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HYDRO BIOLOGICAL STUDIES ON NEBUHA DAM OF SIDHI DISTRICT (M.P.)

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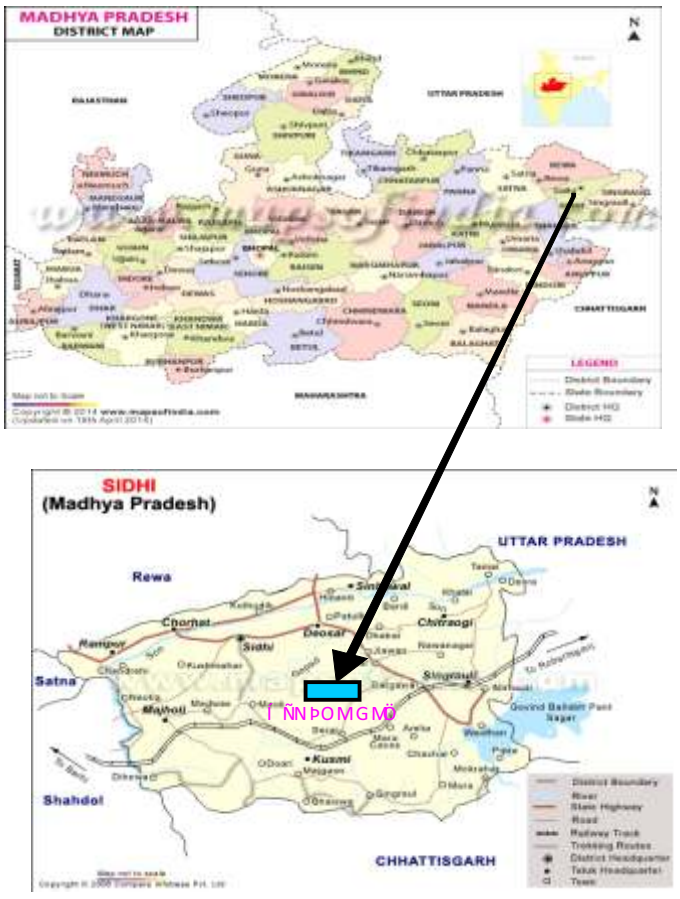
ABSTRACT

The water quality has become a major concern due to over increasing human development activities that over exploits and pollute the water resources. Present investigations were carried out on the limnological aspects of Nebuha dam in Sidhi district (M.P.). Many of the parameters were found below the permissible limits for drinking water as suggested by WHO. A total of 11 parameters were analyzed and their seasonal variations in the year 2014-2015 were discussed.

Key words: Physico-chemical, Limnology, Nebuha dam, Seasonal variations.

INDRODUCTION :-

The aquatic ecosystem is extremely important to mankind as they have various uses, including drinking water supply, irrigation, navigation, recreation etc. and are also source of organic productivity. During recent year there has been increasingly great concern for inland freshwater resources which are affected in different ways by all kinds of anthropogenic activities. Therefore the limnological investigations on water bodies are need of today. Several studies have been made on the limnology of fresh water bodies in India (Ganapathi, 1940; Alikunhi et al., 1948; Harshey, et al., 1982; Rao and Mahmood, 1995; Alfred and Thapa, 1996; Naganandini and Hosmani, 1998; Patel and Sinha, 1998; Pandey *et al*., 2000) but unfortunately very little information is available on the limnology of this region. Therefore, the present study was undertaken of Nebuha dam in Sidhi district (M.P.).



Map. 1 Location map of Madhya Pradesh and study area of Sidhi district.

STUDY AREA :-

The Nebuha dam is constructed on Nebuha nala. It was started for construction in the year1969 and completed in 1975. The Nebuha dam is 18 km. away from the district head quarter and situated on Sidhi Singrauli road near village Bhitari. The dam lies on 24°25'30" latitude and 82°4'30" longitude. The catchment area of the dam is 57.28 sq.m. The water of this dam is used for irrigation and fish culture.

MATERIALS AND METHODS :-

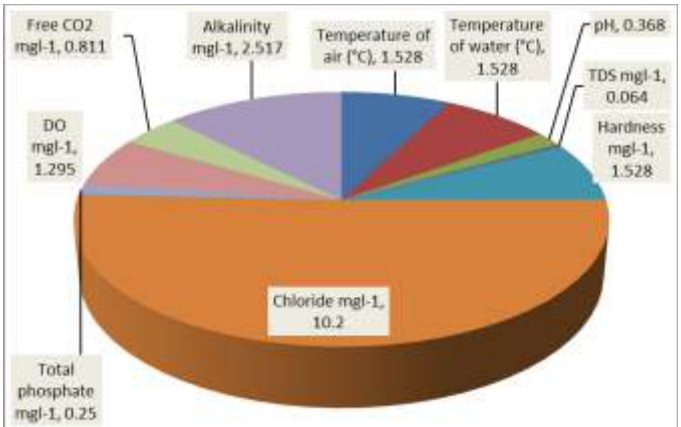
To study the water quality and its seasonal variations, the water samples are collected from the surface at a depth of 22 cm. from four different points, integrated and a representative sample was taken. Water samples were collected during morning hours in between 8.30 to 10.30 a.m. with one liter containers from the dam in three seasons i.e. during summer, monsoon and winter seasons from April 2014 to March 2015. Sampling was done at four sites. Some of the results were recorded at the sampling sites whereas the others were recorded in the laboratory. The parameters observed were air and water temperature, relative humidity, Dissolve Oxygen (DO), Total Dissolved Solid (TDS), Free CO2, pH, Conductivity, and Hardness of the lake water. Samples of the water for physicochemical characteristics were analysed according to standard methods of APHA (1998).

RESULT AND DISCUSSION :-

The results of physicochemical analysis of three seasons are summarized in Table-1. The pH of the dam is 7.20, 6.60 and 6.53 during the summer, monsoon and winter seasons. No significant change was observed in the water pH and it was found within the permissible limits of 6.5 to 8.5 (WHO). The highest value was noticed in summer season and lowest in winter season. Decline in pH during monsoon and winter seasons were attributed to the rains as it increase the amount of carbonic acid to the lake water (Khan and Chaudhary 1994, Kaushik et al. 1989). Huchinson (1975) stated that if any aquatic system is neither higher alkaline nor highly acidic, the pH of the water is principally governed by the CO2 - bicarbonate- carbonate system.

Table 1. Physico-chemical Parameter of Nebuha dam.

S. No.	Parameters	Seasons			SD
		Summer	Monsoon	Winter	
1.	Temperature of air (°C)	8	5	6	±1.528
2.	Temperature of water (°C)	5	3	2	±1.528
3.	Colour	Colourless	Colourless	Colourless	-
4.	pH	7.20	6.53	6.60	±0.368
5.	TDS mgl^{-1}	0.20	0.10	0.08	±0.064
6.	Hardness mgl^{-1}	16.00	13.00	15.00	±1.528
7.	Chloride mgl^{-1}	14.40	24.70	4.30	±10.200
8.	Total phosphate mgl^{-1}	0.09	0.06	0.04	±0.025
9.	DO mgl^{-1}	8.32	9.81	10.90	±1.295
10.	Free CO_2 mgl^{-1}	5.23	3.61	4.34	±0.811
11.	Alkalinity mgl^{-1}	38.00	35.00	33.00	±2.517



Graph.1 : Physico-chemical Parameter of Nebuha dam.

The variation was observed in the water temperatures in three seasons whereas a well marked seasonal variation in air temperature was recorded. Water temperature fluctuated with the air temperature, at all the sampling sites and both air and water temperature were correlated positively (r = 0.786) in the present study. The temperature remained comparatively low throughout the study, which may be due to the presence of thick forest around it. Martin (1972) stated that the clarity of water, presence of vegetation etc. are the factors mainly responsible for the daily fluctuations in water temperature. The alkalinity varied from 33 mgl^{-1} to 38 mgl^{-1} in three seasons, during which minimum value (33 mgl^{-1}) was observed in winter season and the maximum (38 mgl^{-1}) in summer season. This may be due to the liberation of CO_2 in the process of decomposition of bottom sediments with resultant conversion of carbonates to bicarbonates. The alkalinity of water is usually caused by the presence of carbonates, bicarbonates and hydroxyl ions and less frequently by borates, silicates and phosphates (APHA 1998). Total dissolved solids of the dam were 0.20 mgl^{-1} in summer, which is the highest value and the lowest values 0.08 mgl^{-1} was noticed in winter. Total hardness value of the dam was 13 to 16 mgl^{-1} of which higher value was in summer while the lowest in monsoon season. The maximum permissible limit for this parameter for drinking water standards is 500 mgl^{-1}. Chloride values were found ranging between 4.30 to 24.70 mgl^{-1} of which maximum value was noticed in monsoon and the lowest value in winter may be due to dilution effect in post monsoon period. Chourasia and Adoni (1985) also found similar behaviour of chlorides in their studies on Sagar lake with summer maxima and winter minima. The concentration of dissolved oxygen was recorded high during winter season (10.90mgl^{-1}). This may be due to that the oxygen concentration in the dam water increased by the reduction in water temperature. Free Carbon dioxide is one of the essential constituents of an aquatic ecosystem. The abundance of carbon dioxide exerts certain specific effects on aquatic bioata. The dam exhibited maximum carbon dioxide as 5.23mgl^{-1} during summer whereas the lowest concentration of carbon dioxide 3.61mgl^{-1} was recorded during monsoon season. Cole (1975) noted that free CO_2 supply rarely limits the growth of phytoplankton. It is evident from the present study that the phosphate concentration was higher during summer and lower in winter season. It was quite opposite in relation to dissolved oxygen and phytoplankton population. Many earlier workers have also reported similar findings (Marshal and Falconer, 1973; Meckenzie and Gillespie, 1986; Ghavzan *et al*., 2006; Bhadja and Vaghela, 2013).

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