



Ichthyofaunal Diversity and Seasonal Harvest Patterns in Dudhawa Reservoir, Chhattisgarh, 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.

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ABSTRACT

This study seeks to examine the status and biodiversity of fishes in medium reservoir known as Dudhawa of Chhattisgarh. The major objectives were to collect the primary data on fisheries of Dudhawa reservoir, collection, preservation and identification of fish species, to enlist the fish fauna and to study the seasonal variations in fish harvest of Dudhawa reservoir. For this study, fish specimens were collected during August 2022 to February 2024 from the reservoir and primary data pertaining to species abundance, yield and production of the reservoir were collected from the Matsya Mahasangh Raipur. The results of empirical study revealed that the list of 43 species were classified under 5 orders, 13 families and 28 genera. Analysis of different species reveals that

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69.76% of them belong to a single order, Cypriniformes. The analysis of the fishes listed show that 6.97 % species belong to order Mastacembeliformes, 11.62% belong to order Perciformes, 4.65% belong to order Channiformes and 2.32% species belong to order Clupeiiformes. Statistical analysis of data reveals no correlation between stocking and yield of the reservoir. Fish species in the Dudhawa reservoir were broadly categorized into four group *i.e.* major carps, catfishes, minor fish and minnow's fish. Critical observation of data shows that major carp's fishery dominated the catch during August, 2022 to February, 2024. A high yield of major carp's fishery (26728 kg) was obtained in November. However, catfish fishery fluctuated between 2400.5 kg in August to 9063 kg in March. Bulk of minnows fishes (23.33%-56.6%) were recorded in drag netting may be due to reduced water level during summer (February to May, 2023). This data will definitely help the fishermen and as well as fisheries officials for better stock and harvest management of this type of small reservoir of Chhattisgarh.

Keywords: Fish fauna; Dudhawa reservoir; Chhattisgarh.

1. INTRODUCTION

The state of Chhattisgarh of Indian nation has vast and varied natural water resources for fish production in the form of rivers, reservoirs, ponds and tanks. About 1,53,873 hectare of water area is available for fish production, out of which 83,873 hectares (54.51 %) of water spread area is in the form of reservoirs. Total number of reservoirs in the state are 1,616, out of which 1606 are small, eight are medium and two are large, covering an area of 56.72%, 20.83 % and 22.45% respectively. Among reservoirs, 43.28% of the resource comprising large and medium reservoirs are underutilized however, small reservoirs are far better. Average production levels in large, medium and small reservoirs are 2.6 kg/ha/year, 29.55 kg/ha/year and 69 kg/ha/year respectively. Out of eight medium sized reservoirs three have recorded better average yield they are Sondur (91.37 kg/ha/year), Khudia (64.58 kg/ha/year) and Dudhawa (46.38 kg/ha/year) (Singh, 2005).

For the exploitation and scientific development of aquaculture, knowledge of existing fish fauna of the area is a prerequisite. Knowledge of fish diversity in particular region is essential not only for rational management of ichthyofauna of that region but also for their conservation strategies. Biodiversity is a term that has recently been widely used. It is the variety and variability among living organisms and the ecological complexes in which they occur. Diversity can be defined as the number of different organisms and their relative frequency. For biological diversity, these organisms are organised at many levels ranging from DNA sequences that are the molecular basis of heredity to complete ecosystem. Thus the term encompasses genes, species, ecosystems and their relative

abundance. Biodiversity in inland waters is important not only to sustained health of the ecosystem but also to the sustained health and prosperity of our society. India is well known for its rich biodiversity of biological wealth harbouring over 12% of the shell and fin fishes known (Kapoor and Sarkar, 2003). Burman (Burman, 1998) mentioned that the eventual number of living fish species in the world might be close to 28,000, half of the total number of vertebrates (43,173). National Bureau of Fish Genetic Resources, Lucknow, (2002) however, stated only 24,600 and 21,723 fish species in the world respectively. Day (Day, 1998) enlisted 1390 species of fish from British India. Jayaram, (1981) described 742 species from fresh and brackish water and Jhingran, (1991) compiled 930 fresh and brackish water fishes in India.

According to Burman total living fishes are divided into four classes *viz.*, Myxini, Cephalospidomorphi, Chondrichthyes and Osteichthyes, out of which two classes *viz.*, Chondrichthyes and Osteichthyes are represented in India only. The chondrichthyes (with cartilaginous skeleton) are represented by 131 species under 67 genera, 28 families and 10 orders in the Indian region. The cartilaginous fishes constitute a relatively smaller part of the global fish fauna. The Indian Osteichthyes (with bony skeleton) are represented by 2415 species belonging to 902 genera, 226 families and 30 orders. Among the Indian families of fishes, the family Cyprinidae is the largest and the most dominating freshwater fishes of immense economic value in India. According to Burman (*Op. cit.*) 223 fish species are endemic to India representing 8.75% of the fish species known and 127 monotypic genera representing 13.10% of the Indian genera of fishes. The family Cyprinidae contains maximum number of

endemic fish (97 species), followed by the family Balitoridae (46 species) and the family Sisoridae (21 species) in India. Although a large number of workers have studied ichthyofauna of various reservoirs. Much information is still not available regarding fish diversity in different reservoirs of Chhattisgarh state. Therefore, the present study was undertaken to enlist fish fauna of Dudhawa reservoir (district-Kanker) of Chhattisgarh State, and an investigation entitled “Studies on the diversity of fish fauna in Dudhawa reservoir.

2. MATERIALS AND METHODS

2.1 Geography

Chhattisgarh is formed by bifurcating the eastern part of old Madhya Pradesh on 1st November, 2000. Chhattisgarh is situated between 17°46' – 24°80' N latitude and 80°15'-84°24' E longitude. Geographically Chhattisgarh has hilly areas, plateau and river basins. Hills range from 1000-3000 meters and consist of (i) Maikal ranges (ii) Churi Udaipur hills (iii) Chang bhakhar – Deogarh hills and (iv) Abujmarh hills. There are various plateaus. Chhattisgarh plains is a basin of many rivers and its water potential is trapped in the form of few reservoirs. The state receives good amount of precipitation (1200-1600 mm).

2.2 Water resources

The state possess vast and varied natural water resources in the form of rivers, reservoirs, ponds and tanks. About 53, 827 water bodies covering an area of 1,53, 873 ha is available for fish production, out of which 83, 873 ha water area is in the form of reservoirs (54.51%) and the remaining 52,211 are village ponds covering an

area of 70,000 ha (45.49%) reported by Singh also (Singh, 2005). Details are given in Table 1.

Besides, the state has four river systems viz. Mahanadi, Godavari, Ganga and Narmada with their tributaries forming a network of 3,573 km.

2.3 Rivers

The state lies in the catchment areas of the rivers Mahanadi, Ganga, Narmada and Godavari. Mahanadi river originates at Pharsia village in South eastern corner of Raipur district of Chhattisgarh state. Chhattisgarh state contributes 56 per cent of catchment area of Mahanadi. The main tributaries of Mahanadi are Kharun, Arpa, Hasdeo, Silyari, Shivnath. Some parts of Chhattisgarh especially Bastar region forms catchment area for the river Godavari. The tributaries of Godavari are Indravati, Kotri and Sabri. The catchment of Ganga river is mainly in old Surguja district covering 14 per cent of the northern part of Chhattisgarh. The tributaries of Ganga in Chhattisgarh are Son, Rihand, Kankar, Rahar, Banas, Bizal etc. Narmada river, is one of the important westernly falling rivers of peninsular India. The river originates in the Amarkantak hills at an elevation of 1057 meters, above mean sea level, on the border of Pendra Road, Bilaspur district and Shahdol district of Madhya Pradesh. It drains in to the Gulf of Cambay.

2.4 Reservoirs

The newly carved out state of Chhattisgarh from Madhya Pradesh has a total of 1,616 reservoirs having an area of about 0.83 lakh hectare. Details are given in Table 2.

Table 1. Water resources in Chhattisgarh

Water sources	Available		Under use		%
	Number	Area (Lakh ha)	Number	Area (Lakh ha)	
Village ponds	52,211	0.70	41,168	0.552	78.85
Reservoirs	1,616	0.83	1,510	93.43	93.43
Total	53,827	1.53	42,678	1.335	87.25

Table 2. Number of reservoirs and its area in Chhattisgarh state

Category	Number	Area (ha)	Area (%)
Large	02	18,635	22.45
Medium	08	17,285	20.83
Small	1,606	47,080	56.72
Total	1,616	83,020	53.95

Source: Directorate of Fisheries, Raipur (Chhattisgarh)

Some of the important reservoirs in the state are: Ravishankar Sagar reservoir (locally known as Gangrel) (9540 ha at FRL), Tandula (4,410 ha), Kodar (3,583 ha), Manohar Sagar (3,257 ha), Kharkhara (2,975 ha), Kharang (2,760 ha), Hasdeobango (2510 ha), Murumsilli (2508 ha), Maniyari (2460 ha), Dudhawa (2510 ha), Sikasar (1862 ha), Gondli (1862 ha), Sondur (2085 ha), Khudia (1668 ha), Maroda, Dulher etc. All reservoirs are multipurpose but their main objective is irrigation. They are rich in faunal biodiversity.

2.5 Selection of study area

Out of 8 medium reservoirs, Dudhawa reservoir was selected for this study. Dudhawa reservoir harbours a variety of fish fauna. It is the first dam constructed across Mahanadi river at Dudhawa village in Kanker district. Dudhawa reservoir lies between 20°19' N latitude and 81°45' E longitude. The catchment area of the reservoir has rocky terrain, forest and pastures.

2.6 History of the Reservoir

The erection of Dudhawa dam was initiated in 1953-54 and consequently the Mahanadi was impounded in 1963-64 to emerge out as Dudhawa reservoir. The main purpose of constructing the reservoir was irrigation and to feed the Ravishankar Sagar reservoir. At first the reservoir was under the control of Madhya Pradesh State Fisheries Department for fishery purpose. Later on, in 1979 the reservoir was taken up by Fisheries Federation Madhya Pradesh. After the bifurcation of state in 2000, Dudhawa reservoir is now under the control of Fisheries Federation, Chhattisgarh. The detailed studies of the reservoir in relation to its fisheries were not undertaken by any source till 2005.

2.7 Crafts and Gears

Types of crafts and gears, used in the study area were recorded with the help of Fisheries federation.

2.8 Collection of Fish Specimen

Sampling was done from the collections at various landing centres. Fish specimen were collected during the period of August 2022 to February 2023.

2.8.1 Preservation of fish specimen

Preservation of fish specimen is necessary to confirm identification of fish species. The

collected fish specimen were preserved in 10% formaldehyde solution at the sampling site itself. Small fish specimen (less than 25 cm in total length) were preserved directly without injection or opening the visceral cavity. But larger specimen were preserved with the injection of preservative into the visceral cavity or slitting of abdomen for about 25% body length. Larger specimen (more than 25 cm in total length) were injected with 10% formaldehyde in the belly to prevent spoilage. The preserved specimen were stored in the plastic containers.

2.8.2 Identification of fish specimen

Identification of fish specimen was based on diagnostic characters such as body form, colour, size, shape and position of fins, meristic features such as the number of rays in a fin or the number of scales in a specific series, the presence of distinctive organs such as barbels, or the lateral line and various proportions such as the ratio of the length of the head to the total length of the body etc. Identification was performed on the basis of both fresh and preserved specimen. Fresh specimen were mainly used for colour and preserved specimen for morphometric and meristic characteristics. Samples were brought to the laboratory and then identified with the help of mentioned references (Day 1986, Datta Munshi and Shrivastava 1988, Talwar and Jhingran 1991, Jayaram 1994, Fish Base 2000).

2.8.3 Seasonal variation in fish catch

On the basis of recorded data by the Fisheries federation, Raipur (Chhattisgarh) and from the study area, seasonal variations in fish harvest were studied.

3. RESULTS

The results revealed that the Dudhawa reservoir harbours a variety of fish fauna which qualifies it as a freshwater site with exceptional fish biodiversity. In this context results of the present study have been delineated into two parts first part dealing with collection, identification of collected specimen and enlisting of the fish species recorded during the study period, while the second part deals with the discussion based on the previously recorded data provided by Fisheries federation, Raipur, Chhattisgarh.

3.1 Collection of Fish Specimen

The crafts used in the study area are mostly traditional and indigenous. Dugout boats of flat

bottom are used for fishing. They are usually meant for one to three persons. Locally available woods are used to construct the boat. The boats are locally known as "Donga" or "Dinghi". They are 12-15 feet long, 12-25 inches deep and only 16-20 inches wide with a draught of 3-6 inches only.

The gears used in the study area are as follows:

Gill nets: Gill nets are wall like net locally called as "Fasla Jaal". Gill nets having mesh size of 20 mm to 300 mm are used in the reservoir. Two types of gill nets are used: floating gill nets and stationary gill nets. The nets are made of nylon. It is kept hanging over night and taken out early morning.

Drag net: This net is perhaps, just a modification of an ordinary drag net, the modifications being that it is narrow, shorter and is supported by thin transverse wooden sticks. Its length is usually about 80 feet long with a width of 2 feet. It is known as "Khadijal". These nets are used on the periphery along the reservoir bank. Various mesh sizes are used viz. 75 mm, 100 mm and 150 mm. Two men operate this net and generally one or more persons are needed to drive the fishes towards the net.

Hooks: A single hook is attached to angling rod made up of bamboo stick with nylon cord. It is mostly used to catch cat fishes. Various sizes of hooks are used viz. 11, 13, 15, 16, 17 & 18. Hooks are locally called as "Banshi" or "Chhaddi" or "Ghirri".

Fish fauna: The fish specimen collected from the reservoir and identified in the Laboratory of KVK, Fish Farm. A total of 43 different species belonging to 5 orders, 13 families and 28 genera were recorded in the Dudhawa reservoir. Of the 43 species enlisted, one belongs to the order Clupeiformes, 32 belong to the order Cypriniformes (22 species of Cyprinidae, 2 species of Cobitidae, 2 species of Siluridae, 4 species of Bagridae, 1 species of Saccobranchidae and 1 species of Claridae), two species belong to the order Channiformes (2 species of Channidae), five species belong to the order Perciformes (2 species of Centropomidae, 1 species of Nandidae, 1 species of Anabantidae and one species of Gobiidae) and 3 species belong to the order Mastacembeliformes (3 species of Mastacembelidae). Among the Cyprinidae, *Catla catla*, *Cirrhinus mrigala*, *Labeo*

rohita are the dominant fishes. These three well known major crops of high culturable value are in fairly good numbers. Besides, *Labeo calbusa*, *Labeo bata*, *Cirrhinus reba*, *Puntius sarana*, *Puntius saphore* and *Danio devario* are also caught in bulk. Among the cobitidae: *Lepidocephalichthys guntae* and *Noemacheilus botia* are common. Among the catfishes, Siluridae with two species (*Ompok bimaculatus* and *Wallago attu*) dominated the catch, *Mystus aor*, *M. seenghala*, *M. cavassius* and *Rita rita* species of family Bagridae are also caught in fairly good numbers. *Chanda nama*, *Chanda ranga* (Centropomidae), *Nandus nandus* (Nandidae), *Macragnathus aculeatus*, *Mastacembelus armatus* and *M. Pancalus* (Mastacembelidae) and *Glossogobius giuris* (Gobiidae) are also common in catches. *Notopterus notopterus*, (Notopteridae), *Channa striatus* (Channidae), *Anabas testudineus* (Anabantidae), *Clarias batrachus* (Claridae) and *Heteropneustes fossilis* (Saccobranchidae) are rarely found in the catches. Among the catfishes, Siluridae with two species (*Ompok bimaculatus* and *Wallago attu*) dominated the catch, *Mystus aor*, *M. seenghala*, *M. cavassius* and *Rita rita* species of family Bagridae are also caught in fairly good numbers. *Chanda nama*, *Chanda ranga* (Centropomidae), *Nandus nandus* (Nandidae), *Macragnathus aculeatus*, *Mastacembelus armatus* and *M. Pancalus* (Mastacembelidae) and *Glossogobius giuris* (Gobiidae) are also common in catches. *Notopterus notopterus*, (Notopteridae), *Channa striatus* (Channidae), *Anabas testudineus* (Anabantidae), *Clarias batrachus* (Claridae) and *Heteropneustes fossilis* (Saccobranchidae) are rarely found in the catches.

4. DISCUSSION

The present study indicates that the Dudhawa reservoir, which is constructed across Mahanadi river at Dudhawa village in Kanker district harbours a variety of fish fauna. In the erstwhile state of Madhya Pradesh, a total of 210 species of fishes were recorded. However, after the formation of Chhattisgarh there is no record of the number of fishes present in the state. But rough estimate may be between 150 - 200 species, which may be available in the diverse aquatic systems of the state (Chari, 2002). Along with irrigation, Dudhawa reservoir also acts as feeder tank for Ravishankar Sagar reservoir, which is situated in Raipur district. In Ravishankar Sagar reservoir, a total of 48 species of fishes were recorded (Desai and Shrivastava, 2004). At present most of reservoir

water bodies are being used for stocking and harvesting of culturable fishes hence much attention has not been paid to the biodiversity of fishes. With limited time and resources available, all that could be attempted in this brief investigation was a fairly exhaustive survey of the fish fauna of this Dudhawa reservoir. A collection of fishes from the reservoir has been found to contain 43 well known species. The genera represented in the fish fauna are

Amblypharyngodon sp., *Barilius* sp., *Puntius* sp., *Labeo* sp., *Catla* sp., *Cirrhinus* sp., *Notopterus* sp., *Osteobrama* sp., *Chela* sp., *Garra* sp., *Salmostoma* sp., *Parluciosoma* sp., *Danio* sp., *Lepidocephalichthys* sp., *Noemacheilus* sp., *Ompok* sp., *Wallago* sp., *Mystus* sp., *Rita* sp., *Heteropneustes* sp., *Clarias* sp., *Channa* sp., *Chanda* sp., *Nandus* sp., *Anabas* sp., *Glossogobius* sp., *Macrognathus* sp. and *Mastacembelus* sp.

Table 3. Comparison of ichthyofauna reported by different workers in the Mahanadi Basin with present study

S.No.	Fish species	Hora (1940)	Jayaram (1976)	Om Prakash (2004)	Present study (2022-24)
Family	Clupeidae				
1	<i>Gonialosa manmina</i> (Ham.)	+	-	-	-
2	<i>Gudusia chapra</i> (Ham.)	-	-	+	-
Family	Ntopteridae				
3	<i>Notopterus chitala</i> (Ham.)	-	-	+	-
4	<i>Notopterus notopterus</i> (Pallas)	+	-	+	+
Family	Cyprinidac				
5	<i>Amblypharyngodon mola</i> (Ham.)	+	+	+	+
6	<i>Aspidoparia mora</i> (Ham.) <i>r</i>	+	-	-	-
7	<i>Barilius bendelisis</i> (Ham.)	+	+	+	+
8	<i>Barilius barna</i> (Ham.)	+	+	-	-
9	<i>Barilius barila</i> (Ham.-Buch.)	-	-	-	-
10	<i>Barilius vagra</i> (Ham.)	+	-	-	-
11	<i>Catla catla</i> (Ham.)	+	-	+	+
12	<i>Chela (Laubuca) laubuca</i> (Ham.)	-	+	-	+
13	<i>Cirrhinus mrigala</i> (Ham.)	-	-	+	+
14	<i>Cirrhinus reba</i> (Ham.)	-	-	+	+
15	<i>Ctenopharyngodon idella</i> (Val.)	-	-	+	-
16	<i>Cyprinus carpio</i> (Linn.)	-	-	+	-
17	<i>Danio aequipinnatus</i>	-	+	-	-
18	<i>Danio devario</i> (Ham.-Buch.)	-	-	+	+
19	<i>Danio (Brachydenio) rerio</i> (Ham.)	+	+	-	-
20	<i>Esomos danricus</i> (Ham.)	+	+	-	-
21	<i>Garra annandelei</i> (Hora)	-	-	+	-
22	<i>Garra gotyla gotyla</i> (Gray)	-	-	-	+
23	<i>Garra mullya</i> (Sykes)	-	+	-	-
24	<i>Gonoproktopterus kolus</i> (Sykes)	-	-	+	-
25	<i>Hypophthalmichthys molitrix</i> (Val.)	-	-	+	-
26	<i>Hypophthalmichthys nobilis</i> (Rich.)	-	-	+	-
27	<i>Labeo angra</i> (Ham.)	-	-	+	-
28	<i>Labeo bata</i> (Ham.)	+	-	+	+
29	<i>Labeo boga</i> (Bloch)	-	-	+	+
30	<i>Labeo boggut</i> (Sykes)	-	+	+	+
31	<i>Labeo calbasu</i> (Ham.)	-	-	+	+
32	<i>Labeo fimbriatus</i> (Bloch)	-	-	-	-
33	<i>Labeo gonius</i> (Ham.)	-	-	+	+
34	<i>Labeo rohita</i> (Ham.)	+	-	+	+
35	<i>Orichthys cosuatus</i> (Ham.)	-	+	-	-
36	<i>Osteobrama cotio</i> (Ham.)	+	-	+	+
37	<i>Osteobrama vigorsii</i> (Sykes)	-	-	-	+
38	<i>Parluciosoma daniconius</i> (Ham.-Buch.)	+	+	+	+

S.No.	Fish species	Hora (1940)	Jayaram (1976)	Om Prakash (2004)	Present study (2022-24)
39	<i>Puntius chola</i> (Ham.)	-	-	+	+
40	<i>Puntius dorsalis</i> (Jerdon)	-	+	+	+
41	<i>Puntius gelius</i> (Ham.)	+	+	-	-
42	<i>Puntius guganio</i> (Ham.)	-	+	-	-
43	<i>Puntius phutunio</i> (Ham.-Buch.)	-	-	-	-
44	<i>Puntius sarana</i> (Ham.-Buch.)	+	+	+	+
45	<i>Puntius saphore</i> (Ham.)	+	+	+	+
46	<i>Puntius tetrapagus</i> (McClelland)	-	+	-	-
47	<i>Puntius ticto</i> (Ham.)	+	+	+	+
48	<i>Salmostoma bacaila</i> (Ham.)	+	+	+	+
49	<i>Salmostoma phulo</i> (Ham.-Buch.)	-	-	-	-
Family	Amblycepidae				
50	<i>Amblyceps mangois</i> (Ham.)	-	+	-	-
Family	Cobitidae				
51	<i>Lepidocephalichthys guntea</i> (Ham.)	+	+	+	+
52	<i>Noemacheilus botia</i> (Ham.)	-	+	+	+
53	<i>Noemacheilus denisonii</i> (Day)	+	+	-	-
Family	Siluridae				
54	<i>Ompok bimaculatus</i> (Bloch)	+	-	+	+
55	<i>Wallago attu</i> (Bl. & Schn.)	+	-	+	+
Family	Bagridae				
56	<i>Mystus (Aorichthys) aor</i> (Ham.)	-	+	+	+
57	<i>Mystus (Aorichthys) seenghala</i> (Sykes)	+	-	+	+
58	<i>Mystus bleekeri</i> (Day)	-	-	+	-
59	<i>Mystus cavassius</i> (Ham.)	+	+	+	+
60	<i>Mystus tengara</i> (Ham.)	+	+	+	-
61	<i>Mystus vittatus</i> (Bloch)	+	+	+	-
62	<i>Rita rita</i> (Ham.)	-	-	+	+
63	<i>Rita chrysea</i> (Day)	+	-	-	-
Family	Sisoridae				
64	<i>Bagarius bagarius</i> (Ham.)	+	+	-	-
65	<i>Eriethistes hara</i> (Ham.)	-	+	-	-
66	<i>Gagata cenia</i> (Ham.)	+	-	-	-
Family	Schilbeidae				
67	<i>Ailia coila</i> (Ham.)	+	-	-	-
68	<i>Clupisoma bastari</i> (Datta & Karmarkar)	-	-	-	-
69	<i>Clupisoma garua</i> (Ham.)	+	-	-	-
70	<i>Eutropiichthys vacha</i> (Ham.)	-	-	+	-
71	<i>Pseudeotropis atherinoedes</i> (Bloch)	-	+	+	-
Family	Pangasiidae				
72	<i>Pangasius pangasius</i> (Ham.)	-	-	+	-
Family	Saccobranchidae				
73	<i>Heteropneustes fossilis</i> (Bloch)	-	+	+	+
Family	Claridae				
74	<i>Clarias batrachus</i> (Linn.)	-	+	+	+
Family	Belontiidae				
75	<i>Xenentodon cancila</i> (Ham.)	+	+	+	-
Family	Mugilidae				
76	<i>Rhinomugil corsula</i> (Ham.)	+	-	+	-
Family	Channidae				
77	<i>Channa gachua</i> (Ham.)	-	+	+	-
78	<i>Channa marulius</i> (Ham.)	-	-	+	-
79	<i>Channa orientalis</i> (Bl. & Schn.)	-	-	-	-
80	<i>Channa punctus</i> (Bloch)	+	+	+	+

S.No.	Fish species	Hora (1940)	Jayaram (1976)	Om Prakash (2004)	Present study (2022-24)
81	<i>Channa striatus</i> (Bloch)	+	+	+	+
Family	Centropomidae				
82	<i>Chanda nama</i> (Ham.)	+	-	+	+
83	<i>Chanda ranga</i> (Ham.)	+	+	+	+
Family	Nandidae				
84	<i>Badis badis</i> (Ham.)	+	+	-	-
85	<i>Nandus nandus</i> (Ham.)	-	+	+	+
Family	Cichlidae				
86	<i>Oreochromis mossambica</i> (Peters)	-	-	+	-
87	<i>Oreochromis niloticus</i> (Linn.)	-	-	+	-
Family	Anabantidae				
88	<i>Anabas oligolepis</i> (Bleeker)	-	-	+	-
89	<i>Anabas testudineus</i> (Bloch)	-	-	+	+
90	<i>Colisa fasciatus</i> (Bl.& Schn.)	-	-	+	-
Family	Gobiidae				
91	<i>Glossogobius giuris</i> (Ham.)	+	+	+	+
Family	Mastacembelidae				
92	<i>Macrogathus aculeatus</i> (Bloch)	+	+	+	+
93	<i>Mastacembelus armatus</i> (Lacepede)	+	+	+	+
94	<i>Mastacembelus pancalus</i> (Ham.)	+	+	+	+
Total		42	48	64	43

+ = Reported; - = Not reported

An analysis of the fishes enlisted shows that 69.76 per cent of the species belong to the single order viz., Cypriniformes. Out of 43 species only Cyprinidae family contributes about 51.16 per cent species. The analysis further shows that 11.62 per cent of the species belong to the order Perciformes, 6.97 per cent of species belong to the order Mastacembeliformes, 4.65 per cent to Channiformes and 2.32 per cent of the species belong to the order Clupeiformes. At least 53.48 per cent of the fishes enlisted are of considerable economic importance. The economically important fishes are: *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala*. Other economically important fishes are: three species of *Mystus* sp., two species of *Channa* sp., two species of *Mastacembelus* sp. and single species of *Ompok* sp., *Wallago* sp., *Rita* sp., *Heteropneustes* sp. and *Clarias* sp. There is a regular availability of *Catla catla*, *Labeo rohita*, *Mystus aor*, *Ompok bimaculatus* and *Wallago attu* from the reservoir. Perusal of this data shows that of the 43 species reported in the present study, 23 species were found common with the earlier three reports of Mahanadi river basin. They are *Notopterus notopterus*, *Amblypharyngodon mola*, *Barilius bendelisis*, *Catla catla*, *Labeo rohita*, *L. bata*, *Parluciosoma daniconius*, *Puntius sarana*, *P. saphore*, *P. ticto*, *Salmostoma bacaila*, *Lepidocephalichthys guntea*, *Ompok bimaculatus*, *Wallago attu*, *M. seenghala*, *M. cavassius*, *Channa striatus*, *Chanda nama*, *Chanda ranga*,

Glossogobius giuris, *Mastacembelus armatus* and *M. pancalus*.

In the present study, along with Hora and Jayaram studies, (Hora, 1940, Jayaram, 1994) the common 15 species are *Amblypharyngodon mola*, *Barilius bendelisis*, *Puntius saphore*, *P. sarana*, *P. ticto*, *Salmostoma bacaila*, *Mystus aor*, *Lepidocephalichthys guntea*, *M. cavassius*, *Channa punctatus*, *Chanda nama*, *Glossogobius giuris*, *Mastacembelus armatus*, *M. pancalus* and *Macrogathus aculeatus*. If the present study is compared with Hora, (1940), the common species in all six are *Labeo boggut*, *Puntius chola*, *Heteropneustes fossilis*, *Nandus nandus*, *Noemacheilus botia* and *Clarias batrachus*. If the present study is compared with Jayaram (Jayaram, 1976), the common species in all eight are *Notopterus notopterus*, *Mystus seenghala*, *Channa striatus*, *Chanda nama*, *Labeo rohita*, *Catla catla*, *Osteobrama cotio* and *Labeo bata*. The commercially important culturable fish species like *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* did not exist in Mahanadi during 1940, while in 1976 Jayaram recorded *Catla catla* and *Labeo rohita* in this river. Present study when compared with that of Omprakash (Omprakash, 2004), a total of 41 species were found common in both. The species which were not recorded by Omprakash are *Garra gotyla* and *Chela laubuca*. Tallying the present work with the Jayaram, the following species were found not to

be available namely; *Gonialosa manmina*, *Aspidoparia mora*, *Barilius barna*, *B. bagra*, *Danio rerio*, *Esomos danricus*, *Puntius gelius*, *Mystus tengara*, *Rita chrysea*, *Bagarius bagarius*, *Gagata cenia*, *Ailia coila*, *Clupisoma garua*, *Xenentodon cancila*, *Rhinomugil corsula* and *Badis badis*. The fishes reported by Desai (Desai et al. 2004) Ravishankar Sagar reservoir has been compared with fauna of the Dudhawa reservoir (Table 3). Critical observation of this data revealed that 32 species were found common in both reservoirs. The fish species which were recorded in Ravishankar Sagar reservoir but not recorded in Dudhawa reservoir are *Gudusia chapra*, *Labeo fimbriatus*, *Osteobrama vigorsii*, *Puntius ambassis*, *P. phutunio*, *Salmostoma phulo*, *Aspidoparia morar*, *Barilius barila*, *Esomus danricus*, *Nemacheilus sp.* *Mystus bleekeri*, *M. vittatus*, *Clupisoma sp.*, *Xenentodon cancila* and *Rhinomugil corsula* are not recorded in the present study reported by Desai et al. (2004). The following species were not recorded in Ravishankar Sagar reservoir: *Labeo boga*, *L. boggut*, *Puntius chola*, *P.*

dorsalis, *Noemacheilus botia*, *Rita rita* and *Mastacembelus pancalus* but recorded in the present study. There was no impoundment of Mahanadi when Hora and Jayaram conducted their studies. However, the river was impounded in Orissa (Hirakud reservoir) and in erstwhile Madhya Pradesh (Ravishankar Sagar Reservoir). The total number of species recorded by Hora and Jayaram are bound to vary. Such huge variation in all the reports suggest that human intervention along with development activities are interfering with fish habitats leading to fast replacement of species.

4.1 Fishery Status

Primary data related to fish production, species abundance in catch of the reservoir were collected from the Fisheries Federation, Raipur. Based on the above data, yearly and monthly variations in fish yield, catch composition, correlation between major carps stocking and yield. Productivity of the reservoir were studied. Data collected are presented in Table 4.

Table 4. Comparison of fish fauna of Ravishankar Sagar and Dudhawa reservoir

S. No.	Species	CIFRI Project (87-93) (Ravishankar Sagar reservoir)	Present study (2022-24) (Dudhawa reservoir)
Notopteridae			
1.	<i>Notopterus notopterus</i> (Pallas)	+	+
Clupeidae			
2.	<i>Gudusia chapra</i> (Ham-Buch)	+	-
Cyprinidae			
3.	<i>Catla catla</i> (Ham-Buch)	+	+
4.	<i>Cirrhinus mrigala</i> (Ham-Buch)	+	+
5.	<i>Cirrhinus reba</i> (Ham- Buch)	+	+
6.	<i>Labeo boga</i> (Bloch)	-	+
7.	<i>Labeo bata</i> (Ham-Buch)	+	+
8.	<i>Labeo boggut</i> (Sykes)	+	-
9.	<i>Labeo calbasu</i> (Ham-Buch)	+	+
10.	<i>Labeo fimbriatus</i> (Bloch)	+	-
11.	<i>Labeo gonius</i> (Ham-Buch)	+	+
12.	<i>Labeo rohita</i> (Ham-Buch)	+	+
13.	<i>Osteobrama cotio cotio</i> (Ham-Buch)	+	+
14.	<i>Osteobrama vigorsii</i> (Sykes)	+	-
15.	<i>Puntius ambassis</i> (Ham-Buch)	+	-
16.	<i>Puntius phutunio</i> (Ham-Buch)	+	-
17.	<i>Puntius sarana sarana</i> (Ham-Buch)	+	+
18.	<i>Puntius saphore</i> (Ham-Buch)	+	+
19.	<i>Puntius ticto</i> (Ham-Buch)	+	+
20.	<i>Puntius chola</i> (Ham)	+	-
21.	<i>Puntius dorsalis</i> (Jerdon)	+	-
22.	<i>Chela laubuca</i> (Ham-Buch)	+	+
23.	<i>Salmostoma bacaila</i> (Ham-buch)	+	+

S. No.	Species	CIFRI Project (87-93) (Ravishankar Sagar reservoir)	Present study (2022-24) (Dudhawa reservoir)
24.	<i>Salmostoma phulo</i> (Ham-buch)	+	-
25.	<i>Amblypharyngodon mola</i> (Ham-Buch)	+	+
26.	<i>Aspidoparia morar</i> (Ham-Buch)	+	-
27.	<i>Barilius berila</i> (Ham-Buch)	+	-
28.	<i>Barilius bendelisis</i> (Ham-Buch)	+	+
29.	<i>Danio devaria</i> (Ham-Buch)	+	+
30.	<i>Esomus danricus</i> (Ham-buch)	+	-
31.	<i>Parluciosoma danricus</i> (Ham-Buch)	+	+
32.	<i>Garra gotyla gotyla</i> (Gray)	+	+
Balitoridae			
33.	<i>Nemacheilus sp.</i>	+	-
Cobitidae			
34.	<i>Noemacheilus botia</i> (Ham.)	+	-
35.	<i>Lepidocephalus guntea</i> (Ham-Buch)	+	+
Bagridae			
36.	<i>Aorichthys aor</i> (Ham-Buch)	+	+
37.	<i>Aorichthys seenghala</i> (Sykes)	+	+
38.	<i>Mystus bleekeri</i> (Day)	+	-
39.	<i>Mystus cavassius</i> (Ham-Buch)	+	+
40.	<i>Rita rita</i> (Ham.)	+	-
41.	<i>Mystus vittatus</i> (Ham-Buch)	+	-
Siluridae			
42.	<i>Ompok bimaculatus</i> (Bloch)	+	+
43.	<i>Wallago attu</i> (Schneider)	+	+
Schibeidae			
44.	<i>Clupisoma sp.</i>	+	-
Belonidae			
45.	<i>Xenentodon cancila</i> (Ham-Buch)	+	-
Ambassidae			
46.	<i>Chanda nama</i> (Ham-Buch)	+	+
47.	<i>Pseudambassis ranga</i> (Ham-Buch)	+	+
Nandidae			
48.	<i>Nandus nandus</i> (Ham-Buch)	+	+
Mugilidae			
49.	<i>Rhinomugil corsula</i> (Ham-Buch)	+	-
Gobiidae			
50.	<i>Glossogobius Giuris</i> (Ham-Buch)	+	+
Channidae			
51.	<i>Channa sp.</i>	+	-
52.	<i>Channa punctatus</i>	-	+
53.	<i>Channa striatus</i> (Bloch)	+	+
Mastacembelidae			
54.	<i>Macrognathus pancalus</i> (Ham-Buch)	+	+
55.	<i>Mastacembelus armatus</i> (Lacepede)	+	+
56.	<i>Mastacembelus pancalus</i> (Lacepede)	-	+

+ Recorded; - Not recorded

5. CONCLUSION

In present study, 43 fish species were classified under 5 orders, 13 families and 28 genera. Analysis of different species reveals that 69.76% of them belong to a single order, Cypriniformes. The analysis of the fishes listed showed that 6.97 % species belong to order Mastacembeliformes, 11.62% belong to order Perciformes, 4.65% belong to order Channiformes and 2.32% species belong to order Clupeiiformes. Statistical analysis of data reveals no correlation between stocking and yield of the reservoir. Fish species in the Dudhawa reservoir were broadly categorized into four group *i.e.* major carps, catfishes, minor fish and minnow's fish. A high yield of major carp's fishery (26728 kg) was obtained in November. However, catfish fishery fluctuated between 2400.5 kg in August to 9063 kg in March. Bulk of minnows fishes (23.33%-56.6%) were recorded in drag netting may be due to reduced water level during summer (February to May, 2023).

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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