Water Characteristic features of Different Water bodies of Mainpat Hill in Surguja District Chhattisgarh (India).

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Abstract- During the entire study period, total no. of 39 fish species belonging to 13 families were recorded, Cyprinidae was the largest family contributing 16 species .Family Cyprinidae was represented by the Esmosdandricus, *Catla catla, Cirrhinus mrigala, Labeo rohita, ,Labeo calbasu, Labeo bata, Labeo potal, Labeo pungucia. Labeo gonius,*

Aspidoparia jaya, Cyprinus carpio, Cirrhinus reba, Ctenopharyngodon idella, Puntius ticto, Puntius punctatus, Hypothalmichthys molitrico, Oxygaster bacaila, Lepidocephalichthys guntea is Cobitidae, In Notopteridae two species Notopterus notopterus, Notopterus chital. In Siluridae Ompok bimaculatus. In bagridae four species ,In Mastacembelidae *, Mastacembelus armatus, in* Clarridae, *Clarius batracus and Clarias gariepinus ,Belonidae has one species Xenentodon* .The observations recorded in the present study may provide valuable evidence of slight change in morphological structure of fish species due to the environmental condition in the locality, also a new species have been observed knows as *Labeo potail*. Hilly area, depth, temperature, turbidity is the important physical parameters on which the fish diversity of area, but the changes are not much diverse to give rise to new species. Only slightly, morphological changes are generally observed from those fish species living in down hill areas of Mainpat. The physico-chemical parameters of water fall varied seasonally such as Temperature, Turbidity, Ph, Dissolve Oxygen, CO_2, Hardness, Transparency, Nitrate, Chloride, Conductivity, TDS, Alkalinity, also it affects and determines the fish diversity.

Keyword: Physico-chemical, Mainpat, Water fall.

Introduction - Biodiversity is essential for stabilization of ecosystem, protection of overall environmental quality for understanding intrinsic worth of all species on the earth. Biologically biodiversity is a term used to describe the number, variety and variability of organism in a particular area. India is very rich in terms of biological diversity due to its unique biogeographic locations, diversified climatic conditions and enormous eco-diversity and geo-diversity. India is one of the mega biodiversity countries in the world and occupies the ninth position in terms of fresh water mega biodiversity**.** In India there are 2,500 species of fishes out of which 930 live in freshwater and 1570 are marine **(Kar *et al* 2003).** (**Day 1994**) described 1418 species of fish under 342 genera from British. (**Jayaram 1981**) listed 742 fresh water species of fishes coming under 233 genera, 64 families and 16 orders from the Indian region. (**Talwar 1991**) estimated 2546 species of fish

belonging to 969 genera, 254 families and 40 orders from India. About 21,730 species of fishes have been recorded in the world, of which about 11.7% are found in Indian water.

Today the Fish diversity and associated habitat management is a great challenge also the ability to evaluate the effects of habitat change and other impact on the fish population is important. During the decades investigation on Indian reservoir and fish fauna has been conducted by a number of workers, but there is no record of fish fauna in river of dist. Surguja. Hence I decided to study the Fish diversity of Surguja district with special reference to waterfalls of Mainpat hill.

Mainpat area is covered with dense forest with rural and tribal zone in the northern region of Chhattisgarh state. The region is rich in natural resources, several ores and minerals. Diversity of fish directly depends upon the physical and chemical condition of water. It is, therefore, important to know water quality parameters of water fall of Mainpat. Temperature controls the metabolism and rate of biochemical reaction. Turbidity desirable in fish life, because it provide food for filter-feeding fishes. Water Ph affects metabolism and physiological process of fish Mainpat is major hill in Surguja District in Chhattisgarh .Water quality is closely related to aquatic Ecology. Physico-chemical condition of water play most important role in growing the fish and other aquatic animal. Fish diversity studied with reference to the environmental changes and fluctuations that according to physico-chemical parameters of the environment. Water quality for fish must carry dissolved gases like oxygen and carbon dioxide, minerals, ph ,conductivity ,TDS, alkalinity . Present study was carried out to fish diversity status with relation to major biochemical parameters. The physical conditions of water are greatly influenced with depth, temperature, turbidity and light.

METHODOLOGY

Surguja district is the northern part of the state of Chhattisgarh in India. The district borders on the state of Uttar Pradesh, Jharkhand and overlaps of the South-eastern part of the Vindhyachal, Baghelkhand region of peninsular India. It lies between 23°37'25'' to 24°06'17'' north latitude and 81°34'40'' to 84°04'40'' east longitude, 244.62 kilometers along east to west and 67.37 kilometers broad north to south, this land has as area of about 16359 square kilometers. Till now no studies have been done on fish fauna in Surguja. Mainpat is the first area where study of fish faunal diversity is done in Surguja district. Mainpat is an unexplored of Chhattisgarh state is located at a height of 1099 m from the sea level. Mainpat spreads over an area of 368 sq. Km. Tiger point, Fish point and Sarbhanja; Devpravah is main water fall in Mainpat. Tiger point water fall is situated at center of the Mahadev Muda River. Tiger point water falls from a height of 60 m. During winter, the temperature dips to below 5°C (41°F) and during summer, it rises above 46°C (115°F).

The fishes will be collected by local fisherman from Tiger Point waterfalls of Mainpat. Fisherman generally uses many types of nets like gill nets, cast nets, drag net *etc.* Fishes will be preserved in 10% formalin solution. Study period will be conducted from June 2018 to May 2019. Identification of fishes will be done on the basis of morphometric characters, descriptive characters and fin formula. Morphometric characters includes total length of body, standard length of the body, length and dept of the head, position and diameter of the eye, length of snout, maximum and minimum width and girth, length of pre-dorsal fin, pre-pectoral fin, pre-anal fin and pre-caudal fin. Descriptive character includes profile and shape of the body, skin texture and coloration, position and shape of the mouth, lips and snout and jaws, scales and lateral line system. Shape, size and type of median, paired and caudal fins, fin rays and fin formula, tail and special marking. A field kit measuring tape, rope, preservative, digital camera *etc.* will be prepared for regular use. Fishes will be classified and arranged based on standard key of **Jhingran (1983),** with slight modification as followed by **Day's fauna (1958)** and **Srivastava (1998).**

Water samples are collected monthly from different sampling stations of Tiger point water fall. Water sample were analysis monthly from the sampling points during the study period June 2018 to May 2019. The water's quality Parameters such as water temperature was measured with the help of mercury thermometer. Ph level of the water is studied with the help of Ph meter, Conductivity DO,TDS, transparency, alkalinity and dissolved oxygen was test with the help of water analyzer and Photo spectrometer.

Two year average Parameter of Water characteristics in Mainpat (June 2018 to May 2019)

Month	Tem	Tur	Ph	DO	D CO_2	Har	Transp	Nitrate	Chloride	Cond	Tds	Alk
	ºC	NTU		Mg/l	mg/l	mg/l	Cm	mg/l	mg/l	Micro mho/cm	mg/l	mg/l
June 2018	38.1	18.86	7.03	6.1	5.2	65.9	32	23.4	180	373	212	37.7
July 2018	24.2	122.65	6.9	6.2	3.9	35.0	18.82	24	113.0	327	182	11.5
August 2018	24.4	117.67	6.6	6.9	4.3	36.0	16.47	25.3	116.5	256	118	12.8
September2018	23.7	46.00	6.7	8.9	5.4	76.5	23.24	23.5	81.0	255	152	56.9
October 2018	23.4	38.05	7.02	9.4	3.1	76.8	26.34	22.4	76.7	287	165	65.8
November2018	21.8	27.07	6.8	9.5	3.5	80.0	28	22.2	57.1	325	174	65.9
December2018	16.0	24.80	6.7	9.7	3.6	79.4	28.25	21.6	55.3	348	183	75.5
January 2019	14.8	21.30	7.01	9.8	3.1	65.7	29.72	21.3	54.3	361	194	

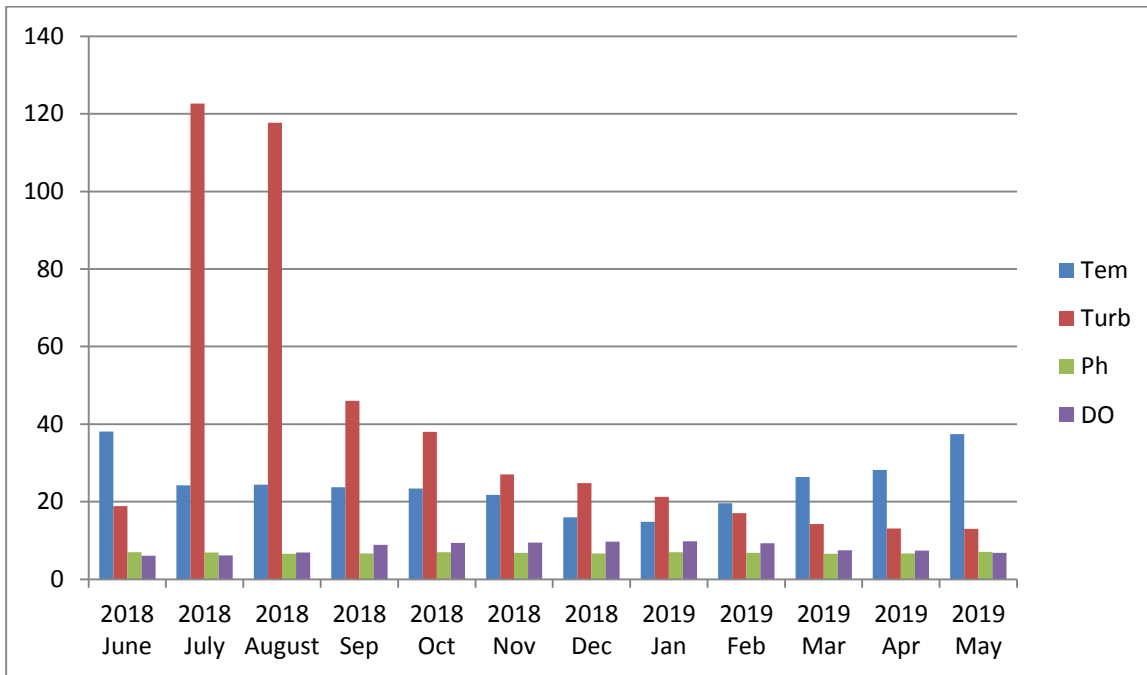| February 2019	19.6	17.05	6.8	9.3	3.4	54.6	32	21.3	51	374	198
March 2019	26.4	14.25	6.60	7.5	4.3	36.2	33	22.7	55	386	206
April 2019	28.2	13.07	6.70	7.4	4.9	66.6	33.25	22.5	56	407	223
May2019	37.4	13.01	7.05	6.8	4.1	70.0	35	23.5	58.2	423	235

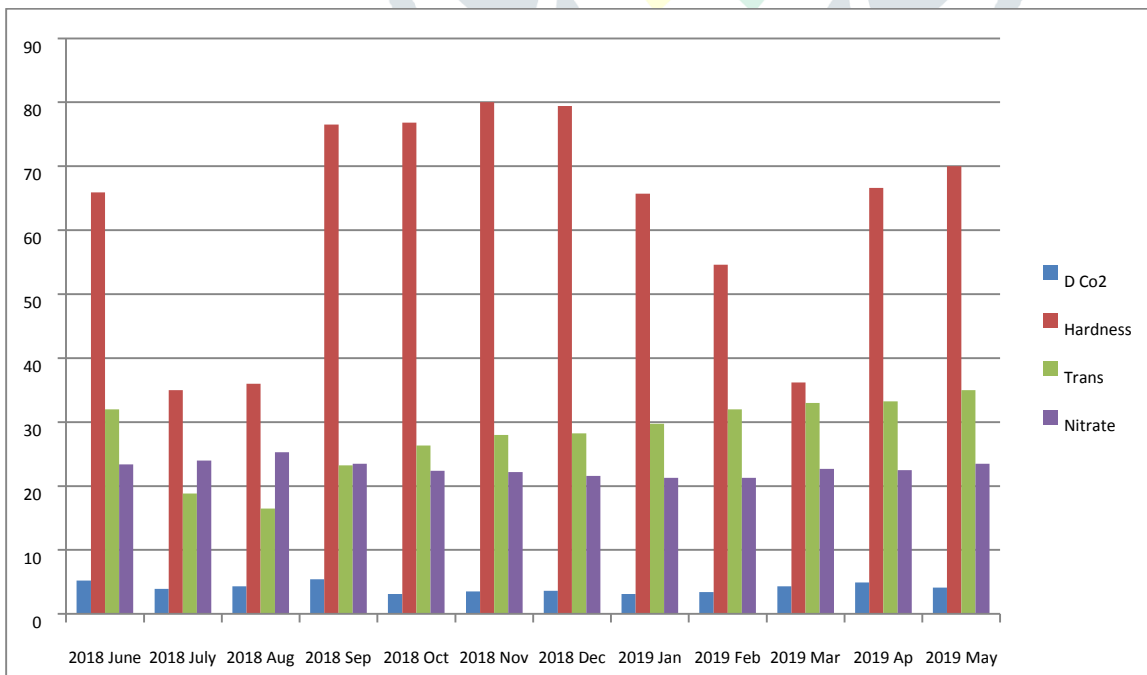Fig-1.Physico-chemical characteristics (Temperature, Turbidity, Ph, Dissolve Oxygen)

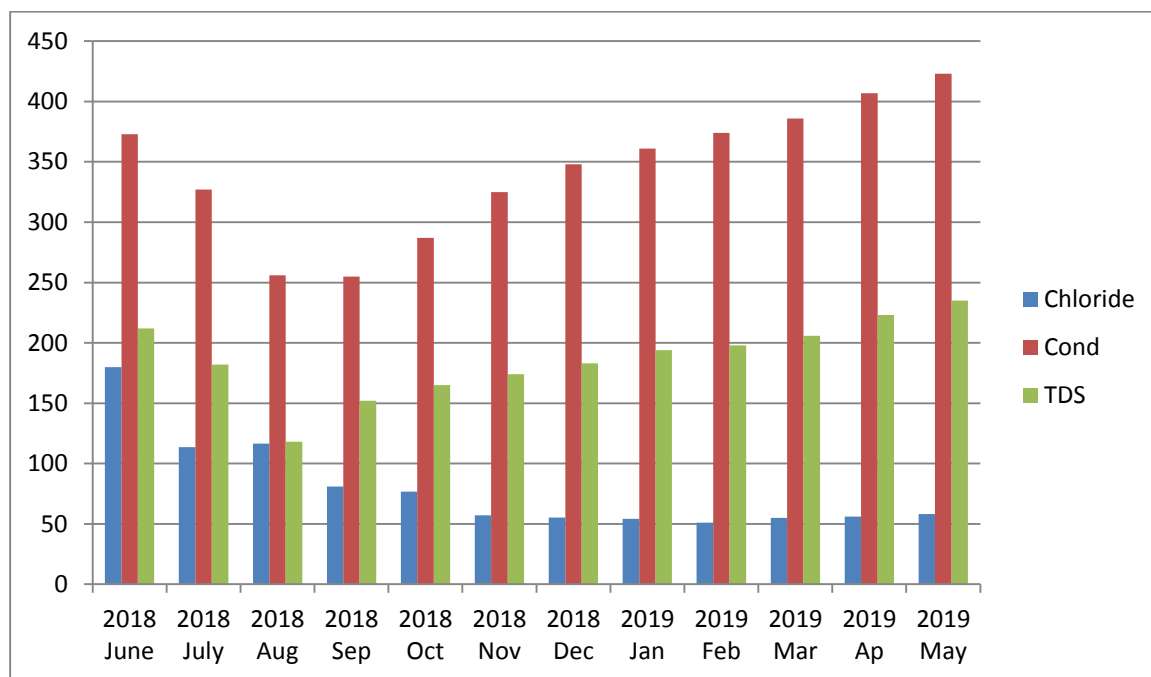Fig-2.Physico-chemical characteristics (D Co2, Hardness, Transparency, Nitrate)

Fig-3 Physico-chemical characteristics (Chloride, Conductivity, TDS)

Systematic position of fish fauna of Mainpat water bodies

S N	Species	Order	Family
1	*Notopterus notopterus*	Osteoglossiformes	Notopteridae
2	*Notopterus chitala*	Osteoglossiformes	Notopteridae
3	*Gudusia chapra*	Clupeiformes	Clupeidae
4	*Esmosdandricus*	Cypriniformes	Cyprinidae
5	*Catla catla*	Cypriniformes	Cyprinidae
6	*Cirrhinus mrigala*	Cypriniformes	Cyprinidae
7	*Labeo bata*	Cypriniformes	Cyprinidae
8	*Labeo calbasu*	Cypriniformes	Cyprinidae
9	*Labeo gonius*	Cypriniformes	Cyprinidae
10	*Labeo rohita*	Cypriniformes	Cyprinidae
11	*Labeo potal*	Cypriniformes	Cyprinidae
12	*Labeo pungucia*	Cypriniformes	Cyprinidae
13	*Aspidoparia jaya*	Cypriniformes	Cyprinidae
14	*Oxygaster bacaila*	Cypriniformes	Cyprinidae
15	*Cyprinus carpio*	Cypriniformes	Cyprinidae
16	*Cirrhinus reba*	Cypriniformes	Cyprinidae
17	*Ctenopharyngodon idella*	Cypriniformes	Cyprinidae
18	*Puntius ticto*	Cypriniformes	Cyprinidae
19	*Puntius punctatus*	Cypriniformes	Cyprinidae
20	*Lepidocephalichthys guntea*	Cypriniformes	Cobitidae
21	*Wallago attu*	Siluriformes	Siluridae
22	*Heteropneustes fossils*	Siluriformes	Heteropneustidae
23	*Ompok bimaculatus*	Siluriformes	Siluridae
24	*Mystus cavasius*	Siluriformes	Bragridae
25	*Mystus tengara*	Siluriformes	Bragridae
26	*Mystus oar*	Siluriformes	Bragridae

27	*Mystus seenghala*	Siluriformes	Bragridae
28	*Channa marulius*	Anabantiformes	Channidae
29	*Channa punctatus*	Anabantiformes	Channidae
30	*Channa gachua*	Anabantiformes	Channidae
31	*Channa striatus*	Anabantiformes	Channidae
32	*Channa stewatii*	Perciformes	Channidae
33	*Telapia mossambica*	Cichiformes	Cichidae
34	*Anabas testudinus*	Anabantiformes	Anabantidae
35	*Macrognathus aculeatus*	Synbranchiformes	Mastacembeledae
36	*Mastacembalus armatus*	Synbranchiformes	Mastacembilidae
37	*Clarius batrachus*	Siluriformes	Clarridae
38	*Clarias garipinus*	Siluriformes	Clarridae
39	*Xenentodon cancila*	Beloniformes	Belonidae

Result and discussion- The observations recorded in the present study may prove valuable change due to the environmental condition in the locality. Depth, temperature , turbidity constitute the important physical parameters on which the productivity of a water body depends.   The month wise temperature water had been studied for three experimental stations. It was measured at time of sample collection. The samples were collected in between 10AM to 12AM on First week of every month.

Temperature- The temperature is one of the most important factors. The temperature varies at different times of the day and also during different seasons of the year. The degree and annual variation in temperature of a water body have a great bearing upon its productivity in general, including all organism and fish. All metabolic and physio-logical activity and life processes are greatly influenced by water temperature. The average annual temperature of water varies in between 14.8^0c to 38.1^0c .The highest temperature of air (38.1^0) was recorded month of June 2018. In other words, it can be said that the highest value of temperature is during summer and post-monsoon periods, and lowest during winter months.

Turbidity-Turbidity is an important limiting factor in the productivity of natural water. This depends on the suspended inorganic substances, such as silt and clay, or on planktonic organisms. Turbidity is responsible for the penetration of sunlight and hence controls the photosynthetic Activity. The average turbidity of the water of Tiger Point river fluctuates between 13.01cm to 122.65cm.The maximum turbidity was noted in the month of July and minimum in the month of May. Turbidity variation was due to clay, sand and other dissolved matter coming from the catchment area. Turbidity values are higher during rains, but it showed decreasing trend in the winter and summer season.

Ph- The hydrogen ion concentration of a liquid is expressed as ph. It is an important environmental factor of natural water and its variations are linked with the animal and plant communitie's life processes which inhabiting them. It is an important factor contributing to the productivity influencing the species composition and affects the availability of nutrients and the relative toxicity of many trace elements .The water, having ph value 7 is neutral. It is depends upon the gases and salts dissolved in it. In the present study, the observations on the ph values of the water recorded 6.6 to 7.05. The ph value is lowest in the month of August and highest in the month of May. It shows increasing trend from October to May.

Dissolved oxygen- Oxygen and Carbon dioxide are the important gases dissolved in water. Living organisms need oxygen for their metabolic process. The river water receives oxygen mainly through two sources - 1.Absorption from atmosphere and 2.Photosynthesis of plants, in the day . The animal community residing in the water fall requires dissolved oxygen for respiration and release carbon dioxide as a catabolic

product. Oxygen consumption in a body of water occurs by the respiration of animals and plants . The oxygen available in the water at a given times is the balance of above process. The value of oxygen dissolved in water is dependent upon temperature and concentration of dissolved salts. The concentration of dissolved oxygen was recorded for four sampling stations in the study period . It ranges an average of from.6.1 to 9.8 Mg/L .The average maximum value of dissolved oxygen concentration had been recorded 9.8 Mg/L, while minimum of 6.1 Mg/L in the month of June .The volume of dissolved Oxygen shows seasonal trends, it shows height values in the season of winter, while low values in the summer (April to June).

Total Hardness- Hardness depends on the amount of calcium and magnesium salts dissolved in water. The average maximum concentration of 5.4 mg/l of hardness was recorded in river water in the month of September 2017 and minimum 2.9 mg/l in the month of April 2017.

Transparency –The transparency of water fall ranged from 35.0 to 80.0. During investigation periods, the highest transparency was recorded during November and lowest values were recorded during August.

Nitrate- During the study, the highest Nitrate level is 25.3. In August, lowest 21.0 is in January and February. **Chloride**- In the study period, the Chloride range is 51 to 180.0. During investigation period, highest chloride was recorded in month of June and lowest values were recorded January.

Conductivity-The minimum conductivity was recorded in 25 September and maximum in May.

TDS –Total dissolved solids considered as salinity indicator for classification of water fall. The TDS in water is due to the presence of calcium, Magnesium, Sodium, Potassium, Bicarbonate, Chloride and Sulphate ions. In the study area TDS varied from 118.0 to 235.0.

Alkalinity- Alkalinity shows increasing trend, during the month of December. While it decreases in the month of July.

Nitrate- Nitrate ranged from 21.3 to 25.3 mg/l in the study period. The highest value of nitrate compound was recorded in the month of August and minimum in January. It shows seasonal fluctuations.

During the entire study period, total of 39 fish species belonging 13 families were recorded, Cyprinidae was the largest dominant family contributing 16 species. Family Cyprinidae was represented by the Esmosdandricus *Catla, catla Cirrhinus mrigala, Labeo rohita, Labeo calbasu, Labeo bata, ,Labeo potal, Labeo pungucia .Labeo gonius , Aspidoparia jaya, Cyprinus carpio, Cirrhinus reba, Ctenopharyngodon idella, Puntius ticto, Puntius punctatus, Hypothalmichthy molitrico, Oxygaster bacailla. Lepidocephalichthys guntea is Cobitidae. In Notopteridae, two species Notopterus notopterus and Notopterus chitala, In Siluridae Ompok bamaculatus. In bagridae four species are Mystus cavasius, Mystus tengara, Mystes oar, Mystus seenghala,* Mastacembilidae *by Macrognathus aculeatus and Mastacembalus armatus .Family Cichidae has Telapia mossambica.* Clarridae *by Clarius batracus and Clarias garipinus, Belonidae has one species Xenentodon.*

Conclusion- Documentation of biodiversity has become important aspect to understand different ecosystem and influence on them. The result of this study shows that Mainpat water falls in biodiversity of fishes. First record of fish diversity was on waterfalls of Mainpat. During this study period has show a good indication of rich biodiversity. Waterfall management and public awareness would be essential to save the fish fauna of this river.

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