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"Fish diversity habitat ecology to various ponds in Chhura Block dist. Gariaband C.G"

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Abstract: - Fauna Diversity is unique in itself, especially the aquatic creatures that live in a certain habitat, such as fish, in which a lot of diversity is found. Biodiversity is found in the Chhura forest area of Gariaband where naturally occurring ponds, Rasela pond, Kansinghi pond, Bhaismida pond, Chhura pond and Kharkhra pond showed good richness of different species, some parameters Fish growth was aided by pH, water depth, and dissolved oxygen. There were a total of 44 species seen in the area. A total of 44 species were seen in the area. 2 belong to the order osteoglossiformes (2 species of notopteride), some parameters Fish growth was aided by pH, water depth, and dissolved oxygen. There were a total of 44 species seen in the area. 6 species of bagridae, 1 species of schilbeidae, 9 species belong to the order perciformes (2 species of centtropomidae, 1 species of saccobranchidae, and 2 species of claride), and 9 species belong to the order pagasiidae (1 species of pagasiidae, 1 species of saccobranchidae, and 2 species of claride). 1 species of nandidae , 2 species of cichilidae, 3 species of anabantidae and 1 species of gobiidae) and 1 species belong to the order mastacembeliformes (1 species of mastacembelide). Approximately 70% of the fishes are caught. Among them three well-known major carps of high cultivable value were recorded in good numbers. Besides native fishes, some exotic fishes and minor carps were also observed in the reservoir. Silver carp, Hypophthalmichthys molitrix, and common carp, Cyprinus carpio, were doing exceptionally well.. Among minor and medium sized carps Labeobata, Labeocalbasu, Cirrhinusreba, Labeoboga, Puntius ticto, Puntius sophore, and Puntius chola were also observed.

Keywords :- Diversity , ponds, distribution, ecology , reservoirs, chhura , species

Introduction:- Aquatic fauna is very important, the diversity of fish has suffered a lot for some time, due to this there has been a lot of changes in the ecology of the river pond, which has brought a lot of change in the ecology of these aquatic thus organism diversity is needed to study and their conservation is necessary. The country also has a diverse range of edible fish species to meet the needs of both the domestic and international markets. India is one of the mega biodiversity (Mukesh P Bhendarkar, Sundaray JK, P.N. Ananth and S Pradhan at al 2017), For a better understanding of the inherent value of all species on the planet, overall environmental quality must be protected. With only 2% of the world's land area, it has about 10% of the world's biological variety..(Choubey K. and Qureshi Y. (2013))

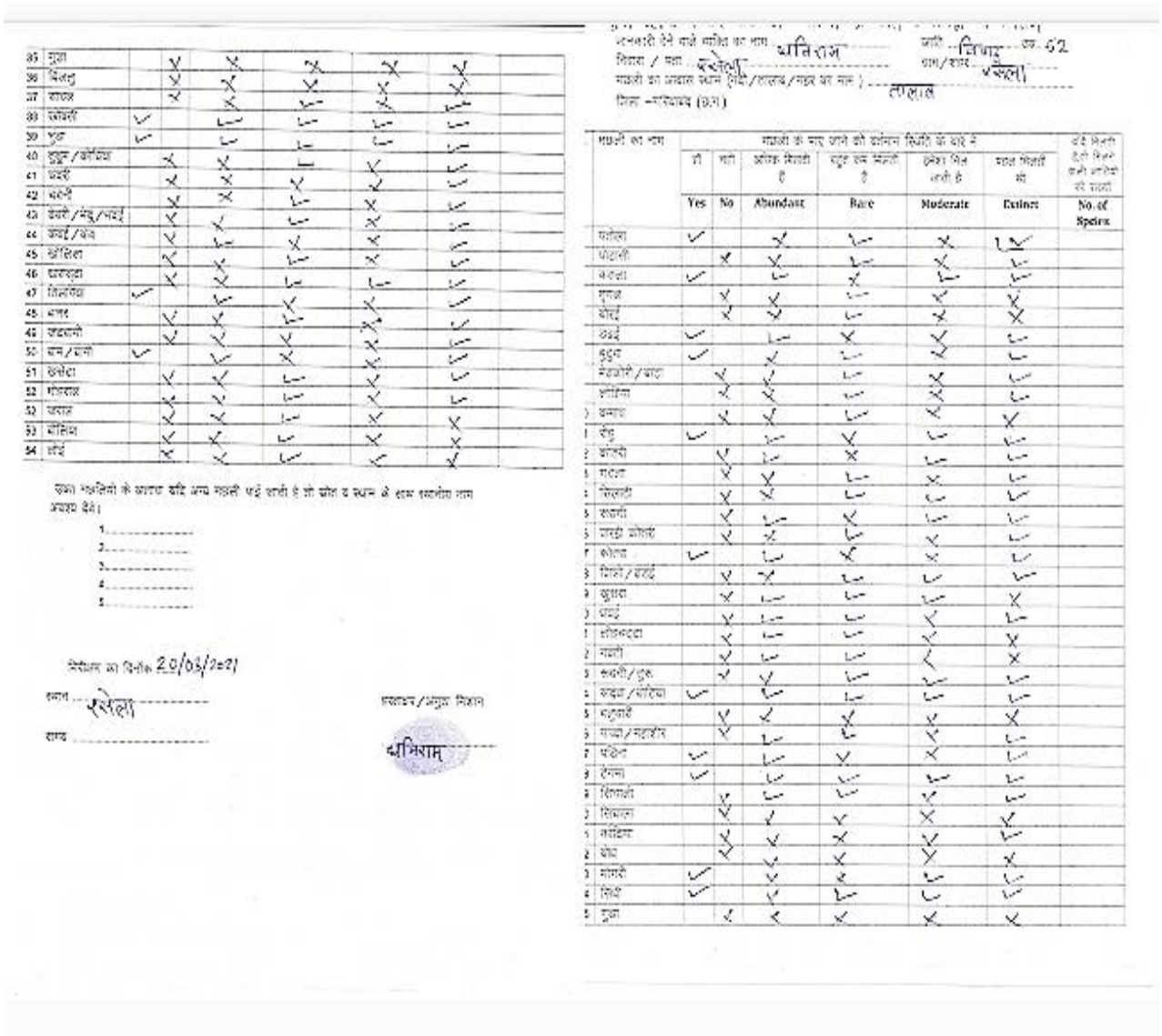
Freshwater ecosystems such as lakes, ponds, and reservoirs, rivers and streams, groundwater, and wetlands are all part of aquatic biodiversity. There are around 21,730 species of fish in the world, with about 11.7 percent found in Indian waters. There are valid scientific descriptions for around 24,600 extant fish species in 482 families and 57 orders. Freshwater fishes are a poorly studied group. There is no proper documentation and most of the information available is from a few well-studied locations only. There is a fundamental need for taxonomists to describe unknown species in the study of biodiversity especially in these species-rich areas. The state of Chhattisgarh, located in the heart of India, is rich in cultural heritage and natural diversity. It is a land of ponds, reservoirs, rivers, wetlands and a long terrestrial belt and hilly areas. Most of these sites are untouched and unexplored. The district of Gariyaband in Chhattisgarh has a distinct cultural and ecological identity, with a wide range of biological species. Gariyaband district of Chhura region (C.G.) has not been extensively surveyed for fish diversity. The fish diversity is not only the wealth of the district but it also has serious implications on fisheries. According to a survey of the literature, there is very little information accessible. According to the existing literature, no attempt has been made to document the fish diversity in this region, as well as their habitat.

Material and Method:-

Research site:- In Chhattisgarh, we studied about the fish by visiting 5 natural big water sources of Chhura block (20° 48’ 43.2” N, 82° 12’ 32.4” E), 22 km from gariyaband district. We looked at the fishes in the natural ponds by visiting water sources (ponds and dam) of places like Chhura, Kharkhra, Kansinghi, Rasela , &Bhaisamuda, and collected fish form net and identified the fishes and gathered more information of names those fishes in local language and matched them with species name. We observed them separately species by species to find out which species have the highest number and density in the Chhura block . In the reservoir, there is only one landing point. Fish samples were collected during the whole fishery season from full year (12month) at an interval of 4-5 days.

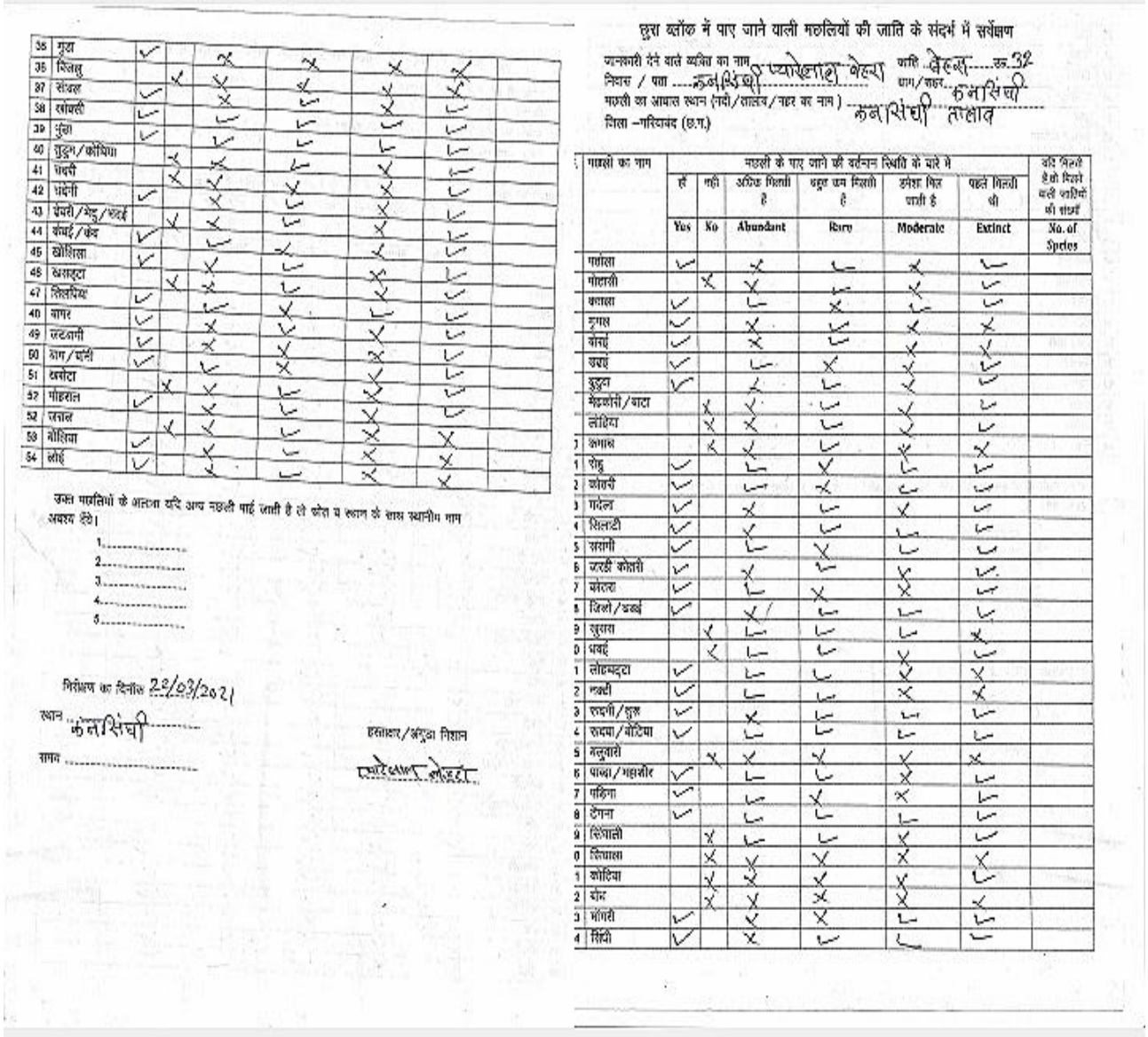
1)Rasela : -

This village is about **40** km away from Gariyaband district and it is located **17** km east of Chhura block , here we chose a big pond to study, we used a lot of nets to catch those fish then we differentiated their body size according to their color and their weight and identification was done in the summer season. The pond is dried up in the summer season due to which many species of fish were destroyed which were found in the other seasons. The depth of the pond is **12** feet. There are many species of fish that live in the nearby areas. We took a form and surveyed it and found out there are about 15-20 species of fish and **09** families.



2. Kansinghi :-

This village is about 47 km away from Gariyaband district and is located 12 km east of Chhura block, here we chose a big pond to study, we caught a lot of fishes with the help of net and then those fish were identified according to their body sizes, their color and their weight. The pond does not dry up in the summer season thus many species of fish are still alive which were earlier found in this pond. Depth is around 20 feet and inhabited by a lot of species of fish. We took a form and surveyed it, which resulted in about 37 species and 12 families of fishes.



छुरा ब्लॉक में पाए जाने वाली मछलियों की जाति के संदर्भ में सर्वेक्षण

जानकारी देने वाले व्यक्ति का नाम ..... जाति ..... उम्र .....
निवास / पता ..... ग्राम/वार्ड .....
मछली का आवास स्थान (नदी/तालाब/नहर का नाम) .....
जिला –गरियाबंद (छ.ग.)

मछली का नाम	मछली के पाए जाने की वर्तमान स्थिति के बारे में						यदि मिलती है तो मिलने वाली जातियों की संख्या
	है	नहीं	अधिक मिलती है	बहुत कम मिलती है	संतोष कि जाती है	पहले मिलती थी	
	Yes	No	Abundant	Rare	Moderate	Extinct	No. of Species
पहासा	✓		✗	✓	✗	✓	
गोलासी		✗	✗	✓	✗	✓	
बलासा	✓		✓	✗	✓	✓	
ट्रास	✓		✗	✓	✗	✗	
सेंगई	✓		✗	✓	✗	✗	
उडरा	✓		✓	✗	✗	✗	
कुडुन	✓		✗	✓	✗	✓	
मेंढकोनी/बाटा		✗	✗	✓	✗	✓	
लोहिया		✗	✗	✓	✗	✓	
कगास		✗	✗	✓	✗	✗	
रोहु	✓		✓	✗	✓	✓	
कोतरी	✓		✓	✗	✓	✓	
गरेला	✓		✗	✓	✗	✓	
सिलाटी	✓		✗	✓	✓	✓	
उसगी	✓		✓	✗	✓	✓	
जरडी कोतरी	✓		✗	✓	✗	✓	
मंगरला	✓		✓	✗	✗	✓	
डिलो/डब्बू	✓		✗	✓	✓	✓	
खुरास		✗	✓	✓	✓	✗	
धवई		✗	✓	✓	✗	✓	
लोहमदरा	✓		✓	✓	✗	✗	
नक्टी	✓		✓	✓	✗	✗	
रुदगी/सुरू	✓		✗	✓	✓	✓	
रावना/बोटिया	✓		✓	✓	✓	✓	
मनुवारी		✗	✗	✗	✗	✗	
पाबदा/महसीर	✓		✓	✓	✗	✓	
पढ़िना	✓		✓	✗	✗	✓	
टेंगना	✓		✓	✓	✓	✓	
सिंघाती		✗	✓	✓	✗	✓	
सिंघासा		✗	✗	✗	✗	✗	
कोटिया		✗	✗	✗	✗	✓	
बोद		✗	✗	✗	✗	✗	
भोगरी	✓		✗	✗	✓	✓	
सिंगी	✓		✗	✓	✓	✓	

उक्त मछलियों के अलावा यदि अन्य मछली पाई जाती है तो कोष्ठ में स्थान के साथ स्थानीय नाम अवश्य दें।

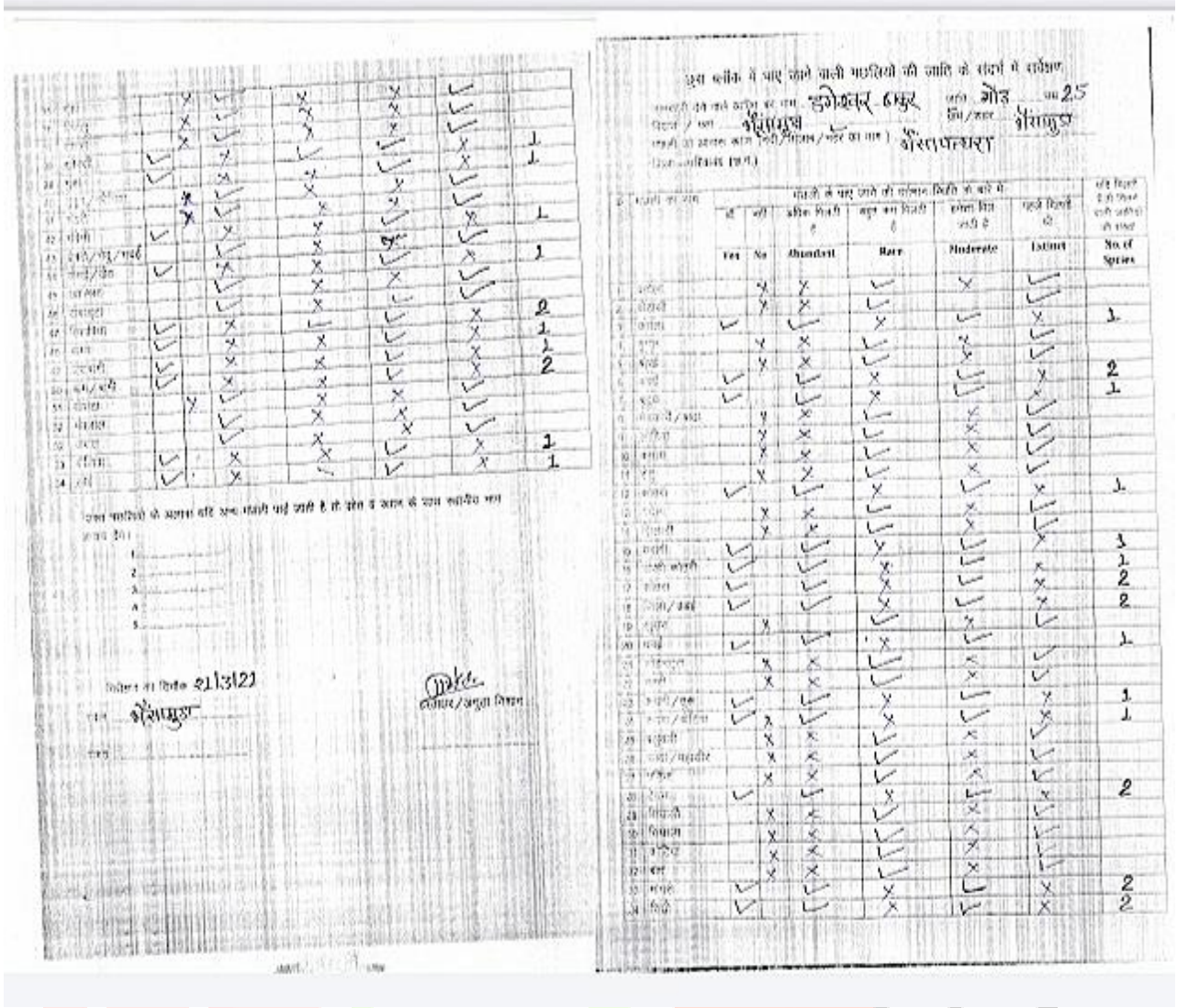
1.....
2.....
3.....
4.....
5.....

सर्वेक्षण का दिनांक 22/03/2021
स्थान कोलसिंघी
सारांश .....

हस्ताक्षर/अंगूठा निशान

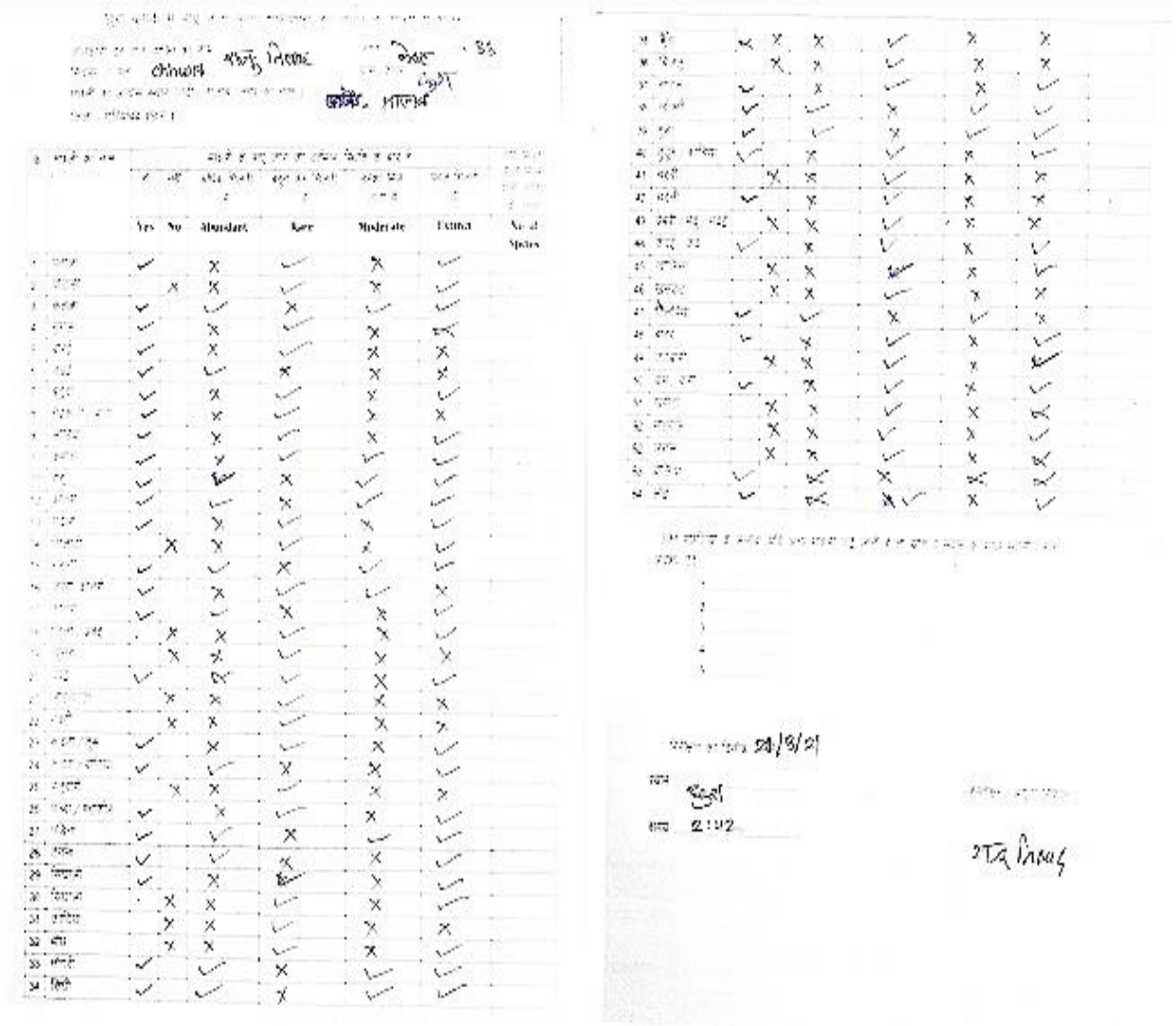
3. **Bhaisamuda :-**

This village is about 31 km from Gariyaband district and is located 09 km east of Chhura block, here we again chose a big pond to study, we used a lot of nets to catch those fishes and differentiated their body size according to their color and their weight and identification were done in the summer season. The pond is dried up in the summer season due to which many species of fish were destroyed which were earlier found. This pond's depth is 15 feet. There are many species of fish that live in the nearby areas. We took a form and surveyed it and found out that there are about 18-20 species of fish and 07 families are found.



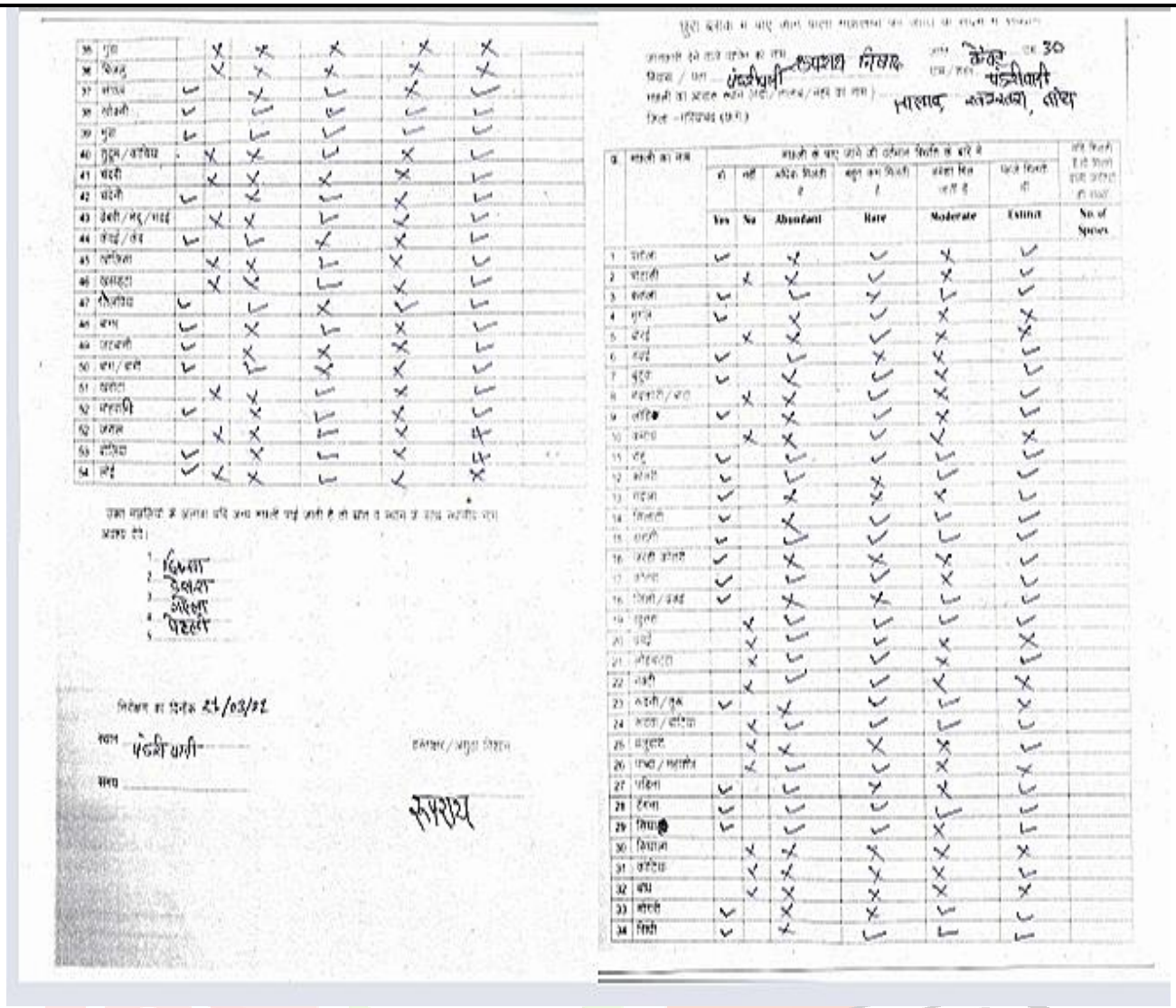
4. Chhura :-

It is a development block located about 22 km north of Gariyaband district, here we chose a big pond to study, we caught a lot of fish with the help of net, and then we sorted those fishes according to their body. Size identifies them according to their color and their weight. The pond does not dry up in the summer season thus many species of fish are still found which were earlier presented. This pond is around 12-15 feet deep which has many species of fish inhabited. We took a form and conducted a survey and it was found that about 32 species 12 families of fish are found here.



5. **Kharkhra :-**

It is located about 19 km north of the Gariyaband district and 3 km south of Chhura block, here we chose to study the dam, With the help of a net, a large number of fish was caught. Their physical shapes, colours, and weights were used to identify them. The dam does not dry up in the summer season, due to which many species of fish are still alive which were previously found. This pond is around 40-70 feet deep and inhabited by many species of fish. A form was taken to conduct a survey, we found about 37 species and 18 families of fishes there.



Appendix- I :-

Fig.:- Showing the Pond and Dam

Methods:-

Five ponds, located in the Chhura block, Gariyaband district, C.G. (India) were selected for present survey. Fresh specimen were preserved and identified. Fishes were collected alive through fishing net. For this, Cost net, Scoop net, Gill nets of varying mesh sizes and a Circular net (with very small mesh size and

sinkers around the edge) were used. The specimens were preserved in 10% formulation with maximum care to avoid disgorgement or defecation of fishes due to stress during immediate transfer to formalin. Morphometric features, descriptive characters, and the Fin formula were used to identify fishes. The total length of the body, the standard length of the body, the length and depth of the head, the position and diameter of the eye are all morphometric features, length of snout, maximum and minimum girth, length of pre dorsal fin, pre pectoral fin, pre anal fin and Pre caudal fin. Descriptive Characters include profile and shape of the body, skin texture and coloration, position and shape of the mouth, lips and snout, barbels and jaws, scales and lateral line system, origin, shape, size and type of median, paired and caudal fins, fin rays and fin formula, tail and special marking. Fishes are classified and arranged based on the work of Jhingran (1991), with slight modification as followed by Day's Fauna (1871), Menon (1999), and Jayaram (1999). A field kit with measuring tapes, ropes, buckets, preservative, enamel trays, and a digital camera, among other things. ware prepared for regular use. A boat was engaged and the station was visited in the sequence, which was carefully followed throughout the investigation period.

Map of the area :-

Those 5 ponds, dams and water reservoir marked with red dots in the map, are:- 1.Chhura 2. Kharkhra dam 3. Bhaisamuda 4. Kansinghi 5. Rasela.

Appendix- II :- 'Chhura block map'

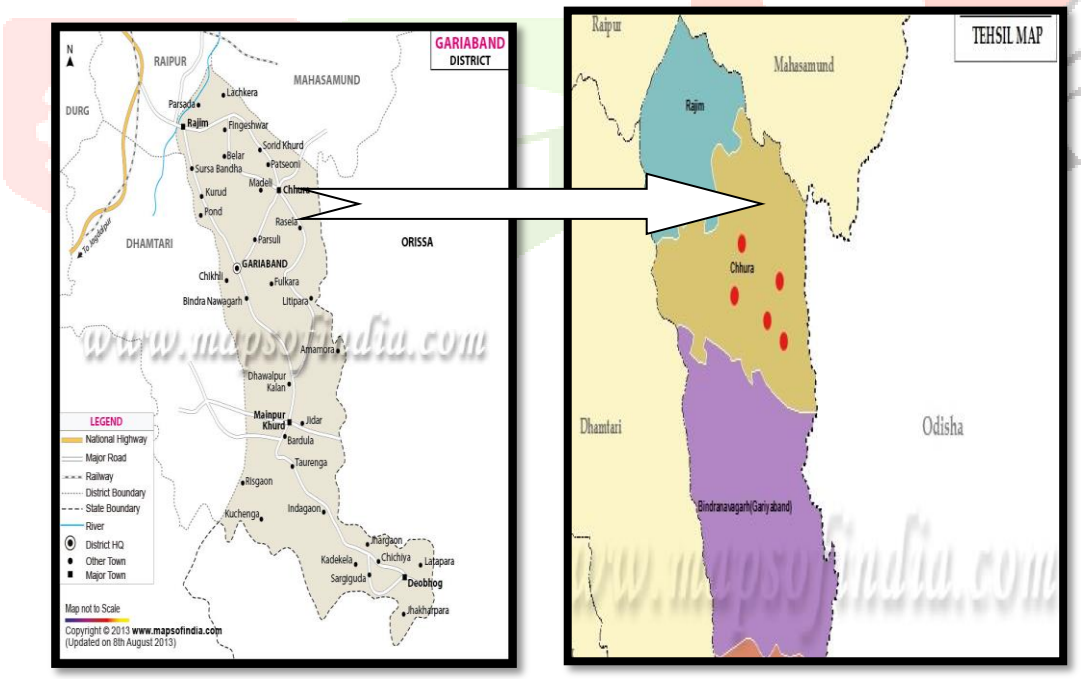


Fig. : - Map of area or chhura block

Biogeography :-

Fresh water fish biodiversity in Chhura block has represented about 44 species belonging to 21 families. Catla (Catlacatla), Rohu (Labeorohita), and Mongri are some of the significant fish species found in the reservoir (Clariasbactrachus), Tengana (Mystuscavasius), Tilapia (Oreochromis Mossambicus), Khoksi (Channa Punctatus) and Bhunda (Channa Striatus) etc. Due to anthropogenic stressors such as habitat degradation, India's aquatic ecosystems are under constant pressure due to rapid aqua-expansion, population growth, and ever-increasing demand for fish as protein-rich food. over exploitation, indiscriminate killing of juveniles and adults excessive water abstraction leaving inadequate water for fish, aquatic pollution, disease and uncontrolled introduction of exotics. Among the fish culturing countries in the globe, India took a major share of large diversity of fish fauna and a large number of fishes are under threat. To predict the expected effects of human-induced changes, the effects of human activities, and to design efficient restoration and rehabilitation projects, more study is needed to gain a fundamental understanding of the causes and processes that govern biodiversity in fresh water systems.. Some strategies and scientific interventions should be made for fish biodiversity conservation to protect the native fish fauna as well as the ecosystem.

Appendix-III:-

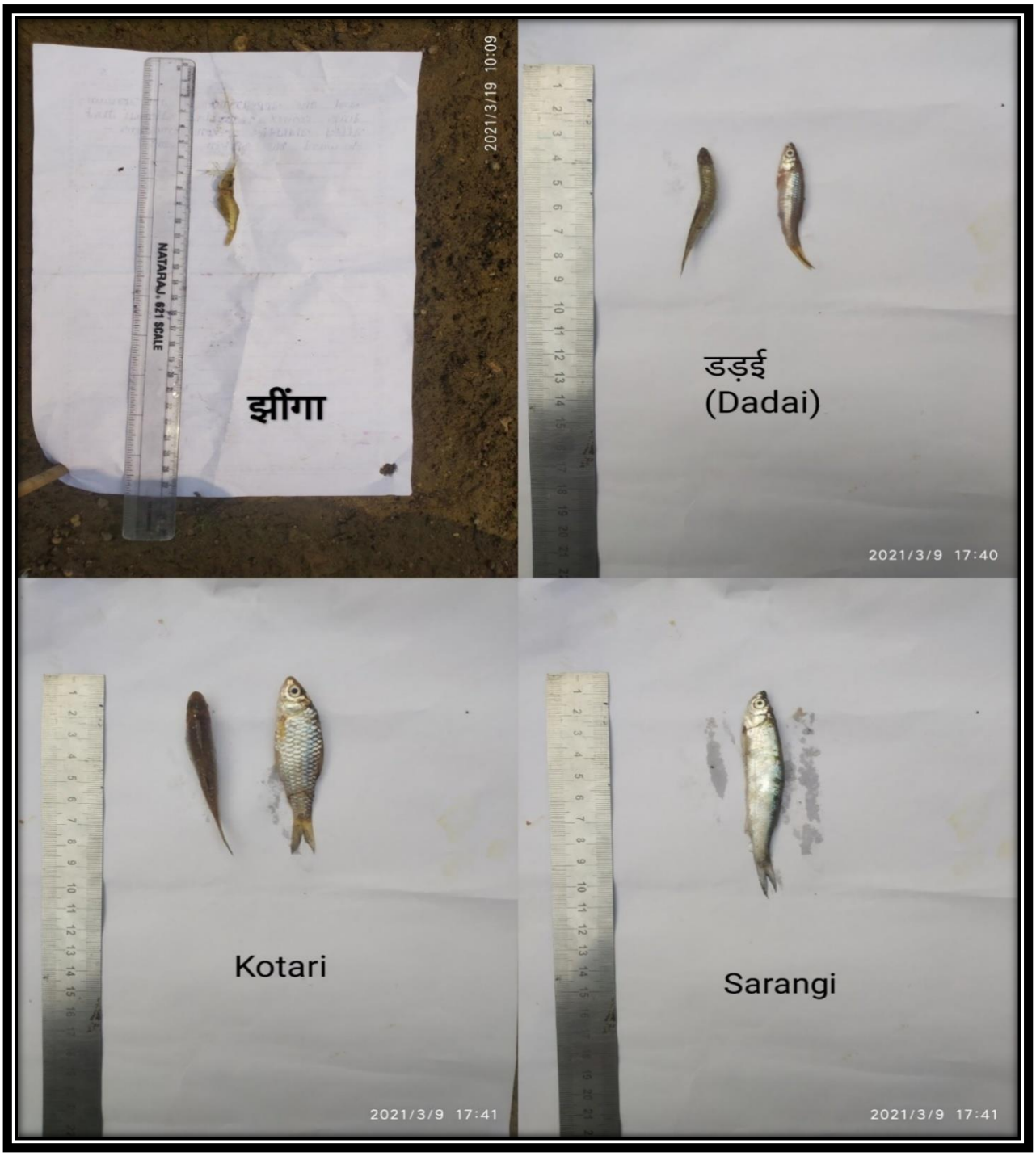


Fig. :- Fishes found throughout the year

Fig. :- Fishes In chhura block

Observation :-

Appendix – IV :- (Table: 01)

We studied at five ponds and we got it

S. No.	Local name of fishes	Scientific name	Present in Rasela pond	Present in Kansinghi pond	Present in Bhaisamuda pond	Pre.in chhura pond	Pre.in Kharkhra
1.	Catla	Catlacatla	+	+	-	+	+
2.	Rohu	Labeorohita	-	-	-	+	+
3.	Kotra	Puntius sarana	+	+	+	+	+
4.	Tengna	Mystuscavasius	+	+	+	-	+
5.	singhi	Mystus oar	-	+	-	+	+
6.	mongri	Clariasbatrachus	+	+	+	-	+
7.	khokshi	Channa punctatus	+	+	+	+	+
8.	bhunda	Chhana striatus	-	-	-	-	+
9.	Tilapiya	Oreochromis mossambicus	+	+	+	+	+
10.	Bammi	Mastacembeluspancalus	-	+	-	-	+
11.	Patola	Notopterus	-	-	-	-	-
12.	Kotri	Puntius ticto	+	+	+	+	+
13	Mrigal	Cirrhinusmrigala	-	-	-	-	+
14	Dadai	Parluciosomadaniconius	+	+	+	+	+
15	Padhina	Wallago attu	+	+	+	+	+
16	Pankaaj	Panagasius pangasius	-	+	-	-	-
17	Borai		-	+	-	-	-
18	Butuaa		-	+	-	-	-
19	Gadela		+	+	+	+	+
20	Silati		-	+	-	-	+
21	Sarangi		+	+	+	+	+
22	Jarhikotri		-	+	-	-	-

23	Kotra		-	+	+	-	-
24	Jilodadai		-	+	-	-	+
25	Lohchatta		-	+	-	-	+
26	Nakti		-	+	-	-	+
27	Rudni		-	+	-	-	+
28	Rudwa		+	+	+	+	+
29	Papda		-	+	-	-	+
30	Gunda		-	+	+	-	+
31	Sanval		-	+	-	-	+
32	Chandeni		-	+	-	-	+
33	Keuu		-	+	+	+	+
34	Dhebri		-	-	-	-	+
35	Kholisaa		-	+	-	-	+
36	Bamar		+	+	-	+	+
37	Mohral		-	+	-	-	+
38	Bolia		+	-	-	-	+
39	Loi		-	+	-	-	+
40	Jaral		-	+	-	-	+
41	Khaseta		-	-	-	-	+
42	Dudum		-	-	-	+	+
43	Bijul		-	-	-	+	+
44	Potasi		-	+	-	-	-

(Table 02)

Number and percent composition of families, genera and species under various orders:-

	Order	Families	genera	species	% of families in an order	%of genera in an order	%of species in an order
1.	Clupeiformes	02	01	06	12.3	6.5	3.3
2.	Cypriniformes	05	11	29	46.5	38.3	29.5
3.	Ophiocephaliformes	01	03	02	25.3	13.5	7.5
4.	Perciformes	08	03	01	33..3	22.7	16.6
5.	Mastacembeleforme	02	03	06	8.3	4.5	9.5
	Total	18	21	44			

Percentage contribution of family, genera and species under 5 order are given in the table 02 . As far as the genera and families to different order are concerned order Crypriniformes consists of 11 genera 05 families, Perciformes of 03 genera under 08 families, Clupeiformes and Ophiocephaliformes of single genus under single family each. While Mastacembeleformes are found with 06 species under single family . (fig. & Table02)

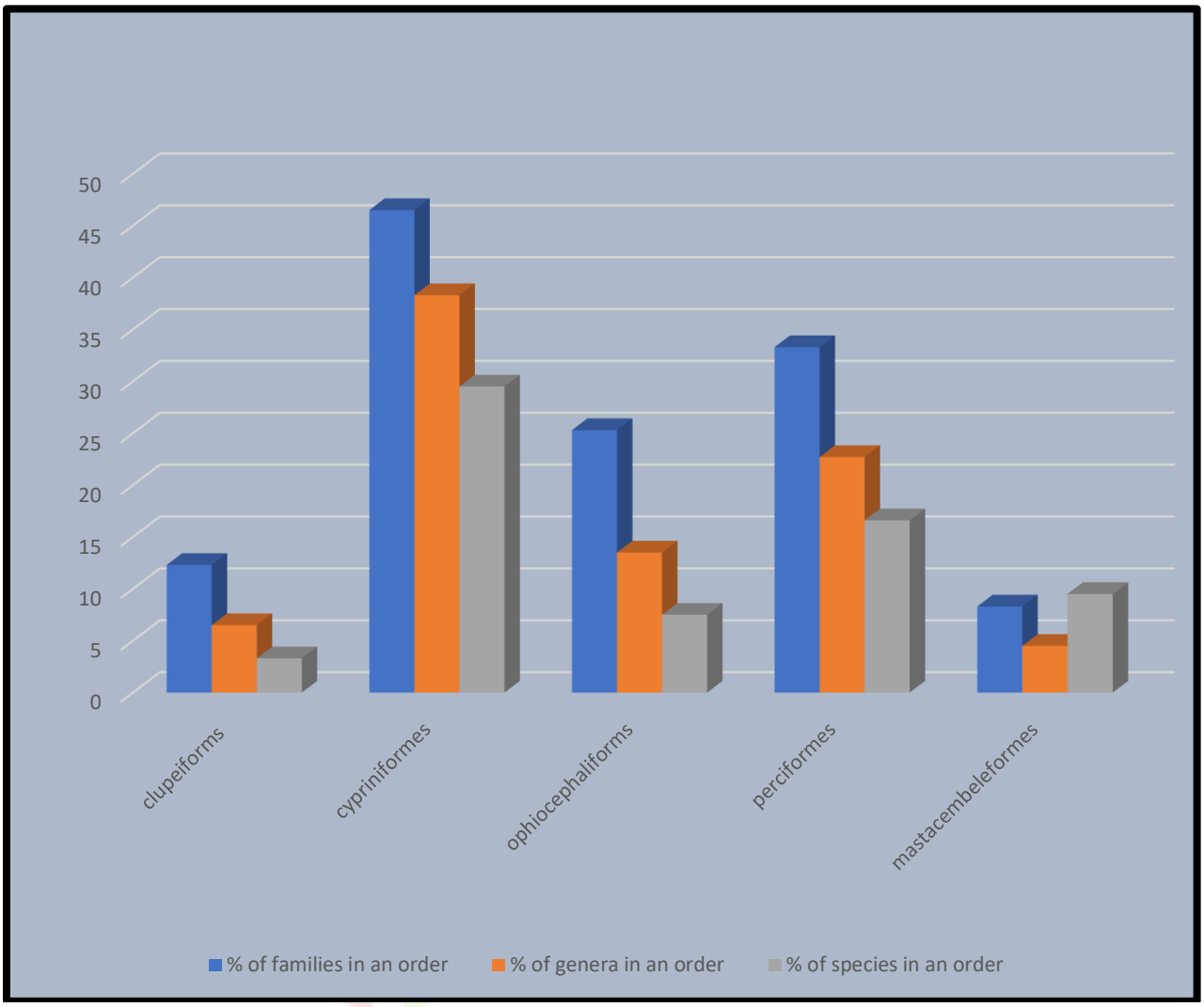


Fig. :- Showing Percent Contribution Of Genera To The Families

Order Cypriniformes has been found to be major order with 29 species and percent contribution of 29.5% Perciformes comes next with 8 species and percent contribution of 16.6 % Mastacembeleforme with 6 species and percent contribution of 9.5% Ophiocephaliformes with 2 species and percent contribution of 7.5% and Clupeiformes with 6 species and percent contribution of 3.3% .(For Table no. 02)

Five ponds are:-

1. Raselapond :-

Rasela is a village about 17 km from Chhurablock, we conducted a study about the pond here, where we found a variety of fishes, in this pond we gathered a total of 15-20 species and 13 families, which shows a very good amount of fish in the area. The density is also impressive.

2.**Kansinghi pond :-**

Kansinghi is a village about 12 km from Chhurablock , we studied Kansinghi pond here, there we found a variety of fishes, in this pond we collected a total of 37 species and 12 families, It depicts a large number of fish in the area.The density of these fishes is very good.

3. **Bhaisamuda pond :-**

Bhaisamuda is a village about 9 km from Chhurablock , Study conducted on the poind we found a variety of fishes, in this pond we gathered a total of 18-20 species and 07 families, This indicated that there were a lot of fish in the vicinity. The density is very good.

4. **Chhurapond:-**

A study was conducted in the Chhura pond there we found 32 species and 12 families, this number proves to be a very good standard for this region.

5.**Kharkhra dam :-**

Kharkhra dam is about 3 km from Chhurablock. A study was conducted and we found a variety of fish, in this pond we collected a total of 37 species and 18 families, The investigation shows that there are a lot of fish in the area. The density is very good.

Results :-

Present study records a total of 44 species of fishes (+ marked in table). Out of 44 species 2 belong to the order Osteoglossiformes (2 species of Notopteride), 18 species belong to the order Cypriniformes (18 species of Cryprinidae), 14 species belong to the order Siluriformes (3 species of Siliride, 6 species of Bagridae, 1 species of Schilbeidae, 1 species of Pagasiidae , 1 species of Saccobranchidae and2 species of Claride), 9 species belong to the order Perciformes (2 species of Centtropomidae, 1 species of Nandidae , 2 species of Cichilidae, 3 species of Anabantidae and 1 species of Gobiidae) and 1 species belong to the order Mastacembeliformes (1 species of Mastacembelide). With the exception of a few small species of carp Minnows, all others are fairly well known and do not call any special comments from a systematic point of view.

Among the Cyprinidae family: Catlacatla, Cirrhinusmrigala and Labeorohita are the dominant fishes in the reservoir comprising of approximately 70% of the fish landings in the total catch. These three well-known major carps of high cultivable values were recorded in good numbers. Besides native fishes, some exotic fishes and minor carps were also observed in the reservoir. They were silver carp, Hypophthalmichthtys Molitrix and common carp, Cyprinus Carpio which were thriving very well. Among minor and medium sized carps Labeobata, Labeocalbasu, Cirrhinusreba, Labeoboga, Puntius Ticto, Puntius Sophore, and Puntius Chola were also observed.

Discussion :-

As per the available records, no scientific studies on the fish fauna availability have been conducted here so far. In India, few studies have been initiated to document the fish diversity and assemblage. Much has been stated about declining fish biodiversity and its conservation issues in Indian pond systems. Fish fauna of Chhattisgarh is scarcely studied and needed to be thoroughly studied.

During the entire study period of six month (6 month), total of 44 fish species belong to 18 families were recorded. The main family, Cyprinidae, contributed 20 species (44.44 percent); the subdominant family, Bagridae, contributed 5 species (11.11 percent), and the rest of the families were in order of abundance. Planktonic and benthic colonies of plants and animals inhabited the foods accessible to the fish in the ponds. Major groups of algae, such as green algae, blue-green algae, desmids, and diatoms, were typically represented in phytoplanktonic communities. Oocystis, Tetrallantos, Sceredesmus, Coelastrum, Oedogonium, Cladophora, Spirogyra, Eudorino, Ulothrix, Volvox, ChlorococcumPediastrum, Oocystis, Tetrallantos, Sceredesmus, Coelastrum, Oedogonium, Cladophora, Spirogyra, Aphanothece is Microcyst. The principal phytoplankton genera are Merismopedia, Dactylococcopsis, Spirulina Oscillatoria, Lynabya, Symploca, Nostoc, Aradaera, andRaphidiopsis. Zooplanktonic communities identified in ponds included Protozoans, Rotifers, Cladocerans, Copepods, and Ostracods. Plankton includes a variety of animal larvae, worms, and several larval stages of fish.

Conclusion :-

After inspecting five ponds in the Chura block (Rasela, Kansinghi, Bhaisamuda, Chhura, Kharkhra), we discovered that several species such as Rohu (Lobeorohita),, Catla (Catla-Catla), Pankaj, Mongri, Khoksi, and Sarangi, Tengana, Kotri, Singhi, Bhunda, Keuu, Bami, Mrigal, Butua, Gadela, Rudwa, Padhina, Dadai, etc. are also found in the area of Chhura block in a large quantity. There are many benefits from them such as taking them as food and some of them are also used as medicine (Dudum fish and Tilapia fish). Once we have studied all those ponds and reservoirs thoroughly it seems that there are a large number of fish species inhabiting the Chhura area. Fishes are rich in protein, vitamins, and other elements and can be taken to avoid malnourishment and also have many others benefits. From our inquiry we also found that foreign species of fishes are threatening the diversity local species of fishes found there and may have serious impact on them. The inspection of five ponds (Rasela, Kansinghi, Bhaisamuda, Chhura, Kharkhra) revealed that a total of 44 species and 18 families are found in this area.

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References :-

1. Agarwal SS. Some aspects of Limnology of Ramaua damwith special reference to phytoplankton and zooplankton.Ph.D. Thesis, Jiwaji University, Gwalior. 1980.

2. Annual Report of Chhattisgarh, Directorate of Fisheries,Raipur, Chhattisgarh. 2008.

3. Ayyappan S. Hand book of fisheries and aquaculture.Indian Council of Agricultural Research. New Delhi.2006.

4. Chauhan BS. Fish and Fishes of the Patna state, Orissa.Records of Indian Museum. 1947; 45(23):.

5. Dahire V. Fish Diversity in the riverine resources ofJanjgir-Champadistrict of Chhattisgarh, India.M.F.Sc.(Inland Fisheries) Thesis, IGKV. Raipur. 2008, .

6. Datta Munshi JS, Shrivastava MP. Natural History offishes and systematic of freshwater fishesof India.Narendra Publishing house, Delhi. 1988.

7. David A. Fish of the river Sone with observations on thezoogeographical significance. Journal of the ZoologicalSociety of India. 1959; 9(1):.

8. Day F. The fishes of India, A natural history of the fishesknown to inhabit the seas and fresh waters of India,Burma and Ceylon. Vol. I &II , Today & Tomorrowsbook Agency, New Delhi. 1986,.

9. Desai VR, Kumar D, Shrivastava NP. Fish fauna ofRavishankar Sagar Reservoir. Journal Inland Fish Societyof India. 2004; 29(2):.

10. Dev R. Fish biodiversity in the riverine resources of Durgdistrict of Chhattisgarh, India. M.F.Sc. (Inland Fisheries)Thesis, IGKV. Raipur. 2008, .

11. Dubey GP. A review of Fish Fauna of Madhya Pradeshwith their Present Status, Freshwater Fish Diversity ofCentral India, National Bureau of Fish GeneticResources, Lucknow, India. 2007, .

12. Fu C, Wu J, Chen J, Wu Q, Lei G. Freshwater fishBiodiversity in the Yangtze River basin of China: patterns, threats and conservation. Biodiversity andConservation, Volume 12. Springer. 2003; 37:.

13. Halder P. Population Dynamics and Stock Assessment of*Catlacatla*(Hamilton) in the Kaptai Reservoir,Bangladesh. Asian Fisheries Science. 2005; .

14. Hora SL. On a collection of fish from the Headwaters ofthe Mahanadi River, Raipur district, Central Provinces.Records of the Indian Museum. 1940; 42(20):.

15. Jayaram KC. The fresh water fishes of India, Pakistan,Bangladesh, Burma and Srilanka. Zool. Survey of Indiapublication Kolkata. 1994.

16. Jayaram KC, Majumdar N. On a collection of fish fromthe Mahanadi. Zoological Survey of India. 1976; .

17. Jhingran VG. Fish and fisheries of India, Hindustan Publ.Corp. Delhi. 1991.

18. Kapoor D, Sarkar VK. Expending initiatives forconservation and sustainable exploitation of fish geneticbio-diversity of India. 2003; 23(1):.

19. Kurup BM, Manojkumar TG, Radhakrishnan KV.Germplasm Inventory, Evaluation and Gene banking offreshwater fishes. NAT-ICAR Research Report. CochinUniversity of Science and Technology, Cochin, Kerala.2001, .

20. Prakash O, Singh S, Vardia HK, Chari MS. Status of fishdiversity of Raipur district, Chhattisgarh. Freshwater fishdiversity of central India, National Bureau of FishGenetic Resources, Lucknow, India. 2007, .

21. Prakash O. Fish Diversity in the Water Resources ofNorthern Part of Raipur District of Chhattisgarh State.MFSc Thesis. IGKV, Raipur (C.G.). 2004, .

22. Pandey BL, Rao PNL, Singh BK, Pisolkar MD.Observation on qualitative abundance of plankton inBhatghar reservoir, J. Inland Fish. Soc. India. 1993;25(2):.

23. Pathak SK, Mudgal LK. Biodiversity of zooplankton ofVirla reservoir Khargone (M.P), India, In: Arvind Kumar(ed.). Biodiversity and Environment. A.P.H. PublishingCorporation, New Delhi. 2004, .

24. Sarkar T. A study on biodiversity of phytoplankton /periphyton in relation to fisheries in selected ponds andminor reservoirs of Raipur (Chhattisgarh). M.F.Sc.Thesis. I.G.K.V. Raipur. 2009,.

25. Shukla KSS. Present status of ichthyofauna diversity ofupper stretch of river Tapti with reference to its habitatdiversity. Fresh water fish diversity of central India,National Bureau of Fish Genetic Resources, Lucknow,India. 2007, .

26. Singh S. Fish Bio-Diversity In The Water Resources ofSouth Raipur District of Chhattisgarh State. M.F.ScThesis. I.G.K.V. Raipur (C.G.). 2004.

27. Singh S, Chari MS. Ichthyofauna of the river Kharun,Environment and Ecology. 2006; 24(4):.

28. Sinha M. Fish genetic resources of the north-easternregion of India. Journal of Inland fish ociety of India.1994; 26(1):.

29. Tripathi K, Chandrakar P. Chhattisgarh Atlas. 2nd editionGraphics, Raipur. 2000.

30. Vardia HK. Pre-impoundment fishery survey of the riverIndravati in relation to Bodhghat Hydel Project. ZonalAgricultural Research Station, Indira Gandhi AgriculturalUniversity, Kumharawand, Jagdalpur Survey Bulletin-I.1991.

31. Ehrlich P.R. and Wilson E.O., Biodiversity studies scienceand policy, *Science*, **253**, **(1991)**

32. Day F., Fishes of India, Willium Dawson's, London U. K.reprint edition, Today and Tomorrow Book agency, Delhi,**1(2) (1878)**

33. Shrivastava G.J., Fishes of Eastern Uttar Pradesh,Vishwavidyalaya Prakashan, Varanasi **(1968)**

34. Talwar P.K. and Jhingran K.C., Inland fishes of India andadjacent countries, **3** (1 and 2) Oxford and IBH Co. Pvt.Ltd, New Delhi **(1991)**

35. Bhat A., Diversity and composition of freshwater fishes inthe river systems of Central Western Ghats, India,*Environmental Biology of Fishes*, **68,**

36. Menon A.G.K., Conservation of Ichthyofauna of India, In:Conservation and Management of Inland Capture FisheriesResources of India (Editors: Jhingran AG, Sugunan VV
eds.) The Inland Fisheries Society of India, 25

37. Dubey G.P., Endangered, Vulnerable and Rare Fishes ofWest Coast River Systems of India, In: Threatened Fishesof India, NATCON, **4, (1994)**

38. Anon Perspective Plan of NBFGRAgriculture Research **(1995)**

39. Kapoor D., Mahanta P.C., Pande A.India: Status and Conservation:*Conserv. Nat. Pub.*, **(1998)**

40. Hora S.L., Notes on fishes in the Indian Museum. On acollection of fish Bailadila range, Bastar State,*Provinces, Record of Indian M***(1938)**

41. Hora S.L., On a collection of fish from the head waters ofthe Mahanadi River, Raipur district, C.P.Museum, **42(2)**, **(1940)**

42. Sen T.K., Fauna of Indravati Tiger Reserve, ConservationArea Series, *Zoological Survey of India*

43. Sharma H.S., Freshwater Fishes, In Fauna of MadhyaPradesh (including Chhattisgarh), State Fauna Series,**15(1), (2007)**

44. www.fishbase.org, Fish base organizationISSN 2278-3202*Int. Res. J. Biological Sci*.NBFGR, Indian Council ofK., Ichthyodiversity of*In Fish Gen. BiodiversityCentralMuseum*, **40(3)**, P., Record of Indian*India*, **6, (1995)(2004)**

45. Mukesh P Bhendarkar, Sundaray JK, PN Ananth and S Aquaculture Development in Chhattisgarh, India: What, why and how (E-ISSN: 2347-5129 P-ISSN: 2394-0506) -2017