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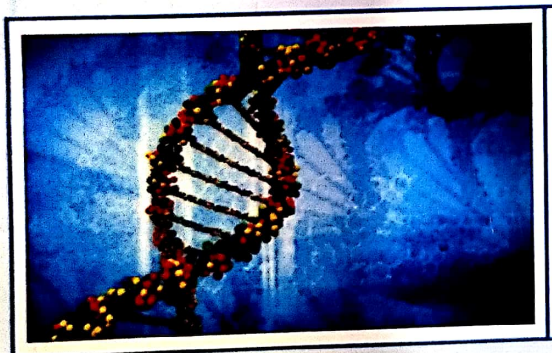

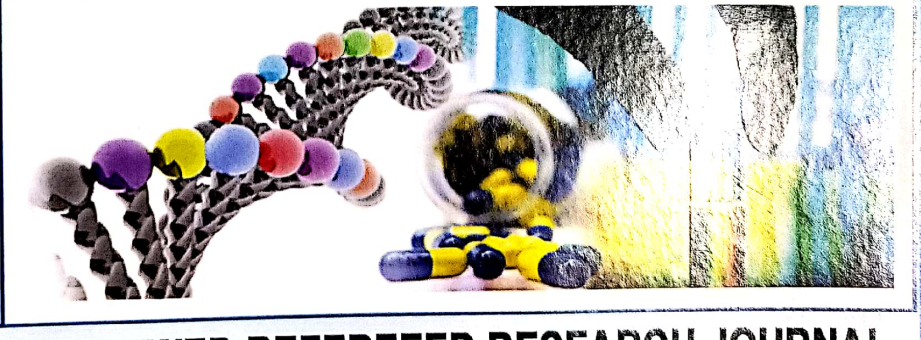

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PHYTOPLANKTON DIVERSITY OF GHUNGHUTTA DAM SURGUJA DISTRICT (C.G)

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ABSTRACT:- The importance of phytoplankton in any water body cannot be over emphasized. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. Investigative study is related with analysis and diversity of phytoplankton of Ghunghutta dam of Surguja District (C.G.) for duration of one year from January 2020 to December 2020. The Ghunghutta dam is located in Surguja district ($22^0$94N latitude & $83^0$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. Investigated study of planktons was divide into phytoplankton's from these phytoplankton were belong to genera of different groups like as Chlorophyceae, Euglenophyceae, Bacillariophyceae and Cyanophyceae. During investigation period Bacillariophyceae are higher in population density and dominant from different of spots of Ghunghutta dam.

KEYWORDS: - Phytoplankton, Diversity, Ghunghutta dam

INTRODUCTION:-

Biodiversity is the degree of variation of life forms within a given species, ecosystem, biome or an entire planet; Biodiversity is a measure of the health of ecosystems and is in part a function of climate. In terrestrial habitats, tropical regions are typically rich whereas Polar Regions support fewer species. But unfortunately in the recent decades, rate of decline and even disappearance of animal species and related habitats, ecosystems and genes (i.e. biodiversity) has increased throughout the world. This loss of biodiversity is deplorable in it and has adverse effects on economic development since it is the basis for the food, fibers, drink, medicines, industrial processes, agriculture, fisheries and all activities we rely on for our survival. Flynn et al., (2013) defined Phytoplankton as a polyphyletic group with utmost variation in size, shape, colour, type of metabolism, and life history traits. Due to the emerging knowledge in nutritional capabilities of microorganisms, our view of phytoplankton has drastically changed .The spatial mapping of phytoplankton assists to determine hotspots area based on abundance and diversity. Some studies analyze the spatial distribution and diversity of plankton. Measures of diversity are frequently seen as indicators of the status of ecological systems. Phytoplankton diversity has relationship with productivity in ecology. According to Sabita Kumari et al., (2018)nature and its contributions to a good quality of life are often perceived and valued by people in starkly different and often conflicting ways. Co-construction of assessments of the state of the world's biodiversity and the benefits it provides to humans Phytoplankton are at the base of aquatic food webs and of global importance for ecosystem functioning and services.

Studies of the ecology of lake phytoplankton have provided a wealth of insight into the interactions between abiotic factors and biotic ones such as competition and predation. Theoretical investigations into the effect of lake thermal stratification on phytoplankton communities have been especially fruitful have provided predictions for the occurrence of plankton blooms among others (Huisman J, Weissing FJ (1995), . Diehl S (2002).

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Planktons are the groups of microscopic plants and animals which are minute and able to spend their whole life floating in the water is called as planktons. The name plankton was given by Hansen. Plankton has very flexible locomotary organs. They are unable to move rapidly and also unable to determine direction of their movement. Water is the nature's most wonderful, abundant and most useful chemical compound created by nature with biological, chemical, physical properties, as well as diversity of phytoplankton's and unique characteristics.

It is the most abundant and elixir of life and essential chemical, but this vast natural resource has been depleted and turned into scarce commodity with increased usage catering to the needs of ever-expanding population. There is almost a global shortage of water and the world's most important and front rank problem is to supply and maintain cheap and clean drinking water today to everyone.

The present investigation involves collection, observation and identification of phytoplankton found in water of Ghunghutta dam of Surguja district located in Chhattisgarh, India. 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 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.

MATERIALS AND METHODS:-

Sample Collection and Analysis In the present study the phytoplankton diversity and the physico-chemical properties of the lake water were studied for monsoon and post monsoon season. Monthly collections of water samples were collected from sampling site for one complete year from January 2020 to December 2020.

Samples are collected from sampling sites on months first week at 6.00 a.m. to 10.00 a.m. Plankton net of bolting silk no. 25 was used for sampling purpose. Samples were taken at mid-stream 0.5 to 1 m below the surface of water. A glass beaker of 50ml capacity was fixed at the lower narrow end of the net and collected sample was transferred into small plastic bottles and the sample to bring to the laboratory and the estimation was carried out by standard methods of which was given by Kodarkar (1992), Trivedi and Goel (1983, 87, 99), Wetzel R.G. (1983), WHO (1984), World lake vision committee (2003), and APHA (1989), Welch P (1952), Yadav and H.G. Verma (1994), etc. Samples were observed under light microscope at 40 – 100X resolution power and identified up to genus and species level with the help of books and keys. (Patterson, 1998 Adoni, 1985).

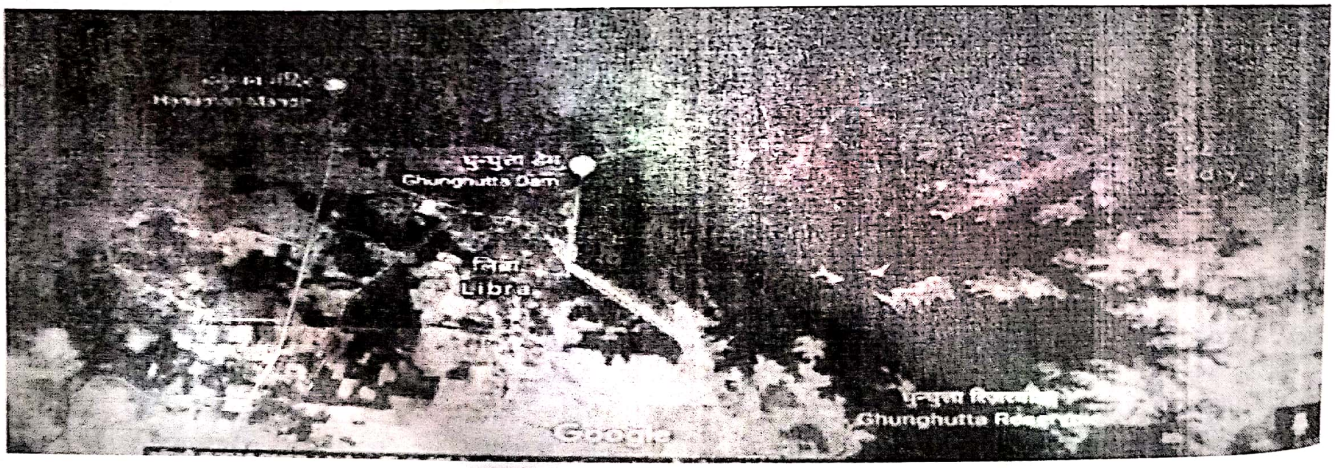

Fig.1- Satellite view of study site Ghunghutta Dam

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RESULT AND DISCUSSION-

In present investigation phytoplankton were belong to genera of different groups like as Chlorophyceae, Euglenophyceae, Bacillariophyceae and Cyanophyceae. During investigation period 43 genera of phytoplankton population have been identified during the research period and listed in table no. 1 & 2 and Graph no. 1. The species identified in this study and their characteristics are as follows:-

Table No. 1. Phytoplankton diversity encountered at different sampling stations of Ghunghutta Dam.

S. No.	PHYTOPLANKTON GENERA	Sampling Stations				
		A	B	C	D	E
	BACILLARIOPHYCEAE					
1.	*Amphora ovalis*	+	+	+	+	+
2.	*Asterionella Formosa*	+	-	+	-	+
3.	*Cymbella cistula*	+	+	-	+	+
4.	*Cymbella naviculiformis*	+	+	+	+	+
5.	*Cymbella cysta*	+	+	+	+	+
6.	*Fragillaria sp.*	-	+	+	+	+
7.	*Frustulia sp.*	+	+	+	+	+
8.	*Gamphonema gracile*	+	+	-	+	+
9.	*Melosira granulate*	+	-	+	-	+
10.	*Meridion circulare*	-	+	+	+	+
11.	*Navicula indica*	-	+	+	+	+
12.	*Nitzschia sp.*	+	+	+	+	+
13.	*Pinnularia braunni*	+	+	+	+	+
14.	*Stauronesis sp.*	+	+	+	+	+
15.	*Synedra ascus*	+	+	+	+	+
16.	*Synedra ulna*	+	+	+	+	-
17.	*Surirella sp.*	-	+	+	+	+
18.	*Tabellaria sp.*	+	+	+	+	+
	CHLOROPHYCEAE					
19.	*Actinastrum hantzschii*	+	+	+	+	+
20.	*Cladophora fracta*	+	+	-	+	+
21.	*Chlorella sps.*	+	+	+	+	+

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S. No.	PHYTOPLANKTON GENERA	Sampling Stations				
		A	B	C	D	E
22.	*Cosmarium sp.*	+	+	+	+	+
23.	*Eudorina sp.*	+	+	+	-	+
24.	*Oedogonium sps.*	+	-	+	+	+
25.	*Pediastrum simplex*	+	+	+	+	+
26.	*Scenedessmus sps.*	-	+	+	-	+
27.	*Spirogyra sps.*	+	+	+	-	+
28.	*Ulothrix zonata*	+	+	+	+	+
29.	*Volvox globater*	+	+	+	+	+
30	*Zygnema majus*	+	+	+	+	+
	CYANOPHYCEAE					
31.	*Anabaena spiroides*	+	+	-	+	+
32.	*Chroococcus sp*	+	+	+	-	+
33.	*Gloeocapsa sp*	+	+	+	+	+
34.	*Lyngbya sp.*	+	+	+	+	+
35.	*Microcystis sp.*	+	+	+	+	+
36.	*Merismospedia sps*	-	+	+	+	+
37.	*Nostoc sps*	+	-	+	+	+
38.	*Oscillatoria sp.*	+	+	+	+	+
39.	*Spirulina sp.*	+	-	+	+	+
	EUGLENOPHYCEAE					
40.	*Euglena viridis*	+	+	+	+	-
41.	*Euglena acus*	+	-	+	+	+
42.	*Phacus curvicauda*	+	+	+	+	+
43.	*Phacus orbicularius*	+	+	-	+	+
Total		**38**	**37**	**38**	**39**	**42**

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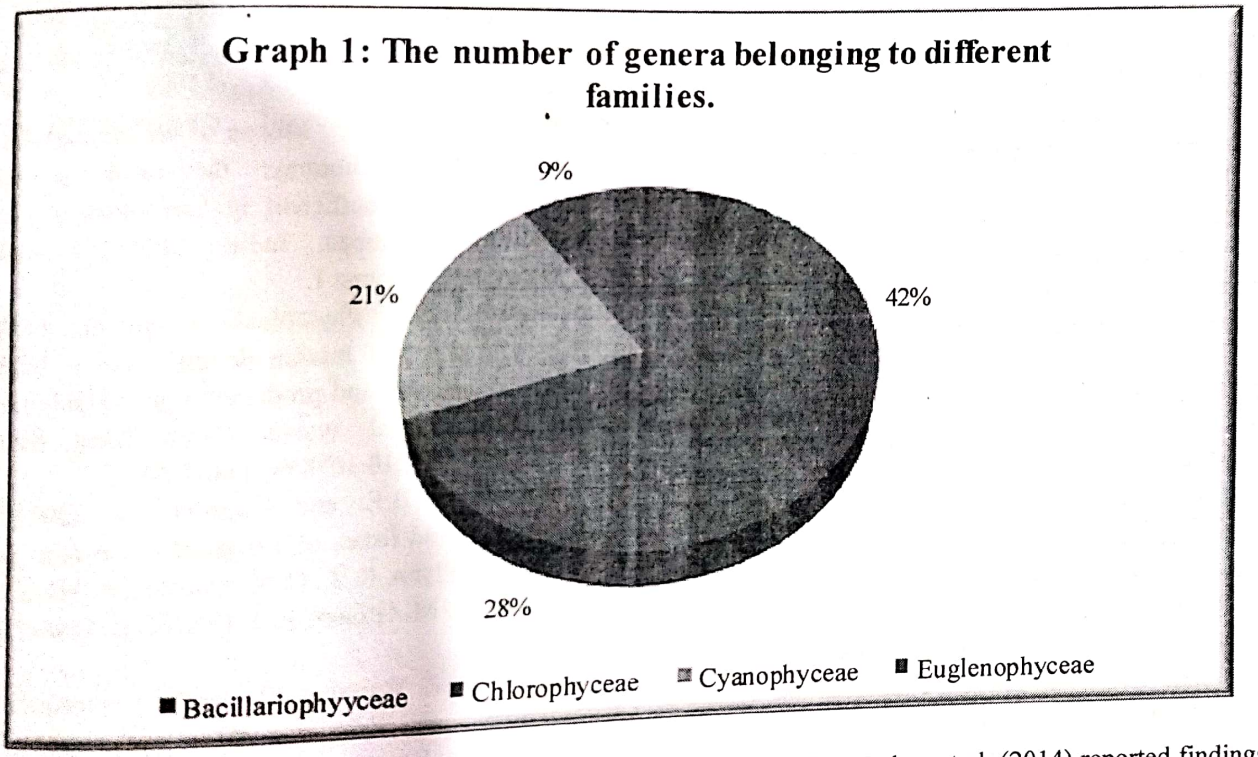
Table No. 2- *The number of genera belonging to different families.*

Group	No. of Genera	Percentage
Bacillariophyyceae	18	41.86 %
Chlorophyceae	12	27.90%
Cyanophyceae	09	20.94%
Euglenophyceae	04	09.30%
Total	43	100 %

Bacillariophyyceae > Chlorophyceae > Cyanophyceae >Euglenophyceae

Graph 1: The number of genera belonging to different families.



The values of total number of phytoplankton have been noted to varied with an increasing trend in quantity from January up to August and reached maximum in the month of August due to rain brings more phytoplankton from the water bodies of upper reaches to the sites under investigation. Then a sharp decline was observed from September onwards up to December. Similar results was found to Manoj Kumar et al, (2015) reported phytoplankton diversity. Chlorophyceae (12 species of 11 genera), Euglenophyceae (3 species of 2 genera), Bacillariophyceae (5 species of 5 genera), and Cyanophyceae (15 species of 7 genera) from Yamuna River at Kalpi. Kadam et al, (2014) reported findings on phytoplankton diversity of reservoirs in Parbhani District, Maharashtra, India they find 37 species of Chlorophyceae, 47 species of Cyanophyceae, 34 species of Bacillariophyceae, 07 species of Euglenophyceae, and 04 species of Dinophyceae. Bamane et al, (2013) studied on phytoplankton diversity of Upvan-lake, Thane, Maharashtra, India reported in his investigation phytoplankton species of Chlorophyta are 13 species, Bacillariophyta 05 species, and Cyanophyta are 02 species.

Mustapha (2010) showed the total phytoplankton to be positively correlated with phosphate,nitrate, DO, sulphate, carbon dioxide, total alkalinity, pH, conductivity and TDS. Only transparency and temperature showed negative correlation with the phytoplankton. Sharma (2010) found positive correlation between Chlorophyceae and DO, pH and calcium whereas; calcium had negative correlation with Bacillariophyceae during winter season.

The productivity of an aquatic environment is directly correlated, with the density of phytoplankton (Narasimha, 2013) as they play an important role as primary producers and thus can affect higher trophic levels by providing nutritional bases for zooplankton and subsequently to other invertebrates, shell fish and finfish (Emmanuel and Onyema, 2007). Gupta and Shukla, (1990) reported, Pollution indicator algal forms have been reported fromCyanophyceae, Bacillariophyceae and Chlorophyceae During summer, increasing temperature enhances the rate of decomposition due to which the water became nutrient rich similarly due to concentration followed by evaporation in summer season the nutrient concentration increases and abundant food present in form of photosynthesis. The high phytoplanktons population density during the summer season could be related to stable hydrological factors and low water level; while low density during the monsoon season attributed to heavy flood and fresh water inflow. They were resumed again in monsoon due to dilution and high water level shinde S.E ,et al (2011). Narayana (2006) found the minimum density of phytoplankton during monsoon and maximum during summer in Lentic Water bodies, Karnataka. Banakar (2005) observed the peak of phytoplanktons during April while lowest peak in July and August in village pond at Imalia (Vidisha) India

CONCLUSION:-

The present investigation has been focused on plankton's diversity including phytoplankton of Ghunghutta dam water with specific environmental associations. This investigation also focuses on reducing the water pollution due to human activity and helps in improve social and cultural importance of dam and its scenario. Our results will help for assessing the potable nature of dam water.

REFERENCES:-

1. Adoni A. D. (1985): Work book on limnology., Pratibha Publications, Sagar (M.P.). analysis. Am Nat 146(4): 536-564.
2. Badsi H, Ali HO, Loudiki M, Aamir A. (2012): Phytoplankton diversity and community composition.
3. Bamane S., Ghondhalekar S., and More K. (2013): Study of phytoplankton diversity and physico-chemical parameters of Upvan-lake, Thane, Maharashtra, India., National Conference on Biodiversity: Status and Challenges in Conservation., pp. 1-6
4. Banakar A.B., Manjappa S., Kiran B.R., Pullaiah E.T. and Ravikumar M. (2005) :J.Aqua. Biol., 20: 25-30. Biogeosciences Discussion 2011;8:487–525. doi:10.5194/bgd-8-487-2011.
5. Burkholder, (2013) : Misuse of the phytoplankton–zooplankton dichotomy: the need to assign organisms as coefficient in harsool-savangi dam, district aurangabad, india. BIOINFO Aquatic Ecosystem, Volume 1.
6. Diehl S (2002) : Phytoplankton, light, and nutrients in a gradient of mixing depths: Theory. Ecology 83(2): diversity and productivity in a highly turbid, tropical coastal system (Bach Dang Estuary, Vietnam). doi:10.1038/ncomms5299
7. Emmanuel, B.E. and Onyema, I.C. (2007):The plankton and fishes of a tropical in Creek in South Western Flynn, K. J., D. K. Stoecker, A. Mitra, J. A. Raven, P. M. Glibert, P. J. Hansen, E. Granéli & J. M.
8. Huisman J, Weissing FJ (1995): Competition for nutrients and light in a mixed water column: A theoretical Issue 1, 2011, PP-19-34
9. Kadam S. U., Kadam S. S., and Babar M., (2014): Phytoplankton diversity of reservoirs in Parbhani District, Maharashtra, India., Int. J. Curr. Microbiol. App. Sci. (2014) 3(8)., pp. 459-466.
10. Lagoon, Southern Mediterranean Coast, Egypt. Egyptian Journal of Aquatic Research(2014); Lakes, Importance of Climate Change and Nature's Benefits to People. Journal of Ecology & Nature 40:133–42.
11. Manoj Kumar and Khare P.K. (2015): Diversity of Plankton and their Seasonal Variation of Density in the Yamuna River at Kalpi, District Jalaun (U.P.)

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Available online at: www.ijaur.com

India., Journal of Global Biosciences., Vol. 4 (7)., pp. 2720-2729.

12. Mustapha, M.K. (2010): Seasonal Influence of Limnological Variables on Plankton Dynamics.
13. Narayana J., Puttaiah E.T. and Basavaraja D. (2008) :J. Aqua. Biol., 23(1): 59 – 63.
14. Nassar MZA, Gharib SM (2012): Spatial and temporal patterns of phytoplankton composition in Burullus.
15. Patterson D. J. (1998): Free-living Freshwater Protozoa., Manson Publishing Ltd 73 Corringham Road, London NW1 7DL. phytoplankton diversity and productivity in the ocean. Natural Community ;5:4299. Resources ISSN: 2578-4994 Volume 2 Issue 1,pp1-8.
16. Sabita Kumari P, Gayathri S and Ramachandra Mohan M (2018): Phytoplankton Diversity in Bangalore Shallow, Tropical African Reservoir. Asian j.exp. Biol. Sci., 1(1):60-79.Assessment 2015;187:192.
17. Shinde S.E., pathan T.S., Sonawane D.L.(2011) : study of phytoplankton's biodiversity and correlation the salinity gradient of the mass estuary. American Journal of Human Ecology 2012;1(2):58-64.
18. Vallina SM, Follows MJ, Dutkiewicz S, Montoya JM, Cermeno P, Loreau M. Global relationship between wetland, Jammu (J & K) - A Ramasar site. International Journal of Applied Environmental Sciences, 22: 386-398.