WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Assessment of Seasonal Variation in Water Quality of Surface Water of Bhadbhada Dam with Special Reference to Environmental Pollution in Bhopal, Madhya Pradesh, India

ROMA SILAWAT

Research Scholar (Ph.D.), Department of Zoology, Govt. Motilal Vigyan MahavidhyalayaBhopal,Madhya Pradesh, India.
https://doi.org/10.5281/zenodo.10788396.

ABSTRACT:

India is one out of those developing countries which are facing the burning problem of environmental pollution. Out of which water pollution is becoming more and more serious day by day because of anthropogenic activities. Mostly, industries discharge their effluents without proper treatment into the water sources which alters the water quality. Water quality is pondered to be a key contributor to both health and state of disease for human beings. The water quality is chiefly influence and disturbed by both natural as well as by anthropogenic activities. The surface water quality is chiefly affected by human activities through effluents discharge, agricultural chemicals and exploitation of water resources. The aquatic ecosystem are largely altered by these factors, resulting in decrease of water quality, biodiversity depletion, habitat and in overall decreasing the quality of life for local inhabitants. Therefore, it is important to prevent and control water pollution and to execute regular monitoring programs. The study area selected for the study of seasonal variation and physico-chemical characteristics of water is Bhadbhada Dam of Bhopal.

KEYWORDS: Environmental pollution, anthropogenic activities, effluents, water quality, biodiversity.

I. INTRODUCTION:

Water is a natural resource accessible to us. All living creatures on earth depends on water for their survival and growth. Water is benefited for men in many ways [1]. The water is needed to us for consumption, washing, irrigation, generation of hydroelectricity [2]. Water favors population in many ways, but owing to increase in human population, industrialization, increased in use of fertilizers in agriculture and other anthropogenic activities it gets highly polluted [3]. Hence, it is necessary that the quality of drinking water should be checked at regular interval of time because contaminated drinking water may cause different water borne diseases to human population [4,5].

Fresh water sources inhabited relatively small portion of the earth surface as compared to marine habitats, but their significance to human beings is far greater

than marine systems due to direct dependence on their habitats. Reservoirs and lakes have been called the Ecological Barometers of the health of a city as they play a role in the regulation of the microclimate of any urban area [6]. The water quality of the surface water sources has an intense effect on urban ground water recharging network because of existence of direct interaction between surface and groundwater [7,8].

Water source provide range of many environmental services like - drinking and irrigation water, recreational services - boating, swimming and fishing, support livelihood - provide food and nutrition, rainwater harvesting, recharge aquifers, temporary store storm water to prevent flood, emergency water supply for firefighting and wildlife habitat for fishes and birds. Surface water sources are mainly exposed to pollution due to its easy availability for disposal of waste waters and pollutants. During the last decade wide spread alteration in water quality of aquatic bodies has been reported owing to extensive use of synthetic fertilizers in agriculture, rapid industrialization and urban sprawl [9,10]. The health and water quality of aquatic ecosystem are very sensitive issues and are virtually determined through its trophic status. The water body is increasing enriched by a n ecological process - Eutrophication. The zestful nature of the biological productivity and eutrophication due to natural and intensified anthropogenic activities leaves n o signal judgement variable as a true measure of the nutrient status of a given aquatic system [11,12]. Water sources especially in developing countries are unfortunately facing severe problems due to various human activities and unsustainable use of these resources. Owing to human activities in the

surrounding water body have been hasting the process of nutrient enrichment thus, affecting the water quality, resulting in loss of biodiversity and biological functions.

Figure 1 Bhadbhada Dam

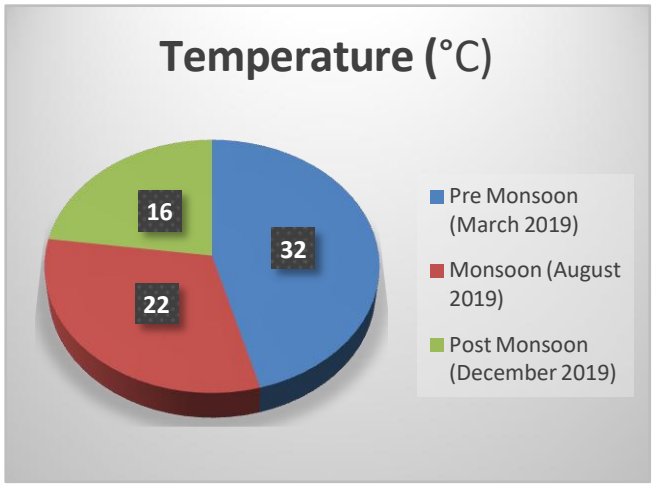
The study area for the present work is Bhadbhada dam of Bhopal "The city of Lakes" in the state of Madhya Pradesh in India. The Dam is a set of 11 Sluice gates located at the South-East corner of Upper Lake. The Bhadbhada Dam was constructed in the year 1965. These gates are used to control the outflow of water from the Bhoj Lake to Kaliyasot River and are usually opened only when the City receives heavy rainfall during rains. Dam has a full tank level of 1666.80 feet. Coordinates of Bhadbhada Dam is 23°12'30" N and 77°22'44" E. The Dam enhances the beauty of Van Vihar National Park of Bhopal and Sair Sapata.The areas are affected by human encroachment, eutrophication, sewage, idol immersion and other human activities.

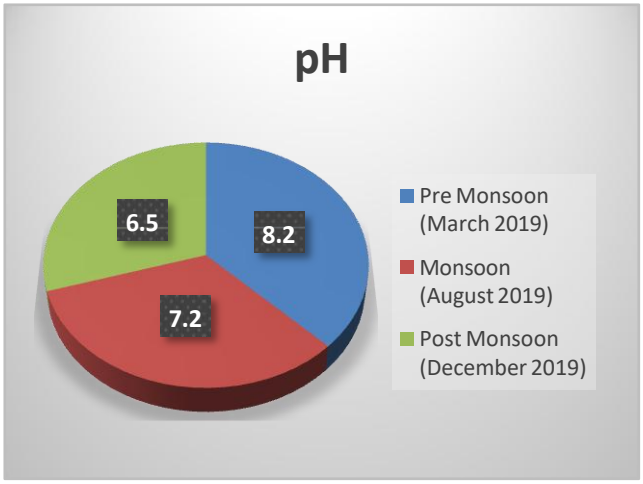
II. MATERIALS AND METHODS:

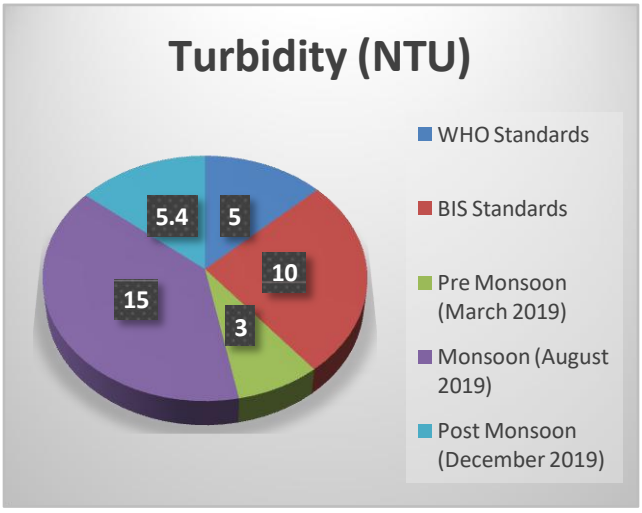
Samples of water collected from Bhadbhada Dam of Bhopal in three different seasons - Pre-monsoon (March 2018), Monsoon (August 2018), Post-monsoon (December 2018. Samples were taken to the laboratory and analyzed for the physico-chemical parameters such as pH, Temperature, Total Alkalinity, Total Hardness, DO, BOD, COD and Chloride using standard methods of APHA (1995) and NEERI (1991). The results wer e analyzed, studied and compared with BIS standards (BIS 1998) and WHO standards (WHO 1993) with special reference to drinking suitability.

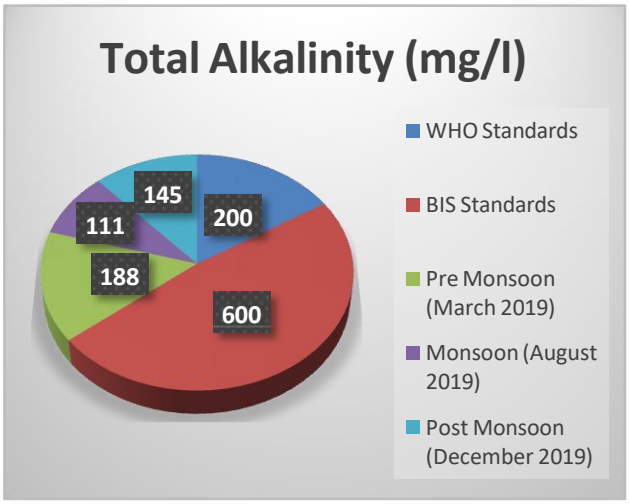
Table 1: Seasonal variation of physico- chemical parameters of Bhadbhada Dam

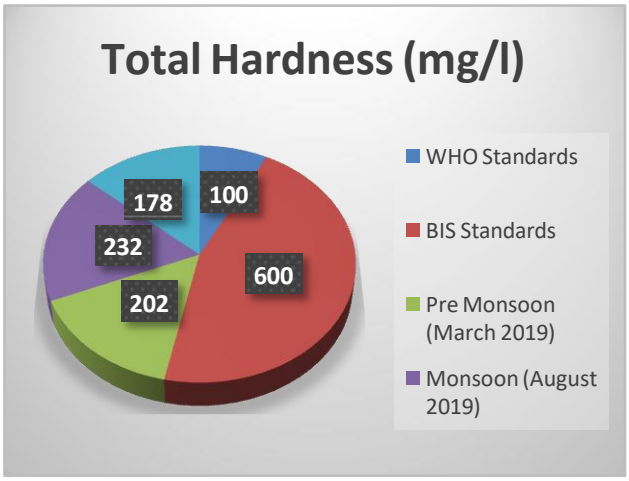
Sno.	Parameters	Unit	WHO Standards	BIS Standards	Pre - Monsoon (March 2019)	Monsoon (August 2019)	Post -Monsoon (December 2019)
1	Temperature	°C	-	-	32	22	16
2	pH	-	7 - 8.5	6.5 - 8.5	8.2	7.2	6.5
3	Turbidity	NTU	5	10	3	15	5.4
4	Total Alkalinity	mg/l	200	600	188	111	145
5	Total Hardness	mg/l	100	600	202	232	178
6	Chloride	mg/l	250	1000	66	42	31
7	DO	mg/l	-	-	7.9	7.7	12.1
8	BOD	mg/l	-	-	6.1	7.4	3.4
9	COD	mg/l	-	-	19	22	25

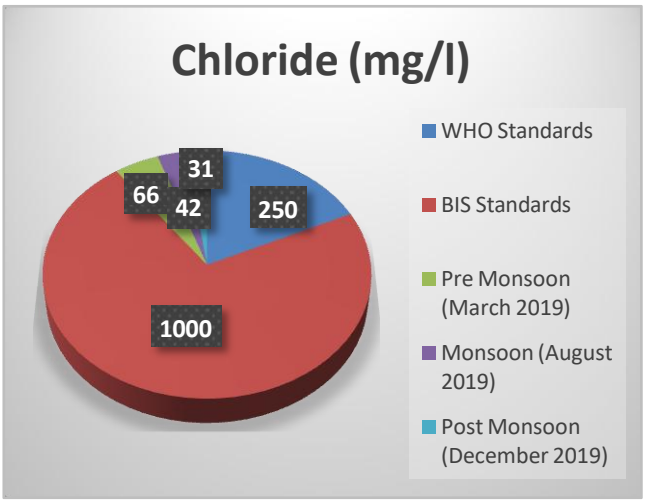

Temperature (°C)
16
32
22
Pre Monsoon (March 2019)
Monsoon (August 2019)
Post Monsoon (December 2019)

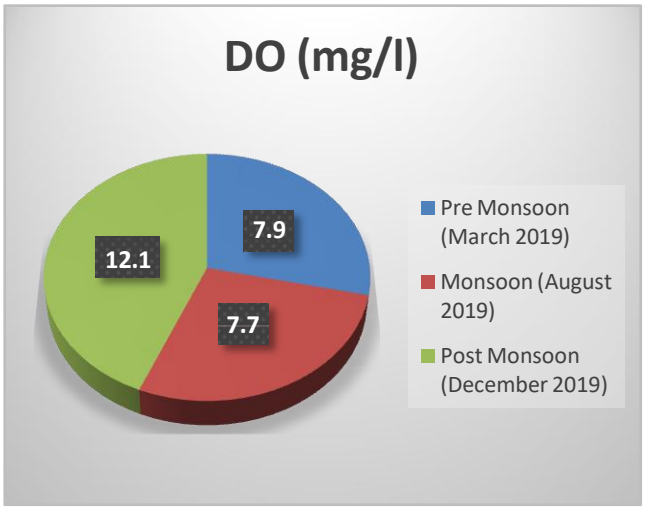

pH
6.5
8.2
7.2
Pre Monsoon (March 2019)
Monsoon (August 2019)
Post Monsoon (December 2019)

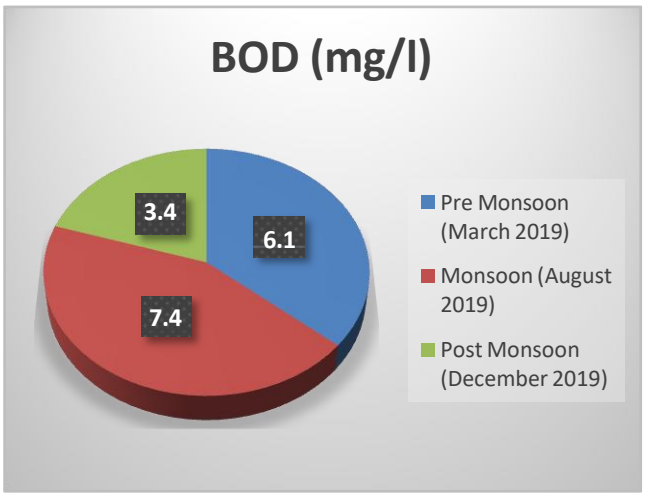

Turbidity (NTU)
5.4
5
10
15
3
WHO Standards
BIS Standards
Pre Monsoon (March 2019)
Monsoon (August 2019)
Post Monsoon (December 2019)

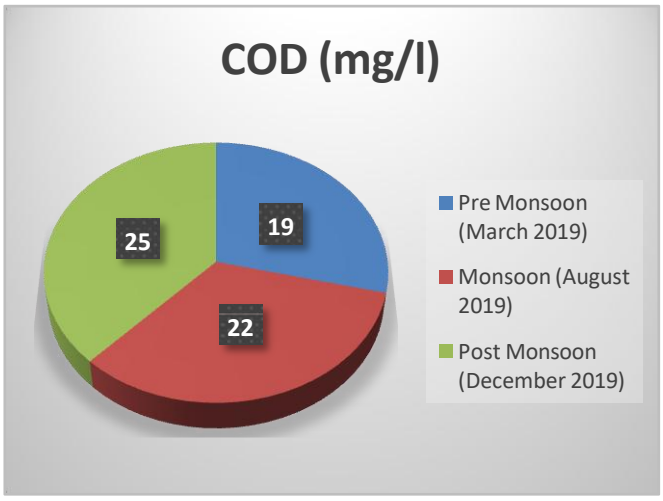

Total Alkalinity (mg/l)
145
200
111
188
600
WHO Standards
BIS Standards
Pre Monsoon (March 2019)
Monsoon (August 2019)
Post Monsoon (December 2019)


Total Hardness (mg/l)
178
100
232
600
202
WHO Standards
BIS Standards
Pre Monsoon (March 2019)
Monsoon (August 2019)


Chloride (mg/l)
31
66
42
250
1000
WHO Standards
BIS Standards
Pre Monsoon (March 2019)
Monsoon (August 2019)
Post Monsoon (December 2019)


DO (mg/l)
7.9
7.7
12.1
Pre Monsoon (March 2019)
Monsoon (August 2019)
Post Monsoon (December 2019)


BOD (mg/l)
6.1
7.4
3.4
Pre Monsoon (March 2019)
Monsoon (August 2019)
Post Monsoon (December 2019)


COD (mg/l)
19
22
25
Pre Monsoon (March 2019)
Monsoon (August 2019)
Post Monsoon (December 2019)

III. RESULTS AND DISCUSSION:

TEMPERATURE- There was seasonal variation in temperature which was observed during whole study period. During the research work temperature of water samples of Bhadbhada Dam was observed minimum 16ºC in Post-monsoon period and maximum 32ºC in Pre-monsoon period.

pH - During the whole research period, the pH varied from 6.5 to 8.2. There was alkaline pH in Pre-monsoon season which may be because of increased photosynthetic activity and slightly acidic in Post-monsoon season which may be because of low temperature WHO and BIS recommended a pH for drinking water with range from 6.0 to 8.5. The pH of Bhadbhada Dam was well within the permissible limit as directed by WHO and BIS for drinking water during Pre-monsoon and monsoon season. It is somewhat below the lower range in Post-monsoon season.

TURBIDITY: Turbidity of Bhadbhada Dam varies from 3.0 NTU to 15.0 NTU. The turbidity of water Bhadbhada Dam was well within the permissible limit as directed by WHO and BIS for drinking water in Pre- and Post-monsoon season but it is significantly higher in monsoon season because of the soil erosion by rain and agitation.

TOTAL ALKALINITY: Total Alkalinity dispensers an idea about the nature of salts present in water. Seasonal variation in total alkalinity was noticed during the entire study period. It was noticed minimum 111 mg/l in monsoon season and maximum 188 mg/l in Pre-monsoon season. It was noticed during the study period that the total alkalinity of Bhadbhada Dam water was created to be well within the permissible limit as directed by WHO and BIS for drinking water.

TOTAL HARDNESS: The hardness alters from place to place. Normally surface water is softer than the groundwater. In the present research work maximum value 232 mg/l of total hardness was revealed in the monsoon season which may be because of increased runoff and minimum value 178 mg/l was described in the Post-monsoon season. During the study period the value of total hardness of water Bhadbhada Dam was initiated to be well within the permissible limit as directed by WHO and BIS for drinking water.

CHLORIDE: Chloride concentration in water is an indication of degree of pollution. Higher concentration of chloride shows high pollution level owing to domestic sewage. In the present work, the concentration of chloride varies 31 mg/l to 66 mg/l. The higher value of chloride was noticed in the Pre-monsoon which may be owing to high rate of evaporation and lower value was noticed in the Post-monsoon season. When the required desirable limit of chloride proposed by BIS is 250 mg/l, beyond these limits then palatability, taste and corrosion of water is affected. During the study period the value of chloride of water of Bhadbhada Dam was notice to be well within the permissible limit is directed by BIS and WHO for drinking water.

DISSOLVED OXYGEN (DO): Seasonal variation in value of DO was noticed during the whole study period. The value of DO varies from minimum 7.7 mg/l in monsoon season to maximum 12.1 mg/l in the Post-monsoon season.

BIOLOGICAL OXYGEN DEMAND (BOD): During the whole research period, seasonal variation in value of BOD was noticed. The value of Biological Oxygen Demand varies from minimum 3.4 mg/l in Post-monsoon season to maximum 7.4 mg/l in monsoon season. The higher values can be attributed to the increased effluents discharged into the drains.

CHEMICAL OXYGEN DEMAND (COD): Seasonal variation in the value of COD was noticed during the whole research period. COD values varies from minimum 19 mg/l in Pre-monsoon season to maximum 25 mg/l in Post-monsoon season which is very high.

IV. CONCLUSION:

The various physico-chemical parameters analysis like pH, Turbidity, Temperature, Total Alkalinity, Total Hardness, DO, BOD, COD and Chlorides can be culminated that the water of Bhadbhada Dam is less polluted. Systematic analysis of data depicts that the value of the turbidity was about the permissible limits in monsoon season. Hence, in monsoon season it needs proper treatment before it's use. In Pre and Post monsoon season it is within the permissible limits. Present research also shows that the BOD values were within the permissible limits and COD values where above the permissible limits of drinking water standards. WHO does not endorsed a BOD limit for drinking water. But normally BODless than 7 mg/l is desirable and for COD it is 10 mg/l. The findings of COD indicates that water is polluted and does not fit for drinking purpose. It can be used for drinking purpose only after acceptable treatment. The water quality enhancement suggestions of the reservoir are based on the results of the physico-chemical analysis.

REFERENCES

[1] Anderson.J, Wondzell.S, Gouseff.M,andHaggerty.R, (2005).*Hydrological Processes*, 19:2931-2949.

[2] Shivhare.S, Singh.P, Tiwari.A, Mishra.A, (2013).*Journal of Chemical, Biological and Physical Sciences*, 4:78-786.

[3] Dhote.S, and Dixit.S, (2010).*Journal of Chemistry and Chemical Science*,1:63-69.

[4] Patil.P, Sawant.D, Deshmukh, R (2012).*International Journal of Environmental Sciences*, 3:1194-1207.

[5] Salla.S, and Ghosh.S, (2014).*Archives of Applied Science Research*, 6:8-11.

[6] Ateshan HM, Saxena PR (2015). Assessment of Physico-Chemical Parameters of Kattamaisamma Lake of Sooraram Village, Hyderabad, Telangana State, India. International Journal of Advanced Research in Science and Technology. 2015; 4(4):437-440.

[7] Jumbe AS, Nandini N, Tandon S, Sunitha N. Bangalore lakes–issues and perspectives on pollution, restoration and management. Proceedings of Taal 2007: The 12th world lake conference, 2008, 1699-1706.

[8] Ravikumar P, Mehmood AM, Somashekar RK (2013). Water quality index to determine the surface water qualityof Sankey tank and Mallathahalli lake, Bangalore urban district, Karnataka, India. Applied Water Science. 2013; 3:247-261

[9] Olajire AA, Imeokparia FE (2001). Water quality assessment of Osun river: studies on inorganic nutrients. Environmental Monitoring and Assessment. 2001; 69(1):17-28.

[10] Murray KE, Thomas SM, Bodour AA (2010). Prioritizing research for tracepollutants and emerging contaminants in the freshwater environment. Environmental Pollution. 2010; 158(12):3462-3471.

[11] Xu FL, Tao S, Dawson RW, Li BG (2001). A GIS-based method of lake eutrophication assessment. Ecological Modelling. 2001; 144(2, 3):231-244.

[12] Padisak J, Crossetti LO, Naselli-Flores L (2009). Use and misuse in the application of the phytoplankton functional classification: a critical review with updates. Hydrobiologia. 2009; 621:1-19.