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WATER QUALITY ASSESSMENT OF BHEEMGARH DAM CHHAPARA SEONI (M.P.)

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ABSTRACT: - :- In the present study is going to centralize on Bheemgarh Dam of Seoni district in Madhya Pradesh India. The water quality status of Bheemgarh dam in Seoni district were determined during June 2020 to May 2021. The present study is aimed to investigate water quality assessment of the Bheemgarh dam Chhapara, Seoni. Bheemgarh dam also known as Sanjay Sarovar Bandh is built Across the Wainganga river in Chhapara tehsil of Seoni district of Indian state of Madhya Pradesh. The Bhimgarh Sanjay Sarovar Dam is located 43 km away from the Seoni. It is known as the biggest Mud / Earthen dam of Asia. It is situated 22°20'41"N 79°36'16"E. It has an average elevation of 611 metres (2004 feet). The city is 2,043 ft. above sea-level, half-way between Nagpur and Jabalpur. 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 Bheemgarh Dam. The monthly intervals during June 2020 through May 2021 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 Bheemgarh dam according to physico-chemical parameters.

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

INTRODUCTION:-

Water is a most important climatic factor of biosphere. It is too much affective to all of the vital activities of living beings. The water is a planetary agent which is circulated by hydrological cycle with various nutrients dissolved in it in environment (Lithosphere and Biosphere). The water is found various form of vapour, liquid and snow. The retaining of water in atmosphere (Vapours of water) depends on the fluctuation of temperature and wind speed. The water of atmosphere reaches to the earth's surface through the process of precipitation and from earth surface it reaches to the atmosphere and transpiration (Hydrological cycle).

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 .

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.

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; pissiculture, 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 Bheemgarh Dam Seoni. The present study is aimed to investigate water quality assessment of the Bheemgarh dam Chhapara, Seoni. Bheemgarh dam also known as Sanjay Sarovar Bandh is built Across the Wainganga river in Chhapara tehsil of Seoni district of Indian state of Madhya Pradesh. The Bheemgarh Sanjay Sarovar Dam is located 43 km away from the Seoni. It is known as the biggest Mud / Earthen dam of Asia. It is situated 22°20'41"N 79°36'16"E. It has an average elevation of 611 metres (2004 feet). The city is 2,043 ft. above sea-level, half-way between Nagpur and Jabalpur. 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

MATERIALS AND METHODS:-

The quality of Bheemgarh 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 Seoni, 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 2020 to May 2021.

Water samples were collected monthly in the morning at 8 am to 10 am from surface layer of the dam. The water samples were collected in glass -stopper sterile bottles for physico-chemical studies. These samples were transported to the laboratory in an ice box to avoid unpredictable changes in physicochemical characteristics and bacteriological test (Adoni, 1985; NEERI, 1988; American Public Health Association,1985). Water temperature measured in the field using mercury glass thermometer, pH was measured by Systronics Digital pH meter. Samples were collected for the laboratory analysis of dissolved oxygen, chemical oxygen demand, biochemical oxygen demand, alkalinity, were determined titrimetrical methods (American Public Health Association, (1985). Nitrate and phosphate were determined by the spectrophotometric method.

The salient features of dam is as following-

1) Catchments area	-	2007.75 Sq. Km.
2) Submerged area	-	105253 Hect.
3) Total Length	-	3870.06 M.
4) Top width of bundh	-	330.25 mt.
5) Population of affected	-	5655 families
6) Maximum annual rainfall	-	1748.00 mm
7) Minimum annual rainfall	-	647 mm

8) Average annual rainfall - 1225.00 mm
9) Cost - 243.478 Caror
(Data is collect from irrigation Dept. of Seoni M.P. state).

RESULT AND DISCUSSION:-

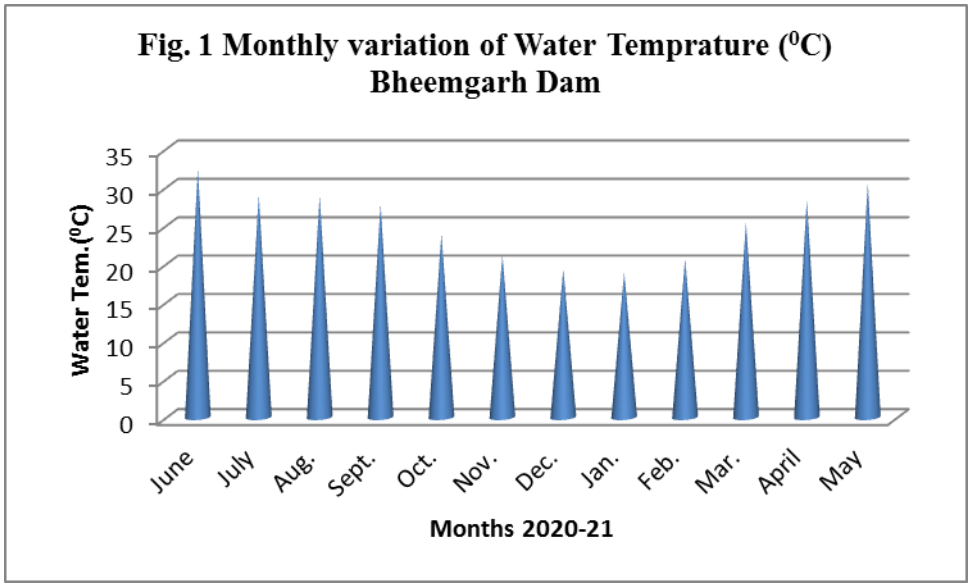
Table 1 indicated that seeds in the polyhouse under shade took 20 days to complete germination. The percentage of germination was highest (85%) as compared to seeds kept under shade house, mist chamber and open condition. Initial growth observation was recorded after two months indicates that B. lanzan seedlings recorded (10.19 cm) plant height, collar diameter (2.079mm) and only (6.867) number of leaves. Highest growth rate in plant kept at polyhouse may be due to built up of high temperature and humidity in combination with Co2 enrichment triggers the growth. It is observed that from the above experiment that *B. lanzan* seeds need to germinate in polyhouse to hasten the germination. Similarly to enhance the early growth of the seedlings/ plants they should be kept in polyhouse or any other modified structure so that we can minimize the time, labour and other production cost to obtain sturdy plants for early planting. Competition for light is size-asymmetric due to the unidirectional nature of sunlight. Slightly faster growth and larger body size confers a disproportionate advantage to a competing plant by simultaneously increasing its own light capture and its shading of smaller competitors (Schwinning and Weiner, 1998). The importance of facilitation by shade has frequently been demonstrated in arid and alpine study systems but has not been as commonly described in temperate grasslands (Brooker et al. 2008). Facilitative effects of shade from neighbors may not be detected in many studies because facilitation above ground can be masked in the field by intense root competition (Callaway, et. al,1991) or may be absent in greenhouse or growth-chamber experiments where a lack of shade may not impose the same level of abiotic stress as under field conditions. Callaway, 2007 reported that plants were grown under ambient atmospheric conditions, and the shading cloths modified not only irradiance levels but also wind speed, air temperature and humidity, which are all known to be modified by vegetation shade. Such an experimental set-up probably allowed us to detect the type of facilitative effect provided by shade in natural conditions. Despite possible difficulties in detecting positive effects of shade, examples of shading treatments having neutral or positive effects on plant growth can be readily found in many studies as incidental results that were largely overlooked (Grubb, Ford & Rochefort 1997; McConnaughay and Coleman 1999; Monaco and Briske 2000; Ryser and Eek 2000; Wahl, Ryser & Edwards 2001; Valladares, Sanchez-Gomez & Zavala 2006). Neutral or positive effects of neighbour shade have also been demonstrated in studies that separated the effects of shoot and root competition (Peltzeret et. al., 1998; Cahill 1999; Lamb et. al., 2009).

Table No. 1 Monthly variation of water quality parameters during the year 2020-21 of Bheemgarh dam Seoni (M.P.)

Months	W.T.	Transp.	Turb.	E.C.	pH	T. Alk.	T.D.S.	T. H.	D.O.	C.O.D.	B.O.D.
	^{0}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

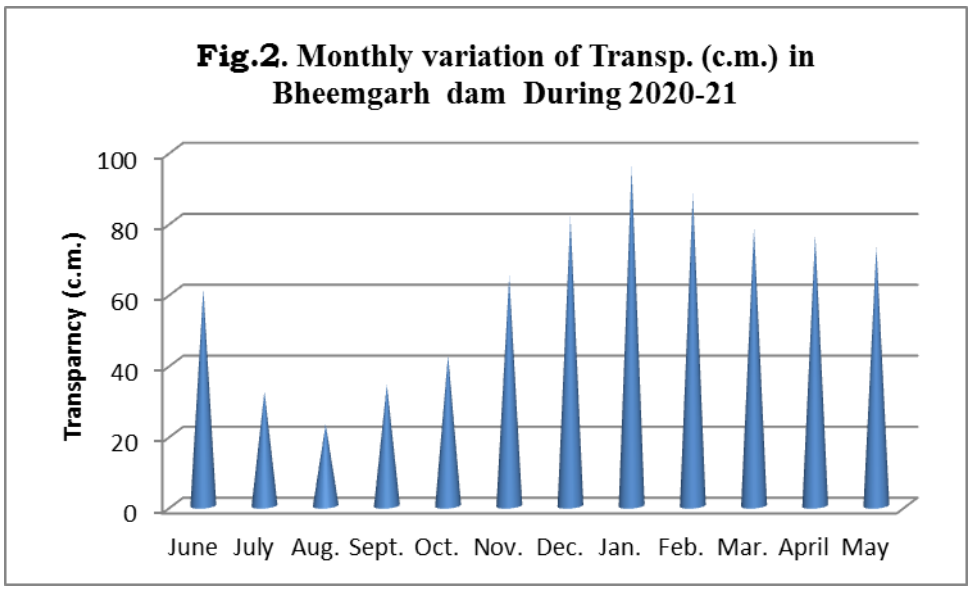
Water temperature (^{0}C):-

The temperature of water is an unique property of its high specific heat, which is three times that air consequently. Temperature remains more or less steady over vast areas of the water body in contrast to the terrestrial environment, where is fluctuate hourly because of its tremendous capacity to store and to release the heat. The larger water bodies one arose to change the atmospheric condition around then self. During the presents study period water temperature ranged from 19.34 0C to 32.42 ^{0}C. Similar results were found by Singhai et al. (1990) Jayabhaye et. al; (2006), Salve and Hiware (2006) and Baghel R.K.(2017), observed that during summer, water temperature was high due to low water level and clear atmosphere.



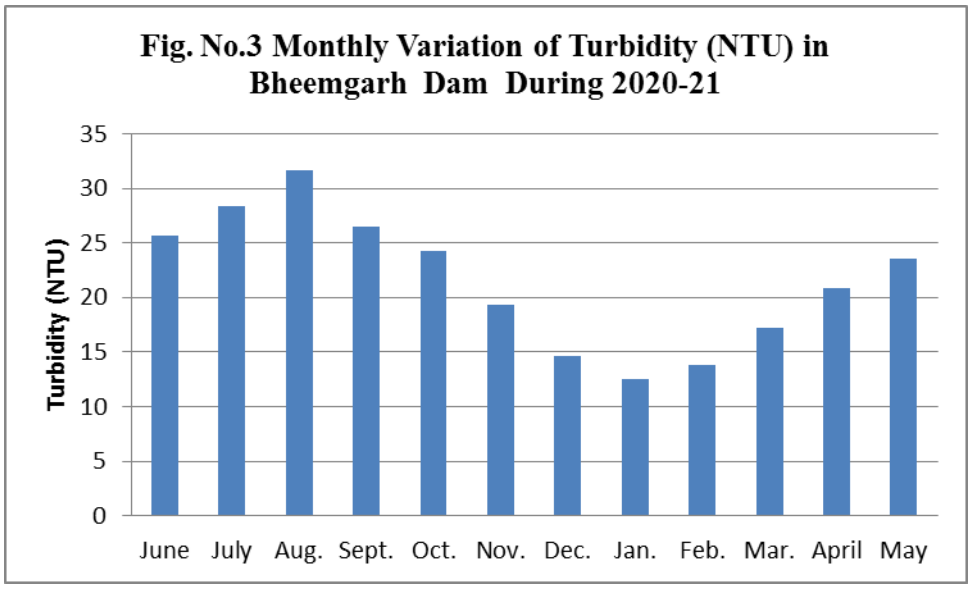
Transparency:-

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 95.4 c.m..



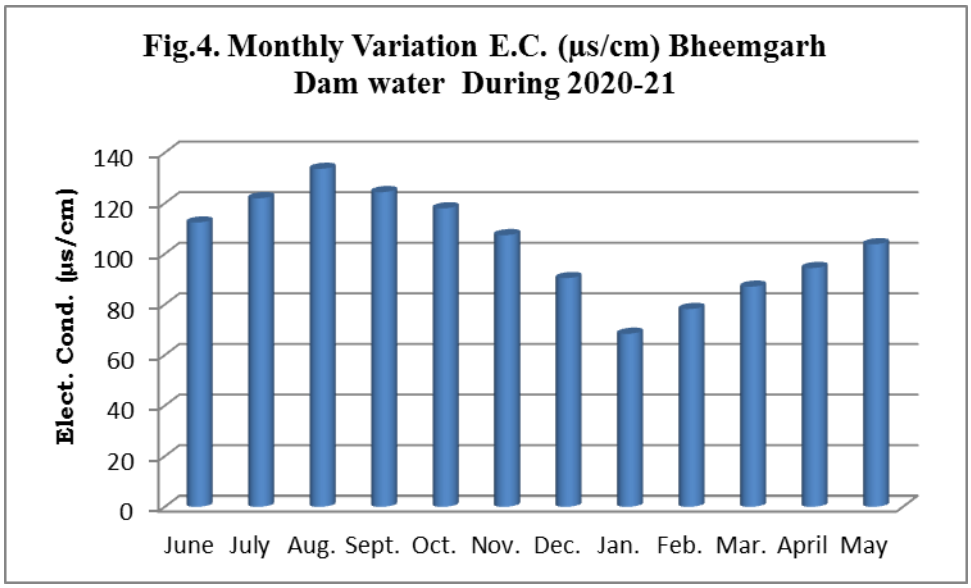
Turbidity (NTU):-

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 2020 and minimum in the winter season January 2021.



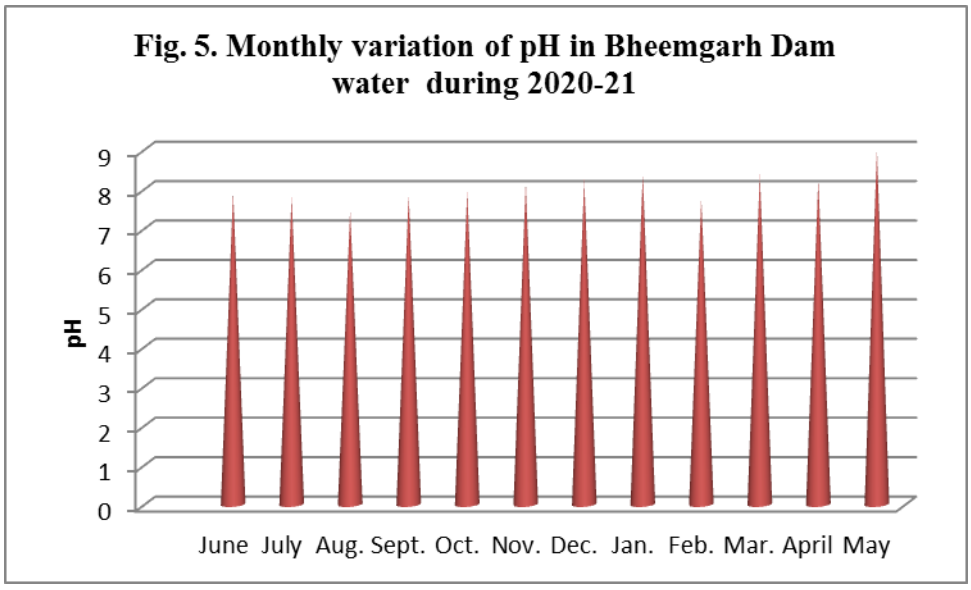
Electrical Conductivity:-

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 25^0C 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 µs/cm. The maximum value was recorded from rainy season August 2020 and minimum in the winter season January 2021. Similar results were found by Iqbal and Kataria (1995).



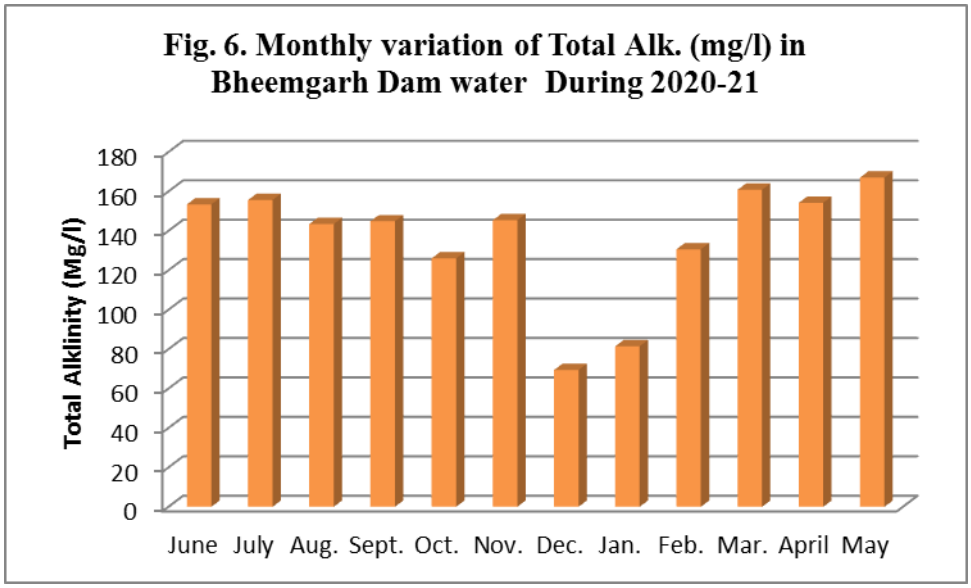
pH:-

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 ranges from 7.44 to 8.98 . The maximum value was recorded from Summer months May 2021 and Minimum in the rainy season August 2020. pH was alkaline throughout study period. Similar results were found Radhika et. al. (2004) and Baghel R. K. (2017).



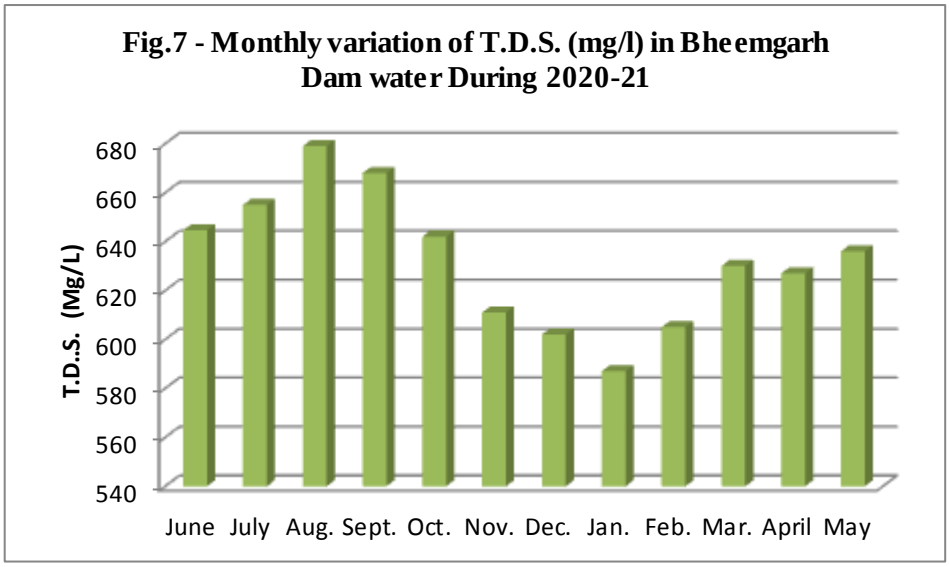
Alkalinity (mg/l):-

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 2021 and minimum value in the winter season December 2020. Similar results were found Garg S.S. (2003).



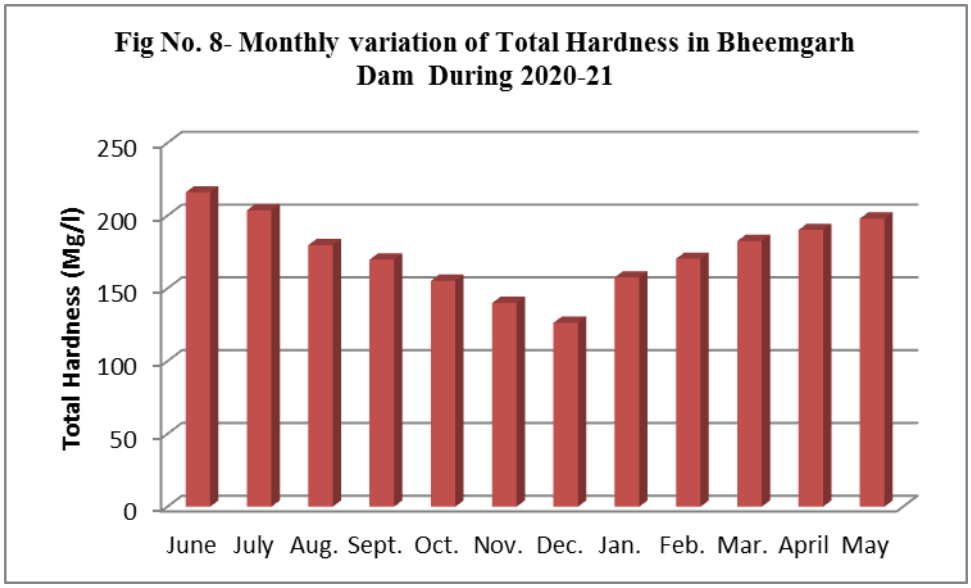
T.D.S. (mg/l):-

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 679 mg/l. The maximum value was recorded from August 2020 and minimum in the January 2021. Similar results were found Radhika et. al. (2004) and Baghel R. K. (2017).



Hardness (mg/l):-

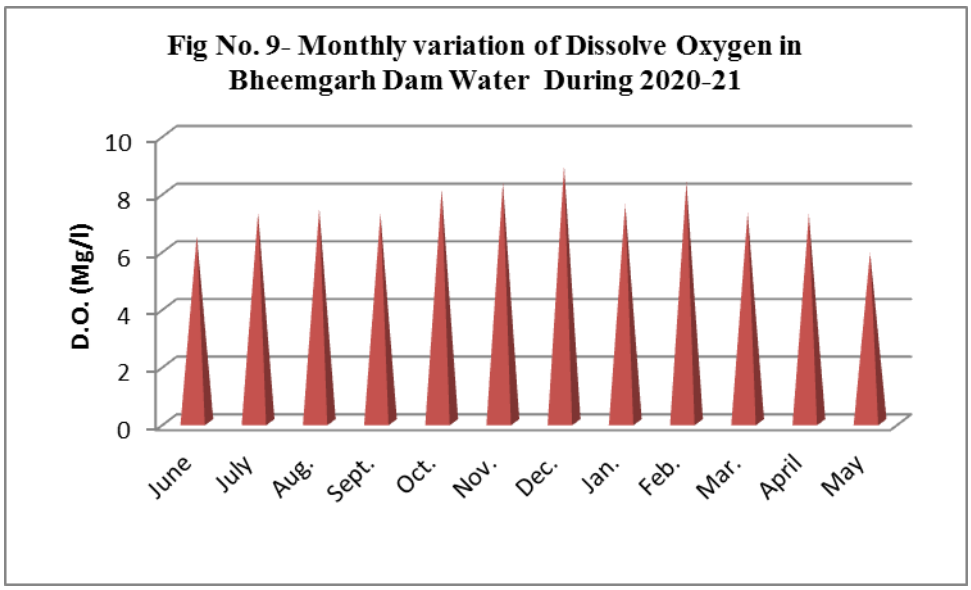
Hardness of water is not specific constituent but as a variable and complex mixture of cations and anions. Hardness of the natural water is mainly caused by cations such as calcium and magnesium. The value of hardness fluctuates from 126.4 to 216 mg/l. The maximum value was recorded in the month of summer June 2020 and minimum in the month of winter December 2020. Similar results were found Radhika et. al. (2004) and Awasthi, Tiwari S. (2004).



Dissolved Oxygen (mg/l):-

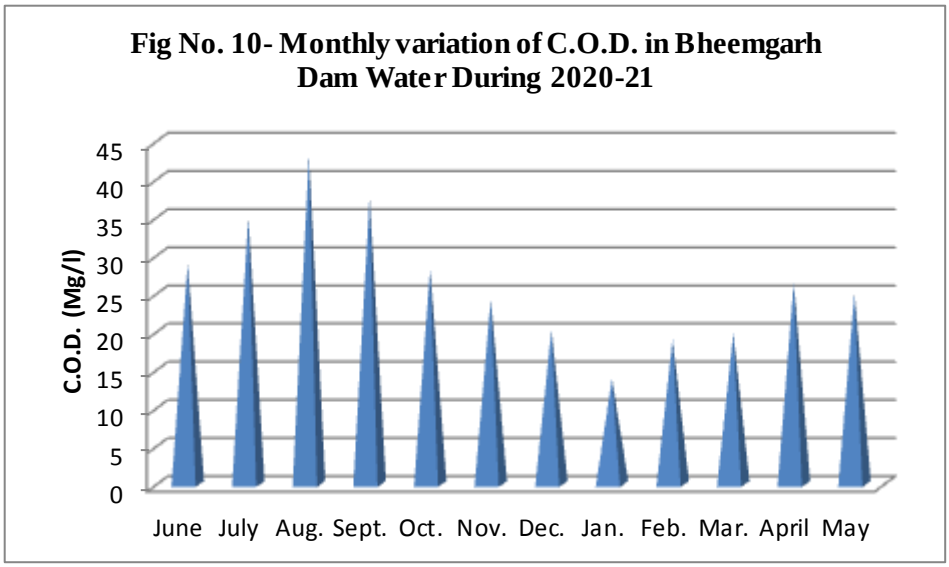
Dissolved oxygen is an important parameter in assessing water quality. In natural water, oxygen is probably one of primary importance both as regulator of metabolic process of plant and animal community and an indicator of water conditions.

The value of DO fluctuate from 5.9 to 8.9 mg/l. The maximum values were recorded in the month of winter December 2020 and minimum value in the summer month May 2021. 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 CO_2 and giving off oxygen. This accounts for the greater quality of O_2 recorded during summer. The quantity is slightly less during winter as reported by Masood Ahmed and Krishnamurthy (1990).



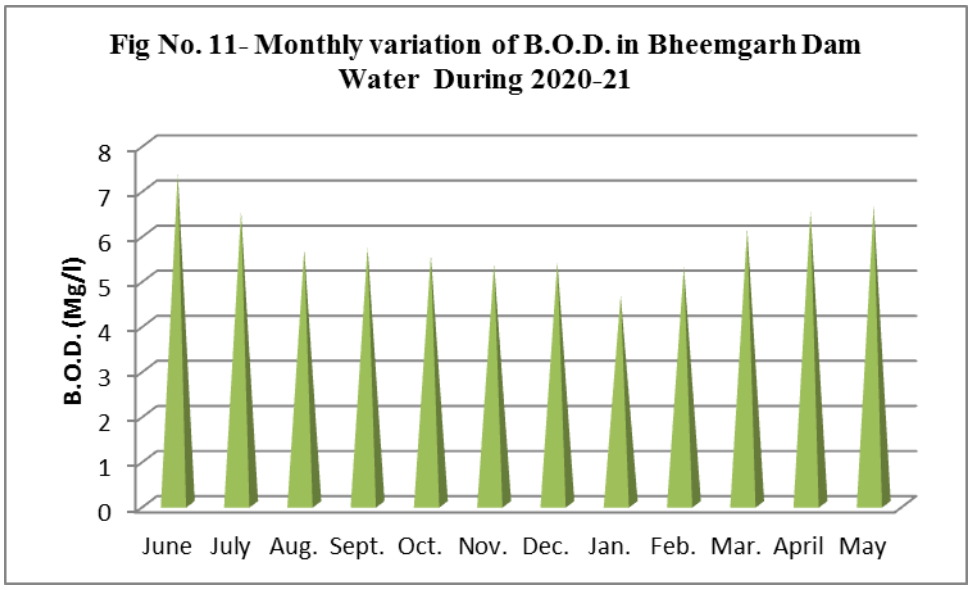
C.O.D. (mg/l):-

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 2020 and minimum value in the winter season January 2021. 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 (Tepe et 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 7.34 mg/l. The maximum values were recorded in the month of June 2020 and minimum value in the January 2021. 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).



CONCLUSION -:

The quality of water Bheemgarh 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 Bheemgarh dam with social and cultural importance is degrading at an alarming rate.

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