

# SOIL QUALITY AND ICHTHYOFAUNAL DIVERSITY IN MAINPAT, SURGUJA DISTRICT, CHHATTISGARH, INDIA

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**Introduction- Abstract-** In present, investigation has been made to investigate the soil quality and Ichthyofaunal diversity in Mainpat hill in Surguja district, Chhattisgarh. The three study site were selected are Tiger point, Machhali point water fall and Ghunghutta river. The study was carried out during July 2018 - June 2019. Fish sampling was carried out at all three site monthly and soil test were done one time in the year. Total 23 species were studied. The Climate and soil provides favourable environment for the origin and growth of vegetation and animals life depends. Therefore, distributional pattern of soil type of the study area is also necessary. So better understanding the relationship of soil quality and Ichthyofaunal diversity were studied.

**Keyword-** Fish, Surguja, Mainpat, Soil quality, Ichthyofaunal diversity.

**Introduction-** India is one of the mega biodiversity countries in the world and occupies the ninth position in terms of fresh water mega biodiversity (Mittermeier *et al* 1997). Biodiversity study of fish generally termed as Ichthyodiversity refers to the variety of fish species found in certain areas (Shinde *et al* 2009). Surguja district is a district in the northern part of the state of Chhattisgarh in India. The district borders on the state of Uttar Pradesh, Jharkhand and overlaps of the Southeastern part of the Vindhya, 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. The 244.62 kilometers along East to West and 67.37 kilometers broad from North to South, this land has an area of about 16359 square kilometers. The average height of area is above 600 meters (2000 ft). Mainpat is on a plateau with the area surrounded by forest, beautiful hill slopes, water falls. The Ichthyofaunal diversity, community, structure and species assemblages are interdependent on many abiotic and biotic factors (Negi *et al* 2013). Composition, distribution and abundance of fish species that are changed affected by soil quality. Mand river originate from north part of Mainpat plane of Surguja district. Ghunghutta river originate from the Mainpat hill and flows in the Darima region. The Ghunghutta reservoir is located in Surguja district (22°04' N latitude and 83°16'40" E longitude) of northern Chhattisgarh in India. Tiger point is at the centre of Mahadev Muda river. It falls from a height of 60 meter from Macchali river enveloped in the deep mountain range falling from the height of 48 meter. In this study I decided to study soil quality and Ichthyofaunal diversity in Mainpat, Surguja district, Chhattisgarh.

The success of freshwater fish culture largely depends upon the availability of nutrients (such as Nitrogen Phosphorus and Calcium) Which are essential for the growth of fish and fish food organism. Fish ecosystem high in sodium salt can bring about harmful effects, unless these salts are counter. It is balanced by solution Calcium and Magnesium salts. The harmful effects are generally characterized by high Ph (>8.8). Phosphorus

and Nitrogen are the most critical factors for water fertility. Phosphorus ions in soil form insoluble Calcium compounds under alkaline conditions (**Jhingran 1991**).

**Material and method-** Mainpat is the most densely forest, rural and tribal zone in the northern region of Chhattisgarh state. The region is rich in natural resources, several ores and minerals..For sample collection Soil get down near the water bodies. And to test the soil sample of the Soil testing Kendra ,Ambikapur. My sapling station are Gunghutta river, near Darima which is about 15 Km from Ambikapur. Second Tiger point, at centre of Mahadev muda river. It falls from a height of 60 meter. The Third Macchali river falling from the height of 48 meter. The collected soil samples were analyzed by Soil test center Ambikapur.

The fishes will be collected by local fishermen, they generally use 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 July 2018 - June 2019. Identification of fishes will be done on the basis of morphometric characters, descriptive characters and fin formula. A field kit measuring tape, rope, preservative, digital camera *etc.* will be prepared for regular uses. Fishes will be classified and arranged based on standard key of **Jhingran (1983)**, with slight modification as followed by **Day's (1958)** and **Srivastava (1998)**. Climate and soil provide favorable environment for the origin and growth of vegetation upon which fish life depends. Therefore, distributional pattern of soil type of the study area is also a necessary for a better understanding of fish diversity.

**Banerjee (1967)** report indicated that soil organic Carbon less than 0.5% is not suitable for fish production. Total alkalinity is a measure of carbonate, bicarbonate and hydroxyl concentration in water. Alkalinity is an index of potential carbon dioxide .When the conversion of carbon dioxide to organic matter by photosynthesis is greater than the available carbon dioxide from biotic respiration and organic matter decomposition..

Nitrogen compounds are especially significant as they provide food to plants with is consumed by animal. Among the various dissolved nutrients in water .Nitrogen and phosphorus are the two nutrients and having major importance. As a constituent of protein, nitrogen occupies a highly important place in aquatic productivity. Nitrogen in ammonium and nitrate forms is readily absorbed by plants but green algae in their role as a primary producer in water can use nitrogen in all the forms. At higher NO<sub>2</sub> concentration the fish may suffer from disease known blood disease. But Nitrogen and phosphorus in river are generally should be below the concentration for the optimal growth of plankton. .

Phosphorus is the most important single element responsible for productivity of fish. In Mainpat phosphorus concentration is usually very small quantity in water.which is important for the production of phytoplankton fish food. Calcium is the highly beneficial to fish production. Magnesium is necessary for plants having chlorophyll.Sulpher is also important for the growth of plankton. Manganese, Zinc are present very small quantity, but are of great significance in productivity of water. Soil of Mainpat contain the iron, aluminums and calcium. These metal ions precipitate phosphate as insoluble iron. The aluminum sulphate and ferric chloride are commercially available in soil .

**Texture-**The nature of soil is important of physical-chemical properties influencing the fertility of fish ponds .An ideal pond soil should be too sandy to allow leaching of the nutrients or should not be too clay to keep in all the nutrients absorbed in it.

**Soil acidity**-Soil may be acidic, alkaline or neutral. The ideal range for soil is 6.5 to 8.5 Ph best for growth. The water passing over acid soil to be acidic with low alkalinity and hardness. Soil sample Ph is 6 to 7 so that the fish growth is slow.

In the table Boron, Iron ,Maganese,Copper,Phosphorus is optimum range.Sulpher and zinc is less and nitrogenous potassium organic carbon is sufficient for fish.

### Soil Quality of water bodies in Mainpat Tehsil

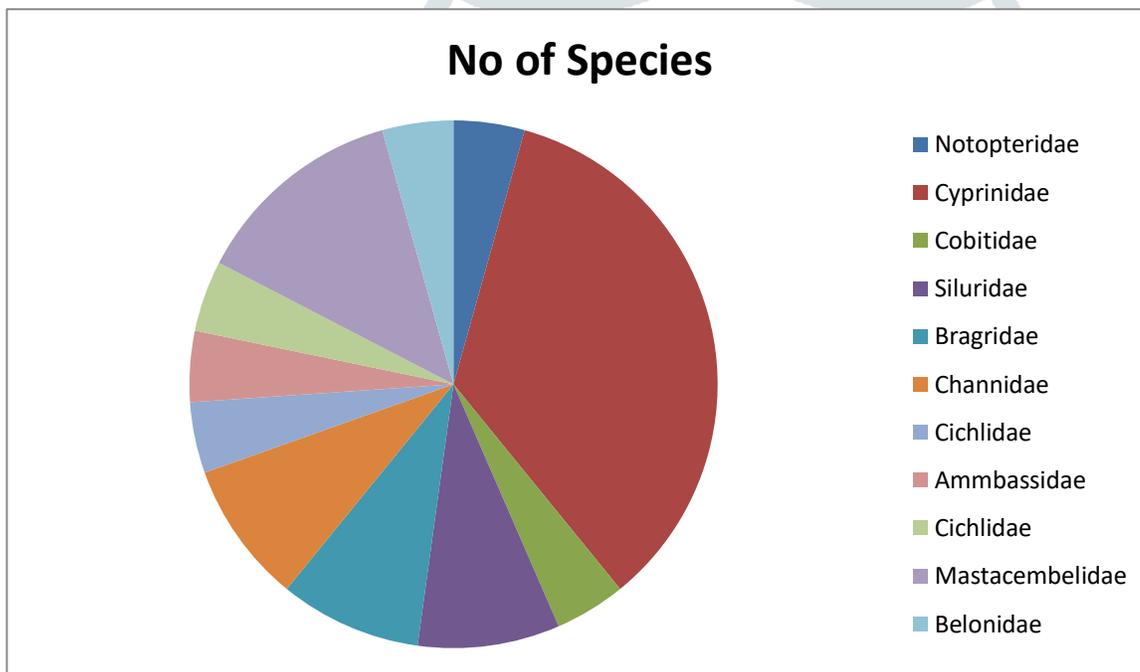
Parameter	Station A	Station B	Station C	Station D	average
Organic Carbon (OC) in %	.80	1.25	.95	1.12	1.03
Avaibility Nitrogen( N)	163.00kg/h	250.80kg/h	137.90kg/h	133.40kg/h	171.275 kg/h
Phosphorus(P)	15.23kg/h	16.12kg/h	17.92kg/h	16.53kg/h	16.45kg/h
Potassium(K)	316.90kg/h	135.50kg/h	293.40kg/h	250.40kg/h	249.05kg/h
Sulpher(S)	11.25ppm	8.75ppm	13.75ppm	9.45ppm	10.8ppm
Zinc(Zn)	1.20ppm	.22ppm	.03ppm	.54ppm	.49ppm
Boron(B)	1.10ppm	.60ppm	1.00ppm	1.00ppm	.925ppm
Iron(Fe)	24.00ppm	19.70ppm	11.70ppm	12.54ppm	16.98ppm
Manganese (Mn)	35.50ppm	32.00ppm	8.70ppm	28.40ppm	26.15ppm
Copper (Cu)	1.00ppm	1.50ppm	.20ppm	1.20ppm	.97ppm

### Fish diversity of Ghunghutta Dam, Tiger point water fall and Macchali nadi

Order	Family	Fish species	Frequen cy	Catch %	Status
Osteoglossiformes	Notopteridae	Notopterus notopterus	01	1.9	++
Cypriniformes	Cyprinidae	Labeo bata	04	7.8	++++
Cypriniformes	Cyprinidae	Labeo calbasu	05	9.8	+++++
Cypriniformes	Cyprinidae	Labeo rohita	05	9.8	+++++
Cypriniformes	Cyprinidae	Labeo potail	03	5.8	+++
Cypriniformes	Cyprinidae	Oxygaster gara	03	5.8	+++
Cyprinifomes	Cyprinidae	Punctius ticto	03	5.8	+++
Cypriniformes	Cyprinidae	Punctius phutonio	02	3.9	++
Cypriniformes	Cyprinidae	Punctius sophore	02	3.9	++
Cypriniformes	Cobitidae	Lepidocephalichthys guntea	02	3.9	++
Siluriformes	Siluridae	Heteropneustes fossilis	03	5.8	+++

Siluriformes	Siluridae	Ompok bimaculatus	02	3.9	++
Siluriformes	Bragridae	Mystus tengara	03	5.8	+++
Siluriformes	Bragridae	Mystus sengkala	02	3.9	++
Anabantiformes	Channidae	Channa gachua	02	3.9	++
Perciformes	Channidae	Channa stewatti	01	1.9	+
Perciformes	Cichlidae	Tilapia mozambique	02	3.9	++
Perciformes	Ambassidae	Chanda nama	01	1.9	+
Perciformes	Cichlidae	Oreochromis niloticus	01	1.9	+
Synbranchiformes	Mastacembelidae	Macrogathus aculeatus	01	1.9	+
Synbranchiformes	Mastacembelidae	Mastacembelus pancalus	01	1.9	+
Synbranchiformes	Mastacembelidae	Mastacembalus armatus	01	1.9	+
Beloniformes	Belonidae	Xenentodon cancila	01	1.9	+

**Key:>++++ Most abundant,+++abundant,++less abundant, +Rare**



**Fish Species and Family of water bodies of Mainpat**

**Fish fauna families recorded in the water resources of Mainpat**

<p>Notopterus notopterus                  Phylum:Chordata                  Class:Actinopterygii                  Order:Osteoglossiformes                  Genus:Notopterus                  Species:notopterus</p>		<p>Class:Actinopterygii                  Order:Siluriformes                  Family:Bagridae                  Genus:Mystus                  Species:tengara</p>	
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<p>Class:Actinopterygii Order:Cypriniformes Family:Cyprinidae Genus:Labeo Species:bata</p>		<p>Class:Actinopterygii Order:Siluriformes Family:Bargridae Genus:Mystus Species:senghala</p>	
<p>Class:Actinopterygii Order:Cypriniformes Family:Cyprinidae Genus:Labeo Species:rohita</p>		<p>Class:Actinopterygii Order:Siluriformes Family:Heteropneustida Genus:Heterpneustus Species:fossilis</p>	
<p>Class:Actinopterygii Order:Cypriniformes Family:Cyprinidae Genus:Labeo Species:potail</p>		<p>Class:Actinopterygii Order:Beloniformes Family:Belonidae Genus:Xenentodon Species:cancila</p>	
<p>Class:Actinopterygii Order:Cypriniformes Family:Cyprinidae Genus:Oxygaster Species:gara</p>		<p>Class:Actinopterygii Order: Anabantiformes Family:Channidae Genus:Channa Species:stewartii</p>	
<p>Class:Actinopterygii Order:cypriniformes Family:Cyprinidae Genus:Punctius Species:Phutunio</p>		<p>Class:Actinopterygii Order: Anabantiformes Family:Channadae Genus:Channa Species:gachua</p>	
<p>Class:Actinopterygii Order:Cypriniformes Familae:Cyprinidae Genus:Punctius Species: sophore</p>		<p>Class:Actinopterygii Order: Synbranchiformes Family: Mastacembelidae Genus:Mastacembaus Species: armatus</p>	
<p>Class:Actinopterygii Order:Cypriniformes Family: Genus: Lepidocephalichthys Species:guntia</p>		<p>Class:Actinopterygii Order: Synbranchiformes Family: Mastacembelidae Genus: Macrognathus Species:aculeatus</p>	

Class:Actinopterygii Order:Siluriformes Family: Siluridae Genus:Ompak Species:bimaculatus		Class:Actinopterygii Order:perciformes Family: Cichlidae Genus: Tilapia Species: mozambique	
Class:Actinopterygii Order:Cypriniformes Family:Cyprinidae Genus:Labeo Species: calbasu		Class:Actinopterygii Order:perciformes Family: Ambassidae Genus: Chanda Species: nama	
Class:Actinopterygii Order: Synbranchiformes Family:Mastacembalida Genus: Mastacembalus Species:puncalus		Class:Actinopterygii Order: Perciformes Family: Cichlidae Genus: Oreochromis Species: niloticus	

**Result and Discussion**-In Mainpat region soil sample recorded organic carbon 1.03%, Availability nitrogen(N) 171.275 kg/h, Phosphorus(P) 16.45 kg/h, Potassium(K) 249.05 kg/h, Sulphur(S) 10.8ppm, Zinc(Zn) .49 ppm, Boron(B) .925 ppm, Iron(Fe) 16.98 ppm, Manganese(Mn) 26.15 ppm, Copper(Cu).97 ppm. These quality of soil in water bodies 23 species were recorded. The study was carried out during July 2018 to June 2019. Total 23 species belonging to eleven Families were studied during the study period. Highest fish distribution was recorded Family Cyprinidae eight species followed Mastacembelidae three species, Siluridae, bragridae and channidae had two species. Notopteridae, Cobitidae, Cichlidae, Ambassidae, cichlidae, Belonidae had one species. *Notopterus notopterus*, *Labeo bata*, *Labeo calbasu*, *Labeo rohita*, *Labeo potal*, *Oxygaster gara*, *Punctius phutonio*, *Punctius ticto*, *Punctius sophore*, *Lepidocephalichthys guntia*, *Hetropneustes fossilis*, *Ompok bimaculatus*, *Mystus tengara*, *Mystus seenghala*, *Channa gachua*, *Channa stewartii*, *Tilapia Mozambique*, *Chanda nama*, *Oreochromis niloticus*, *Mastacembalus armatus*, *Mastacembelus pancalus*, *Macragnathus aculeate*, *Xenentodon cancila* were the species collected from all the sampling sites throughout the year. Fish distribution patterns related to environmental factor, Soil quality, and water quantity.

**Conclusion-** The present study may prove soil quality and variation of fish valuable as a reference for assessing the changes due to the environmental conditions in the locality.

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