

FISH DIVERSITY OF SORODA RESERVOIR, GANJAM, ODISHA

N.K. SIAL, G.C. KUND* AND S.K. PATRA

College of Fisheries (OUAT), Rangailunda, Berhampur – 760 007, Odisha. Email: gckundouat@gmail.com

Corresponding author: **Dr. G.C. Kund**

E-mail: gckundouat@gmail.com

Mobile: +91-9938060886

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ABSTRACT

A total of 21 fish species were recorded from Soroda reservoir belonging to family Cyprinidae (9species), Siluridae (3species), Channidae (2pecies), Cobitidae (1species), Mastacembalidae (1species), Gobiidae (1species), Ambasiidae (1species), Bagridae (1species), Heteropneustidae (1species), and Notopteridae (1species) during the year, 2022-23. The diversity index ranged from 0.03 to 0.09, 1.03 to 1.27 and 11.60 to 13.68 through the Simpson diversity index, Shannon-Weiner diversity index and Margalef diversity index respectively. This study should be considered as a baseline data for more detailed research on the biodiversity of the reservoir. To maintain the species richness and diversity of the reservoir, management should take a precautionary approach and instigate conservation measures that would benefit both the reservoir and the local fishermen.

INTRODUCTION

Biodiversity is an important concept in natural as well as artificial ecosystems. The definition says, it is the variation in the genetics and life forms of populations, species, communities and ecosystems. India, considered as one of the mega diversity countries is home to 930 fresh water species belong to 326 genera, 99 families and 20 orders (Talwar and Jhingran, 1991), is eighth in the world and third in Asia in fresh water fish diversity (Kottelat and Whitten, 1996). Diversity of fish species have been studied by Vijaykumar *et al.*(2008), Sarwade and Khillare (2010), Vijaylaxmi, and Vijaykumar (2011) and Mishra (2024). Odisha is coastal state having a coastline of 480 km, is situated in eastern India. There were some studies carried out in several districts of Odisha like species diversity and habitat characteristics of freshwater fishes in the Similipal biosphere reserve (Baliarsingh *et al.*, 2013), the fish diversity and conservation of fishery resources of the river Pilasalunki, Phulbani district, Odisha (Satapathy *et al.*, 2014), fish and shellfish biodiversity in Chilika lake, Odisha (Mohanty *et al.*, 2006), Ichthyofauna diversity of Budhabalanga River, Mayurbhanj, Odisha (Samal *et al.*, 2016) etc.

In this context, Ganjam district plays major role in state's total fish production. The district comprises vast resource of reservoirs and minor irrigation ponds or tanks which contribute as a major share in freshwater fish production. It raises the economic status of the farmers and provides employment to many rural youths. The Soroda reservoir is located near the Soroda block of Ganjam district. Focusing on the importance of diversity and the management of the ecosystem in reservoirs, the current study was undertaken with the aim to find the fish diversity and species composition in Soroda Reservoir, Ganjam, Odisha.

MATERIALS AND METHODS

Study area

The present study was conducted in Soroda reservoir, located near the Soroda block of Ganjam district (Latitude 84°24' - 84°26' N and Longitude 19°44' - 19°46'). It was created by construction of earthen dam of 585-meter length over river Padma. It is a multipurpose reservoir, created with a prime objective of augmenting the water supply to the Berhampur city during lean period. The dam site is 35 km from Aska and 75 km from Berhampur.

Sampling

The fish species were collected from the Soroda reservoir at monthly intervals by the use of gill nets and drag nets with the help of local fishermen. The collected specimens were immediately preserved in ice for further identification.

Biodiversity index:

The data were tabulated in a manner to provide as input to the BioDiversity Pro 2.0 statistical package. Thereafter, descriptive statistics, Shannon's diversity index, Simpson index of dominance and Margalef index of richness were attempted from the output of the software.

RESULTS AND DISCUSSION

The fish species were collected from the Soroda reservoir at a sampling interval of one month. The fish species at a varying densities and seasonal distribution are given in table-1. *Amblypharyngodon mola* marked its abundance varying 0 to 7 at an average of 2.2 ± 2.3 . *Amblypharyngodon mola* recorded tri model peaks in the month of august (7 numbers) and the other in the month of January (1 numbers) and the third one in the month of May (3 numbers). Out of which the first and third one was distinct. The fish is recorded greater abundance during within monsoon months followed by post monsoon. *Catla catla* fluctuated from 1 to 7 numbers at an average 3.3 ± 2.0 . It marketed a singular distinct peak in the month of November (7 numbers). It marked greater abundance during July to

December. *Chanda nama* species marked its fluctuation from 0 to 6 at an average of 2.4 ± 1.9 . It showed alternate multiple peaks thrice in a year indicating fluctuating or randomized abundance. *Channa punctatus* recorded a variation from 0 to 5 numbers at an average of 1.7 ± 1.6 . It recorded three alternate multiple peaks in a year particularly in the month of March- May. However, it also recorded highest abundance in the month of July. *Channa striatus* fluctuated from 0 to 3 numbers at an average of 1.1 ± 1.1 . It recorded 2 peaks; one in the month of September (2 numbers) and the second one in the month of June (3 numbers). It recorded a greater abundance in the months of April to June. *Cirrhinus mrigala* marked its abundance varying 0 to 7 at an average of 4.8 ± 1.5 . *Cirrhinus mrigala* recorded peaks one in the month of September (7) and the other one in the month of March (7 numbers). It marked greater abundance during September to May. *Cirrhinus rebe* fluctuated from 0 to 4 numbers o at an average of 1.8 ± 1.5 . It recorded alternate multiple peaks thrice in a year indicating randomized abundance. It also recorded highest abundance in the month of October and November i.e. 4 numbers. *Glossogobius giuris* marked its abundance varying to 0 to 3 at an average of 1.0 ± 1.2 . It showed alternate multiple peaks thrice in a year indicating fluctuating or randomized abundance. The highest abundance recorded in the month of October to January. *Heteropneustis fossilis* fluctuates from 0 to 7 numbers at an average of 2.9 ± 1.9 . It marked 3 peaks in a year particular in the month of one in the month of September (7 numbers), second in the month of November (5 numbers) and third in the month of March (4 numbers) September, October, and February. It also recorded greater abundance in the month of July to November. *Labeo calbasu* recorded a variation from 0 to 7 number at an average of 2.1 ± 2.1 . It recorded two peaks one in the month of August (7 numbers) and the second one in the month of February (2numbers). It recorded greater abundance in the month of July to October. *Labeo rohita* species marked its fluctuation from 2 to 8 at an average of 4.3 ± 1.9 . It recorded two peaks one in the month of November (8 numbers) and the second one in the month of December (5 numbers). The highest abundance was observed from July to November. *Macrognathus punctatus* fluctuates from 0 to 3 numbers at an average of 1.5 ± 1.1 . There are three peaks recorded in the month of November, January (3numbers) and May (2numbers). *Mystus vitatus* marked as fluctuation from 0 to 3 with an average of 1.7 ± 1.2 . It also recorded tri model peaks which showed that same number abundance of species i.e. 3 numbers of each in the month of October, February and June. *Notopterus notopterus* recorded a variation from 0 to 2 at an average of 0.7 ± 0.9 . It recorded greater abundance in the month of April to June. *Ompok bimaculatus* fluctuated from 0 to 2 at an average of 0.8 ± 0.8 . It recorded 5 peaks one in the month of September (2numbers) and other in the month of December (1) and third one in the month of February (1) fourth one and fifth one is (2number). *Ompok pabda* fluctuates from 0 to 3 numbers at an average of 1.0 ± 1.0 . It recorded 2 peaks, one in the month of December (3number) and other in the month of May (2number). It also recorded grater abundance in the month of December. *Puntius sophore* fluctuation from 0l to 4 at an average of 1.4 ± 1.2 . It marked a distinct singular peak in the month of October (4numbers). *Rasbora daniconius* recorded variation from 0l to 3 at an average of 1.3 ± 1.2 . It also recorded highest abundance in the month of April and June of 3 number of each. *Salmostoma bacaila* species marked its fluctuation from 0 to 4 at an average of 1.3 ± 1.3 . It shows alternate multiple peek in a year; however it also recorded highest abundance in the month of June (4 numbers). *Lepidocephalichthys guntea* marked as abundance varying 0 to 3 at an average of 1.3 ± 1.1 . It recorded highest peak in the month of August (3numbers). *Wallago attu* fluctuates from 0 to 3 at an average of 1.3 ± 1.1 . It shows alternate multiple peaks in a year indicating fluctuating or randomized abundance.

A total of 21 species of fishes under 10 families and 5 orders has been recorded from the study area (table-2). Among the recorded fish species, family Channidae represented by four species, Cyprinidae represented by eleven species, rest of the family had their representation limiting to one or two fish species within the stations. The present finding indicates that

Soroda reservoir has diverse fish fauna including numerous economically important food fishes. The distribution and abundance of fishes usually depend on water quality, habitat, availability of food and seasonal effect. Studies on the fish species availability in different reservoirs and river have been undertaken by many researchers. Joshi *et al.* (2012) recorded 20 species from Purna River at Buldhana District. Kamble and Mudkhede (2013) reported 15 species of fish from Loni reservoir, Keshave *et al.* (2013) recorded commercially important 9 fish species from Isapur Reservoir. The above authors were recorded less number of species compared to the present study suggesting that Soroda reservoir has diverse fish fauna at par with many other reservoirs in the country. Singh (2014) undertook a study during 2013 and 2014 from Hirakud reservoir and recorded 56 species. Ubharhande *et al.* (2011) reported 27 species from Ambadi dam. Shahnawaz *et al.* (2010) recorded 56 species of fish from Bhadra river of Western Ghats. Shaikh *et al.* (2011) observed 27 fish species from upper Dudhna reservoir near Somthana at Jalna.

In the present study, the order Cypriniformes represented as two families i.e. Cyprinidae with 9 fish species and Cobitidae with single species (*Lepidocephalichthys guntea*). The orders in Branchiiformes represent a single family (Mastacembelidae) with a single species (*Macrognathus punctatus*). The perciformes represented 3families i.e. Channidae, Gobiidae and Ambasidae. The family Channidae has represented by 2 fish species *Channa punctatus* (spotted murrel) and *Channa striatus* (stripped murrel). The family Gobiidae represent a single species i.e. *Glossogobius giuris* (tank goby) local known as baligiridi. The family Ambasidae also represented with a single species of *Chanda nama* commonly known as elongated glassy perchlet(Chandi). The orders Siluriformes represented as 3families (Bagridae, Heteropneustidae and Siluridae). The Bagridae family represented a single species commonly known as stripped dwarf cat fish (Kantia). Heteropneustidae family represented a single species i.e. *Heteropneustis fossilis* commonly known as stinging cat fish (Singhi). The family Siluridae represented a 3 species i.e. *Ompok pabda*, *Ompok bimaculatus* and *Wallago attu* commonly known as pabda, Indian butter cat fish and fresh water shark respectively. The order Osteoglossiformes represent a single family with single species i.e. *Notopterus notopterus* commonly known as feather back (Phali). Fish species availability in different reservoirs and river have been undertaken by many researchers and recorded more number of species compared to the present findings. Singh (2014) undertake a study during 2013 and 2014 from Hirakud reservoir. He observed occurrence of 56 species belonging 35 genera, 19 families and 7 orders. Species like *A.mola*, *C. catla*, *C.mrigala*, *L.rohita*, *O.cotio*, *P.sophore* and *W.attu* occurred in almost all sides. Sugunan (1995) reported the commercial fishery of Hirakud reservoir comprises nearly 40 species, a few important ones are *Catla catla*, *Labeo rohita*, *L. gonius*, *L. fimbriatus*, *L. calbasu*, *L. bata*, *Cirrhinus mrigala*, *C. reba*, *Notopterus notopterus*, *N. chitala*, *Channa gachua*, *Channa punctatus*, *Channa striatus*, *Clarias batrachus*, *Heteropneustes fossilis*, *Wallago attu*, *Tor mosal*, *Ompok bimaculatus*, *Mystus tengara*, *Silonia silonia* etc. After commissioning of the reservoir in the year 1957, the fish fauna of the Mahanadi River system underwent a significant change. A large number of fish and prawn species have been already affected. These include fishes like Tor mosal, *Hilsa ilisha*, and prawns like *Macrobrachium malcolmsonii* (Rasid and Tripathy, 2005). Exotic fish like silver carp (*Hypophthalmichthys molitrix*) is also found in the Mahanadi River. The Mahseer fish (*Tor mosal*) which is also called as Kudo, occupies a significant position in terms of its availability in the reservoir (Mahapatra, 2003). Ubharhande *et al.* (2011) reported that ichthyofauna of Ambadi dam belonged to 8 orders, 11 families, 22 genera and 27 species where Cyprinidae family was found to be dominant with 13 species which constituted 48.16% besides family Balitoridae, Bagridae, Channidae and Mastacembelidae contributed 02 species each with 7.41% and family Clariidae, Cichlidae, Notopteridae, Belonidae and Mugilidae contributed 01 species each with 3.70%. Shahnawaz *et al.* (2010) recorded 56 species of fish representing 39 genera and 15 families from Bhadra river of Western Ghats.

Sarwade and Khillare (2010) reported the variety and abundance of fresh water fish from Indapur Dist. Pune. Shaikh *et al.* (2011) observed 27 fish species belonging to 7 orders 15 genera and 9 families from upper Dudhna project water reservoir near Somthana at Jalna. Rankhamb (2011) investigation revealed the occurrence of 26 fish species belonging to 05 orders, 07 families and 15 genera from Godavari River at Mudgal, Pathri, Dist. Pawara and Patel (2012) have recorded 25 fish species belonging to 03 orders, 05 families and 13 genera. Katwate *et al.* (2012) collected 66 fish species belonging to 31 families and 53 genera from northern Western Ghats at Raigad. Ahirrao (2014) reported an account of fish resources of 39 fish species belonging to 24 genera and 12 families from Bori dam at Tamaswadi, Parola, dist. Jalgaon. Pawar (2014) has reported 42 fish species belonging to 29 genera, 15 families and 9 orders from Majalgaon reservoir from Beed district. fluctuated from 2.4 to 3.0. The Simpson's dominance index values fluctuated between 0.08 to 0.2 and Margalef index of species richness values ranged from 1.48 to 2.4 from Anjanapiura reservoir of Karnataka. Nath and Deka (2012) reported the highest Shannon-Weiner diversity was 3.602 in the monsoon months and similarly Simpson dominance index higher in the monsoon months (0.9591) and Margalef richness value was 9.065 (monsoon). Vyas *et al.* (2012) observed Shannon-Weiner diversity value ranged from 2.54 to 3.18, the value of Simpson diversity index fluctuated between 0.08 to 0.11 and Margalef diversity index value ranged from 3.771 to 6.70 in the fish diversity of Betwa river of Madhya Pradesh. (Shukla and Singh ,2013) reported the Shannon-Weiner diversity index ranged from 0.0213 to 0.00422 and the Simpson dominance index value fluctuated from 0.064 to 0.0133 from the Aami river, Gorakhpur. The index value in the present study was low as compared to many findings of the previous authors. This could be attributed due to the assessment of fish diversity restricted to limited period. Hence, there was a need for a thorough and strategic sampling method and sampling period for covering the entire area of the reservoir. Therefore, this study should be considered as a baseline data for more detailed research on the biodiversity of the reservoir. To maintain the species richness and diversity of the reservoir, management should take a precautionary approach and instigate conservation measures that would benefit both the reservoir and the local fishermen.

In the present study, the diversity index ranged from 0.03 to 0.09, 1.03 to 1.27 and 11.60 to 13.68 through the Simpson diversity index, Shannon-Weiner diversity index and Margalef diversity index respectively (table-3). Studies on the fish diversity in different reservoirs and river have been undertaken by many authors. Alam (2013) calculated the diversity index ranged from 0.05 to 0.06, 0.94 to 0.95, 3.29 to 3.49 and 6.60 to 7.91 through the Simpson's dominance index, Simpson Diversity index, Shannon-Weiner diversity index and Margalef diversity index respectively in Halda river. Nabi *et al.* (2011) investigated that the Shannon-Wiener value ranged from 0.95 to 2.62 in Bakkhali river estuary. Vijaylaxmi *et al.* (2011) estimated the Shannon-Weiner value of different sites ranged from 4.1 to 3.7. Satapathy and Misra (2014) calculated the fish diversity of Pilasalunki river of Phulbani district. Singh (2014) studied on the fish diversity of the river Mahanadi in Odisha and reported that the Shannon-Weiner diversity index ranged from 1.51 to 3.25. Sharmila *et al.* (2016) observed that Shannon-Weiner index diversity ranged from 2.157 (August) to 2.684 (November). Kantaraj *et al.* (2011) observed Shannon-Weiner index fluctuated from 2.2 to 4.10 in Bhadra reservoir of Karnataka District. Naik *et al.* (2013) investigation revealed that the Simpson's index of diversity was fluctuated between 0.894 to 0.860 and Shannon diversity index ranged from 2.68 to 2.37 and Margalef index of species richness was ranged from 4.50 to 3.50 from the Upper Mullamari reservoir, Basavakalyan, Karnataka. Basavaraja *et al.* (2014) reported Shannon-Weiner fish diversity index was

Table 1: Seasonal abundance of fishes in Soroda reservoir based on sampling (July, 2022 to June, 2023)

Name of the species	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April	May	Jun	Mean \pm SD
<i>Amblypharyngodonmola</i>	3	7	6	2	0	0	1	0	0	2	3	2	2.2 \pm 2.3
<i>catlacatla</i>	2	2	4	6	7	6	2	3	2	2	1	2	3.3 \pm 2.0
<i>Chanda nama</i>	0	0	3	5	2	1	4	2	6	1	2	3	2.4 \pm 1.9
<i>Channa punctatus</i>	5	2	0	0	2	1	0	0	3	2	3	2	1.7 \pm 1.6
<i>Channa striata</i>	0	0	2	1	0	0	0	2	1	2	2	3	1.1 \pm 1.1
<i>cirrhinusmrigala</i>	3	3	7	6	6	4	5	5	7	5	4	3	4.8 \pm 1.5
<i>Cirrhinusreba</i>	2	1	2	4	4	2	0	3	0	0	0	3	1.8 \pm 1.5
<i>glosogobiusgjuris</i>	0	0	0	3	1	2	1	0	0	2	3	0	1.0 \pm 1.2
<i>Heteropneustesfossilis</i>	4	2	7	3	5	2	1	3	4	2	2	0	2.9 \pm 1.9
<i>Labeocalbasu</i>	5	7	3	2	0	0	0	2	1	2	2	1	2.1 \pm 2.1
<i>Labeorohita</i>	2	2	5	7	8	5	4	4	5	4	3	2	4.3 \pm 1.9
<i>Macrogathuspancalus</i>	0	0	0	2	3	1	3	2	2	1	2	2	1.5 \pm 1.1
<i>Mystusvittatus</i>	2	2	1	3	0	0	2	3	2	0	2	3	1.7 \pm 1.2
<i>Notopterusnotopterus</i>	0	0	0	0	2	1	0	0	0	2	1	2	0.7 \pm 0.9
<i>Ompokbimaculatus</i>	0	0	2	0	0	1	0	1	1	2	1	2	0.8 \pm 0.8
<i>Ompokpabda</i>	0	1	1	0	2	3	1	0	0	1	2	1	1.0 \pm 1.0
<i>Puntius sophore</i>	2	1	0	4	2	0	1	0	2	1	2	2	1.4 \pm 1.2
<i>Rasbora daniconius</i>	0	2	1	3	1	0	0	1	0	3	2	3	1.3 \pm 1.2
<i>Salmostomabacaila</i>	0	2	1	0	2	1	2	0	0	3	1	4	1.3 \pm 1.3
<i>Lepidocephalichthysguntea</i>	1	3	0	2	2	2	0	2	0	0	2	1	1.3 \pm 1.1
<i>Wallago attu</i>	2	3	1	0	3	0	2	0	2	1	1	1	1.3 \pm 1.1

Table 1. : Classification of fishes collected from Soroda reservoir during the period from July, 2022 to June, 2023

Sl.No.	Order	Family	Scientific name	Common name	Local name
1	Cypriniformes	Cyprinidae	<i>Amblyopharyngodonmola</i>	Mola	Mahurali
			<i>Salmostomabacaila</i>	Large razobelly minnow	Baunsapatri
			<i>Puntius sophore</i>	Spot fin swamp barb	Kerandi
			<i>Cirrhinusreba</i>	Reba carp	Boria
			<i>Rasbora daniconius</i>	Slender rasbora	Dandikiri
			<i>Catlacatla</i>	Catla	Bhakura
			<i>Labeorohita</i>	Rohu	Rohi
			<i>Cirrhinusmrigala</i>	Mrigal	Mrigal
			<i>Labeocalbasu</i>	Orangefinlabeo	Kameshu
		Cobitidae	<i>Lepidocephalichthysguntea</i>	Guntea loach	Gudikhai
2	Synbranchiformes	Mastacembalidae	<i>Macrognathuspancalus</i>	Barred spiny eel	Todi
3	Perciformes	Channidae	<i>Channa punctatus</i>	Spotted murrel	Gadisha
			<i>Channa striatus</i>	Stripped murrel	Seula
		Gobiidae	<i>Glossogobiusgiuris</i>	Tank goby	Baligiridi
		Ambassidae	<i>Chanda nama</i>	Elongated perchlet	Chandi
4	Siluriformes	Bagridae	<i>Mystusvittatus</i>	Stripped drawf catfish	Kantia
		Heteropneustidae	<i>Heteropneustesfossilis</i>	Stinging catfish	Singhi
		Siluridae	<i>Ompakpabda</i>	Pabda	Pabda
			<i>Ompakbimaculatus</i>	Indian butter catfish	Tambasi
			<i>Wallago attu</i>	Fresh water shark	Balia
5	Osteoglossiformes	Notopteridae	<i>Notopterusnotopterus</i>	Feather back	Phali

Table 15. : Fish diversity in Soroda reservoir during the period from July, 2022 to June, 2023

Months	Simpsons Diversity	Shannon diversity	Margalef diversity
JUL	0.07	1.04	13.17
AUG	0.07	1.09	12.48
SEP	0.08	1.07	12.03
OCT	0.07	1.13	11.60
NOV	0.07	1.12	11.66
DEC	0.08	1.06	13.29
JAN	0.07	1.04	13.68
FEB	0.06	1.08	13.17
MAR	0.09	1.03	12.66
APR	0.04	1.21	12.66
MAY	0.03	1.27	12.40
JUN	0.04	1.25	12.32

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