



WATER QUALITY ASSESSMENT OF GHUNGHUTTA DAM SURGUJA (C.G.)

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ABSTRACT

In the present study is going to centralize on Ghunghutta Dam of Surguja district in Chhattisgarh India. The water quality status of Ghunghutta dam in Surguja district were determined during June 2017 to May 2018. The Ghunghutta dam is located in Surguja district (22°94N latitude & 83°164E Longitude) of northern Chhattisgarh in India. Ghunghutta is a medium irrigation project which was constructed in 2002 across the river Ghunghutta which is a tributary of Rehar Sub basin Sone in the Ganga basin. The Dam is 14km. from the district head quarter Ambikapur. The Dam water use is domestic purposes, irrigation, aquaculture etc. The surrounding area of dam semi urban semi agricultural and to generate electricity. Present study is aimed at investigating the main factors responsible for water pollution in Ghunghutta Dam. The monthly intervals during June 2017 through May 2018 with an objective to estimate the water quality of the dam on various physico-chemical parameters Total dissolve solids, and turbidity values were maximum on all the sites in rainy months, which may be due to the gradual disturbances in sedimentation of solids as well as dust particles deposited along with runoff rainwater. The alkalinity varied during different months. The values of pH, conductivity, hardness, dissolved oxygen C.O.D. and biological oxygen demand were higher during summer months. Among the in this study, diversity, and evenness and to predict the state of Ghunghutta dam according to physico-chemical parameters.

KEYWORDS: Physico-chemical parameters, Monthly variation, Ghunghutta dam.

I. INTRODUCTION

Water is one of the abundantly available substances in nature. It is an important and life sustaining drinks to human and is essential for the survival of all the organisms. Living organisms require large quantities of water for their sustenance. The enormous quantity of water covers most of the globe and riddles the continents with lakes and river, water is the medium, participant in all of the chemical reactions occurring in the environment, including the life processes. Indeed water is an important condition of life. Water is essential for all socioeconomic development and for maintaining healthy ecosystems. Natural surface water bodies like rivers and streams are subjected to pollution comprising of organic and inorganic constituent.

Surface water acts as a receptor of pollutants, which are washed out and carried by surface runoff from urbanized catchments or watersheds. Rapid urbanization leads to degradations upon water quality via eutrophication and pollution. Polluted surface water includes river and lakes as well as agricultural drains. Nearly all water bodies, including ground water, are affected by pollution. Polluted water loses its economic and aesthetic value. Resultantly, in many developed countries, water pollution is a major problem and many river basins have been found to show high organic matter concentration.

Rivers are the most important sources of water to global population. Rivers provide water for industry, agriculture, commercial, aquaculture and domestic purposes. Unfortunately this important source of water is being polluted by indiscriminate disposal of sewage, industrial wastes and plethora of human activities. The significant role played by river in almost in every development program of country hardly needs many elaborations. Peoples living along bank of these rivers largely depends on them for their water needs for everyday for living.

During the study of earth watch program, the ecologists and hydro-biologist have observed that there are several natural and man engineered resources, which are still lacking of research studies therefore a gap have been formed (Williams & Feltmate,1992).

Today, the water, which is an essential components for all of the living beings for their metabolic activities. The main cause of surface water pollution are discharged of industrial, domestic, municipal wastes and agriculture water like irrigation return flow, animal wastes fertilizers, crop residue, dead animal, pesticides residues, disposal of municipal and industrial wastes, sewage leakage, septic tank ,cesspools and urbanization .

Most of the fresh water resources in recent years are rapidly degrading due to intense of human activities and loading of pollutants. The rapid expansions of human population and increasing rate of industrialization create unfavourable hydro biological conditions of the water due to pollution which may cause mysterious mass killing of the fishes and aquatic organisms.

A number of large anthropogenically constructed fresh water impoundment have come in to existence in India. During the last four decades earlier various multipurpose river-valley projects have been existed. Fish production in Indian reservoirs varies from water to water depending upon its fisheries development.

After the freedom of India various types of stop dams and barrages had been proposed for construction by the central and state government (five year plans, govt. of india1952). To fulfil their objective as for irrigation; pisciculture, power generation etc .and to improve the socio, economic status, of public. Therefore, various dams, stop dams and barrages are constructed on nallahas and rivers.

Present study is going to centralize on Ghunghutta Dam Surguja. The Ghunghutta dam is located in Surguja district (22^o94N latitude & 83^o164E Longitude) of northern Chhattisgarh in India. Ghunghutta is a medium irrigation project which was constructed in 2002 across the river Ghunghutta which is a tributary of Rehar Sub basin Sone in the Ganga basin. The Dam is 14km. from the district head quarter Ambikapur. The Dam is 242.20 meter long and 31.50 meter high. The live storage capacity of the reservoir is 62.05 MCM. Mainly reservoir water is used for irrigation but it is also utilized for pisciculture practices. Their flows in township, industrial, domestic and municipal discharge merge into it at different points. The water of the reservoir is used by urban and peripheral rural population directly at many stations for domestic and agriculture uses.

OBJECTIVES

The objectives of the present study are following:

1. To the Study physicochemical characteristic of the dam.
2. To improve the aquaculture and water quality of dam.
3. To examine the causes of water pollution and their impact the aquatic life

II. MATERIAL AND METHODS:-

The quality of Ghunghutta dam water is deteriorated because of in-stream uses of water in the following ways. During survey it was observed that rural areas are situated on both the side of Surguja, which are engaged mainly in the agriculture and cattle farming. These cattle's while wading in the river transfer fecal matter and other types of pathogens in the dam. Also the vigorous movement and activities of the cattle inside the water disturb the river bed where the pollutants are settled in the form of sludge. This

ultimately deteriorates the quality of the dam water to a considerable extent. The present study conducted from June 2017 to May 2018.

Water samples were collected monthly in the morning at 8 am to 10 am from surface layer of the dam. Physico-chemical analysis of water samples were made following standard methods suggested by APHA, AWWA, WPCI (2005).

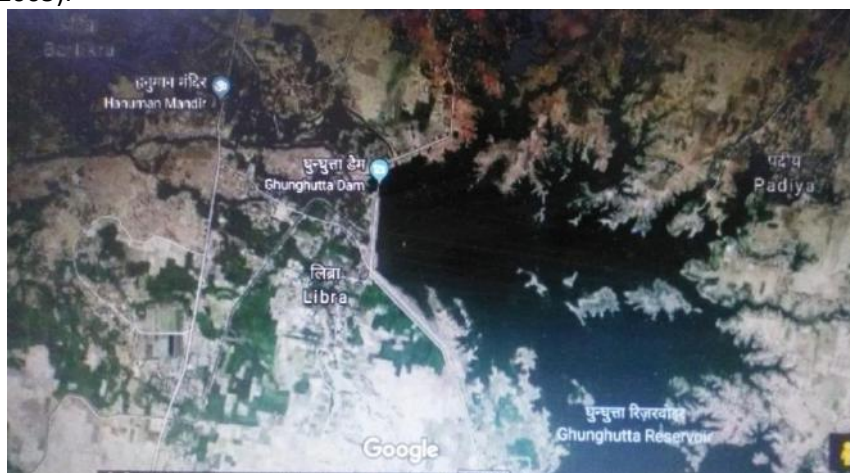


Fig. 1 Satellite Map of Ghunghutta Dam Surguja (C.G.)

III. RESULT AND DISCUSSION:-

The data on physico-chemical analysis of water Surgujadam has been given in table no. 1

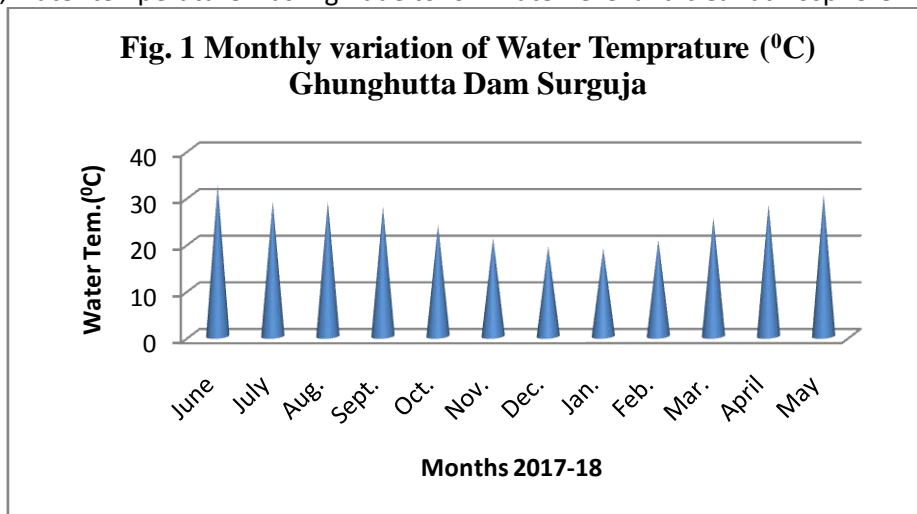
Table No. 1 Monthly variation of water quality parameters during the year 2017-18 of Ghunghutta dam Surguja(C.G.)

Months	W.T.	Transp.	Turb.	E.C.	pH	T. Alk.	T.D.S.	T. H.	D.O.	C.O.D.	B.O.D.
	°C	cm	NTU	µs/cm		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
June	32.47	61.2	25.62	112.4	7.91	153.4	644.6	216	6.48	29	7.34
July	28.97	32.2	28.36	122.0	7.8	155.6	655	203.8	7.28	35	6.5
Aug.	28.88	23	31.62	133.6	7.44	143.4	679	179.8	7.4	43.2	5.66
Sept.	27.77	34.2	26.54	124.4	7.84	144.8	668	169.8	7.24	37.6	5.7
Oct.	23.9	42.4	24.3	118.0	7.94	126.0	642	155.2	8.08	28.2	5.52
Nov.	21.15	64.8	19.28	107.4	8.14	145.4	611	140	8.32	24.2	5.34
Dec.	19.34	81.4	14.6	90.4	8.22	69.4	602	126.4	8.9	20.2	5.38
Jan.	18.86	95.4	12.48	68.4	8.38	81.4	587	157.6	7.58	13.8	4.64
Feb.	20.66	88	13.86	78.2	7.74	130.6	605	170.4	8.34	19	5.28
Mar.	25.43	78.4	17.2	87.0	8.36	160.8	630	182.6	7.28	19.8	6.12
April	28.31	76.2	20.82	94.4	8.24	154.2	627	190.2	7.22	26.4	6.5
May	30.46	73	23.54	103.8	8.98	167	636	198	5.9	25	6.64

Water temperature (°C):-

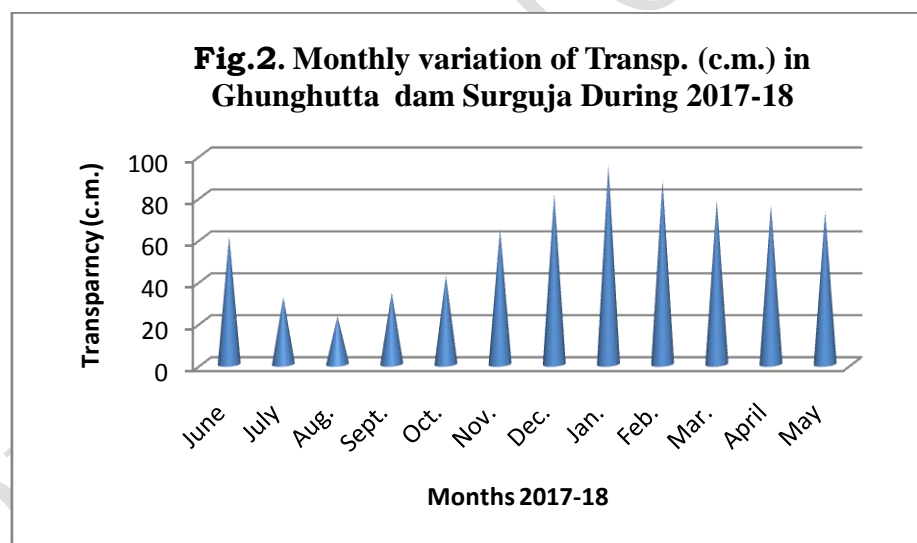
The temperature of water is a unique property of its high specific heat, which is three times that of air consequently. Temperature remains more or less steady over vast areas of the water body in contrast to the terrestrial environment, where it fluctuates hourly because of its tremendous capacity to store and to release the heat. The larger water bodies are able to change the atmospheric condition around them.

the presents study period water temperature ranged from 19.34 °C to 32.42°C. Similar results were found by Singhai et al. (1990) Jayabhayeet. al; (2006), Salve and Hiware (2006) and BaghelR.K.(2017), observed that during summer, water temperature was high due to low water level and clear atmosphere.



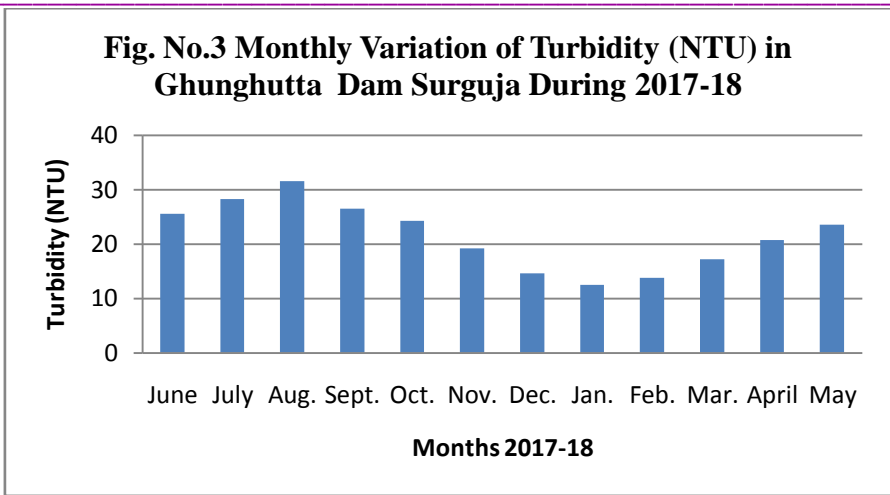
Transparency:-

The clear transparency is an important characteristic of water quality. The light penetration is often regulated by the suspended matters in the water which restrict the photosynthesis thus; it is effective for the productivity of water body. During the presents study period transparency ranged from 23 to 95.4c.m..



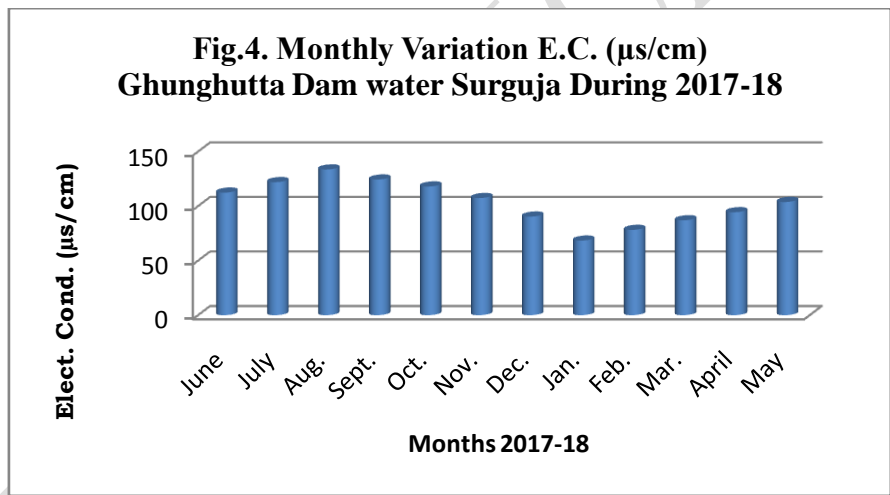
Turbidity (NTU):-

In water contamination terminology the visible pollution due to suspended materials in water which cause the reduction in the transmission of light. Turbidity in water is caused by the presence of suspended materials such as clay, silt, colloidal organic matters, planktons and other microscopic organism. The turbidity values ranges from 12.48 to 31.62 NTU. The maximum value was recorded from rainy season August 2017 and minimum in the winter season January 2018.



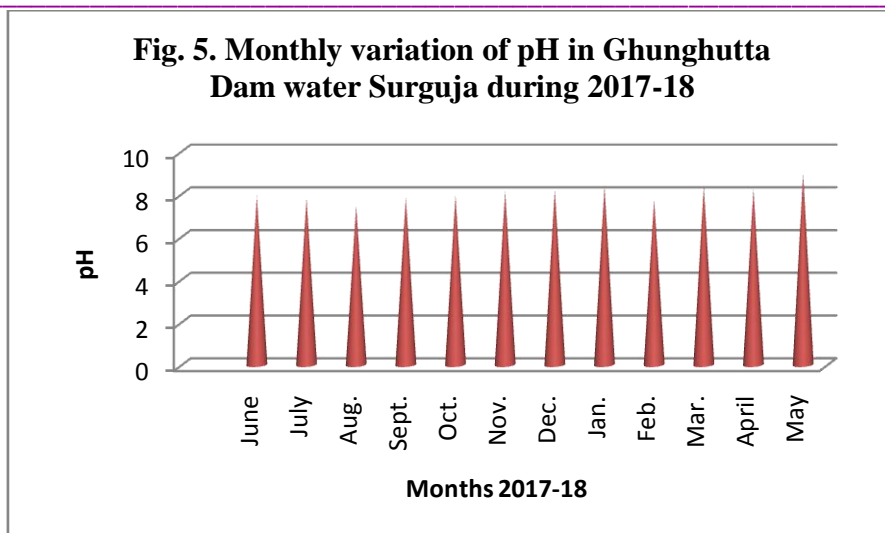
Electrical Conductivity:-

The electrical conductance of water denotes the capacity of conductance of electrical current. If the conductivity of a cube of each side of 1c.m at 25⁰C is called the specific conductance. In aquatic habitats it is a property caused by the zone present in water. Electrical conductivity value ranges 68.4 to 133.6 $\mu\text{s/cm}$. The maximum value was recorded from rainy season August 2017 and minimum in the winter season January 2018. Similar results were found by Iqbal and Kataria (1995).



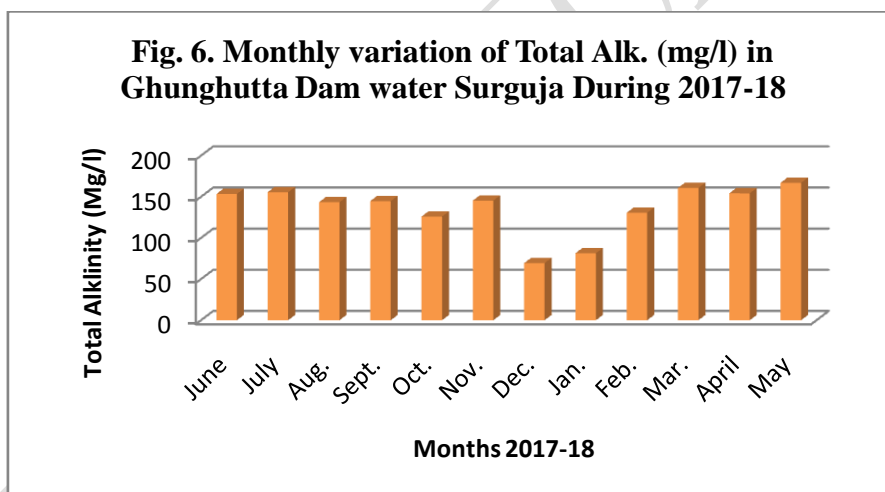
pH:-

pH is a scale indicating the acidity or alkalinity of aqueous solutions. pH value is designated as a number from 1 to 14. Which represents a logarithmic scale indicating the concentration of hydrogen ions. The pH values range from 7.44 to 8.98. The maximum value was recorded from Summer months May 2018 and Minimum in the rainy season August 2017. pH was alkaline throughout study period. Similar results were found Radhika et. al. (2004) and Baghel R. K. (2017).



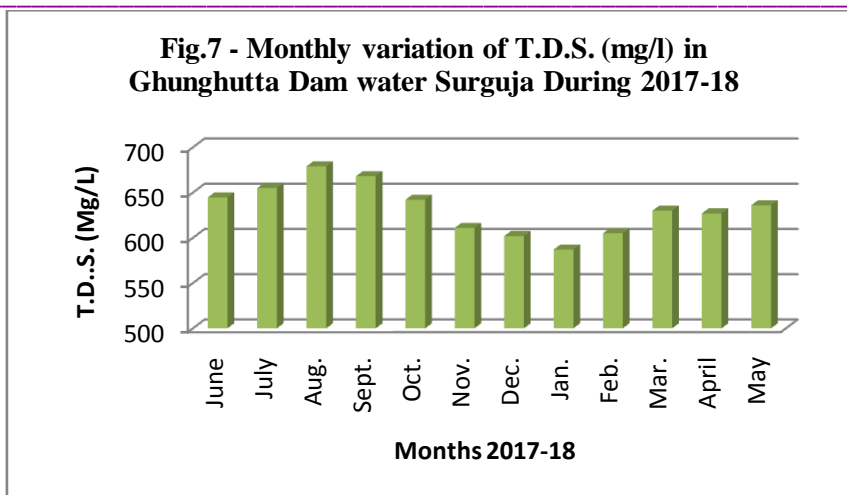
Alkalinity (mg/l):-

The alkalinity of water is the characteristic capacity of neutralizing factors of strong acids. This character is due to the presence of all the hydroxyl ions, which are able to have the combination the hydrogen ion. Total alkalinity ranges from 69.4 to 167 mg/l. The maximum value was recorded in summer season May 2018 and minimum value in the winter season December 2017. Similar results were found Garg SS (2003).



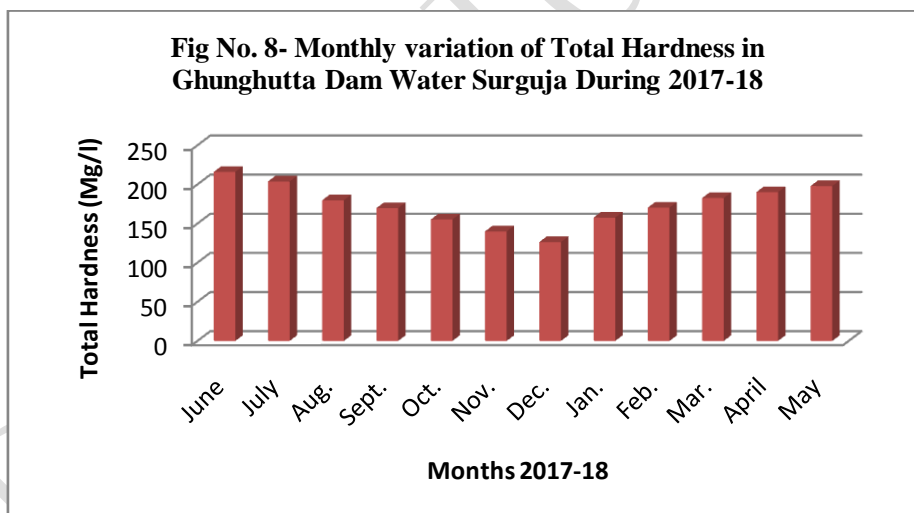
T.D.S. (mg/l):-

The total dissolved solid term is used in relation of water quality and pollution studies, it refers to the inorganic salts and small amount of organic matter present in water, the principal ions contributing to T.D.S. The total dissolve solid value ranges from 587 to 679mg/l. The maximum value was recorded from August 2017 and minimum in the January 2018. Similar results were found Radhikaet. al. (2004) and BaghelR. K. (2017).



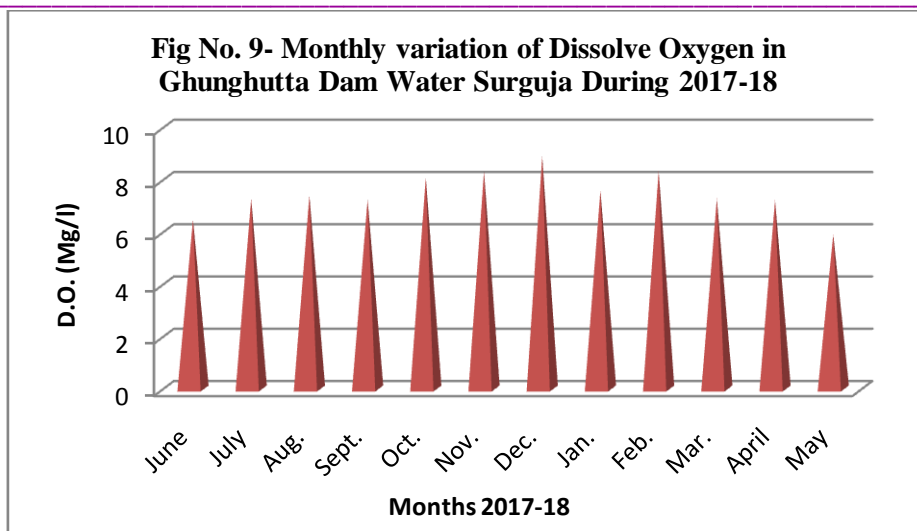
Hardness (mg/l):-

Hardness of water is not specific constituent but as a variable and complex mixture of cations and anions. Hardness of the natural water is mainly caused by cations such as calcium and magnesium. The value of hardness fluctuates from 126.4 to 216mg/l. The maximum value was recorded in the month of summer June 2017 and minimum in the month of winter December 2017. Similar results were found Radhikaet. al. (2004) and Awasthi, Tiwari S. (2004).



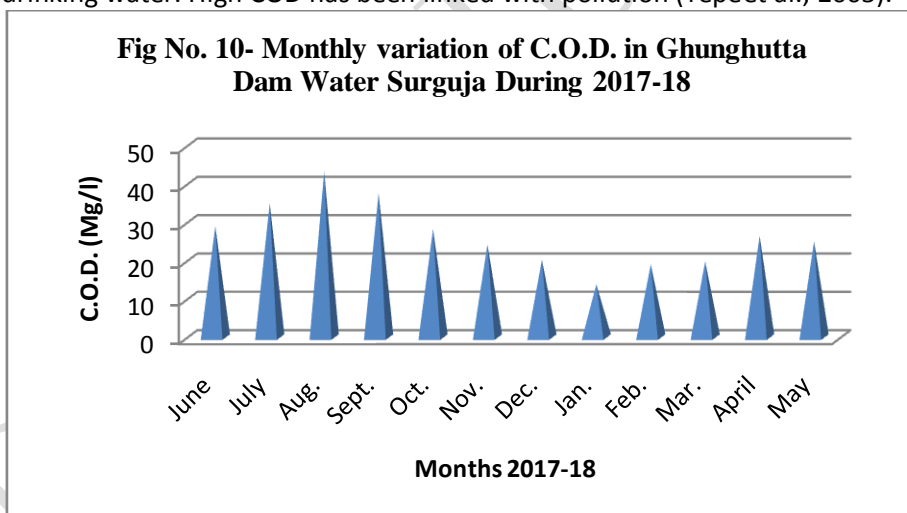
Dissolved Oxygen(mg/l):-

Dissolved oxygen is an important parameter in assessing water quality. In natural water, oxygen is probably one of primary importance both as regulator of metabolic process of plant and animal community and an indicator of water conditions. The value of DO fluctuate from 5.9 to 8.9mg/l. The maximum values were recorded in the month of winter December 2017 and minimum value in the summer month May 2018. Similar trend of dissolved oxygen in fresh water lakes also observed by Bhatt *et al.* (1998), Pandey (1993). The high DO in summer is attributed to increase in temperature and duration of bright sunlight. The long days and intense sunlight during summer seems to accelerate photosynthesis by phytoplankton's, utilizing CO₂ and giving off oxygen. This accounts for the greater quality of O₂ recorded during summer. The quantity is slightly less during winter as reported by Masood Ahmed and Krishnamurthy (1990).



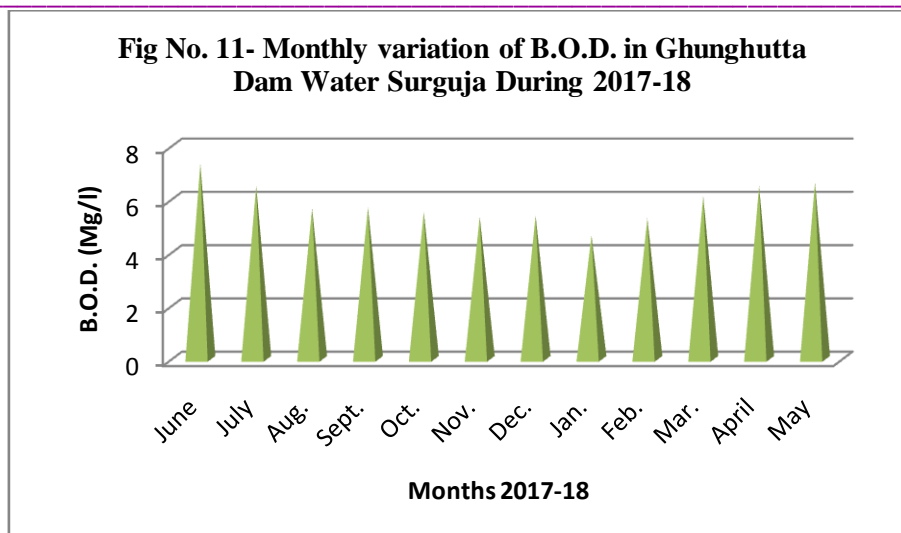
C.O.D. (mg/l):-

Chemical Oxygen Demand (COD) a parameter of water quality which measures the amount of oxygen in parts per million required to oxidize organic and oxidizable inorganic compound in water samples. Chemical oxygen demand (COD) value range between 13.8 and 43.2 mg/l. The maximum values were recorded in the month of August 2017 and minimum value in the winter season January 2018. There was no statistical difference in COD between the one year of study. APHA (1995), however, recommended COD levels of <2 mg/L in drinking water. High COD has been linked with pollution (Tepeet al., 2005).



B.O.D. (mg/l):-

Biochemical Oxygen Demand (B.O.D.) is amount of oxygen, expressed mg/l; or parts per million (ppm), that bacteria take form water when they oxidize organic matter. Biological oxygen demand (BOD) value range between 4.68 and 7.34mg/l. The maximum values were recorded in the month of June 2017 and minimum value in the January 2018. These findings are also in accordance with Ahmad (1989), Parashshar et al (2008), Sharma and Capoor (2010) and Arya et al(2011). The heavy human settlements around the pond are responsible for adding municipal waste water thus creating organic pollution in the pond. It is also an important factor in enhancing the BOD value Sharma and Gupta (2004).



IV. CONCLUSION:-

The quality of water Ghunghutta dam is deteriorating day by day due to inflow of domestic sewage, municipal waste, agricultural runoff and effluents of organic waste of animal and human origin into the lake. Therefore it can be concluded through this study that the Ghunghuttadam with social and cultural importance is degrading at an alarming rate.

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