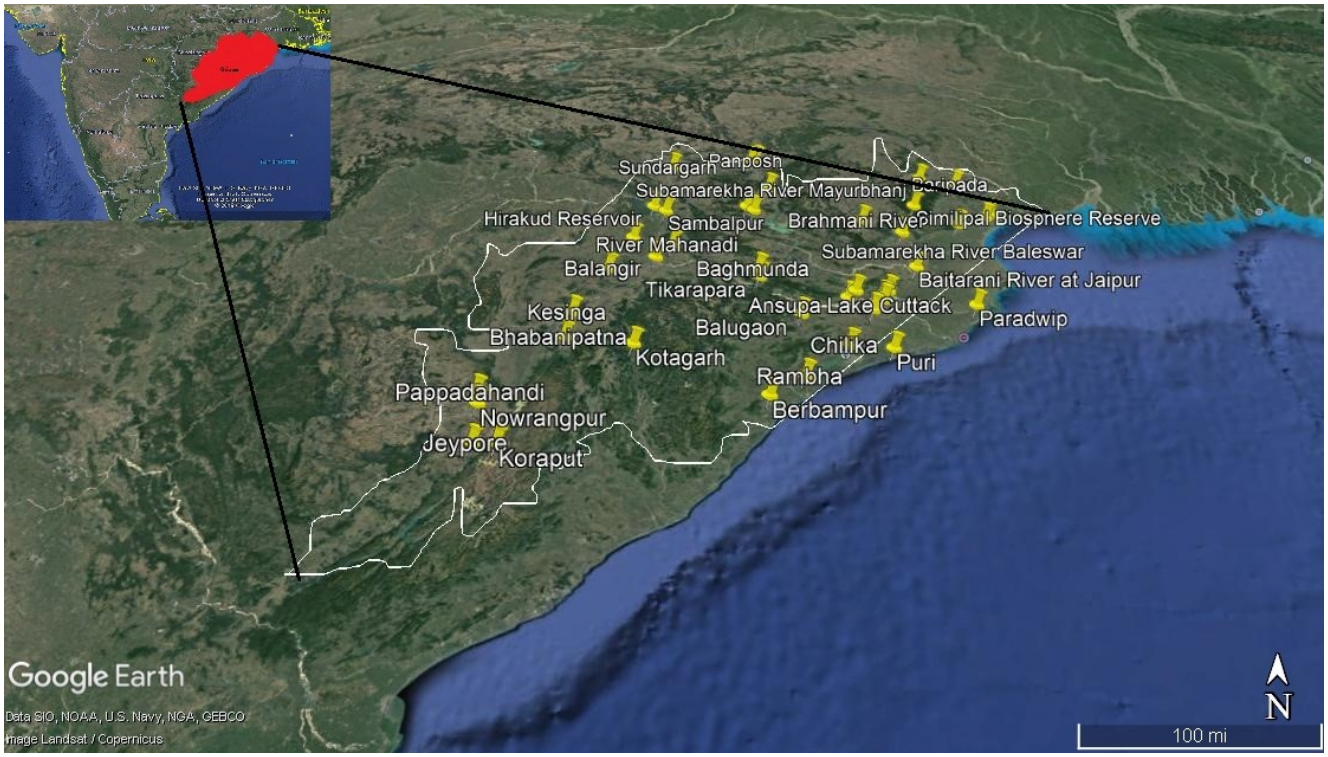

FIGURE 1 Reported locality of freshwater bodies in Orissa, India (map source: Google Earth)

3 | RESULT AND DISCUSSION

The classification of the freshwater fishes of Odisha along with their habitat, trophic level, maximum size, fishery information, IUCN conservation status and references for the reported locality of fish species has been illustrated in Table 2. The checklist consists of 186 species of freshwater fishes belonging to 11 orders, 33 families and 96 genera from various freshwater bodies of Orissa (Table 3).

In total, 105 fish species were primary freshwater and remaining 81 species were diadromus (Table 2). Cypriniformes was the most dominant order represented by three families, 37 genera and 95 species followed by Siluriformes (ten families, 25 genera and 41 species) and Perciformes (eight families, 15 genera and 25 species). Cyprinidae was diverse family represented by 84 species and 33 genera followed by Bagridae (12 species and five genera), Sisoridae (eight species and five genera) and Ailiidae (seven species and five genera) (Table 3). Out of 186 fishes, *Ctenopharyngodon idella*, *Cyprinus carpio*, *Hypophthalmichthys molitrix*, *Oreochromis mossambicus*, *Oreochromis niloticus* and *Clarias gariepinus* were non-native to India. The negative impact of non-native fishes on native fish fauna of Orissa has not yet been reported.

The consolidation of available data on the trophic level of freshwater fishes of Odisha ranged from 2 (Cyprinids) to 4.5 (*Channa marulius*). Data on the trophic level indicated that nearly 62.41% of the freshwater fishes of Odisha are mid or high level carnivores (trophic level ranging from 3.01 to 4) and two species are top predators (trophic level >4) (Table 2).

Fishery status of freshwater fish fauna of Odisha revealed existence of 120 species worth for capture (food) fishery, followed by ornamental fishery (101 spp.), aquaculture (37 spp.) and sport (25 spp.; Table 2). A considerable number of threatened species of the freshwater fishes was found in Odisha that comprises of *Hypselobarbus pulchellus* (Critically Endangered; facing an extremely high risk of extinction in the wild), *Hypselobarbus mussullah*, *Tor khudree*, *T. putitora*, *Schistura striata* and *Clarias magur* (Endangered; facing a very high risk of extinction in the wild), *Hypselobarbus kolus*, *Laubuka fasciata* and *Cyprinus carpio* (Vulnerable; facing a high risk of extinction in the wild) and 16 Near Threatened species (IUCN 2018; Table 2). However, conservation status of 13 species has not yet been evaluated against the criteria (Table 2).

TABLE 2 Freshwater fishes of Orissa with note on habitat, trophic level, maximum size, fishery information, conservation status and references for reported locality.

Taxa	*Habitat*[a]	*Trophic Level (SE)*[b]	*Max size (TL, cm)*[c]	*Fishery info*[d]	*IUCN Status*[e]	*Ref.*
Kingdom: Animalia						
Phylum: Chordata						
Class: Actinopterygii						
Order: Anguilliformes						
Family: Anguillidae						
Anguilla bengalensis (Gray, 1831)	B, F, M	3.8 ± 0.7	200	C, S	NT	1–3
Anguilla bicolor McClelland, 1844	B, F, M	3.6 ± 0.5	123	C	NT	2
Order: Beloniformes						
Family: Adrianichthydae						
Oryzias dancena (Hamilton, 1822)	B, F	3.3 ± 0.4	3.1 (SL)	O	LC	2
Oryzias melastigma (McClelland, 1839)	B, F	3.3 ± 0.4	4	O	LC	4
Family: Belonidae						
Strongylura strongylura (van Hasselt, 1823)	B, F, M	4.2 ± 0.73	40 (SL)	C, O	NE	4
Xenentodon cancila (Hamilton, 1822)	B, F, M	3.9 ± 0.62	40	C, O	LC	1–2, 4–11
Family: Hemiramphidae						
Hyporhamphus limbatus (Valenciennes, 1847)	B, F, M	3.1 ± 0.1	35	C	LC	2
Order: Clupeiformes						
Family: Clupeidae						
Gonialosa manmina (Hamilton, 1822)	B, F	3.1 ± 0.3	14.1	C	LC	1–2, 4–6, 8, 10
Gudusia chapra (Hamilton, 1822)	B, F	3.1 ± 0.3	20	C	LC	1–5, 8–10, 12
Tenualosa ilisha (Hamilton, 1822)	B, F, M	2.9 ± 0.29	60	C	LC	13
Family: Engraulidae						
Setipinna phasa (Hamilton, 1822)	B, F	3.3 ± 0.39	40	C	LC	4
Setipinna taty (Valenciennes, 1848)	B, F, M	3.2 ± 0.40	15.3	C	NE	4
Order: Cypriniformes						
Family: Cobitidae						
Lepidocephalichthys guntea (Hamilton, 1822)	B, F	2.7 ± 0.2	15	O	LC	1–2, 4–10, 14
Lepidocephalichthys thermalis (Valenciennes, 1846)	F	2.9 ± 0.4	38 (SL)	O	LC	4, 7, 14
Family: Cyprinidae						
Amblypharyngodon mola (Hamilton, 1822)	F	3.3 ± 0.4	20	O	LC	1–13, 15,17
Amblypharyngodon microlepis (Bleeker, 1853)	F	3.2 ± 0.4	10	O	LC	4
Bangana ariza (Hamilton, 1807)	F	2.7 ± 0.25	30 (SL)	C	LC	1–2, 4, 5
Bangana dero (Hamilton, 1822)	F	2	75	C	LC	1, 4
Barilius barila (Hamilton, 1822)	F	3.2 ± 0.4	10	O	LC	1, 4–5, 8, 10,16
Barilius barna (Hamilton, 1822)	F	3.4 ± 0.65	15	C	LC	1, 4, 6, 8, 10, 16
Barilius bendelisis (Hamilton, 1807)	F	3.3 ± 0.4	22.7	C	LC	1, 4–6, 8
Barilius shacra (Hamilton, 1822)	F	3.2 ± 0.4	14	C	LC	4
Barilius vagra (Hamilton, 1822)	F	3.2 ± 0.4	12.8	O	LC	1, 4–8, 11
Bengala elanga (Hamilton 1822)	F	3.2 ± 0.4	21	O	LC	4
Cabdio morar (Hamilton, 1822)	F	3.3 ± 0.4	20	O	LC	1, 4, 5, 6, 8, 10, 16,
Catla catla (Hamilton, 1822)	B, F	2.8 ± 0.22	182	C, Cu, S	LC	1–4, 6–11, 13–14, 17
Chagunius chagunio (Hamilton, 1822)	F	2.7 ± 0.3	50	C, S	LC	4
Chela cachius (Hamilton, 1822)	B, F	3.1 ± 0.4	6	O	LC	1–2, 4, 18
Cirrhinus fulungee (Sykes, 1839)	F	2.4 ± 0.2	30 (SL)	C	LC	4, 7

(Continues)

TABLE 2 (Continued)

Taxa	*Habitat*[a]	*Trophic Level (SE)*[b]	*Max size (TL, cm)*[c]	*Fishery info*[d]	*IUCN Status*[e]	*Ref.*
Cirrhinus mrigala (Hamilton, 1822)	F	2.2 ± 0.2	99	C, Cu, S	LC	1–4, 7–11, 13–14, 17
Cirrhinus reba (Hamilton, 1822)	F	2.4 ± 0.2	30	C, Cu	LC	1–2, 4–5, 8–10, 12–13, 16
Crossocheilus latius (Hamilton, 1822)	B, F	2.4 ± 0.2	15.2	O	LC	1–2, 4, 7, 10–11, 16
Ctenopharyngodon idella (Valenciennes, 1844)	F	2	150	C, Cu, S	NE	3, 8, 9
Cyprinus carpio Linnaeus, 1758	B, F	3.1	120	C, Cu, O	VU	1, 4, 7–9, 14
Danio dangila (Hamilton, 1822)	F	3.0 ± 0.4	15	O	LC	4
Danio rerio (Hamilton, 1822)	F	3.1 ± 0.1	3.8 (SL)	O	LC	1–2, 4–9, 14
Dawkinsia filamentosa (Valenciennes, 1844)	B, F	2.6	18	O	LC	4
Devario devario (Hamilton, 1822)	F	3.0 ± 0.35	10	O	LC	1, 4–5, 8–10
Devario aequipinnatus (McClelland, 1839)	F	2.9 ± 0.33	15	O	LC	1, 4, 7–8
Devario malabaricus (Jerdon, 1849)	F	3.2 ± 0.2	12	O	LC	1, 4–5
Esomus danrica (Hamilton, 1822)	B, F	2.4 ± 0.1	13	C, O	LC	1–2, 4–8, 13–14, 17
Garra annandalei Hora,1921	F	-	23	O	LC	8
Garra gotyla (Gray, 1830)	F	2	18	O	LC	1, 4, 7–8
Garra lamta (Hamilton, 1822)	F	-	20.4	O	LC	4
Garra mullya (Sykes, 1839)	F	2	17	O	LC	1, 4, 7–8, 11, 14
Haludaria melanampyx (Day, 1865)	F	2.9 ± 0.3	7.5	O	DD	4
Hypophthalmichthys molitrix (Valenciennes, 1844)	F	2	105	C, Cu	NT	8–9
Hypselobarbus dobsoni (Day, 1876)	F	2	120	C, Cu	DD	4
Hypselobarbus kolus (Sykes, 1839)	F	2.7 ± 0.33	30	C	VU	8
Hypselobarbus mussullah (Sykes, 1839)	F	-	150	C, Cu, S	EN	4
Hypselobarbus pulchellus (Day, 1870)	F	2	44	C	CR	11
Labeo angra (Hamilton, 1822)	F	-	22	C	LC	8, 16
Labeo bata (Hamilton, 1822)	F	-	61	C, Cu	LC	1, 4, 6–9, 11, 13–15, 17
Labeo boga (Hamilton, 1822)	F	-	30	C	LC	1–2, 4, 8, 18
Labeo boggut (Sykes, 1839)	F	-	29	C, Cu	LC	1, 4–5, 8
Labeo calbasu (Hamilton, 1822)	F, B	2	90	C, Cu	LC	1–2, 4–5, 7–15, 17–18,
Labeo dyocheilus (McClelland, 1839)	F	-	90	C	LC	1, 4, 12
Labeo fimbriatus (Bloch, 1795)	F	2	91	C, Cu	LC	1, 4–5, 8–10
Labeo gonius (Hamilton, 1822)	F	-	150	C, Cu	LC	1–2, 4–5, 8–10
Labeo pangusia (Hamilton, 1822)	F	2	90	C	NT	1, 4
Labeo rohita (Hamilton, 1822)	F, B	2.2 ± 0.12	200	C, Cu, S	LC	1–4, 6–11, 13–15, 17
Laubuka dadiburjori Menon, 1952	F	3.2 ± 0.3	2.5 (SL)	O	LC	1
Laubuka fasciata (Silas, 1958)	F	3.1 ± 0.3	6	O	VU	1, 14
Laubuka laubuca (Hamilton, 1822)	B, F	3.2 ± 0.2	7	O	LC	1–2, 4, 8
Oreichthys cosuatis (Hamilton, 1822)	F	3 ± 0.4	8	O	LC	1, 4, 8
Osteobrama cunma (Day 1888)	F	2.8 ± 0.3	15	O	LC	5
Osteobrama cotio (Hamilton, 1822)	F	2.8 ± 0.3	15	O	LC	1, 3–4, 8–10
Osteobrama peninsularis Silas, 1952	F	2.8 ± 0.3	15	C	DD	2, 6
Osteobrama vigorsii (Sykes, 1839)	B, F	2.7 ± 0.3	30	C	LC	1–2, 4–5, 7–9, 14
Osteochilus nashii (Day, 1869)	F	-	18	O	LC	4
Pethia conchonius (Hamilton, 1822)	F	2.9 ± 0.33	14	O	LC	1, 3–5, 7, 10–11
Pethia gelius (Hamilton, 1822)	F	3.3 ± 0.41	5.1	O	LC	1, 4, 6, 8, 12
Pethia guganio (Hamilton, 1822)	F	2.5 ± 0.1	8	O	LC	1, 4, 8
Pethia phutunio (Hamilton, 1822)	F	2.9 ± 0.32	3.5	O	LC	1, 3–4, 8
Pethia punctata (Day 1865)	F	2.5 ± 0.1	7.5	O	LC	14
Pethia ticto (Hamilton, 1822)	B, F	2.2	10	O	LC	1–2, 4–12,14, 16

(Continues)

TABLE 2 (Continued)

Taxa	*Habitat*[a]	*Trophic Level (SE)*[b]	*Max size (TL, cm)*[c]	*Fishery info*[d]	*IUCN Status*[e]	*Ref.*
Puntius ambassis (Day, 1869)	F	2.7 ± 0.1	7.5	O	DD	17
Puntius amphibius (Valenciennes, 1842)	B, F	2	20	C	DD	1, 3–5, 7, 11, 15
Puntius chola (Hamilton, 1822)	F	2.5 ± 0.1	15	C, O	LC	1–2, 4–5, 8, 12, 18
Puntius dorsalis (Jerdon, 1849)	F	2.8 ± 0.1	25	C, O	LC	1, 4, 8
Puntius sophore (Hamilton, 1822)	B, F	2.6 ± 0.1	20	O	LC	1–14, 18
Puntius terio (Hamilton, 1822)	F	2.6 ± 0.1	10	O	LC	4
Puntius vittatus Day, 1865	B, F	2	5	O	LC	2, 4
Raiamas bola (Hamilton, 1822)	F	3.3 ± 0.4	35	C, S	LC	4
Rasbora daniconius (Hamilton, 1822)	B, F	3.1 ± 0.1	15	C, O	LC	1–9, 11–12, 14
Rasbora rasbora (Hamilton, 1822)	B, F	3.2 ± 0.4	13	O	LC	2, 4
Salmostoma acinaces (Valenciennes, 1844)	F	3.2 ± 0.4	15	O	LC	17
Salmostoma bacaila (Hamilton, 1822)	B, F	3.2 ± 0.4	18	O	LC	1–2, 4–11, 16
Salmostoma balookee (Sykes, 1839)	F	3.2 ± 0.4	15	C	LC	1, 4–5
Salmostoma boopis (Day, 1874)	F	3.2 ± 0.4	12	O	LC	1, 4–5
Salmostoma phulo (Hamilton 1822)	F	3.2 ± 0.4	12	O	LC	1, 4, 8
Salmostoma untrahi (Day, 1869)	F	2.3 ± 0.1	20	O	LC	1, 4
Securicula gora (Hamilton, 1822)	F	3.2 ± 0.4	24.5	C	LC	1, 4–5, 10
Systomus chrysopoma (Valenciennes, 1842)	F	2.9 ± 0.4	15 (SL)	C, O	NE	4, 5
Systomus sarana (Hamilton, 1822)	B, F	2.9 ± 0.2	42	C, O	LC	1–2, 4–10, 12–14, 17
Tor khudree (Sykes, 1839)	F	3.1 ± 0.43	50	C, Cu, S	EN	1, 4–5, 12
Tor putitora (Hamilton, 1822)	F	2.9 ± 0.3	275	C,Cu,O,S	EN	1, 4, 7, 8, 14
Tor tor (Hamilton, 1822)	F	2.6 ± 0.1	200	C, Cu, S	NT	1, 4, 7, 14
Family: Nemacheilidae						
Indoreonectes evezardi (Day, 1872)	F	2.9 ± 0.3	3.8 (SL)	O	LC	4
Paracanthocobitis botia (Hamilton, 1822)	F	3.2 ± 0.4	11	O	LC	1, 4–5, 7–8, 11–12
Paracanthocobitis mooreh (Sykes, 1839)	F	2.9 ± 0.3	4.4	O	LC	1
Paracanthocobitis aurea (Day 1872)	F	-	-	O	NE	5
Schistura denisoni (Day 1867)	F	2.8 ± 0.3	5 (SL)	O	LC	4, 8
Schistura beavani (Günther, 1868)	F	3 ± 0.3	8	O	LC	4
Schistura dayi (Hora, 1935)	F	3 ± 0.3	7.4 (SL)	O	LC	4, 5
Schistura rupecula McClelland, 1838	F	3 ± 0.3	6.7 (SL)	O	LC	4
Schistura striata (Day, 1867)	F	3 ± 0.3	5 (SL)	O	EN	4
Order: Cyprinodontiformes						
Family: Aplocheilidae						
Aplocheilus lineatus (Valenciennes, 1846)	B, F	3.8 ± 0.5	10	O	LC	4
Aplocheilus panchax (Hamilton, 1822)	B, F	3.2 ± 0.4	9	C, O	LC	1–2
Order: Mugiliformes						
Family: Mugilidae						
Planiliza parsia (Hamilton 1822)	B, F, M	2	16	C, Cu	NE	4
Rhinomugil corsula (Hamilton, 1822)	B, F	2.4 ± 0.2	45	C, Cu	LC	1, 4–6, 8, 10, 13
Order: Osteoglossiformes						
Family: Notopteridae						
Chitala chitala (Hamilton, 1822)	F	3.7 ± 0.59	122 (SL)	C,Cu,O,S	NT	1–4, 7–11,13–14, 17–18
Notopterus notopterus (Pallas, 1769)	B,F	3.5	60 (SL)	C, Cu, O	LC	1–11
Order: Perciformes						
Family: Ambassidae						
Ambassis ambassis (Lacepède, 1802)	B, F	3.7 ± 0.56	15	C, O	LC	2

(Continues)

TABLE 2 (Continued)

Taxa	*Habitat*[a]	*Trophic Level (SE)*[b]	*Max size (TL, cm)*[c]	*Fishery info*[d]	*IUCN Status*[e]	*Ref.*
Ambassis gymnocephalus (Lacepède, 1802)	B, F	3.9 ± 0.56	16	C	LC	2
Chanda nama Hamilton, 1822	B, F	3.6 ± 0.54	11	C, O	LC	1–6, 8–11
Parambassis baculis (Hamilton, 1822)	F	3.3 ± 0.5	5 (SL)	C, O	LC	4
Parambassis lala (Hamilton, 1822)	B, F	3.2 ± 0.5	3.8 (SL)	O	NT	9–10
Parambassis ranga (Hamilton, 1822)	B, F	3.3 ± 0.39	8	C, O	LC	1–6, 8–10,16, 18
Family: Anabantidae						
Anabas cobojius (Hamilton, 1822)	F	3.5 ± 0.4	30	C	DD	2, 7–8, 11, 16
*Anabas testudineus (*Bloch, 1792)	B, F	3 ± 0.4	25	C, Cu, O	DD	1–2, 4, 7–9, 11, 14, 17
Family: Badidae						
Badis badis (Hamilton, 1822)	F	3.3 ± 0.39	5	O	LC	1, 4, 6–8, 10
Family: Channidae						
Channa gachua (Hamilton, 1822)	F	3.8 ± 0.62	20 (SL)	O	LC	1–3, 5, 8–9, 12–13, 17–18
Channa marulius (Hamilton, 1822)	F	4.5 ± 0.8	183	C,Cu,O,S	LC	1–4, 7–14
Channa orientalis Bloch and Schneider, 1801	B, F	3.8 ± 0.59	33	C, O	NE	3–4, 8, 14
Channa punctata (Bloch, 1793)	B, F	3.8 ± 0.7	1	C, Cu, O	LC	1–15, 17–18
Channa striata (Bloch, 1793)	B, F	3.4 ± 0.45	100 (SL)	C, Cu, O	LC	1–2, 4–12, 14, 17
Family: Cichlidae						
Etroplus suratensis (Bloch, 1790)	B, F	2.9 ± 0.26	40	C, Cu, O	LC	2, 18
Oreochromis mossambicus (Peters, 1852)	B, F	2.2	39 (SL)	C,Cu,O,S	NT	1–2, 7–9, 18
Oreochromis niloticus (Linnaeus, 1758)	B, F	2	60 (SL)	C, Cu	NE	8–9
Family: Gobiidae						
Apocryptes bato (Hamilton 1822)	B, F, M	2.6 ± 0.2	26	C	NE	15
Awaous stamineus (Eydoux and Souleyet, 1850)	F	2.3 ± 0.1	-	C	NE	1
Glossogobius giuris (Hamilton, 1822)	B, F, M	3.7 ± 0.2	50 (SL)	C, Cu, O	LC	1–6, 8–13, 17
Gobiopterus chuno (Hamilton, 1822)	B, F	3.4 ± 0.45	3 (SL)	O	DD	2, 17
Pseudapocryptes elongatus (Cuvier, 1816)	B, F	2.6 ± 0.2	20	C	LC	2
Family: Osphronemidae						
Trichogaster fasciata Bloch and Schneider, 1801	F	3.1 ± 0.3	12.5	O	LC	1–4, 7–9
Trichogaster lalius (Hamilton, 1822)	F	3.1 ± 0.3	8.8	O	LC	1–2, 7, 10
Family: Nandidae						
Nandus nandus (Hamilton, 1822)	B, F	3.9 ± 0.63	20	C, O	LC	1, 3–5, 8–11, 18
Order: Siluriformes						
Family: Ailiidae						
Ailia coila (Hamilton, 1822)	B, F	3.4 ± 0.4	30	C	NT	1–2, 4, 6–10, 14, 17
Ailiichthys punctata Day 1872	F	3.2 ± 0.4	10	C	DD	16
Clupisoma bastari Datta and Karmakar, 1980	F	3.3 ± 0.4	18	C	DD	8
Clupisoma garua (Hamilton, 1822)	B, F	3.7 ± 0.59	60.9 (SL)	C, S	LC	1, 4–6, 8–10, 16
Eutropiichthys vacha (Hamilton, 1822)	B, F	3.9 ± 0.63	34	C, S	LC	1–2, 4–5, 7–9, 10–11, 13–14
Eutropiichthys murius (Hamilton, 1822)	F	3.4 ± 0.4	28	C	LC	4, 10
Silonia silondia (Hamilton, 1822)	B, F	3.5 ± 0.37	183	C, S	LC	1–2, 10, 17
Family: Amblycepidae						
Amblyceps mangois (Hamilton, 1822)	F	3.2 ± 0.4	12.5 (SL)	O	LC	1, 4, 7–8, 14
Family: Ariidae						
Arius gagora (Hamilton, 1822)	B, F, M	3.7 ± 0.4	91.4 (SL)	C	NT	10
Nemapteryx nenga (Hamilton, 1822)	B, F, M	3.9 ± 0.6	30	C	NE	4
Hexanematichthys sagor (Hamilton, 1822)	B, F, M	4 ± 0.61	45	C	NE	4

(Continues)

TABLE 2 (Continued)

Taxa	*Habitat*[a]	*Trophic Level (SE)*[b]	*Max size (TL, cm)*[c]	*Fishery info*[d]	*IUCN Status*[e]	*Ref.*
Family: Bagridae						
Batasio tengana (Hamilton, 1822)	F	3.3 ± 0.3	9	C	LC	1, 6
Hemibagrus menoda (Hamilton, 1822)	F	3.5 ± 0.6	45	C	LC	4
Mystus bleekeri (Day, 1877)	F	3.3 ± 0.4	15.5	C, O	LC	1, 4–5, 7–8, 10–12
Mystus cavasius (Hamilton, 1822)	B, F	3.4 ± 0.5	40 (SL)	C	LC	1–2, 4–8, 10–12, 17
Mystus gulio (Hamilton, 1822)	B, F	4 ± 0.5	46	C	LC	1–2, 4, 7, 13, 18
Mystus tengara (Hamilton, 1822)	F	3.2 ± 0.4	18	C, O	LC	1, 8–9, 11
Mystus vittatus (Bloch, 1794)	B, F	3.1 ± 0.1	21 (SL)	C, O	LC	1–2, 4, 6–11, 13, 18
Rita chrysea Day, 1877	F	3.4 ± 0.3	19.5	C	LC	1, 4, 6, 8
Rita kuturnee (Sykes, 1839)	F	3.5 ± 0.3	30	C	LC	4
Rita rita (Hamilton, 1822)	B, F	3.7 ± 0.57	150	C	LC	4, 8, 11
Sperata aor (Hamilton, 1822)	F	3.6 ± 0.53	180	C, S	LC	1, 4, 7–11, 14
Sperata seenghala (Sykes, 1839)	B, F	3.8 ± 0.4	150	C, Cu, S	LC	1–2, 4–11, 13–14
Family: Claridae						
Clarias batrachus (Linnaeus, 1758)	B, F	3.4 ± 0.5	47	C, Cu, O	LC	1, 4–5, 8–9, 11, 14–15, 17
Clarias gariepinus (Burchell, 1822)	F	3.8 ± 0.4	170	C, Cu, S	LC	8
Clarias magur (Hamilton, 1822)	F	3.4 ± 0.5	21.3 (SL)	C, Cu, S	EN	2
Family: Heteropneustuidae						
Heteropneustes fossilis (Bloch, 1794)	B, F	3.6 ± 0.3	31	C, Cu, O	LC	1–4, 7–9, 12, 14–15, 17
Family: Horabagridae						
Pachypterus atherinoides (Bloch 1794)	B, F	3.3 ± 0.4	15	C, O	LC	1, 3–4, 8, 10
Family: Pangasiidae						
Pangasius pangasius (Hamilton, 1822)	B, F	3.4 ± 0.51	300 (SL)	C, Cu, S	LC	1–2, 4, 8, 10, 13
Family: Siluridae						
Ompok bimaculatus (Bloch, 1794)	B, F	3.9 ± 0.4	45 (SL)	C, Cu, O	NT	1–2, 4–11, 13
Ompok pabo (Hamilton, 1822)	F	3.8 ± 0.6	25	C	NT	1, 8–9
Ompok pabda (Hamilton, 1822)	F	3.8 ± 0.6	30	C	NT	1–2, 4, 8–9, 10, 13
Wallago attu (Bloch and Schneider, 1801)	B, F	3.7 ± 0.56	240	C, S	NT	1–2, 4–14, 17
Family: Sisoridae						
Bagarius bagarius (Hamilton, 1822)	B, F	3.7 ± 0.59	200	C, S	NT	1–2, 4, 6, 8, 10
Bagarius yarrelli (Sykes, 1839)	F	3.7 ± 0.6	200 (SL)	C	NT	2
Erethistes hara (Hamilton 1822)	F	3.3 ± 0.5	13	O	LC	1, 4–5, 8
Erethistes pusillus Müller and Troschel, 1849	F	3.1 ± 0.4	4.2 (SL)	O	LC	10
Gagata cenia (Hamilton, 1822)	B, F	3.3 ± 0.5	15 (SL)	C	LC	4, 6, 8, 16
Gagata gagata (Hamilton, 1822)	B, F	3.4 ± 0.6	31	C	LC	1
Glyptothorax lonah (Sykes, 1839)	F	3.2 ± 0.4	15	O	LC	1, 4–5
Gogangra viridescens (Hamilton, 1822)	F	3.2 ± 0.5	8.5	C	LC	1, 4
Order: Synbranchiformes						
Family: Mastacembelidae						
Macrognathus aral (Bloch and Schneider, 1801)	B, F	3.1 ± 0.33	63.5	C	LC	2, 9, 13
Macrognathus aculeatus (Bloch, 1786)	B, F	3.3 ± 0.4	38	C, O	NE	1, 4, 6–8, 11, 14–15
Macrognathus pancalus Hamilton, 1822	B, F	3.5 ± 0.51	18	C	LC	1–11, 14
Mastacembelus armatus (Lacepède, 1800)	B, F	2.8 ± 0.27	90	C, O	LC	1–6, 8–12
Family: Synbranchidae						
Monopterus cuchia (Hamilton, 1822)	B, F	3.8 ± 0.64	70	C	LC	1, 4, 7, 9, 11, 14
Ophisternon bengalense McClelland, 1844	B, F	3.3 ± 0.3	100	C	LC	2, 4

(Continues)

TABLE 2 (Continued)

Taxa	*Habitat*[a]	*Trophic Level (SE)*[b]	*Max size (TL, cm)*[c]	*Fishery info*[d]	*IUCN Status*[e]	*Ref.*
Order: Tetraodontiformes						
Family: Tetraodontidae						
Leiodon cutcutia (Hamilton, 1822)	B, F	3.3 ± 0.3	15	C	LC	4

[a] as per Talwar and Jhingran (1991), Jayaram (2010) and Froese and Pauly (2013). B, Brackish; F, Freshwater; M, Marine

[b] as per Froese and Pauly (2013)

[c] as per Talwar and Jhingran (1991), Jayaram (2010) and Froese and Pauly (2013).

[d] as per Talwar and Jhingran (1991), Jayaram (2010) and Froese and Pauly (2013). C, Capture; Cu, Cultivable; O, Ornamental; S, Sport.

[e] as per IUCN (2018). CR, Critically Endangered; DD, Data Deficient; EN, Endangered; LC, Least Concern; NE, Not Evaluated; NT, Near Threatened; VU, Vulnerable.

References: [1]Pathak *et al.* (2007), [2]Mohanty *et al.* (2015), [3]Sarkar *et al.* (2015), [4]Dutta *et al.* (1993), [5]Chauhan (1947), [6]Jayaram and Majumdar (1976), [7]Baliarsingh *et al.* (2013), [8]Singh *et al.* (2013), [9]Singh (2014), [10]Das *et al.* (2016), [11]Samal *et al.* (2016), [12]Satapathy and Mishra (2014), [13]Mishra *et al.* (2013), [14]Ramakrishna *et al.* (2006), [15]Dandapat (2015), [16]Karmakar *et al.* (2008), [17]Das (2008), [18]Behera and Nayak (2014)

The freshwater fish fauna of India is highly diverse in nature and constituting 1027 species (Gopi *et al.* 2017). Orissa constitute about 18.11% to the freshwater fish fauna of India (Dutta *et al.* 1993). Earlier reports on freshwater fish fauna of Odisha such as Hora (1938, 1940), Misra (1938), Chauhan (1947), Jayaram and Majumdar (1976), Dutta *et al.* (1993), Ramakrishna *et al.* (2006), Pathak *et al.* (2007), Karmakar *et al.* (2008), Das (2008), Baliarsingh *et al.* (2013), Mishra *et al.* (2013), Singh *et al.* (2013), Behera and Nayak (2014), Satapathy and Misra (2014), Singh (2014), Dandapat (2015), Mohanty *et al.* (2015), Sarkar *et al.* (2015), Das *et al.* (2016) and Samal et al. (2016) agreed with dominance of cyprinids over other freshwater fish families. The dominance of cyprinid species in natural water bodies is common all over the South Asia and reported in several studies (e.g. Galib *et al.* 2009a; Mohsin *et al.* 2009; Flowra *et al.* 2009). Appropriate management strategies should be developed for threatened fishes; brood stock development, captive breeding, seed production and ranching of seed in naturel water bodies might be considered in this aspect. Use of harmful and destructive fishing gears and methods, which is very common in many countries over the world including South Asia (e.g. Galib *et al.* 2009b; Sultana and Islam 2016; Parvez *et al.* 2017) should strictly be monitored and controlled.

4 | CONCLUSION

Varied freshwater resources of Orissa blessed with diverse fish fauna useful for rural livelihood. Freshwater fish fauna of Odisha constitute about 20% to the freshwater fish diversity of India. The findings of present communication may serve as baseline information for planning, conservation and management of fish and fisheries resources of Orissa in the future.

TABLE 3 Diversity of freshwater fishes of Orissa

Order	*Family*	*Genus*	*Species*
Anguilliformes	Anguillidae	1	2
Beloniformes	Adrianichthydae	1	2
	Belonidae	2	2
	Hemiramphidae	1	1
Clupeiformes	Clupeidae	3	3
	Engraulidae	1	2
Cypriniformes	Cobitidae	1	2
	Cyprinidae	33	84
	Nemacheilidae	3	9
Cyprinodontiformes	Aplocheilidae	1	2
Mugiliformes	Mugilidae	2	2
Osteoglossiformes	Notopteridae	2	2
Perciformes	Ambassidae	3	6
	Anabantidae	1	2
	Badidae	1	1
	Channidae	1	5
	Cichlidae	2	3
	Gobiidae	5	5
	Osphronemidae	1	1
	Nandidae	1	2
Siluriformes	Ailiidae	5	7
	Amblycepidae	1	1
	Ariidae	3	3
	Bagridae	5	12
	Claridae	1	3
	Heteropneustuidae	1	1
	Horabagridae	1	1
	Pangasiidae	1	1
	Siluridae	2	4
	Sisoridae	5	8
Synbranchiformes	Mastacembelidae	2	4
	Synbranchidae	2	2
Tetraodontiformes	Tetraodontidae	1	1
N = 11	***N = 33***	***N = 96***	***N = 186***

ACKNOWLEDGEMENTS

The authors are thankful to reviewers for their critical suggestions in improving the quality of this paper.

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HSM Secondary data collection, checklist preparation and manuscript writing; **JC** validation of species names, collection of distribution range data, manuscript editing and formatting.