

The study on Ichthyofaunal diversity in Chhattisgarh

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Abstract: In the context of massive loss of biodiversity, conservation of fresh water fauna has received increasing attention in recent times. Hence, assessment of the aquatic biodiversity and potential for the exploitation of natural resource of Chhattisgarh is attempted. Chhattisgarh state has 27 districts, in which 8 districts (Raipur, Dhamtari, Mahasamund, Raigarh, Rajnandgaon, Bastar, Kanker, Janjgir Champa), which were selected for the study purpose. Fish diversity studies are done in the four river basins viz., (i) Basin of Mahanadi proper (ii) Indrāvati river basin (iii) Sheonath river basin and (iv) Hasdeo river basin. The basin of Mahanadi river proper, Indrāvati river basin, Sheonath river basin and Hasdeo river basin includes the major area of Chhattisgarh districts flowing through it. In this paper, a study is presented about ichthyofaunal diversity in a Chhattisgarh state including 8 districts with 4 major river basins and discussed the different species of fish which are available on rivers and ponds, tanks, reservoirs etc. The classification is done according to river basins and district wise to understand better ichthyofauna of the state.

Index Terms - diversity indices, fish fauna, Raipur, Mahanadi, Sheonath, Indrāvati, Hasdeo.

I. INTRODUCTION

"Biodiversity" is the term used to summarize many facts about the diversity of life. Biodiversity refers to the species of plants, animals and micro-organisms, to their different communities, which form and to the diversity of the genes they contain. Biodiversity also refers to the natural biological process that occurs within ecosystems that support species richness and genetic diversity. This diversity may be in immediate ecological timeframe or in longer-term evolutionary time frames. The concept of biodiversity includes terrestrial environments and other aquatic environments. The latter includes rivers, streams, wetlands, groundwater and marine systems.

Fish biodiversity is subject to changes in land and water that result in substantial losses and the rest may be at risk. Even dreamlike species must live in more difficult and more variable conditions and can undergo an extraordinarily common stress when a reservoir is formed that determines the survival of those species, which adapt to the new environment. Therefore, the biodiversity of fish in artificial basins is usually not as large as in natural waters. Natural waters have more stable conditions in which fish evolve, so the recruitment of biodiversity and its distribution over time and space become important. Until we know the diversity and variation in time and space, it is difficult to plan conservation and development projects related to water resources.

The Chhattisgarh has been blessed with a number of natural resources, including productive water in the form of rivers, reservoirs, reservoirs, etc. Its main tributaries are Kharun, Arpa, Hasdeo, Seonath, Sabari, Indravati, Sone and Tanda.

Knowledge of the diversity of fish in a particular region is essential not only for the rational management of the fish fauna of that region, but also for its conservation strategies. Furthermore, for the exploitation and scientific development of aquaculture, knowledge of the existing fish fauna in the area is a prerequisite. Although a large number of workers have studied ichthyofauna of lactic and lunatic waters of the various dream systems. However, not much is known about the recent state of fish diversity in the lactic and lunatic water bodies of the different districts of the state of Chhattisgarh.

II. RELATED WORK ON ICHTHYOFAUNAL DIVERSITY IN C.G.

The review of literature on the work done in the past is essential to understand the problem in depth, which provides necessary guidelines as well as feedback for the fulfillment of objectives of the study. Various workers have worked on diversity of fishes in India. However, few references are there on the fish diversity in Chhattisgarh. A brief account of relevant work done in Chhattisgarh is as follows:

Hora (1938) reported a collection of fish from the State Bailadila range, Bastar, central province. The Bailadila mountain range is located south of the river Indravati, a tributary of the Godawari, and to the center of the state of Bastar from north to south. This collection was made by four different flows and took note of the ecological conditions of its waters. *Danio aequipinnatus* (McClelland), *Slender Rasbora* (Hamilton), *Garra mullya* (Sykes), *parapsilorhynchus tentaculatus* (Annandale) *Barbus Tičić* (Hamilton), *Nemachilus Dayi* (*Nemachus*) *Nemachus* (: in this collection were obtained 13 species of fish from places several days), *Glyptothorax dekhaniensis* (Günther), *ophiocephalus gachua* (Hamilton), *Mastacembelus armatus* (Lacepedi), *Barbus amphibius* (Cuvier and Valenciennes) *Barbus pinnauratus* (day), *Nemachilus Botia var aureus* (day). Among the 13 species of fish obtained, *Mastacembelus armatus*, *Danio aequipinnatus*, *Snella Rasbora*, *Barbus ticto* and *ophiocephalus gachua* are widely distributed throughout India. The remaining species are generally limited to peninsular, but its presence in the state of Bastar deserves special attention. He noted that the fish fauna of the Bailadila mountain range has a close affinity with Satpurus and Western Ghats. [1]

Motwani and David (1957) reported on the fish of the river Sone, a tributary of the Ganges River that originates in the nearby Pendra plateau in Chhattisgarh. The fish fauna of the Sone river 70 miles upstream from its confluence with the river Ganges was

mainly of the Ganges and, therefore, predominantly Himalayas. Most of the species represented in the collection have been widely distributed in India. It is significant that the peninsular forms such as boopis Oxygaster (Day), Puntius amphibius (Val.), Tor khudree (Sykes), Labeo fimbriatus (Bloch) and boggut Labeo (Sykes) also recorded for some time (1949) by Rihand near Pipri. They were not observed by Motawani and David (op.cit.). Time (1949) also divided the fauna of the Rihand into 3 zoogeographic categories, namely, (i) common species in peninsular India and Ceylon (tor khudree and Puntius amphibius, (ii) the species widely distributed in peninsular India (boopis Chela, claw mullya, boggut Labeo, Nemachilus dayi and Nemachilusdenisonii) and (iii) species of limited distribution in India (Amblyceps mangois, Laguvia rebeiroi, Glyptothorax annandalei, Glyptothorax Horai, Cenia gagata, Crossochilus latius). river has been found soil of peninsular forms. [2]

Jayaram et al. (1976) worked on the Mahanadi drainage system in Orissa and Madhya Pradesh in a section extending from Cuttuck to Seorinarayan, a distance of about 350 km. 42 species have been recorded, some of which are still alive above and below the Hirakud dam. Taxonomic notes have been provided on some interesting species. Osteobrama cotio and Sila Peninsularies are first recorded in this fluvial system. [3]

Datta and Karmakar (1980) and Karmakar and Datta (1981) also reported 100 species belonging to 45 genera and 19 families of the sources of the Godawari and Mahanadi river systems, ie Indrawati, Sabari, Mahanadi, Dudhnadi and Kokri (Bhor) rivers and lakes. Tanks and other water bodies in the Bastar Chhattisgarh region. Indicating the presence of Deccan endemic fish in the district of Bastar with two new species, Clupisoma Bastari and Puntius Saberi. [4]

Vardia (1991) has conducted a study of fish fauna in the river that flows through Indravati since its inception in the district of Bastar di Orissa of Kalahan up to the confluence with the river Godawari and reported 49 species. The main fish found are catla catla, cirrhinus mrigala, Labeo Rohita, Cyprinus carpio, two-colored Anguilla, Mastacembalus aaculeatum, buchanani Rita, Rita chrysea, Rita hustata, Silundia silundia and Tor Tor. [5]

Om Prakash (2004) studied the status of fish biodiversity in the northern part of the Raipur district (C.G.) India. He has documented 64 species belonging to 40 genera, 19 families and 7 orders of 23 sampling sites. In their study, reported 18 new species of fish (including 6 exotic), which has not been reported previously (Time, 1940, Jayaram and Majumdar, 1979). The family Cyprinidae with 27 species formed the largest in this group ictiofauna region. [6]

Manoj Kumar (2005) reported 43 species of fish belonging to 28 genera, 13 families and 5 Dhudhawa tank orders. The order Cypriniformes with 32 species represented 68.76%, followed by Perciforms contributing 11.62%, contributing Synbranchiformes (6.97%), Channiformes (4.65%) and Clupeiformes (2.32%) of the total fish fauna. [7]

Singh and Chari (2006) identified 59 species belonging to 38 genera, 19 families and 7 orders in the Kharun river, an important tributary of the Mahanadi river system. The fish fauna was collected in the Kharun river basin in the Raipur district. 59 catla sampling sites, cirrhinus mrigala, Channa gachua and Mastacembelus armatus have found. The family Cyprinidae with 23 species formed the largest of the fish fauna of the Kharun group. [8]

Singh et al. (2006) recorded the fish fauna of the Mahanadi river sink and Mahanadi itself seven sampling sites in the Raipur district from January to July 2004. A total of 53 species belonging to 7 orders, 17 families, 34 genera were registered in this region. Of these 53 species, Notopterus Notopterus, Labeo Rohita, pethia ticto, Puntius Chola, catla catla, herbivorous carp, Cyprinus carpio, Aristichthys nobilis, Rita rita, Oreocromis mossambica, Mystus cavasius and Mystus Tengra have been found in most places. The family of cyprinids with 19 species is the largest of the Mahanadi ictiofauna basin, contributing to 35% of the total ictiofauna group. The second largest family is the Bagridae which shares 11% of the total icufauna. [9]

Dev (2008) studied the state of fish biodiversity in the Durg (CG) district of India and recorded a total of 61 species of fish belonging to 37 genera, 18 families and 6 orders 12 sampling sites together with a new species Even the turtledove is enlisted. He recruited 61, 43, 45 species of fish from the Sheonath River basin, Tandula and Kharun, respectively. The Cyprinidae family with 26 species is the largest group in the Durg district's fish fauna. The researcher also identified sixteen possible species of fish for ornamental purposes. [10]

Kolhe (2012) conducted studies on the status of fish biodiversity in the water resources of the Rajnandgaon district in the state of Chhattisgarh. In his study, he recorded a total of 63 species belonging to 37 genera, 20 families and 7 orders of 14 sampling sites with seven new species: Crossocheilus latius, Colisa lalia, dyocheilus Labeo, Pseudambassis lala, Puntius amphibio and Ompok Pabda. The rivers Seonath, Baghnadi, Kotrinadi, Pairynadi and Aamer have 59, 46, 48, 45 and 44 species of fish, respectively. The Cyprinidae family with 26 species is the largest group in the fish fauna of the Rajnandgaon district. Similarly, the threat of 10 species was assessed according to the NBFGR criteria, two of which are in danger of extinction and eight vulnerable species. [11]

Patel (2012) observed the status of fish biodiversity in the aquatic resources of the Raigarh district in Chhattisgarh, India. A total of 61 species of 41 genera, 22 families and 7 orders were registered. murius Eutropiichthys, Gagata gagata, Johanius gangaticus, Ompak Pabda and Tor putitora: five new registered participants. In this study 54 species Mahanadi, 30 and 37 of the Kelo Mand river, dam 24 in Chinkari and 18 in the Kodar dam and 14, 12, 14 pools Chhapora and Kodatarai Pussore respectively were registered. [12]

Tamboli and Jha (2012) reported on the state of diversity feline river fish in Kelo and district of Raigarh Mand, CG, India. They recorded 17 species of catfish of 12 genera and 6 families during the period from July 2010 to March 2011, when the rivers had enough water. [13]

Choubey and Qureshi (2013) biodiversity study of the heptofauna CG Rajnandgaon District, India. A total of forty-five species from different sampling stations were collected. The fish species collected were classified into 6 orders, 15 families and 32 genera. Cyprinidae family Cypriniformes end consists of 5, 9 Siluridae, Bagridae, Saccobranchidae and Clariidae dominant group. The main fish found are catla catla, cirrhinus mrigala, Labeo Rohita, Cyprinus carpio, Clarius batrachus and Oreochromis mossambicus. [14]

III. RESEARCH METHODOLOGY

This section deals with the description of the study area, criteria of sampling, site selection, details of sampling sites and methods of collection of samples, preservation of fish specimen, etc. Following figure 1 gives the overview of research methodology which has been used to accomplish ichthyofaunal study on certain geographical region generally.

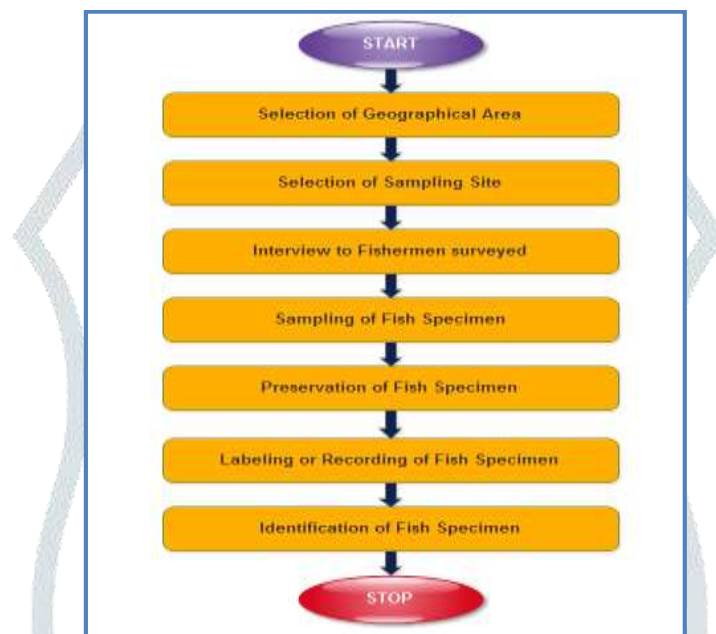


Figure 1: Research Methodology

(a). Selection of the study area

The Chhattisgarh State has 27 revenue districts, out of which 8 district are selected for this study.

(b). Selection of sites

The selection of sites belongs to Mahanadi, Sheonath, Indrāvati and Hasdeo River basins.

(c). Interview of fishermen

The survey was done based on a fixed questionnaire. Primary data was collected through personnel interviews of the farmers pertaining to water bodies, fish species, their abundance etc. in the sampled area where direct fish sampling was not possible.

(d). Sampling of fish specimen

Sampling was done in two ways:

- (1) By Nets:- The fish specimen were sampled from their natural habitats.
- (2) By Market:- The local fish market village haats were also visited and specimen procured.

(e). Preservation of fish specimen

Preservation of fish specimen was necessary to confirm identification of fish species. The collected fish specimen was preserved in 10% formaldehyde solution at the sampling site itself. The preserved specimen was stored in the plastic containers.

(f). Labeling or recording of fish specimen

Every sample was labeled and entered in a field diary against a number. These details included locality, date and time of collection and other related information of specimen.

(g). Identification of fish specimen

Identification of fish specimen was based on diagnostic characters such as body form, color, 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 scales in a specific series, the presence of distinctive organs such as barbless, 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.

IV. RIVER SYSTEMS IN CHHATTISGARH

Chhattisgarh is rich in ichthyofauna because four major river basins pass through it, viz. the Mahanadi proper, Indravati, Sheonath and Hasdeo. Most of the area is plain land and lies in Chhattisgarh plains. The extreme eastern area bordering Mahasamund, Raigarh, Janjgir Champa is full of forest, which adds to the productivity of water in the river Mahanadi.

(a). Basin of the Mahanadi river proper

The Mahanadi is an important river system of the state of Chhattisgarh with a total length of 857 km, of which 286 km are in the state of Chhattisgarh. Seventy-five percent of the Chhattisgarh is located in the Mahanadi River basin. The Mahanadi River originates in the Sihawa Hills in the Dhamtari district of Chhattisgarh at an altitude of 2,200 feet. After crossing a short distance from its source, it enters the district of Kanker and then turns north and enters the district of Dhamtari again. The Mahanadi River enters the Raipur district near Navapara (Rajim). Two tributaries Paury and Sondur join Mahanadi in Rajim. This is called as a prayer of the Chhattisgarh. After crossing the district of Raipur, it enters the district of Janjgir-Champa, near Deorghata (Bhuigaon), where another tributary of Sheonath joins. The Hasdeo near Deori (Kera) and Mand near Mahadeopali (Chandrapur) will be joined later. The main tributaries of the left bank of the Mahanadi are: Sheonath, Hasdeo, Borai, Mand and Kelo. The tributaries on the right bank are: Sondur, Paury, Sukha, Jonk and Lath. 75 different species of fish collected in the Mahanadi River.

(b). The Hasdeo river basin

The Hasdeo River is one of the main tributaries of the Mahanadi River. It comes from the Ramgarh hill in the district of Korea. The main tributaries of Hasdeo are Gej, Atam, Ahiron and Chorni. It runs 176 km in the state of Chhattisgarh with a drainage area of 7,210 km² which flows into the districts of Korea, Bilaspur, Korba and Janjgir-Champa. Hasdeo covers 90 km in the Janjgir-Champa district. It flows from north-west to south and joins the Mahanadi river near Kera Deori, 12 km before Seorinarayan. 56 different species of fish collected in the Hasdeo River.

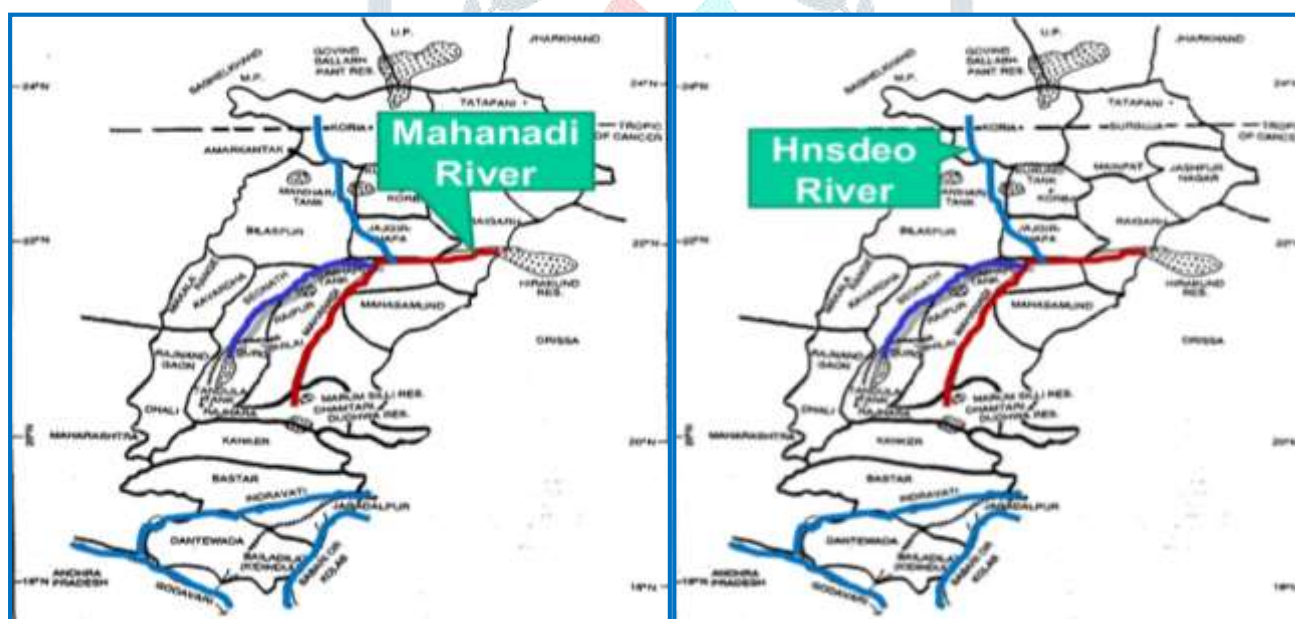


Figure 2: (a) Mahanadi River (b) Hasdeo River Basins

(c). Sheonath river basin

The Sheonath River (or Sheonath River) is the longest tributary of the Mahanadi River, which is joined to Khargahni in the Bilaspur district in Chhattisgarh, India. It has a total distance of 290 kilometers (180 miles). The name comes for the god Shiva in Hinduism. Sheonath originates from the hill of Panabaras, at 624 meters (2,047 feet) above sea level, in the Ambargarh Chowki division of the Rajnandgaon district of Chhattisgarh. The river flows 300 kilometers northeast (190 miles) from its source and joins the Mahanadi River near the town of Shivrinarayan. 59 different samples of fish collected in the Sheonath river.

(d) Indrāvati river basin

The Indravati River reaches a height of 914 meters (2,999 feet) in the Odisha district of Kalahandi, on the western slopes of the eastern Ghats. It flows west through the districts of Kalahandi, Nabarangapur and Koraput for 164 kilometers (102 mi) and after forming the border between the states of Odisha and Chhattisgarh of 9.5 kilometers, enters the district of Bastar of Chhattisgarh. After traveling 233 kilometers (145 miles) to Chhattisgarh, it turns south and flows along the Chhattisgarh and Maharashtra

boundary for about 129 kilometers (80 miles) and joins the Godavari river at the intersection of the states of Maharashtra, Chhattisgarh and Telangana. 74 samples of different fish collected from the river Indravati.

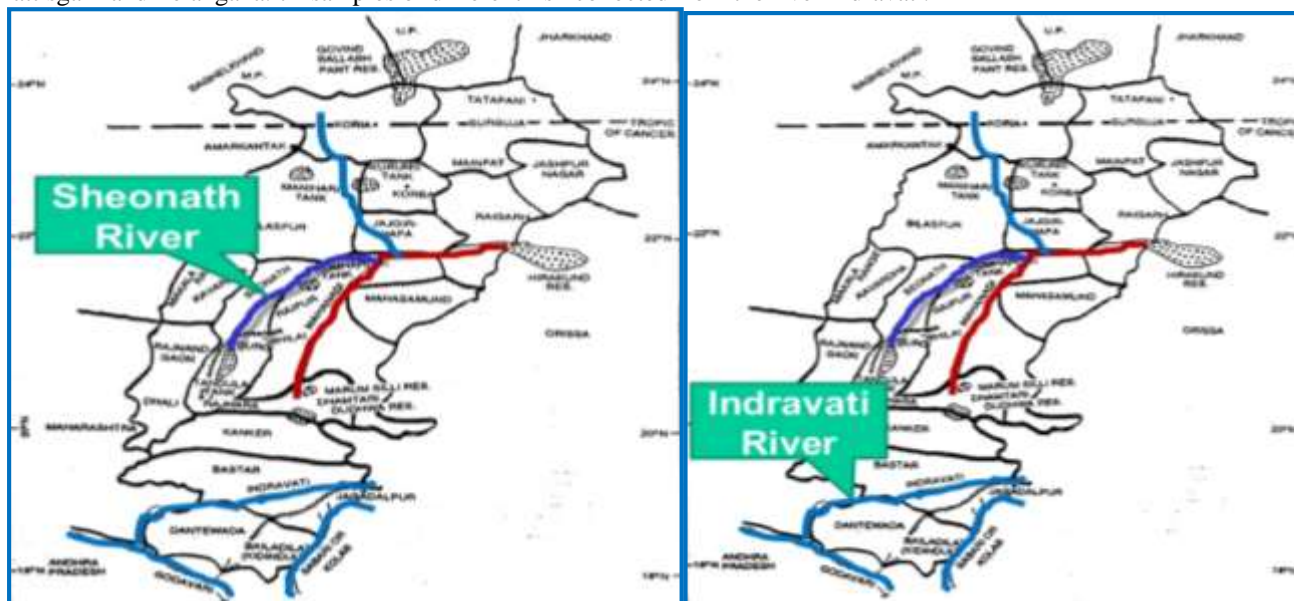


Figure 3: (a) Sheonath River (b) Indravati River Basins

When individual fish species was compared amongst various sampling sites in different river basins, the frequency of occurrence differed significantly. Frequency distribution was calculated for individual river basins are as follows:

$$\text{Frequency Distribution} = (\text{Presence of Fish Species in number of Sites}) / (\text{Total number of sampling sites in a basin}) \times 100$$

Frequency distribution helps us to know that which species is available on all sampling sites or one/more sampling sites. Hundred percent occurrence shows that the specific species is available at all sampling sites i.e. through the river course.

Following figure 4 & 5 shows the some of different fish species belonging to different family and genera found in river basins of Chhattisgarh.



Figure 4: Features of Fish Species



Figure 5: Features of Fish Species

V. DISCUSSION

The districts wise fish fauna diversity is discussed in this section.

(1) Bastar District

This was on the basis of catchments of four rivers present in the area. Four zones are (i) Indravati basin (ii) Narangi basin (iii) Markandey basin and (iv) Mungabaha basin.

Sampling site for Indravati basin includes Dalpat Sagar reservoir, Gangamunda reservoir, Jagdalpur anicut on Indravati river, Jagdalpur Fish Market, Lohandiguda fish market, Chitrakot fish landing centre, Burungpal reservoir and Karanji talab. Sampling site for Narangi basin includes Mundagaon fishing site and Siwani Talab. Sampling site for Basin of Markandey nala includes Bastar fish market, Bastar talab and Kosarteda reservoir. Sampling site for Basin of Mungabaha river includes Tirathgarh fishing site.

A systematic account of 74 fish species belonging to 43 genera, 21 families and 7 orders were recorded from 14 sampling sites in Bastar district (C.G.). Out of 74 species 35 belong to the order Cypriniformes dominating with (31 species of Cyprinidae, 1 species of Cobitidae and 3 species of Balitoridae) followed by the order Siluriformes with 17 species (4 species of Siluridae, 8 species of Bagridae, 2 species of Clariidae and one species each of Sisoridae, Pangasiidae and Heteropneustidae), 14 belong to the order Perciformes (5 species of Channidae, 2 species of Ambassidae, 2 species of Cichlidae, 2 species of Belontiidae and one species each of Nandidae, Anabantidae and Gobiidae), 2 belong to the order Osteoglossiformes (2 species of Notopteridae), 4 belong to the order Synbranchiformes (3 species of Mastacembelidae and 1 species of Sybranchidae), 1 belong to the order Anguilliformes (1 species of Anguillidae) and 1 belong to the order Cyprinodontiformes (1 species of Belontiidae).

(2) Dhamtari District

The sampling sites are: Rambag fish market, Kolyari fish market, Achota fish market, Mahanadi catchment of Onakona landing center and Barbandha landing center, Ama talab, Ratnabandha talab, Dandesara talab Kurud, Ravishankar reservoir, Rudri dam and Murumsilli catchment.

In all 55 species were collected from 13 sampling sites at different fisheries resources of Dhamtari district. Their study revealed that they belong to 38 genera, 21 families and 8 orders. Out of 55 species, 22 belong to the order Cypriniformes dominated with 20 species of Cyprinidae, 1 species of Cobitidae and 1 species of Balitoridae, followed by the order Perciformes with 15 species (4 species of Channidae, 3 species of Ambassidae, 2 species of Cichlidae, 2 species of Belontiidae, 2 species of Nandidae, and one of each Anabantidae and Gobiidae), 11 belong to the order Siluriformes (3 species of Siluridae, 4 species of Bagridae, 2 species of Clariidae and one species each of Pangasiidae and Heteropneustidae), 1 belong to the order Clupeiformes (one species from Clupeidae), 1 belong to the order Osteoglossiformes (1 species of Notopteridae), 3 belong to the order Synbranchiformes (2 species of

Mastacembelidae, 1 Synbranchidea), 1 belong to the order Cyprinodontiformes (1 species of Belonidae) and 1 belong to the order Tetraodontiformes (1 species of Tetraodontidae).

(3) Janjgir Champa District

Janjgir-Champa district is rich in ichthyofauna because 3 main rivers pass through it, viz. the Mahanadi proper, Hasdeo and Mand. The sampling site for Mahanadi proper includes Seorinarayan, Singhul, Berekelkala, Saradih, Chandarpur and Balpur. The sampling site for Hasdeo River includes Deori, Champa, Pithampur and Kera. The sampling site for Mand River includes Siroli, Parsada and Chandli.

A total 67 fish species were collected from 13 sampling sites belonging to 41 genera, 19 families and 7 orders in Jan. Besides native fishes, 6 exotics were also included while enlisting the ichthyofauna. In the proper Mahanadi River 65 species were recorded from 6 sampling sites out of 67 species recorded from the whole river system. In four sampling sites of the river Hasdeo, total 56 fish species were recorded. In three sampling sites of the Mand River, total 37 species were recorded.

(4) Kanker District

Two ponds located in the Kanker city, north Bastar Kanker, C.G., India were selected for the study. The investigation showed fish fauna diversity of the fishes collected from Pakhanjoor Reservoir comprised of 22 genera and 42 species belonging to 12 different families viz., Cyprinidae, Cobitidae, Siluridae, Bagridae, Saccobranchidae, Clariidae, Mugilidae, Ophiocephalid, Centropomidae, Nandidae and Gobidae of 4 orders.

(5) Mahasamund District

The study records a total of 44 fish species were observed in Kodar reservoir located at Mahasamund District, out of 44 species 2 belong to the order Osteoglossiformes (2 species of Notopteridae), 18 species belong to the order Cypriniformes (18 species of Cyprinidae), 14 species belong to the order Siluriformes (3 species of Siluridae, 6 species of Bagridae, 1 species of Schilbeidae, 1 species of Pangasiidae, 1 species of Saccobranchidae and 2 species of Claridae), 9 species belong to the order Perciformes (2 species of Centropomidae, 1 species of Nandidae, 2 species of Cichlidae, 3 species of Anabantidae and 1 species of Gobiidae) and 1 species belong to the order Mastacembeliformes (1 species of Mastacembelidae).

(6) Raigarh District

Three rivers flow in Raigarh district which are Kelo (112.60 km), Mahanadi (113 km) and Mand (174 km). Five sampling sites were selected for each of the rivers. Sampling sites selected for Mahanadi river were Hicha, Chikhali, Chandrapur, Surajgadh and Mahadeopalli; for Mand river they were Usrout, Tarapur, Bhatpur, Chandai, Chandrapur and for Kelo river they were Ghargoda, Raigarh, Atarmuda, Jhalmala and Rengalpali. 61 fish species recorded in Mahanadi, Mand and Kelo River of Raigarh district, Chhattisgarh.

(7) Raipur District

Raipur District is divided into the four zones for the study purpose on the basis of catchments of four rivers present in the area. Four zones are (i) Mahanadi basin (ii) Kharun basin (iii) Sheonath basin (iv) Jonk basin. The sampling site for Basin of Mahanadi River proper includes Kosrangi Bandha, Pethu Taria, Balsamundra Talab, Ramsagar Talab, Naya Taria and Shastri Market (Mahanadi collection). The sampling site for Basin of Kharun River includes Purena Taria, Naya Talab, and River Kharun near Tatibandh, Budha Talab, Mahaan Talab, Telibandha Talab and Chhokra Nala. The sampling site for Basin of Sheonath River includes Lal Bandha, Rohra Bandhawa, Ganga Sagar, Kisun Talab, Kharun-Seonath Sangam, Simga fish market and Tilda Bandha. The sampling site for Basin of Jonk River includes Katgi dabri, Arjuni Muda and Arjuni Market.

In the study total 64 fish species were collected from 23 sampling sites belonging to 40 genera, 19 families and 7 orders. Besides native fishes, 6 exotic fishes were also included to ichthyofauna.

(8) Rajnandgaon District

The fishes were collected from Sheonath river at Mohara station and from local fisherman and also from local cooperative societies operating in different ponds of Rajnandgaon town. A total of 45 fish species belonging to 15 families and 32 genera were recorded, Cyprinidae was the largest dominant family contributing 20 species; Bagridae formed the subdominant family contributing 5 species.

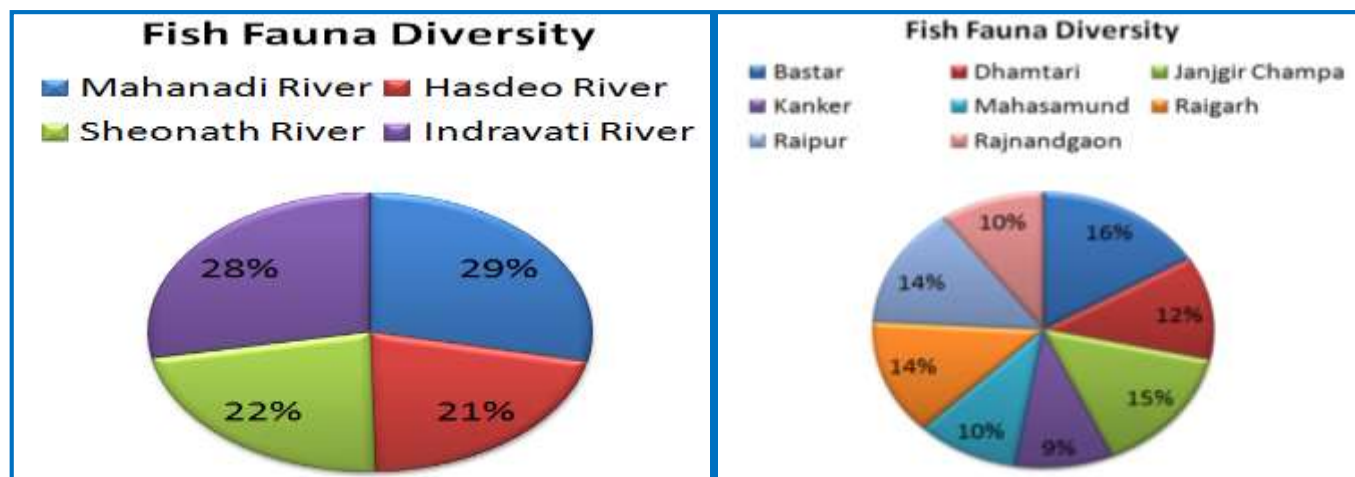


Figure 6: Fish Fauna Diversity (a) River Basin Wise (b) District Wise

VI. CONCLUSION & FUTURE WORK

There are 27 districts in Chhattisgarh state and out of these 27, 9 districts are included in the study along with 4 major River basins of Chhattisgarh state. Mahanadi River Basin includes 28.4% of Fish Fauna diversity, Hasdeo River Basin includes 21.21% of Fish Fauna diversity, Sheonath River Basin includes 22.34% of Fish Fauna diversity and Indravati River Basin includes 28.03% of Fish Fauna diversity. The Fish Fauna diversity of Bastar District studied is about 16.37%, Dhamtari district 12.16%, Janjgir Champa District 14.82%, Kanker District 9.29%, Mahasamund District 9.73%, Raigarh District 13.49%, Raipur District 14.15% and Rajnandgaon District 9.95% respectively.

The study needs further investigation regarding fish diversity in other natural waters. It needs to be informed of the perilous state of biodiversity in our inland waters and the causes of biodiversity decline. It needs to further develop and apply methods to estimate the environment, social and economic values of the ecosystems and their consequent impacts on biodiversity inland waters. Researcher and managers needs to work together to clarify biodiversity in operational terms and to develop and test rigorous inventory, assessment and monitoring protocols across a range of spatial scales.

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