



Assessment Of Water Quality Of Shivnath River And Their Tributaries At Rajnandgaon District And Its Impact On Fish Culture

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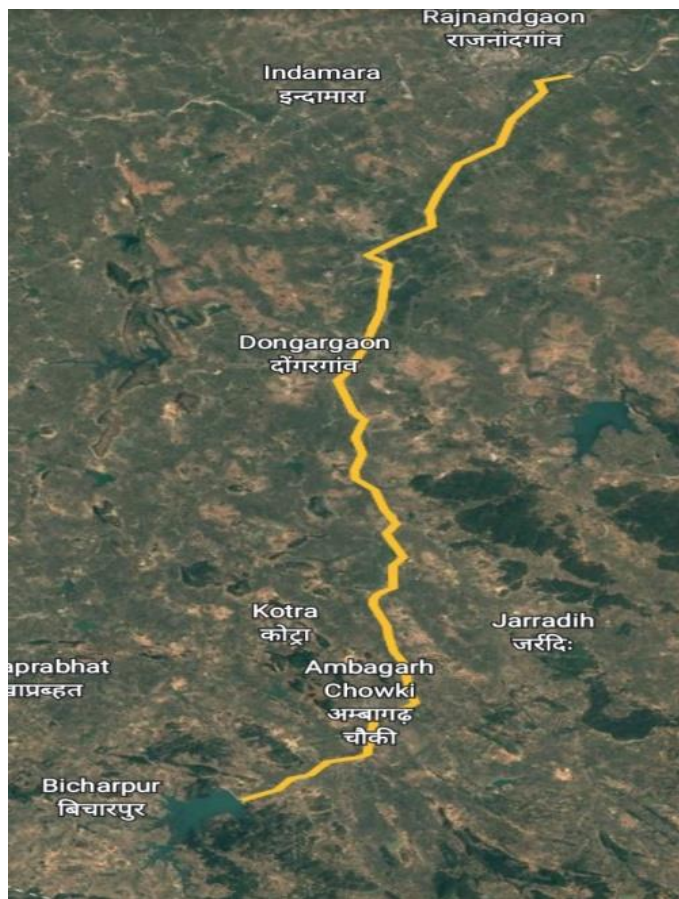
Abstract - The Shivnath River is a medium flowing river of Chhattisgarh, which starts from the southern part of Chhattisgarh and joins its numerous tributaries towards the east. This reflects the three month seasonal interval that is responsible for fishing. Some of these rivers also die. The place of collecting samples is Rajnandgaon, the stoppage dam and some barrages are integrated. Information about some of its tributaries has also been examined. The intention of the nature of changeable water is continued by the presence of some data present in the water. In this, physics test and chemical test are to be used to test the water which depends on the behavior of fish in fish farming. This experiment is being conducted with the help of more useful equipment for the test which we have done for a fish and shows its behavior in depth. In this process (Biological Oxygen Demand) BOD, Chemical Oxygen Demand) COD, pH, Spectrophotometer, Photochlorimetre, (Total Dissolve Solid) TDS is the consolidated form of numbers calculated through spectrophotometer meter. This is a not only a fish culture for the survival of the fish but also from the agricultural point of view. It is also indicated for cage culture techniques in fish farming.

Keywords – Shivnath River, Water quality, Cage culture, Fish Farming, Reservoir.

Introduction – Water is life, life is water. Most of the part of our earth is surrounded by water, so we can estimate the importance of water on the fact that from the rising sun in the morning till the setting moon at night, it seems impossible to pass a moment without water. Water acts as a medium for animals living in nature to provide them shelter, food etc. which reflects the environmental reasons, so that environmental balance is maintained. This river is 62.5 kilometers (Km) (Neatherland, 1867) and 33.74 nautical miles (NM) (Robert Hues *et al.*, 1594) long, which extends from Mongra Reservoir to Rajnandgaon and its tributaries extend over a distance of about 400 kilometers. Shivnath River is the life-giving river of some districts like Ambagarh Chowki, Rajnandgaon, and Durg. Through the water of this river, farmers are basically allocated for agriculture and fish farming (Cruz *et al.*, 2000; Malik *et al.*, 2017) at various places, according to their utility area. At the same time, the water of this river is treated and made suitable in large districts, in which adequate water supply is being provided to the urban people. Its tributaries - Pairi, Pari

Nala, Sukha Nala and Ghumaria are integrated, which after separating from the main stream of this river, are supplying water to other villages and towns. Stop dams for irrigation at some places on this river - Sukhri, Dari, Chando has been constructed which reduces the water problem in summer by 40%. A Bhakheri Reservoir with maximum irrigation capacity is also situated on the Shivnath River, which is setting a vision on its region by removing the dire problem of water for agriculture of the farmers. There is Sankardahra Ghat on the Shivnath River, which is where the ashes of people are scattered in infinite directions. At this place, abundant amounts of calcium are found in the water, due to which the water at this place has a higher density than other places. It is highly responsive to biological parameters thereby improving the ecosystem. According to external researchers, in the last few years, due to the high amount of protein found in fish, its demand is well known on (FAO 2000) the world stage, as a result of which its production capacity is increasing in all the countries. The fish present in rivers are found to have more liver oil protein than the fish in ponds. At present, it is necessary to develop cage culture at some places on this river because with cage culture BOD and COD remain balanced on the aquatic system present in the environment. Fish farming on Aquaculture has proved to be the most profitable compared to other agriculture. In the last ten years its quantity has been extremely large because along with water it also increases the fertility of the land due to which bushes and grass are being planted (Renato *et al.*, 2006; Mcmutry *et al.*, 2007) relatively unethically in some places. Growth can be achieved. At present time, if we want, we can think about pollution-free fish farming and fee forms (e.g. Bergstrom & Kirchmann 2006, Bosoh *et al.*, 2006) on Shivnath river. This paper will prove to be a guide for the future in the field of fish farming by building fish farming or ponds on the ground through the water of this river.

Study Area - It is a part of Chhattisgarh, which flows from (Northing = 212342; Easting = 810256) the southwest, flows towards the east. It defines four months of monsoon and classifies it in to different weather, according to Mathar (1974). Here's the average temperature and measurement of rain fall and the speed of the air, twenty seven degree, three hundred mm, forty km / h, respectively. There is no fish form on this river far and wide. People do fishing on this river with their tributaries in traditional ways, the fish found on the rivers supplies their food and livelihood. We have selected sixes sample areas on this river, out of which there are stop dams and its tributaries. During this time, the sampling site has been shown with G, in which G1 is Rajnandgaon, G2 Sukhri Stop Dam, G3 Parry, G4 Parry Nala, G5 Sukha Nala, and G6 Ghumaria. A sample area covers eight square feet, as this determines the use and fishing. Shivnath River and its tributaries symbolize the village and farming, in which it tries to create an environment conducive to irrigation of all types of land.



This is the map on the basis of site selection.

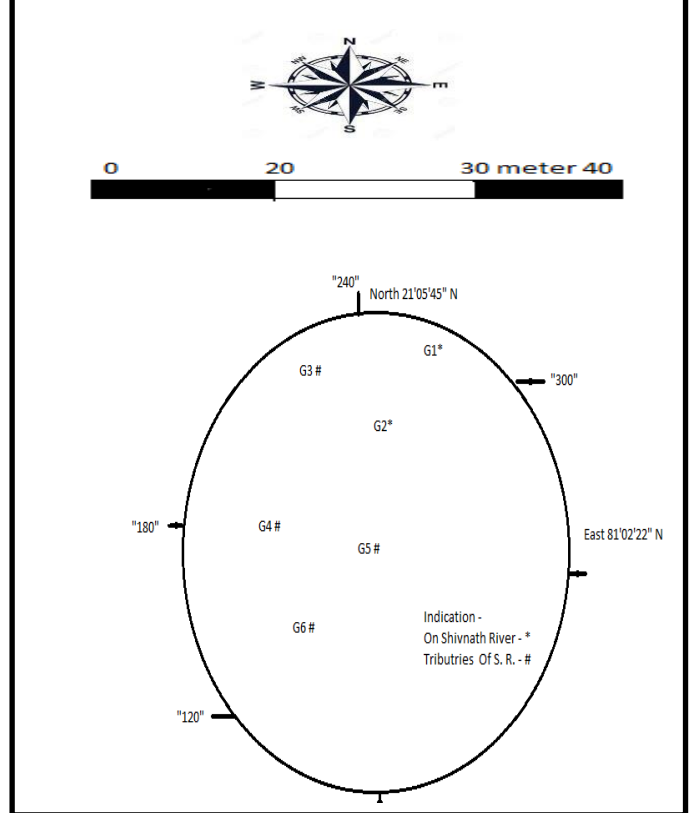
















Table (A) – 01 Names of fishes found in Shivnath River (Rajnandgaon)

SL No.	Scientific name	Order	Local Name	Fin Formula	Feding Habit	Diagram	100% of productivity for abundance
1.	<i>Labeo rohita</i>	Cypriniforms	Rohu	D. 16 (3/13); P. 17; V.9; A. 7; (2/5); C. 19; L. 1. 40- 41 ; L.tr. 6½ – 7½ /9; Barbels 1 pair.	Herbivorous		22.3%
2.	<i>Catla catla</i>	Cypriniforms	Catla	D.18-19 (3/15-16); P. 19; V.9; A. 8(3/5); C. 19; L.1. 43; L.tr. 7(1/2) - 6(1/2).	Herbivorous		20%
3.	<i>Cirrhinus mrigala</i>	Cypriniforms	Mrigal	D. 16(3/13); P. 18; V. 9; A.8(2/6); C. 15; L. 1. 42-44; L.tr. 6(1/2). Barbels 1paire	Herbivorous		10%
4.	<i>Wallago attu</i>	Cypriniforms	Padhina	D. 5; P.1/14; V. 10; A.86 (4/82); C.17; Barbels 2 pairs	Herbivorous		9%
5.	<i>Amphipnous cuchia</i>	Symbranchifroms	Bam	D. very reudimentary, just fold of skin, P., V. , A. , and C. absent	Carnivorous predatory		7.5%
6.	<i>Ilisha motius</i>	Clupeiforms	Sarangi	D.15-17 (3/12-14); P.14-16; V.6-7;A. 40-41; (2/38-39); C.17; Lr. 44 -45; L.tr. 12-13	Carnivorous predatory		8.3%
7.	<i>Oreochromis mosambica</i>	Perciforms	Tilapia	D. 11 (3/8); P.13 – 15; V.9; A.8 (3/5); C. 19; L.1. 26 – 27; L.tr. 5½ - 6/6½	Omnivorous		22.8%

Fishes Present In Different Site Selection Till To Kilogram

SL No.	Local Name	Diagram	G1	G2	G3	G4	G5	G6
1.	Rohu		250gm – 4.3Kg	250gm – 2.3Kg	250gm – 2.3Kg	250gm – 4.3Kg	250gm – 3.3Kg	250gm – 4.3Kg
2.	Catla		100gm – 3Kg	100gm – 1.2Kg	100gm – 3Kg	100gm – 1Kg	100gm – 3.2Kg	100gm – 2Kg
3.	Mrigal		250gm - 2.5Kg	250gm - 2.9Kg	250gm – 3.5Kg	250gm - 2.5Kg	250gm -1.5Kg	250gm - 2.5Kg
4.	Padhina		100gm – 1Kg	100gm – 1.2Kg	100gm – 2.3Kg	100gm – 3Kg	100gm – 1Kg	100gm – 800Kg
5.	Bam		50gm – 1.5Kg	50gm – 2Kg	50gm – 1.5Kg	50gm – 1.9Kg	50gm – 2Kg	50gm – 1.5Kg
6.	Sarangi		100gm – 900gm	100gm – 500gm	100gm – 300gm	100gm – 700gm	100gm – 400gm	100gm – 900Kg
7.	Sarangi		100gm – 3Kg	100gm – 3Kg	100gm – 1.3Kg	100gm – 2.2Kg	100gm – 3.2Kg	100gm – 1Kg

Picture From Study Area For G1 Site

Water level is incrised in beside.



Water level is incrised in upside.



They are Watching the weather.



They are captching the fish.



It is the west area of the site.



Materials and Methods- This study is being conducted on Shivnath River and its tributaries in the south-west of Chhattisgarh, whose area is 300 square kilometers. There are no fish ponds or fish farm on this river or on the banks of its tributaries. People are inclined towards fish farming in a timely and traditional manner. These monitoring points are protected according to the use of (Global Positioning System) GPS. The samples collected by us establish consistency between different sites, for which 6 places - G1, G2, G3, G4, G5 and G6 have been ensured to check the relative monitoring of physical and chemical changes. For this process, twenty samples are taken in three months. Were twelve collected. According to the time period from July to September, samples of impure water and infertile water are collected in air-tight bottles. We had six sites on this river from which fortnightly sampling of events occurring during the three months before or after (July - September) was taken, which is based on physical survey. There is also a water treatment plant at the G1 sampling site for which we have also used their scale. To test the samples, digital methods and kit tests were done jointly, the results of which are listed in Table (B) 1, 2, 3, and 4—

Table(B) –1 Sampling scale of site.

JULY											
S N O.	Station Variable	G1	G2	G3	G4	G5	G6	Mean ± Average	USEPA	FAO	APHA
1.	pH	7.5	7.5	6.5	7.8	7.1	7.8	4.5 ± 7.8	6.50-8.40	6.0 – 8.5	5.9 – 8.2
2.	Temp°C	22.2	22.4	25.6	23.3	25.3	27.2	22.2 ± 25.6	25°C - 30°C	25°C - 30°C	25°C - 30°C
3.	Turb. NTU	72.3	70.2	6	19	25.2	23.2	4 ± 72.3	< 30	30	** b
4.	TDS mg/l	700	750	120	100	200	120	100 ± 750	< 450	** b	
5.	COD mg/l	6.9	6.5	5.6		5.4	3.2	1.2 ± 6.9	** b	** b	
6.	BOD mg/l	3.9	2.4	1.2	3.2	2.1	3.2	1.2 ± 3.9	10	4- 19	3 -20
7.	Cond. mS	0.05	0.06	0.33	0.44	0.55	0.32	0.32 ± 0.55	< 0.75	** b	** b
8.	DO mg/l	7	6	10	20	5.2	6.2	5.2 ± 20	< 40	>30	>20
9.	EC pS	201	200	210	250	190	180	180 ± 250	>200	>220	

Table(B) - 02 Sampling scale of site.

AUGUST											
S N O	Station Variable	G1	G2	G3	G4	G5	G6	Mean ± Average	USEPA	FAO	APHA
1.	pH	8.7	8.2	7.5	7.2	6.5	7.2	5 ± 7.2	6.50-8.40	6.0 – 8.5	5.9 – 8.2
2.	Temp°C	23.4	23.2	24.6	26.3	25.3	26.3	23.4 ± 26.3	25°C - 30°C	25°C - 30°C	25°C - 30°C
3.	Turb. NTU	70.2	70.0	4	25	32.3	36.5	3 ± 70.2	< 30	30	** b
4.	TDS mg/l	600	650	100	300	250	263	100 ± 650	< 450	** b	
5.	COD mg/l	9.8	2.3	4.5	5.6	7.2	6.5	2.3 ± 9.8	** b	** b	
6.	BOD mg/l	8.6	3.2	5.4	7.6	2.3	3.5	2.3 ± 8.6	10	4- 19	3 -20
7.	Cond. mg/l	0.04	0.04	0.22	0.36	0.23	0.36	0.22 ± 0.36	< 0.75	** b	** b
8.	DO. mg/l	9	7	11.1	12.3	10.2	8.3	7 ± 12.3	< 40	>30	>20
9.	EC pS	100	185	236	256	300	420	100 ± 420	>200	>220	

Table(B) - 03 Sampling scale of site.

SEPTEMBER											
S NO.	Station Variable	G1	G2	G3	G4	G5	G6	Mean ± Average	USEPA	FAO	APHA
1.	pH	8.2	9.7	7.5	8.2	7.6	7.4	4.7 ± 7.4	6.50-8.40	6.0 – 8.5	5.9 – 8.2
2.	Temp°C	25.6	25.2	26.3	27.2	23.3	24.3	23.3 ± 27.2	25°C - 30°C	25°C - 30°C	25°C - 30°C
3.	Turb. NTU	70.01	70.02	16	28	23	10	10 ± 28	< 30	30	** b
4.	TDS mg/l	600	650	100	300	250	263	100 ± 650	< 450	** b	
5.	COD mg/l	6.5	7.2	2.3	6.8	5.6	6.3	2.3 ± 6.8	** b	** b	
6.	BOD mg/l	2.4	1.2	2.3	2.5	3.2	4.5	14.1	10	4- 19	3 -20
7.	Cond. mg/l	0.04	0.04	0.22	0.36	0.23	0.36	0.20	< 0.75	** b	** b
8.	DO. mg/l	9	7	11.1	12.3	10.2	8.3	9.65	< 40	>30	>20

9.	EC pS	200	230	320	450	520	120	120 ± 450	>200	>220	
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Observation - When the water star decreases on Shivnath River the number of fish decreases and fewer fish also appear, because due to the sudden decrease in water star, the adaptation of fish gets affected, this happens from July to August. An attempt has been made to show all this. Its tributaries are more waterlogged than the Shivnath river, due to which the change in the genetic environment of the fishes on it appears to be less as compared to the Shivnath river. At some places, the fish are found very clean on the upper and lower surface of the water. It appears as if it has become transparent

Result and discussion –

Result which has showing from table one, shows the acidity of water in G1 and G2 areas because in most of the areas the water is affected by the presence of garbage, garbage, various types of chemical fertilizers and things useful for humans. Colorlessness of water indicates that the amount of TDS in it increases, DO 9mg/l; 7 mg/l ; 6 mg/l ; 5.2 mg/l decreases and cond. increases, which increases the concentration of its water, on the other hand, due to very low TDS found in its tributaries G3, G4, G5, G6 there is a jump in the amount of DO 11.1mg/l; 12.3mg/l in its water and the quality of this water increases. The concentration is achieved, due to which the water appears to be **Mathar (1974)** pollution free.

Result which has showing from table two, shows that the water level is currently at its permanent high of 3.5 meters. At this time, the temperature is more or less as per the environment at both the places and Turb. is very high at which the quantity of COD, TDS (600 mg/l; 650 mg/l; 100 mg/l; 300 mg/l; 250 mg/l) and BOD increases, due to which the concentration is seen in G1 and G2 area and the DO 9mg/l; 7mg/l; 11.1mg/l; 12.3mg/l and 10.2mg/l in its (**Nyanti et al., 2018**) tributaries. The quantity increases more on the other side of the voice, COD, TDS and BOD(8 mg/l; 6 mg/l; 3.2 mg/l; 5.4 mg/l) all these things are done and most of its areas are separated from their main stream and travel long distances due to which Turbidity in its water effect is less visible.

Result which has showing from table three, there is an additional impact on water due to seasonal changes due to less rainfall at this time. The situation after floods in the month of September becomes relatively less as compared to July and August due to which some improvement in water quality can be seen. But in this month, water is also released from the fields on which chemical fertilizers are found to a large extent, due to which the amount of COD, TDS (600 mg/l; 650 mg/l; 300 mg/l and 263 mg/l) increases and shows the acidity of the water. At this time BOD (2.4mg/l; 1.2 mg/l; 2.3 mg/l and 2.5 mg/l) is the quantity is found to be low which indicates all the G1 and G2 regions.

The amount of bacteria E.coli absents on this Shivnath River and (**Nagar Palika Nigam, Rajnandgaon**) its tributaries. In this way, due to greater effect of chemical elements and nutrients, there is an increase in the velocity of water, which proves to be responsible for the increase between dilution and culture concentration. For heavy elements like Arsenic(As) Palladium(Pd) Mercury (Hg) we used spectrophotometer and photo calorimeter to determine that there are no residues (**e.g. Sasireka Velusamy &**

Anurag Roy *et.al.* 2021) of these elements at any place on this river. If in all these rivers the absorption of light due to increase in turbidity is limited till the lower and middle reaches of the river, the fish do not get proper access as sunlight is very important for some part of the river.

Stata –

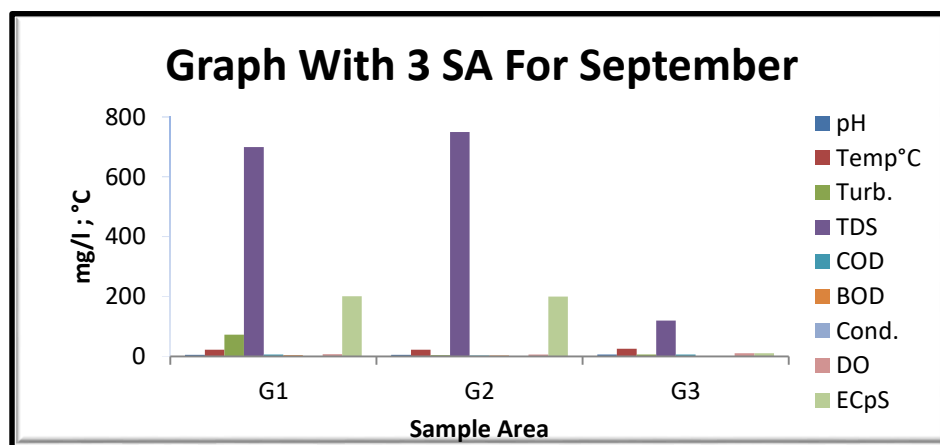
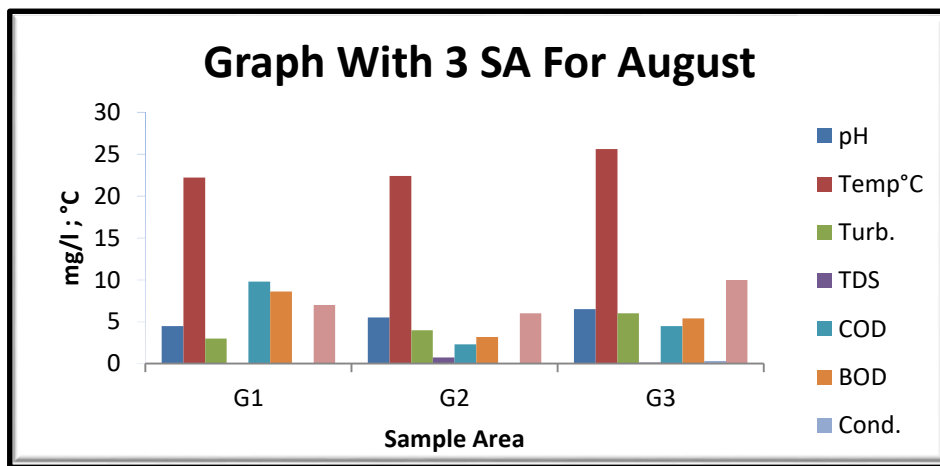
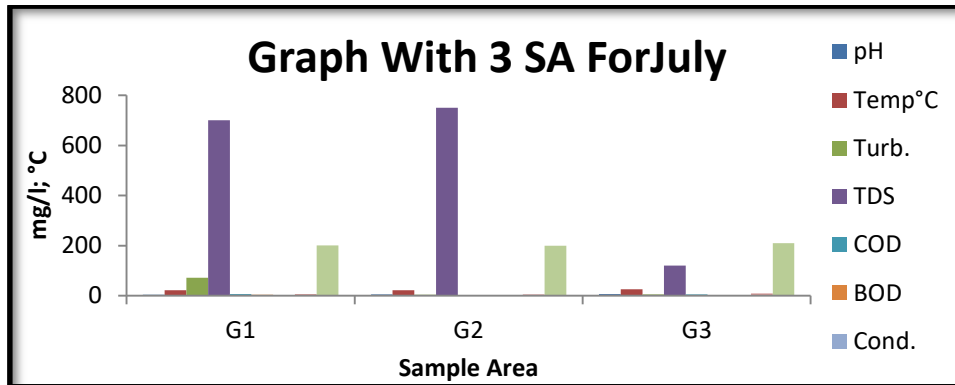


Fig.01 Values of three area July to September.

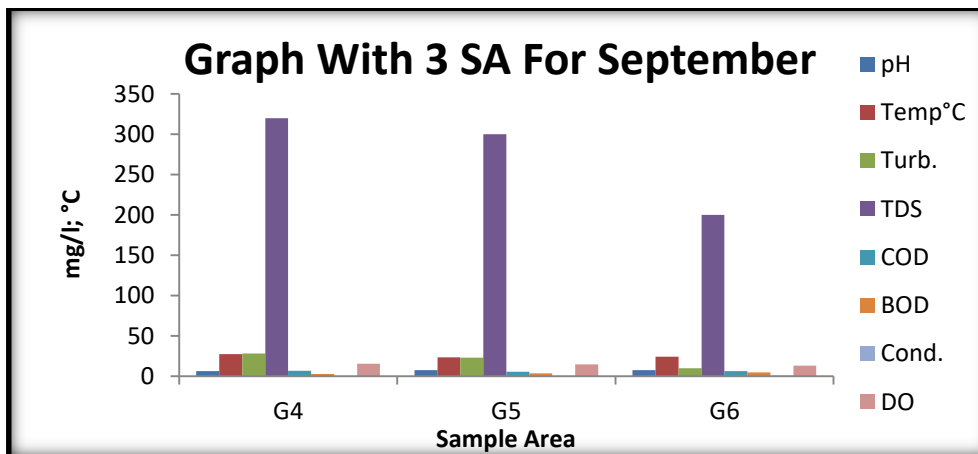
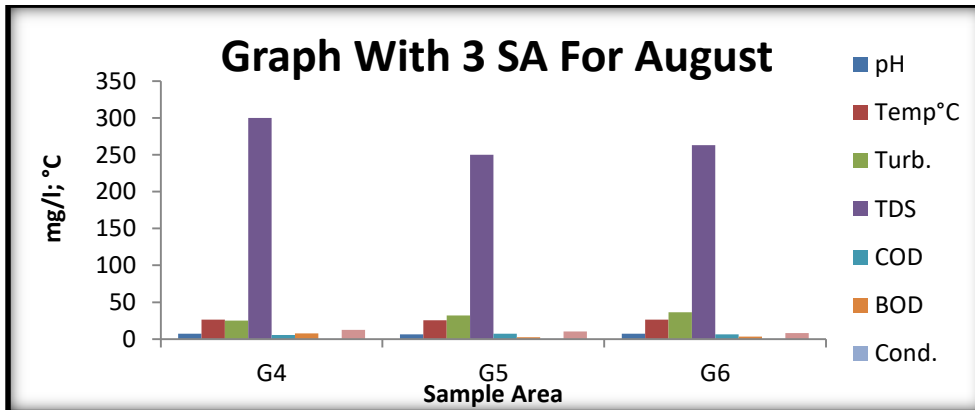
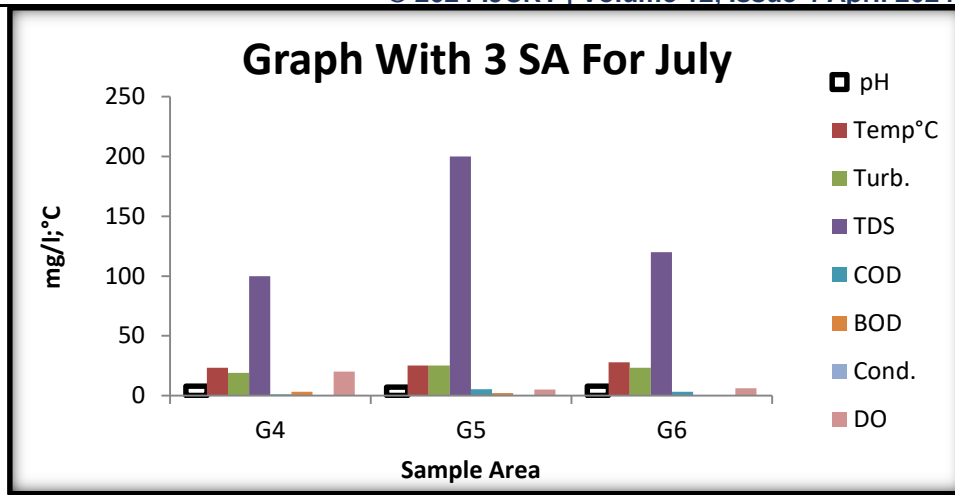


Fig.02 Values of three area July to September.

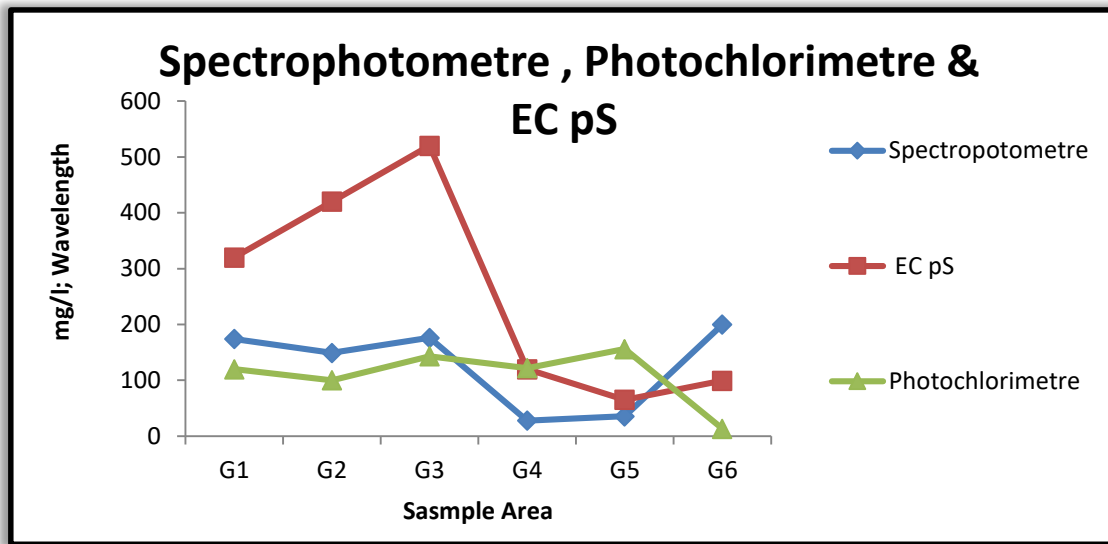


Fig.03 - Values for light of absorbance, Concentration exacta.

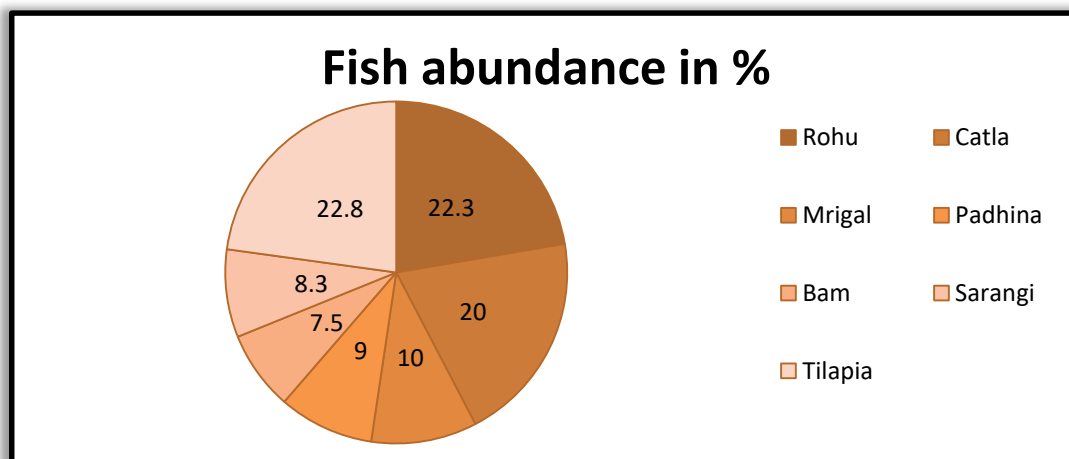


Fig.04 - Data for fish abundance in Shivnath River and their Tributaries.

Conclusion - Some amount of pollution is seen in Shivnath River and its tributaries, its quantity in different areas is given above and different effects of environment are seen on them. According to the study, this effect lasts for three months during the paint year and its peak can be seen in this area. In this area, the case of fish water is not colored, which is very important for development in which the environment and water intensity remain in good condition. A large number of farms were built along the banks of this river, which means that we can promote fish farming in this area. There is a need to improve DO, Turbidity for a few months in G1 and G2 areas, after which fish farming can be done extensively. The fertilizers released from the fields (water coming through irrigation) prove to be suitable for some fishes. It may be that fish farms and cage culture play a role to a great extent in reducing river pollution due to the polluted water caused by people.

References –

Arur, Anand and Krishanan, P. (2019). Assessing the water spread area available for fish culture and fish production potential in inland lentic water bodies using remote sensing: A case study from Chhattisgarh State, India \ \ <https://doi.org/10.1016/j.rsase.2019.100273>

A Review on Heavy Metal Ions and Containing Dyes Removal Through Graphene Oxide-Based Adsorption Strategies for Textile doi.org/10.1002/tcr.202000153 Wastewater Treatment
<https://doi.org/10.1002/tcr.202000153>

Agriculture in India.(n.d.).Tropo Go. Retrieved March 29, 2024, from <https://tropogo.com/blogs/application-of-drones-in-agriculture-in-india>

Banjare, GokulRam Sahu, Bharat LalFluoride Contamination of Groundwater and Toxicities inDongargaon Block, Chhattisgarh, IndiaDOI 10.1007/s12403-016-0229-3

Castany, G., Marce, A., Margat, J., Moussu, H., Vuillaume, Y., &Evin, J. (1974). An environmental isotope study of the groundwater regime in large aquifers. International Atomic Energy Agency (IAEA): IAEA. ISSN 0074 – 1884

Devi, Ansuya P and Padmavathy, P (2017) Review on water quality parameters in fresh water cage culture Aanand, S and Aruljothi, K ; Department of Aquatic Environment Management, Fisheries College and Research Institute, Thoothukudi India 2017; 2394 -7500

FAO.(2016). Food and Agriculture Organization of the United Nations. The State of World Fisheries and Aquaculture: Contributing to food security and nutrition for all. Rome. 200 pp. ISBN 978-92-5-109185-2

Fayyadh,A.S.; Hussien,B.M.; Al-Hamdani, M.M.; Salim,S.A.; Mukhlef,H.N and Maher,A.A. (2016). Hydrologic System of Euphrates River (Spatial Analysis) between Al-Qaem and Falluja.Iraqi Bulletin of Geology and Mining. 2: 1-12. doi.org/10.1016/j.biopha.2017.10.134

Fish culture .(n.d.).Reserch Gate. Retrieved March 29, 2024, from https://www.researchgate.net/figure/Architecture-for-aquaculture-monitoring-and-management-using-drones_fig3_357655803

Fish culture .(n.d.).Google . Retrieved March 30, 2024, from https://www.google.com/search?q=How+to+control+fish+culture+by+drone&oq=How+to+control+fish+culture+by+drone&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIHCAEQIRigATIHCAIQIRigAdIBBzg5MmowajeoAhSwAgE&client=ms-android-samsung-gj-rev1&sourceid=chrome-mobile&ie=UTF-8

Fish culture .(n.d.).Reserch Gate. Retrieved March 29, 2024, from https://www.researchgate.net/figure/Architecture-for-aquaculture-monitoring-and-management-using-drones_fig3_357655803

Holger, Lars Bergstrom Kirchmann and Widespread, GudniThorvaldsson Opinions About Organic Agriculture – Are They Supported by Scientific Evidence? doi=10.1007/978-1-4020-9316-6_1

Kumar, PravejDamle, Kumar DushyantPathak, NeerajFish Biodiversity in The River Sheonath of ChhattisgarhState in India ONLINE ISSN 2277- 1565 PRINT ISSN 0976 – 4828 DOI: .10.15515/iaast.0976-4828.11.4.812

Pitta P, Karakassis I, Tsapakis M, Zivanovic S. Natural vs. mariculture induce variability in numbers and plankton in the eastern Mediterranean .Hydrobiologia. 1999; 391:181-194

Simhadri, J. J., Loffredo, C. A., Mondal, T., Noreen, Z., Nnanabu, T., Quartey, R., Howell, C., Korba, B., Nunlee-Bland, G., & Ghosh, S. (2022). Correlates and Covariates of Type 2 Diabetes in an African American Population in the Washington DC Area. *Open Journal of Epidemiology*, 12(04), 431–448. <https://doi.org/10.4236/ojepi.2022.124035>

Srivastava, J. Gopal Book; (Fishes of Uttar Pradesh and Bihar); Vishwavidyalaya Prakashn (1980); ISBN 13:9788171240135 <https://www.abebooks.com/Fishes-U.P-Bihar-Srivastava-G.J-Vishwavidyalaya/30627046650/bd>.

Tacon, A.G.J and Halwart, M. (2007). Cage aquaculture: a global overview. In: Cage aquaculture -Regional reviews and global overview. Halwart, M.; Soto, D. and Arthur, J. R. (Eds.): 1-16. FAO Fisheries Technical Paper. No. 498, Rome, FAO, 241 p. DOI:[10.1080/23308249.2014.987209](https://doi.org/10.1080/23308249.2014.987209)

Thakur, Ankit (2018)of status of the fishery cooperatives, SHGs and fishermen groups in Baster of Chhattisgarh P –ISSN: 2349-8234

Yi Y, Phuong DR, Phu TQ, Lin CK, Diana S. Environmental Impacts of cage culture for Catfish in Hongngu, Vietnam. In: Harris, R., Courter, I., Egna, H. (Eds.), Twenty-First Annual Report. Aquaculture CRSP, Oregon State University, Corvallis, Oregon. 2004; 157-168. DOI:[10.13140/2.1.3089.7280](https://doi.org/10.13140/2.1.3089.7280)